INVITATION TO BID
BID NO. 9953 - TROY SCHOOL DISTRICT 2023 PAVING PROGRAM

The Troy School District will receive firm, sealed bids for all labor, material, equipment, and all other services to complete Bid No. 9953 Troy School District 2023 Paving Program.

Specifications and proposal forms can be obtained online at http://www.troy.k12.mi.us. From the main page menu click the Menu/Departments/Business Services/Section Menu/Purchasing and Bid Dept./Bids and Invitations. Bid documents will be placed on Buildingconnect.com with the following link: https://app.buildingconnected.com/public/5cc9d7f637c1a90018cb55dc by January 12, 2023 at 5:00 PM local time.

Sealed bids should be submitted through Buildingconnect.com with the following link: https://app.buildingconnected.com/public/5cc9d7f637c1a90018cb55dc. No physical bids will be accepted in person or via delivery service. Bids are to be submitted no later than **11:00 AM Local Time Thursday, January 26, 2023.** The District will not consider or accept a bid received after the date and time specified for bid submission. Bids will be publicly opened immediately following the close of receiving bids with the following virtual meeting link **meet.google.com/urt-ogsb-zig** or phone number (678) 632-5916 PIN 223 459 271#. No oral, email, telephonic or telegraphic proposals shall be considered.

No pre-bid walk through has been scheduled. If a bidder wants to visit the sites, please contact Mark Paulus at lecoleplanners3@gmail.com or (248) 880-6791. All questions regarding the services specified, the bid specified, or the bid terms and conditions will be accepted in writing ONLY and subsequently answered through an addendum to all interested parties. Questions must be received no later than 1:00 pm Local Time, Thursday, January 19, 2023; at no other time prior to the bid opening will questions/concerns be addressed or accepted and may be faxed to: 248.823.4077, or emailed as a Word document to: PurchasingOffice@troy.k12.mi.us.

All bidders must provide familial disclosure in compliance with MCL 380.1267 & attach this information to the bid proposal. The bid proposal will be accompanied by a sworn & notarized statement disclosing any familial relationship that exists between the owner or any employee of the bidder & any member of the Troy School Board or the Troy School District's Superintendent. Also, a sworn and notarized Affidavit of compliance for the Iran Economic Sanctions Act certifying the vendor does and will comply with Public Act 517 of 2012 shall accompany all proposals. Both forms will be enclosed in the specification and shall be used for this purpose. The District will not accept a bid proposal that does not include these sworn and notarized disclosure statements.

In accordance with Michigan Compiled Laws Section 129.201, successful bidders whose proposals are $50,000 or more, for any bid category, will be required to furnish a U.S. Treasury Listed Company Performance and Payment Bond in the amount of 100% of their bid. The Bond cost shall be identified within each proposal. If a bidder is submitting a certified check or money order as bid security, this must be submitted in person prior to the bid due date & time at Troy School District Purchasing, Maintenance & Grounds Office, 1140 Rankin St.; Troy, MI 48083

The Troy Board of Education reserves the right to accept or reject any or all bids, either in whole or in part; to award contract to other than the low bidder; to waive any irregularities and/or informalities; and in general to make awards in any manner deemed to be in the best interest of the owner.

Purchasing Department
Troy School District
1140 Rankin
Troy, MI 48083

INSTRUCTIONS TO BIDDERS

PROPOSAL/INTENT

1. The Troy School District will receive firm, sealed bids for all labor, material, equipment and all other services to complete Bid No. 9953 Troy School District 2023 Paving Program

2. Sealed bids should be submitted through Buildingconnect.com with the following link: https://app.buildingconnected.com/public/5cc9d7f637c1a90018cb55dc. No physical bids will be accepted in person or via delivery service. Bids are to be submitted no later than **11:00 AM Local Time, Thursday January 26, 2023.** The District will not consider or accept a bid received after the date and time specified for bid submission. Bids will be publicly opened immediately following the close of receiving bids with the following virtual meeting link **meet.google.com/urt-ogsb-zig** or phone number (678) 632-5916 PIN 223 459 271#. No oral, email, telephonic, or telegraphic proposals shall be considered.

3. Proposals will be made in conformity with all the conditions set forth in the specifications. All products must conform to the specifications.

4. No pre-bid walk-through has been scheduled. If a bidder wants to visit the sites, please contact Mark Paulus at lecoleplanners3@gmail.com or (248) 880-6791. Questions must be received no later than 1:00 PM Local Time, Thursday, January 19, 2023.

5. Bidder shall be reputable and a recognized organization, with at least five (5) years of successful experience on work of this type and scope, of equal or better quality than this project.

6. References in the specifications to any article, product, material, fixture, form or type of construction, etc., by proprietary name, manufacturer, make or catalog number will be interpreted as establishing a standard quality of design and will not be construed as limiting proposals.

7. Bid bond or certified check, for an amount not less than five (5%) percent of the amount of the bid, must accompany each bid. Failure to submit proper bid security shall constitute rejection of the bid.

8. A performance bond shall be required for the project if the cost is in excess of $50,000 and must be listed separately on the proposal form as an individual line item.

9. A completed Familial Disclosure and an Iran Economic Sanctions form must be included with each proposal submitted or the proposal will not be accepted, please note these forms must be notarized.

10. The Troy Board of Education reserves the right to accept or reject any or all proposals either in whole or in part; to waive any irregularities and/or informalities; and in general to make awards or cancel this proposal, if deemed to be in the best interests of the owner.

SCOPE

This bid includes Troy School District Paving Program per the attached documents. Proposals will be on a line item lump sum basis, according to the schedule listed below and where specified only the qualified products listed will be considered in this proposal.

WARRANTY

All material and equipment will be guaranteed to be free from defects in both workmanship and materials for no less than two years from date of receipt/installation. If manufacturer warranty exceeds this minimum requirement, the manufacturer warranty will prevail. Any item(s) found to be defective will be replaced or repaired within seven working days at Vendor(s) expense.

WITHDRAWAL OF BIDS

Any bidder may withdraw their bid at any time prior to the scheduled time for receipt of bids. No proposal may be withdrawn until after 45 days after bid opening.

FIRM PRICING

Unit pricing will prevail when computing total quantity on bids. No price allowance or extra consideration on behalf of the bidder will subsequently be allowed by reason of error or oversight on the part of the bidder. The successful bidder(s) will hold bid prices firm for all purchase orders placed for a period of approximately one full year.

PERMITS, FEES AND REGULATIONS

The Contractor shall obtain and pay for all permits, assessments, fees, bonds, and other charges as necessary to perform and complete the work of this contract, including disconnection charges, capping and unplugging utilities.

The Contractor shall be responsible for obtaining all permits and licenses necessary for the proper completion of project. Permits and licenses are available from the appropriate agencies having jurisdiction. The Contractor shall give all notices, pay all fees and comply with all laws, ordinances, rules and regulations bearing on the work. At the completion of the project, the Contractor will provide to the District all paperwork related to the full execution of the permits(s), including all payments and inspections.

If any of the work of the Contractor is done contrary to such laws, ordinance rules and regulations without such notice, he shall bear all costs arising therefrom. The Contractor shall include all cost and taxes in its bid, and make proper provisions for payment of all other State and Federal applicable taxes, fees or other costs.

TAXES

Troy School District is not automatically exempt from State of Michigan Sales and Use Taxes. The District must pay these taxes when materials are to be incorporated into reality. Materials that are permanently attached i.e lockers, built-in, incorporated or otherwise made part of the structure all applicable taxes shall be paid by the Vendor. Troy School District shall not be responsible for any taxes that are imposed on the Vendor. Furthermore, the Vendor understands that it cannot claim exemption from taxes by virtue of any exemption that is provided to Troy School District.

DELIVERY/INSTALLATION

Time of delivery is part of the consideration. It is understood that the bidder agrees to deliver prepaid to the schools, specified from the resulting contract, all items. All cost of delivery, drayage, freight, packing, unpacking, and setup are to be included in the prices bid.

The Contractor is responsible for removing from the project all waste materials and rubbish resulting from his operations and installation including all packing cartons and debris. Removal is to occur on a daily basis. Failure to do so will result in the Owner doing so and the cost thereof shall be charged to the Contractor as a deduction in his contract price.

The Contractor shall provide an adequate number of qualified, experienced installers, in harmony with other works at the site.

BID SECURITY

Bid Bond or certified check, for an amount not less than five (5%) percent of the amount of the bid, must accompany each bid. The check or bond of each unsuccessful bidder will be returned within ten (10) days after the bid is awarded. Failure of any accepted bidder to enter into a contract to complete the specified work may forfeiture of his bid security. Failure to submit proper bid security shall constitute rejection of bid.

PERFORMANCE BOND/PAYMENT BOND

Within fourteen (14) days after date of issuance of written notice of selection for the award of a contract, which shall be considered as the notice to proceed, the successful bidder shall enter into a contract with the Owner and shall execute and file with the Owner, the following in the amount 100% equal to full contract sum.

A performance bond shall be required for the project if the cost is in excess of $50,000 and must be listed separately on the proposal form as an individual line item. The Performance Bond must insure the faithful performance of all provisions of the contract and satisfactory completion of the specified work, within the time agreed upon.

The payment bond must insure the payment and protection of claimants supplying labor or materials to the principal contractor or his subcontractors in the prosecution of the work provided for in the contract. The successful contractor's bond company must be listed by the State of Michigan as a licensed carrier and have an excellent or superior rating from AM Best Company.

SAFETY

Under the "General Conditions of the Contract for Construction" of the contract to be awarded, the Contractor;

a) shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures;
b) shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the contract;
c) shall take reasonable precautions for safety of all persons who may be affected, including employees of the Contractor and Subcontractor; and
d) shall have an accident prevention representative at the site.

The general conditions of the contract for construction and the agreement also require that the Contractor indemnify the Owner in the event of certain claims arising out of the performance of the work.

INSURANCE REQUIREMENTS

The Contractor shall protect, defend and indemnify the Owner, its officers, agents, servants, volunteers, and employees from any and all liabilities, claims, liens, demands, and costs of whatsoever kind and nature which may result in injury or death to any persons, and for any result in injury or death to any person, and for loss or damage to any property, including property owned or in the care, custody, or control of the Owner in connection with or in any way incident to or arising out of the occupancy, use, with this Agreement resulting in whole or in part from negligent acts or omissions of the Contractor, any Subcontractor, or any employee, agent or representative of the Contractor or any Subcontractor.

The Contractor shall maintain, at its expense, during the term of this contract the following insurance:

a) Worker's Compensation Insurance with statutory limits and Employer's Liability Insurance with a minimum limit of $1,000,000 each occurrence.

b) Comprehensive General Liability Insurance with a minimum combined single limit of $1,000,000 per occurrence, $1,000,000 aggregate, in the same amount made for bodily injury and property damage. The policy is to include products and completed operations, cross liability, broad form property damage, independent contractors, and contractual liability coverage. The policy shall be endorsed to provide sixty (60) days written notice to the District of any material change of coverage, cancellation, or non-renewal of coverage.

c) If Subcontractors are likely to be used, the Comprehensive General Liability policy shall include coverage for independent Contractors.

d) Owner's Contractor's Protective Policy-comprehensive in the name of the Owner, with a minimum combined single limit of $1,000,000 per occurrence in the same amount for bodily injury or property damage.

e) Automobile Liability insurance covering all owned, hired, and non-owned vehicles with personal protection insurance and property insurance to comply with the provisions of the Michigan no-fault Insurance Law, including residual liability insurance with a minimum combined single limit of $1,000,000 each occurrence of bodily injury and property damage.

f) All insurance policies shall be issued by companies licensed to do business in the State of Michigan. The companies issuing the policies must be domestic (on-shore) companies and have an A rating by AM Best.

g) The Contractor shall be responsible for payment of all deductibles contained in any insurance policy required in this contract.

COMPLIANCE WITH SCHOOL SAFETY INITIATIVE LEGISLATION

Meeting the requirements of the School Safety Initiative Legislation, being MCL 380.1230, 80.1230a, 380.1230c, 380.1230d and 380.1230g.

The Bidder acknowledges and agrees that the Bidder will have any and all of its installation personnel (including sub-contractors) subjected to criminal history and background checks. **Personnel that fall into this group will be working on District premises for more than one continuous week.** Criminal history and background checks will be done within a year of the beginning of the project and should be completed before worked begins on this project.

The Bidder is required to provide written documentation listing all personnel who fall into the group indicated in the above paragraph. The documentation will also verify that none of the personnel have a "listed offense" as indicated below. This documentation is to be provided before the beginning of the project and updated as necessary for any additions or subtractions from the list as long as the project lasts.

The Bidder shall indemnify, defend and hold the District, its employees, Board of Education, and each member thereof, agents and consultants, harmless from and against any and all claims, counter-claims, suits, debts, demands, actions, judgments, liens, liabilities, costs, expenses, including actual attorney's fees and actual expert witness fees, arising out of or in connection with any violation of, or the Bidder's failure to comply with the above paragraphs.

The Bidder shall be responsible for all costs and expenses associated with the above-required criminal history and background checks.

LISTED OFFENSES

1. MCL 750.145a - Accosting, enticing or soliciting child (less than 16 years of age) for immoral purposes.
2. MCL 750.145b - Accosting, enticing or soliciting childe (less than 16 years of age) immoral purposes – second or subsequent offenses.
3. MCL 750.145c - Involvement in child sexually abusive activity or material, including possession of child sexually abusive material ("child" is a person less than 18 years of age who has not been legally emancipated.)
4. MCL 750.158 - Crime against nature (i.e., sodomy and beastiality) if the victim is an individual less than 18 years of age.
5. A third of subsequent violation of any combination of the following:
    a. MCL 750.167(1)(f) - indecent or obscene conduct in a public place;
    b. MCL 750.335a - indecent exposure;
    c. A local ordinance of a municipality substantially corresponding to a section described in (a) or (b), *supra.*
6. Except for juvenile disposition or adjudication, a violation of:
    a. MCL 750.338 - gross indecency between males; fellatio or masturbation;
    b. MCL 750.338a - gross indecency between females; oral sex;
    c. MCL 750.338b - gross indecency between male and female persons;
    if the victim is an individual less than 18 years of age.
7. MCL 750.349 - Kidnapping, if victim is an individual less than 18 years of age.
8. MCL 750.350 - Kidnapping; child under 14 years of age with intent to detain or conceal from child's parent or legal guardian.
9. MCL 750.448 - Soliciting or accosting by a person 16 years of age or older, if victim is an individual less than 18 years of age.
10. MCL 750.455 - Pandering
11. MCL 750.520b - First degree criminal sexual conduct.
12. MCL 750.520c - Second degree criminal sexual conduct.
13. MCL 750.520d - Third degree criminal sexual conduct.
14. MCL 750.520e - Fourth degree criminal sexual conduct.
15. MCL 750.520g - Assault with intent to commit criminal sexual conduct.
16. Any other violation of a law of the state or a local ordinance of municipality that by its nature constitutes a sexual offense against an individual who is less than 18 years of age.

17. MCL 750.10a - Offense by sexually delinquent person (i.e., "any person whose sexual behavior is characterized by repetitive or compulsive acts which indicate a disregard of consequences or the recognized rights of others, or by the use of force upon another person in attempting sexual relations of either a heterosexual or homosexual nature, or by the commission of sexual aggressions against children under the age of 16").
18. An attempt or conspiracy to commit an offense described in (1) through (17).
19. An offense substantially similar to an offense described in (1) through (17) under a law of the United States, any state, or any country or any tribal or military law.

TERMINATION BY THE DISTRICT FOR CONVENIENCE

The District may, at any time, terminate the Contract for the District's convenience and without cause.

Upon receipt of written notice from the District of such termination for the District's convenience, the Contractor shall:

a) Cease operations as directed by the District in the notice;
b) Take actions necessary, or that the District may direct, for the protection and preservation of the Work; and
c) Except for Work directed to performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further Subcontracts and purchase orders.

Owner Is An Equal Opportunity Employer

The Owner is an Equal Opportunity Employer. Pursuant to the Executive Order 11246 as amended, you are advised that under the provisions of this order, Contractors and Subcontractors are obligated to take affirmative action to provide equal opportunity without regard to race, creed, color, national origin, age or sex.

Michigan Right to Know Law

Troy School District will comply with the Michigan Right to Know Law by informing Contractors of hazardous chemicals to which they may be exposed. All Contractors will be required to provide Material Safety Data Sheets for any hazardous chemicals brought to the workplace. The Contractor shall comply with all applicable provisions of the Occupational Safety and Health Act for the duration of the specified work.

Asbestos Hazard Emergency Response Act

As required by the Environmental Protection Agency Asbestos Hazard Emergency Response Act, each school district is responsible for providing contractors with information regarding locations of known or assumed asbestos containing material prior to the Contractor entering a building under the school district's jurisdiction. The successful bidder will be required to complete the school district's Contractor Notification forms.

Notification of Assumed Lead-Containing Materials

The intent of this section is to formally notify all Contractors and Sub-Contractors applying for or bidding on work covered within this specification that, due to the age of the facilities within this District, there is the presumption that building components do contain lead-based paint pursuant to OSHA definition. The District has not conducted lead-based paint inspections. As a result, all Contractors and Sub-Contractors bidding must assume that building components do contain lead-based paint.

Furthermore, all awarded Contractors and Sub-Contractors shall be responsible to comply with all applicable Federal and Michigan State lead regulations including, but not limited to, 29 CFR Part 1926.62 of the OSHA Lead Construction Standard, (Part 603 of the Michigan State Standards). All costs associated with regulatory compliance shall be borne by the Contractor and/or Sub-Contractor.

General Conditions

The District reserves the right to accept or reject any or all proposals, to waive irregularities, and to accept a proposal which, in the District's opinion, is in the District's best interest.

The District reserves the right to declare as non-responsive, and reject, any bid which is incomplete or where material information requested in not furnished, or where indirect or incomplete answers or information is provided.

In the event, the Administration Building is closed due to unforeseen circumstances on the day Proposals are due, Proposals will be due at the same time on the next day that the District and/or the Administration Building is open.

Negligence in preparation, improper preparation, errors in, or omissions from, proposal shall not relieve a bidder from fulfillment of any and all obligations and requirements of the proposed Contract Documents.

The District expects that the awarded bidder will complete the work as outlined in the specifications for the amount bid by the bidder. Any additional costs above the amount bid and awarded, must be approved by the District in advance of any work.

Voluntary alternates for bids are acceptable but should NOT be put in the space for the Base Bid on the Bid Response Form but on an attached sheet, clearly labeled Voluntary Alternative. Such Alternates should be described in enough detail for the District to understand the Bidder's intent.

Owner may choose to conduct testing to verify correct products and installation. If the materials and installation are found not to be per spec, owner will require subsequent tests to be performed by Owners testing company at contractors' expense.

Any exceptions to the terms and conditions contained in this RFP or any special considerations or conditions requested or required by the Contractor MUST be specifically enumerated by the Contractor and be submitted as part of its Proposal, together with an explanation as to the reason such terms and conditions of this RFP cannot be met by, or in the Contractor's opinion should not be applicable to, the Contractor. The Contractor shall be required and expected to meet the specifications and the requirements as set forth in this RFP in their entirety, except to the extent exceptions or special considerations or conditions are expressly set forth in the Contractor's Proposal and those exceptions or special considerations or conditions are expressly accepted by the District.

No responsibility shall attach to the District, or the authorized representatives of either one, for the premature opening of any proposal, which is not properly addressed and identified.

The Contract Documents, as outlined in the executed Agreement, shall imply the inclusion of the entire agreement between the parties thereto, and the Contractor shall not claim any modification thereof resulting from any representation or promise made at any time by an officer, agent or employee of the District or by any other person.

The bidders shall include an allowance for the following:

- $5,000 for Larson Middle School
- $5,000 for Schroeder Elementary School
- $5,000 for Leonard Elementary School
- $5,000 for Wass Elementary School
- $5,000 for Transportation Center
- $5,000 for Barnard Elementary School

Opening and Awarding of Bids

Bids will be publicly opened and read aloud immediately following the close of receiving bids with the following virtual meeting link **meet.google.com/urt-ogsb-zig** at 11:00 AM local time, Thursday, January 26, 2023.

The recommendation for award will be submitted to the Board of Education at the regular Board of Education Meetings to be held on Tuesday, February 7, 2023, and Tuesday, February 21, 2023.

Scope of Work \ Specifications

Drawings and Specifications

Drawings

#	Description	Date
GENERAL		
C-0.0	Cover Sheet	1/4/23
SCHROEDER ELEMENTARY SCHOOL		
C-1.2	Topographic Survey and Demolition Plan	1/4/23
C-2.2	Paving and Dimension Plan	1/4/23
C-3.2	Grading and SESC Plan	1/4/23
LEONARD ELEMENTARY SCHOOL		
C-1.3	Topographic Survey and and Demolition Plan	1/4/23
C-2.3	Paving and Dimension Plan	1/4/23
C-3.3	Grading and Soil Erosion Plan	1/4/23
TRANSPORTATION CENTER		
C-1.6	Topographic Survey and Demolition Plan	1/4/23
C-2.6	Paving and Dimension Plan	1/4/23
C-3.6	Grading and Soil Erosion Plan	1/4/23
C-4.2	Engineering Plan - East	1/4/23
C-4.3	Engineering Plan - Southeast	1/4/23
C-5.0	Erosion Control Plan	1/4/23
NOTES AND DETAILS		
C-4.0	Notes and Details	1/4/23
C-4.1	Notes and Details	1/4/23

#	Description	Date
LARSON MIDDLE SCHOOL		
C-1.1	Topographic Survey and Demolition Plan	1/4/23
C-2.1	Paving and Dimension Plan	1/4/23
C-3.1	Grading and SESC Plan	1/4/23
WASS ELEMENTARY SCHOOL		
C-1.4	Topographic Survey and Dimension Plan	1/4/23
C-2.4	Paving and Dimension Plan	1/4/23
C-3.4	Grading and Soil Erosion Plan	1/4/23
	Northwest	1/4/23
TROY LEARNING CENTER		
C-2.5	Engineering Plan	1/4/23
BARNARD ELEMENTARY SCHOOL		
C-1.7	Topographic Survey and Demolition Plan	1/4/23
C-2.7	Paving and Dimension Plan	1/4/23
C-3.7	Grading and Soil Erosion Plan	1/4/23
ATHENS HIGH SCHOOL		
C-2.8	Engineering Plan	1/4/23
TROY STANDARD DETAILS		
D	SESC Details	April 2019
E	Storm Sewer Details	April 2019

Specifications

#	Description	Pages	#	Description	Pages
310516	Soils and Aggregates	6	311000	Site Clearing	5
312213	Rough Grading	4	312316	Excavation	3
312317	Trenching	4	312323	Fill	3
312513	Erosion Controls	3	321216	Asphalt Paving	7
321313	Concrete Paving	12	321723	Pavement Markings	5
329113	Soil Preparation	2	329119	Landscape Grading	2
329219	Seeding	6	330513	Manholes and Structures	6
334100	Storm Utility Drainage Piping	5	334600	Subdrainage	2
N/A	Slurry Seal	6			

Geotechnical Reports as Prepared by G2 Consulting Group

Larson Middle School dated December 27, 2022.
Schroeder Elementary School dated January 4, 2023.
Wass Elementary School dated December 20, 2021
Leonard Elementary School dated January 4, 2023
Barnard Elementary School dated December 28, 2022

Work Schedule

- Start Date: June 19, 2023
- Substantial Completion Date: August 18, 2023
- Final Completion Date: September 8, 2023
- Final Closeout: 45 Days after Substantial Completion

DUE: 11:00 PM Local Time, Thursday, January 26, 2023
PROPOSAL: BID 9953 Troy School District 2023 Paving Program

PROPOSAL FORM

We propose to furnish all material, labor and equipment, as per the specifications, for the Troy School District. and all other services to complete BID 9953 Troy School District 2023 Paving Program.

PROJECT #1 – SCHROEDER ELEMENTARY SCHOOL, LEONARD ELEMENTARY SCHOOL, AND TRANSPORTATION CENTER

Schroeder Elem. School Base Bid Amount:	$	_____
Schroeder Elem. School Bond Amount:	$	_____
Schroeder Elem. School Undercut Allowance of 375 Cubic Yards:	$	_____
Schroeder Elem. School Undercut 4" Drain Tile Allowance of 600 Lineal Feet:	$	_____
Schroeder Elem. School Allowance Amount:	$	5,000.00
Leonard Elem. School Base Bid Amount:	$	_____
Leonard Elem. School Bond Amount:	$	_____
Leonard Elem. School Undercut Allowance of 450 Cubic Yards:	$	_____
Leonard Elem. School Undercut Undercut Allowance of 400 Lineal Feet:	$	_____
Leonard Elem. School Allowance Amount:	$	5,000.00
Transportation Center Bid Amount:	$	_____
Transportation Center Bond Amount:	$	_____
Transportation Center Undercut Allowance of 115 Cubic Yards:	$	_____
Transportation Center Allowance Amount:	$	5,000.00
Grand Total Project #1 -	$	_____

PROJECT #2 – LARSON MIDDLE SCHOOL, WASS ELMENTARY SCHOOL, TROY LEARNING CENTER, BARNARD ELEMENTARY SCHOOL, AND ATHENS HIGH SCHOOL

Larson Middle School Base Bid Amount:	$	_____
Larson Middle School Bond Amount:	$	_____
Larson Middle School Undercut Allowance of 460 Cubic Yards:	$	_____
Larson Middle School Undercut 4" Drain Tile Allowance of 500 Lineal Feet:	$	_____
Larson Middle School Allowance Amount:	$	5,000.00
Wass Elem. School Base Bid Amount:	$	_____
Wass Elem. School Bond Amount:	$	_____
Wass Elem School Undercut Allowance of 75 Cubic Yards:	$	_____
Wass Elem School Undercut 4" Drain Tile Allowance of 300 Lineal Feet:	$	_____
Wass Elem. School Allowance Amount:	$	5,000.00
Troy Learning Center Base Bid Amount:	$	_____
Troy Learning Center Bond Amount:	$	_____
Barnard Elem. School Base Bid Amount:	$	_____
Barnard Elem. School Bond Amount:	$	_____
Barnard Elem School Undercut Allowance of 450 Cubic Yards:	$	_____
Barnard Elem School Undercut 4" Drain Tile Allowance of 500 Lineal Feet:	$	_____
Barnard Elem. School Allowance Amount:	$	5,000.00
Athens High School Base Bid Amount:	$	_____
Athens High School Bond Amount:	$	_____
Grand Total Project #2 -	$	_____
Combined Bid Amount if Award Both Projects	$	_____

UNIT PRICING

Description	Units	Unit Price
Remove Sidewalk	SF	$ _____
Remove Asphalt Pavement	SF	$ _____
Remove Concrete Pavement	SF	$ _____
Remove Curbing	LF	$ _____
Remove Concrete Stoop	EA	$ _____
Sawcut Pavement	LF	$ _____
Cold Milling Bituminous Surface (1 ½")	SF	$_____
Mill and Pave 24" Wide Butt Joint	SF	$ _____
Subgrade Undercutting	CY	$ _____
4" HDPE Single Walled Underdrain with Sock	LF	$ _____
6" HDPE Single Walled Underdrain with Sock	LF	$ _____
6" PVC SDR 26 Storm Sewer	LF	$ _____
8" PVC SDR 26 Storm Sewer	LF	$ _____
10" PVC SDR 26 Storm Sewer	LF	$ _____
12" RCP Storm Sewer	LF	$ _____
15" RCP Storm Sewer	LF	$ _____
18" RCP Storm Sewer	LF	$ _____
24" RCP Storm Sewer	LF	$ _____
Adjust Fire Hydrant	EA	$ _____
Adjust Utility Manhole/Catch Basin (12-Inches or Less)	EA	$ _____
Adjust Non Manhole Utility Structure (12-Inches or Less)	EA	$ _____
Reconstruct Utility Manhole/Catch Basin (After 1st 12-Inches)	VF	$ _____
Replace Manhole/Catch Basin Frame and Cover	EA	$ _____
Replace Non-Manhole Utility Cover/Box	EA	$ _____
18" MDOT 3,500 P1 Concrete Curb & Gutter w/4" Agg. Base	LF	$ _____
24" Mountable MDOT 3,500 P1 Concrete Curb w/4" Agg. Base	LF	$ _____
4" Integral MDOT 3,500 P1 Concrete Sidewalk Curb w/4" Sand Base	SF	$ _____

UNIT PRICING CONT.

Description	Units	Unit Price
4” MDOT 3,500 P1 Concrete Sidewalk w/4” Sand Base	SF	$ _____
4” MDOT 3,500 P1 Concrete Pavement	SY	$ _____
MDOT 3,500 P1 Concrete Stoop	EA	$ _____
1.5” MDOT 5E1 Asphalt Overlay	SY	$ _____
3” Playground MDOT 36/13A Asphalt Pavement	SY	$ _____
4” MDOT 5EML/4ELM Asphalt Pavement	SY	$ _____
5” MDOT 5EML/4EML Asphalt Pavement	SY	$ _____
6” 21AA Aggregate (CIP)	SY	$ _____
8” 21AA Aggregate (CIP)	SY	$ _____
10” 21AA Aggregate (CIP)	SY	$ _____
1” x 3” Crushed Concrete Aggregate (CIP)	SY	$ _____
Coal Tar Sealcoat (2 coats)	SF	$ _____
Asphalt Joint & Crack Routing & Sealing	LF	$_____
6” Steel Bollard – Concrete Filled	EA	$ _____
Playground Striping (2 coats)	LF	$ _____
Parking Lot Striping (2 coats)	LF	$ _____
Parking Lot Symbols (Arrows, Stop, Etc.) (2 coats)	LF	$ _____
Cross Walk Hatching (2 coats)	EA	$ _____
Add Parking Lot Striping (2 coats)	LF	$ _____
Add Parking Symbols (2 coats)	EA	$ _____
Signage (Stop, Yield, PED Crossing, Etc.) with Post Only	EA	$ _____
Signage (Stop, Yield, PED Crossing, Etc.) with Post/Bollard	EA	$ _____
ADA Sign with Post/Bollard	EA	$ _____
Concrete stoop for a 48” Wide Door Including Excavation	EA	$ _____
Concrete stoop for a 66” Wide Door Including Excavation	EA	$ _____
Tensar Tri-Axial Geo-Grid	SF	$ _____

NOTE: Unit prices are for work items to be added or removed from the contract

BIDDER'S FIRM NAME_____

ADDRESS_____

CITY/STATE _____ ZIP _____

CELL NUMBER_____FAX # _____

SIGNED BY_____TITLE _____

TYPED NAME_____DATE_____

E-MAIL ADDRESS_____

ADDENDUMS ACKNOWLEDGED _____

VENDOR: LIST FIVE RECENT REFERENCES, PREFERABLY SCHOOL DISTRICTS:

School District	Person to Contact	Phone Number
School District	Person to Contact	Phone Number
School District	Person to Contact	Phone Number
School District	Person to Contact	Phone Number
School District	Person to Contact	Phone Number

Interested vendors will note in this space only any additional information, criteria or contingencies affecting their proposal, understanding that this additional information, criteria or contingency may be utilized in the evaluation process and subsequent award.

SWORN AND NOTARIZED FAMILIAL DISCLOSURE STATEMENT
FAMILIAR DISCLOSURE AFFIDAVIT

The undersigned, the owner or authorized office of the below–named contractor (the 'Contractor"), pursuant to the familial disclosure requirement provided to Troy Schools, hereby represents and warrants that, excepts as provided below, no familial relationship exists between the owner or key employee of the Contractor, and any member of the Troy School Board or the Troy School Superintendent. A list of the School District's Board of Education Members and its Superintendent may be found at http://www.troy.k12.mi.us.

List any Familial Relationships:

Contractor:

_____
Print Name of Contractor

By: _____

Its: _____

Subscribed and sworn before me, this _____ Seal:

day of _____, 20 ____, a Notary Public

in and for _____ County, _____

_____
(Signature)
NOTARY PUBLIC

My Commission expires _____

CERTIFICATION OF COMPLIANCE – IRAN ECONOMIC SANCTIONS ACT

Michigan Public Act No. 517 of 2012

The undersigned, the owner, or authorized officer of the below-named Company, pursuant to the compliance certification requirement provided in Troy School District's Request For Proposal, the "RFP", hereby certifies, represents, and warrants that the Company and its officers, directors and employees, is not an "Iran Linked Business" within the meaning of the Iran Economic Sanctions Act, Michigan Public Act No. 517 of 2012 (the "Act"), and that in the event the Company is awarded a contract by Troy School District as a result of the aforementioned RFP, the Company is not and will not become an "Iran Linked Business" at any time during the course of performing any services under the contract.

The Company further acknowledges that any person who is found to have submitted a false certification is responsible for a civil penalty of not more than $250,000.00 or two (2) times the amount of the contract or proposed contract for which the false certification was made, whichever is greater, the cost of Troy School District's investigation, and reasonable attorney fees, in addition to the fine. Moreover, any person who submitted a false certification shall be ineligible to bid on a request for proposal for three (3) years from the date the it is determined that the person has submitted the false certification.

_____

NAME OF COMPANY

_____

NAME AND TITLE OF AUTHORIZED REPRESENTIVE

_____

SIGNATURE

_____

DATE

Acceptance of Proposal

The undersigned agrees to execute a Contract for work covered by this Proposal provided that he is notified of its acceptance within thirty days after the opening of the Proposal.

It is agreed that this bid will not be withdrawn until after forty-five (45) days after receipt of bids.

The undersigned affirms that the bid was developed without any collusion, undertaking, or agreement, either directly or indirectly, with any other bidder(s) to maintain the prices of indicated work or prevent any other bidder(s) from bidding the work.

BIDDER'S FIRM NAME _____

BUSINESS ADDRESS _____

_____

TELEPHONE NUMBER _____

CELL NUMBER _____

FAX NUMBER _____

BY (SIGNATURE) _____

PRINTED NAME _____

TITLE _____

SIGNED THIS _____ DAY OF _____, 20 _____

E-MAIL ADDRESS _____

SOILS AND AGGREGATES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Subsoil materials.
2. Topsoil materials.
3. Coarse aggregate materials.
4. Fine aggregate materials.

B. Related Sections:

1. Section 31 22 13 - Rough Grading.
2. Section 31 23 17 - Trenching.
3. Section 31 23 23 - Fill.
4. Section 32 91 19 - Landscape Grading.
5. Section 33 41 00 - Storm Utility Drainage Piping.

1.2 REFERENCES

A. ASTM International:

1. ASTM D136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
4. ASTM D2974 - Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
5. ASTM D7928 - Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis.
6. ASTM C4972 - Test Method for PH of Soils.
7. MTM 109 - Michigan Test Method for Sieve Analysis of Fine, Dense Graded, Open Graded and Coarse Aggregates in the Field.

1.3 SUBMITTALS

A. Samples: Submit 2, 20lb samples of each type of material to be tested, to the testing agency.

B. Materials Source: Submit name of imported materials supplier(s).

C. Manufacturer's Certificate: The Contractor shall submit to the Owner, two copies of material certificates signed by the Material Producer and Contractor. Certificates shall state that each material item meets specified requirements.

D. Gradation Reports: The Contractor shall submit to the Owner, two copies of the gradations for each of the required aggregate mixtures. Mix designs shall be within allowable tolerances as specified for the particular section.

1.4 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

B. Perform Work in accordance with local governing agency standards.

C. Testing and Inspection: The Owner will engage a testing agency to sample and test materials proposed for use in the Work.

PART 2 PRODUCTS

2.1 SUBSOIL MATERIALS

A. Subsoil Type S1:

1. Excavated and re-used material, imported borrow and select or local borrow.

2. Graded.

3. Free of lumps larger than 3 inches, rocks larger than 2 inches, organic material, and debris.

2.2 TOPSOIL MATERIALS

A. Topsoil Type S2:

1. Fertile, friable, natural topsoil of loamy character, obtained from well drained arable site.

2. Reasonably free of clay, lumps, coarse sands, plants, roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.

3. Acidity range pH of 5.0 to 7.5.

4. Containing minimum of 10 percent organic matter.

2.3 SOIL MATERIALS

A. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.

B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.

C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.

D. Backfill and Fill Materials: Satisfactory soil materials as recommended by a geotechnical engineer.

2.4 AGGREGATE MATERIALS

A. Crushed Stone Fill, Type A1: Dense-graded crushed aggregate shall meet the requirements of Section 902 of the latest Michigan Department of Transportation Standard Specification for Construction and shall consist of 21AA Crushed Limestone.

B. Granular Fill, Type A2: Granular material shall consist of natural sand, stone screenings, gravel or a blend of natural sand, gravel and stone screenings. It shall be composed of rough surfaced and angular grains of quartz or other hard durable rock and meet the requirements of Section 902 of the latest Michigan Department of Transportation Standard Specification for Construction and shall consist of Class II granular material.

C. Open-Graded Drainage Course Aggregate Materials (OGDC), Type A3: for use in Temporary Construction Access Drives, Drainage Course under Pavement Aggregate Base Courses and other miscellaneous uses shall consist of crushed stone or crushed gravel free from organic matter or other deleterious substances with material sized between 1” and 3” in diameter, with less than 6% fine material (#200 sieve). Such materials are usually referred to as “1x3” or “OGDC”.

D. Crushed Aggregate Surface Course (CASC), Type A4: shall meet the requirements of Section 306 of the latest Michigan Department of Transportation Standard Specification for Construction and shall consist of 23A Crushed Aggregate.

2.5 SOURCE QUALITY CONTROL

A. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D1557.

B. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D2974 and ASTM D4972.

C. When tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials from same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavate subsoil and aggregates from areas designated. Strip topsoil to full depth of topsoil in designated areas.

B. Stockpile excavated material meeting requirements for subsoil materials, topsoil materials and aggregates.

C. Remove excess excavated subsoil and topsoil not intended for reuse, from the site.

D. Remove excavated materials not meeting requirements for subsoil materials, topsoil materials and aggregates from the site.

3.2 EXAMINATION

A. The Owner's 3rd party testing company shall verify compacted substrate is dry and ready to support paving and imposed loads.

B. The Owner's 3rd party testing company shall verify substrate has been inspected, gradients and elevations are correct.

3.3 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place fill on soft, muddy, or frozen surfaces.

3.4 AGGREGATE TRANSPORTING AND PLACEMENT

A. The aggregate shall be transported from the crushing plant to the point of use in hauling vehicles which are covered. Deliveries shall be scheduled so that spreading and compaction of all aggregate delivered that day can be completed during daylight hours, unless adequate artificial lighting is provided, or stockpile locations are provided. Hauling over freshly placed material shall not be permitted until the material has been compacted as specified.

B. Upon arrival, the aggregate shall be spread to a thickness not to exceed 6 inches by an approved grading method. It shall be struck off in a uniform layer of such depth that, when the Work is completed, it shall have the required thickness and conform to the grade and contour indicated.

C. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the aggregate may be spread, raked, leveled and compacted by using hand tools.

D. After spreading, the aggregate shall be thoroughly and uniformly compacted by approved compaction equipment. The speed of the compaction equipment shall at all times be sufficiently slow enough to avoid displacement of the aggregate. Any displacement occurring as a result of reversing direction of the compaction equipment or from any other cause shall be corrected at once. Rolling shall continue until all roller marks are eliminated, the surface is of uniform texture and true to grade and cross-section and the required field-density is obtained.

E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.5 MINIMUM QUALITY REQUIREMENTS

A. The Owner shall hire a 3rd party testing company to test in-place aggregate surface, base course and subbase materials for compliance with the requirements for density and thickness per the latest version of ASTM and MDOT Standard Specifications for Construction.

B. Maximum dry density shall be determined per ASTM D1557 modified proctor.

C. In-place compacted minimum thickness is as shown in the cross-sectional details on the Plans. Any thickness less than shown on the plans is not acceptable.

3.6 TOLERANCES

A. Maximum Variation from Flat Surface: 1/2 inch measured with 10-foot straight edge.

B. Maximum Variation from Thickness: No less than shown on the Plans.

C. Maximum Variation from Elevation: 1/2 inch.

3.7 FIELD QUALITY CONTROL

A. The Owner shall hire a 3rd party testing company to complete all field quality control testing per the latest version of ASTM and MDOT Standard Specifications for Construction.

B. Quality Control During Aggregate Placement: Perform the following sampling and testing of aggregate mixtures for quality control during operations. Record the locations where samples are taken to correlate with subsequent testing.

C. Test uncompacted aggregate for gradation distribution per ASTM D136 or MTM 109. Test for compaction per ASTM D1557 modified proctor.

D. Perform three tests for each day’s aggregate placement, unless otherwise specified or directed.

E. Test in-place, compacted aggregate for density and thickness. Perform five tests for each day’s aggregate placement unless otherwise specified or directed.

F. Additional testing may be required if any of the previous tests indicate insufficient values. If two successive tests indicate insufficient values, contact the Owner for a course of action.

G. Aggregate materials not complying with specified requirements shall be removed and replaced with new compliant aggregate.

H. Upon completion of the construction Work and after spoils and debris have been removed, re-grade any areas disturbed by the operations.

3.8 STOCKPILING

A. Stockpile materials on site at locations designated by Owner.

B. Stockpile in sufficient quantities to meet project schedule and requirements.

C. Separate different materials with dividers or stockpile individually to prevent mixing.

D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

E. Surround stockpile with silt fence or erosion eels.

F. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.9 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above and below-grade site improvements.
6. Temporary erosion and sedimentation control.

1.3 DEFINITIONS

A. 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.

B. 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.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.

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

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.

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

1.4 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.5 MATERIAL OWNERSHIP

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

1.6 INFORMATIONAL SUBMITTALS

A. Existing Conditions: The Contractor shall have the option to submit documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video recordings.

2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

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

1.7 FIELD CONDITIONS

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

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

3. All activities shall be appropriately scheduled and communicated to the Owner prior to commencement of construction operations.

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

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

C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises at location directed by the Owner.

D. Utility Locator Service: Three full working days before construction begins, call the Miss Dig system at 1-800-482-7171 or 811. Private onsite utility locations must be completed prior cutting or excavation activity.

E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

F. Tree and Plant Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 310516 "Soils and Aggregates".

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction unless otherwise indicated to be removed.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to plan requirements.

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

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

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

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

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

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

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to according to plan requirements.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to plan requirements.

3.4 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Owner will arrange to shut off indicated utilities when requested by Contractor.

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

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

1. Notify Owner not less than 3 days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Owner's written permission.

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

3.5 CLEARING AND GRUBBING

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

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

2. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of 24 inches below exposed subgrade.

3. Use only hand methods or air spade for grubbing within protection zones.

4. Chip removed tree branches and dispose of off-site.

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

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

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to required depth in a manner to prevent intermingling with underlying subsoil or other waste materials.

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

1. Limit height of topsoil stockpiles to 72 inches.

2. Do not stockpile topsoil within protection zones.

3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.

4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.7 SITE IMPROVEMENTS

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

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

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically. If possible, adjust line of demolition to the nearest joint.

2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

C. Burning of waste materials is not permitted on Owner's property.

END OF SECTION

ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating subsoil.

2. Cutting, grading, filling, rough contouring, and compacting site for site structures, building pads, and pavements.

B. Related Sections:

1. Section 31 05 16 – Soils and Aggregates.

2. Section 31 10 00 - Site Clearing: Excavating topsoil.

3. Section 31 23 16 - Excavation: General area excavation

4. Section 31 23 17 - Trenching: Trenching and backfilling for utilities.

5. Section 31 23 23 - Fill: General area backfilling.

1.2 REFERENCES

A. ASTM International:

1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

2. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Materials Source: Submit name of imported materials suppliers.

B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.5 QUALITY ASSURANCE

A. The services of a full-time Soils Engineer and Soils Laboratory may be retained by the Owner to observe earthwork operations, analyze soil materials and perform applicable laboratory and field tests.

B. The Contractor shall arrange and pay for any other test or required inspections necessary to meet the requirements set forth in these Construction Documents.

PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil: Type S2 as specified in Section 31 05 16.

B. Subsoil Fill: Type S1 as specified in Section 31 05 16.

C. Crushed Stone Fill: Type A1 as specified in Section 31 05 16.

D. Granular Fill: Type A2 as specified in Section 31 05 16.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

C. Locate and protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.

D. Control datum for survey is that shown on Drawings.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

3.2 PREPARATION

A. Call Local Utility Line Information service, MISS DIG at 1-800-482-7171 or 811, not less than three working days before performing Work. Private utility location is required.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Notify utility company prior to removing or relocating utilities.

D. Protect utilities indicated to remain from damage.

E. Protect plant life, lawns, and other features remaining as portion of final landscaping.

F. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be further excavated, re-landscaped, or regraded.

B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

C. Remove excess subsoil not intended for reuse, from site.

D. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.

E. Stability: Replace damaged or displaced subsoil as specified for fill.

3.4 FILLING

A. Fill areas to contours and elevations with unfrozen materials.

B. Place material in continuous layers as follows:

Compaction Method	Maximum Loose Lift Thickness
Hand-operated vibratory plate or light roller in confined areas	4 inches
Hand-operated vibratory roller weighing at least 1,000 pounds	6 inches
Vibratory roller drum roller, minimum dynamic force, 2,000 pounds	9 inches
Vibratory drum roller, minimum dynamic force, 30,000 pounds	12 inches
Sheeps-foot roller	8 inches

C. Maintain optimum moisture content of fill materials to attain required compaction density.

D. Make grade changes gradually. Blend slope into level areas.

E. Repair or replace items indicated to remain damaged by excavation or filling.

3.5 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

3.6 FIELD QUALITY CONTROL

A. The Owner shall hire a 3rd party testing company to complete all field quality control testing per the latest version of ASTM and MDOT Standard Specifications for Construction.

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Perform in place compaction tests in accordance with the following:

1. Density and Moisture Tests: ASTM D-6938.

D. When tests indicate Work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: Provide one density test for every lift.

3.7 SCHEDULES

A. Fill in the upper 12 inches under pavement and sidewalks:

1. Compact uniformly to minimum 95 percent of maximum density per ASTM D-1557.

B. Fill below 12 inches under pavement and sidewalks:

1. Compact uniformly to minimum 92 percent of maximum density per ASTM D-1557.

C. Fill in landscape areas:

1. Compact uniformly to minimum 88 percent of maximum density per ASTM D-1557.

END OF SECTION

EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil densification.
2. Excavating for paving, roads, and parking areas.
3. Excavating for slabs-on-grade.
4. Excavating for site structures.
5. Excavating for landscaping.

B. Related Sections:

1. Section 31 05 16 – Soils and Aggregates.
2. Section 31 22 13 - Rough Grading: Topsoil and subsoil removal from site surface.
3. Section 31 23 17 - Trenching: Excavating for utility trenches.
4. Section 31 23 23 - Fill.
5. Section 33 41 00 – Storm Utility Drainage Piping.

1.2 REFERENCES

A. Local utility standards when working within 24 inches of utility lines.

1.3 SUBMITTALS

A. Shop Drawings: None required.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with local governing agency standards.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

A. Call Local Utility Line Information service and Miss Dig at 1-800-482-7171 or 811, not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

2. Private locating required?

B. Identify required lines, levels, contours, and datum.

C. Notify utility company prior to the removal and relocation of utilities.

D. Protect utilities indicated to remain from damage.

E. Protect plant life, lawns, and other features remaining as portion of final landscaping.

F. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs indicated to remain from excavating equipment and vehicular traffic.

3.

3.2 EXCAVATION

A. Underpin adjacent structures which may be damaged by excavation work.

B. Excavate subsoil to accommodate slabs-on-grade, paving and site structures.

C. The removal of existing soil to get to the final subgrade elevation shall not be considered subgrade undercutting. It is part of this section for excavation to balance the site and establish the elevations for the placement of the proposed pavement elevations. Subgrade undercutting is excavation and removal below proposed top of subgrade elevation, or the elevation new work will be constructed on.

D. Slope banks with machine to angle of repose or less until shored.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Trim excavation. Remove loose matter.

G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume. Remove larger material as specified in Section 31 23 23.

H. Notify Owner/Engineer immediately of unexpected subsurface conditions.

I. Correct over-excavated areas with crushed stone fill Type A1 specified in Section 31 05 16 or as directed by the Geotechnical Engineer.

J. Remove excess and unsuitable material from site.

K. Stockpile subsoil to be re-used on-site in area designated by Owner on site to height not exceeding 6feet and protect from erosion.

L. Repair or replace items indicated to remain damaged by excavation.

3.3 FIELD QUALITY CONTROL

A. Request inspection of excavation and controlled fill operations in accordance with applicable code and local governing agency requirements at least 48 hours ahead of scheduled work or per agency requirements.

B. Request visual inspection of bearing surfaces by inspection agency before installing subsequent work at least 48 hours ahead of scheduled work or per agency requirements.

3.4 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

TRENCHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities from 5 feet outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Sections:

1. Section 31 05 16 – Soils and Aggregates.
2. Section 31 22 13 - Rough Grading: Topsoil and subsoil removal from site surface.
3. Section 31 23 16 - Excavation: General building excavation.
4. Section 31 23 23 - Fill: General backfilling.
5. Section 32 91 19 - Landscape Grading: Filling of topsoil over backfilled trenches to finish grade elevation.
6. Section 33 41 00 - Storm Utility Drainage Piping

1.2 REFERENCES

A. ASTM International:

1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
2. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 SUBMITTALS

A. Product Data: Submit data for geotextile fabric indicating fabric and construction.

B. Materials Source: Submit name of imported fill materials suppliers.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with local governing agency standards.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Subsoil Fill: Type S1 as specified in Section 31 05 16.

B. Crushed Stone Fill: Type A1 as specified in Section 31 05 16.

C. Granular Fill: Type A2 as specified in Section 31 05 16.

2.2 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, non-woven.

1. Tencate Mirafi; Model 140N Filter Fabric or approved equal.

PART 3 EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.

1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call Local Utility Line Information service, Miss Dig, at 1-800-482-7171 or 811, not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

2. Private utility location is required.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, and other features remaining as portion of final landscaping.

D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs indicated to remain from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

3.3 TRENCHING

A. Excavate subsoil required for utilities to utility service.

B. Remove lumped subsoil, boulders, and rock up of 1/6 cubic yard, measured by volume.

C. Perform excavation within 24 inches of existing utility service or in accordance with utility's requirements.

D. Do not advance open trench more than 200 feet ahead of installed pipe.

E. Cut trenches to width indicated on Drawings. Remove water or materials that interfere with Work.

F. Excavate bottom of trenches maximum 12 inches wider than outside diameter of pipe.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.

H. Do not interfere with 45 degree bearing splay of foundations.

I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls cannot be sloped, provide a trench box or sheeting and shoring to protect excavation as specified in this section.

J. Cut out soft areas of subgrade not capable of compaction in place. Backfill with bedding material and compact to density equal to or greater than requirements for subsequent backfill material.

K. Trim excavation. Remove loose matter.

L. Correct over-excavated areas with compacted backfill as specified for authorized excavation.

M. Remove excess subsoil not intended for reuse, from site.

N. Stockpile subsoil for reuse in area designated by the Owner on site to depth not exceeding 6 feet and protect from erosion.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

D. Repair damage to new Work and existing improvements from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place material in continuous layers as follows:

1. Common Fill: Maximum 4 inches compacted depth for hand compaction and 8 to 12 inches for roller compaction.

2. Granular Fill: Maximum 4 inches compacted depth for hand compaction and 8 to 12 inches for roller compaction.

D. Employ placement method that does not disturb or damage foundation perimeter drainage and utilities in trench.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Do not leave more than 50 feet of trench open at end of working day.

G. Protect open trench to prevent danger to Owner and the public.

3.6 TOLERANCES

A. Top Surface of Backfilling: Plus or minus 1 inch from required elevations.

3.7 FIELD QUALITY CONTROL

A. The Owner shall hire a 3rd party testing company to complete all field quality control testing per the latest version of ASTM and MDOT Standard Specifications for Construction.

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D6938.

2. Moisture Tests: ASTM D6938.

D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

3.8 PROTECTION OF FINISHED WORK

A. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

FILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backfilling site structures to subgrade elevations.
2. Fill under slabs-on-grade.
3. Fill under paving.
4. Fill for over-excavation.

B. Related Sections:

1. Section 31 05 16 – Soils and Aggregates.
2. Section 31 22 13 - Rough Grading: Site filling.
3. Section 31 23 16 - Excavation.
4. Section 31 23 17 - Trenching: Backfilling of utility trenches.
5. Section 32 91 19 - Landscape Grading.
6. Section 33 41 00 - Storm Utility Drainage Piping.

1.2 REFERENCES

A. ASTM International:

1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
2. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: None required.

C. Materials Source: Submit name of imported fill materials suppliers.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with local governing agency standards.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Common Fill: Type S1 as specified in Section 31 05 16.

B. Crushed Stone Fill: Type A1 as specified in Section 31 05 16.

C. Granular Fill: Type A2 as specified in Section 31 05 16.

PART 3 EXECUTION

3.1 EXAMINATION

A. Administrative Requirements: Coordination and project conditions.

3.2 PREPARATION

A. Compact subgrade to density requirements for subsequent backfill materials. The removal of existing soil to get to the final subgrade elevation shall not be considered subgrade undercutting. It is part of excavation per Section 31 23 16 to balance the site and establish the elevations for the placement of the proposed pavement elevations.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural or granular fill as directed by testing agency and compact to density equal to or greater than requirements for subsequent fill material.

C. Scarify subgrade surface to a minimum depth of 8 inches.

D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING

A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Place material in continuous layers as follows:

Compaction Method	Maximum Loose Lift Thickness
Hand-operated vibratory plate or light roller in confined areas	4 inches
Hand-operated vibratory roller weighing at least 1,000 pounds	6 inches
Vibratory roller drum roller, minimum dynamic force, 2,000 pounds	9 inches
Vibratory drum roller, minimum dynamic force, 30,000 pounds	12 inches

Sheeps-foot roller	8 inches

D. Employ placement method that does not disturb or damage other new work or existing improvements.

E. Maintain optimum moisture content of backfill materials to attain required compaction density.

F. Make gradual grade changes. Blend slope into level areas.

G. Remove surplus backfill materials from site.

H. Leave fill material stockpile areas free of excess fill materials.

3.4 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

A. The Owner shall hire a 3rd party testing company to test in-place aggregate surface, base course and subbase materials for compliance with the requirements for density and thickness per the latest version of ASTM and MDOT Standard Specifications for Construction.

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D6938.

2. Moisture Tests: ASTM D6938.

D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

E. Proof roll compacted fill surfaces under slabs-on-grade and paving.

3.6 PROTECTION OF FINISHED WORK

A. Reshape and re-compact fills subjected to vehicular traffic

END OF SECTION

EROSION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Check Dams.
2. Inlet Filters.
3. Silt Fencing.
4. Rip-Rap.

B. Related Sections:

1. Section 31 05 16 – Soils and Aggregates.
2. Section 31 10 00 - Site Clearing.
3. Section 31 23 16 - Excavation.
4. Section 31 23 23 - Fill.
5. Section 32 91 19 - Landscape Grading.
6. Section 32 92 19 - Seeding.

1.2 REFERENCES

A. Troy School District Stormwater Management – Illicit Discharge Regulatory Policy

1. A copy of this policy will be part of the bid package or is available upon request.

B. Troy School District Stormwater Management – Post -Construction Policy & Procedure

1. A copy of this policy will be part of the bid package or is available upon request.

C. ASTM International:

1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

1.3 SUBMITTALS

A. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with local governing agency standards.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not place grout when air temperature is below freezing.

PART 2 PRODUCTS

2.1 ROCK MATERIALS

A. Rock: Sound, tough, durable fractured rock, free from decompressed stones or other defects impairing its durability. Broken concrete or rounded stones are not acceptable and material shall be to the sizes indicated in the plans

2.2 PLANTING MATERIALS

A. Seeding and Soil Supplements: as specified in Section 32 92 19.

B. Mulch: as specified in Section 32 92 19.

C. Erosion Control Blankets: as specified in Section 32 92 19

2.3 ACCESSORIES

A. Inlet Filter Fabric: Geotextile fabric with minimum flow rate of 100 gal/min./sft meeting local governing agency requirements.

B. Inlet Filter Bag: Silt Sack by ACF Environmental or approved equal.

C. Silt Fencing: Geotextile filter fabric with minimum flow rate of 10 gal/min./sft, Amoco ProPex 2130 or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify compacted subgrade is acceptable and ready to support devices and imposed loads.

3.2 SITE STABILIZATION

A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.

B. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.

C. Stockpile and waste pile heights shall not exceed 6 feet. Slope stockpile sides at 2H:1V or flatter.

D. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.

1. During non-germinating periods, apply mulch per the supplier's recommended rates.

2. Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year in accordance with Section 32 92 19 at 50 percent of permanent application rate with no topsoil.

3. Stabilize disturbed areas which are either at finished grade or will not be disturbed within one year in accordance with Section 32 92 19 permanent seeding specifications.

E. Stabilize stockpiles within 24 hours after the pile has been put in place.

3.3 FIELD QUALITY CONTROL

A. Inspect erosion control devices on a weekly basis and after each runoff event per the school district's stormwater management policies. Make necessary repairs to ensure erosion and sediment controls are in good working order.

B. Compaction Testing: In accordance with ASTM D1557.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.4 CLEANING

A. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.

B. Do not damage structure or device during cleaning operations. Repair or replace any damages structures or devices.

C. Do not permit sediment to erode into construction or site areas or natural waterways.

D. Clean channels when depth of sediment reaches approximately one-half channel depth.

END OF SECTION

ASPHALT PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphalt materials.
2. Aggregate materials.
3. Aggregate subbase.
4. Asphalt paving base course, binder course, and wearing course.
5. Asphalt paving overlay for existing paving.

B. Related Sections:

1. Section 31 22 13 - Rough Grading: Preparation of site for paving [and base].
2. Section 31 23 23 - Fill: Compacted subbase for paving.
3. Section 31 05 16 – Soils and Aggregates: Product requirements for aggregate for placement by this section.
4. Section 32 13 13 – Concrete Paving
5. Section 32 17 23 - Pavement Markings: Painted pavement markings, lines, and legends.
6. Section 33 05 13 - Manholes and Structures

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M140 - Standard Specification for Emulsified Asphalt.
2. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

B. Asphalt Institute:

1. AI MS-19 - Basic Asphalt Emulsion Manual.

C. ASTM International:

1. ASTM D977 - Standard Specification for Emulsified Asphalt.
2. ASTM D979 - Standard Practice for Sampling Bituminous Paving Mixtures.

3. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples.

4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

5. ASTM D1559 – Test Method for Resistance of Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.

6. ASTM D2172 - Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.

7. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.

8. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.

9. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

10. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.

11. ASTM D3910 - Standard Practices for Design, Testing, and Construction of Slurry Seal.

12. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

1.3 SUBMITTALS

A. Product Data:

1. Submit product information for asphalt and aggregate materials per plans.

2. Submit mix design with laboratory test results supporting design per plans.

3. All testing and material data must be dated within the previous two months of the date of the submittal.

B. Manufacturer's Certificate: Certify that materials specified in this section meet or exceed the specified requirements.

C. The paving contractor shall execute the Guarantee for Bituminous Pavement form located at the end of this section per the requirements set forth on the form.

1.4 QUALITY ASSURANCE

A. Mixing Plant: Certified by State of Michigan.

B. Obtain materials from same source throughout.

C. Perform Work in accordance with Michigan Department of Transportation (MDOT) standards.

1.5 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum of five (5) years documented experience.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Apply bituminous tack coats only when temperature has not been below 35 degrees F for 12 hours immediately prior to application. Construct asphalt surface course only when atmospheric temperature is above 40 degrees F and base is dry. Asphalt binder and base courses may be laid when the atmospheric temperature is above 35 degrees F and rising.

PART 2 PRODUCTS

2.1 ASPHALT MATERIALS

A. Asphalt Cement: Shall comply with the requirements of ASTM D3381 for viscosity graded asphalt cement AC-10 (85-100 penetration grade) and meet the requirements of Section 501 of the Michigan Department of Transportation Standard Specifications for Construction (latest edition) for PG64-28.

B. Tack Coat: Shall be emulsified asphalt meeting the requirements of ASTM D977, AASHTO M140 and the Asphalt Institute for type SS-1h.

C. Reclaimed Asphalt Pavement (RAP): Processed material obtained by milling or full depth removal of existing asphalt paving.

2.2 AGGREGATE MATERIALS

A. Coarse Aggregate: Shall consist of crushed stone, crushed gravel, a mixture of uncrushed gravel with either crushed stone or crushed gravel, or other inert material having similar characteristics. It shall be composed of clean, tough, durable fragments free from an excess of flat or elongated pieces and shall be free of organic matter and deleterious substances and meet the requirements of Section 902 of the Michigan Department of Transportation Standard Specifications for Construction (latest edition).

B. Fine Aggregate: Shall be well graded from coarse to fine and consist of natural sand, stone screenings or a blend of natural sand and stone screenings. It shall be composed of rough surfaced and angular grains of quartz or other hard durable rock and meet the requirements of Section 902 of the Michigan Department of Transportation Standard Specifications for Construction (latest edition).

C. Mineral Filler: Shall be limestone dust, dolomite dust, slag or hydrated lime meeting the requirements of Section 902 of the Michigan Department of Transportation Standard Specifications for Construction (latest edition).

2.3 MIXES

A. Use dry material to avoid foaming. Mix uniformly.

B. Asphalt Paving Mixtures: Designed in accordance with Section 501 the Michigan Department of Transportation Standard Specifications for Construction (latest edition).

1. Asphalt Cement: PG 64-28 per plans

2. Leveling Course: MDOT 4EML or 4EMH per plans

3. Wearing Course: MDOT 5EML or 4EMH per plans

2.4 SOURCE QUALITY CONTROL

A. Submit proposed mix design of each class of mix for review prior to beginning of Work.

B. Test samples in accordance with ASTM D979, D2172 or D6307and D6925.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.

C. Verify compacted subgrade, aggregate base course and subbase is dry and ready to support paving and imposed loads.

D. Verify gradients and elevations of base are correct.

E. Verify existing concrete curb lines and elevations are correct.

F. Verify all manhole, catch basin and inlet grates and frames (and any other type of casting within the area to be paved) are installed in correct position and at correct elevation.

3.2 BASE COURSE

A. Aggregate Base Course to be installed per Section 31 05 16.

3.3 EXISTING WORK

A. Saw cut existing paving as indicated on the Drawings.

B. Clean existing paving to remove foreign material, excess joint sealant and crack filler from paving surface.

C. Repair surface defects in existing paving to provide uniform surface to receive new paving.

D. Protect new and existing works adjacent to the paving area to prevent damage.

3.4 BOND COAT

A. Apply bond coat to contact surfaces of previously constructed surfaces abutting or projecting into the area to be paved with new asphalt.

1. New Asphalt Surfaces: 0.02-0.05 gal/sq yd residual rate.

2. Existing Asphalt Surfaces: 0.004-0.07 gal/sq yd residual rate.

3. Milled Asphalt Surfaces: 0.04 – 0.08 gal/sq yd residual rate.

4. Portland Cement Concrete Surfaces: 0.03 – 0.05 gal/sq yd residual rate.

B. Apply bond coat to contact surfaces of curbs, gutters and sidewalks etc. as required. Protect surfaces from overspray Bond coat shall be applied uniformly without streaks and/or bare spots.

C. Coat surfaces of manholes, catch basin and any other casting frames with oil to prevent bond with asphalt paving. Do not tack coat these surfaces.

3.5 SINGLE COURSE ASPHALT PAVING

A. Install Work in accordance with Section 502 of the Michigan Department of Transportation Standard Specifications for Construction (latest edition).

B. Place asphalt within 24 hours of applying bond coat.

C. Place asphalt wearing course to the thickness as indicated on Drawings.

D. Compact paving by rolling to specified density (Ninety-two (92) to Ninety-seven (97) percent of the recorded laboratory specimen density per ASTM D2041). Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.

E. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.6 DOUBLE COURSE ASPHALT PAVING

A. Place asphalt binder course within 24 hours of applying bond coat to existing vertical surfaces abutting proposed pavement.

B. Place binder course to the thickness as indicated on Drawings.

C. Clean and dry binder surface and apply bond coat before placing wearing course.

D. Place wearing course to the thickness as indicated on Drawings.

E. Compact each course by rolling to specified density (Ninety-two (92) to Ninety-seven (97) percent of the recorded laboratory specimen density per ASTM D2041) . Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.

F. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.7 ASPHALT PAVING OVERLAY

A. Apply tack coat to existing paving milled surface at rate recommended of 0.04 – 0.08 gal/sq yd residue rate.

B. Place wearing course to the thickness as indicated on Drawings.

C. Compact overlay by rolling to specified density (Ninety-two (92) to Ninety-seven (97) percent of the recorded laboratory specimen density per ASTM D2041) . Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.

D. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.8 CONSTRUCTION TOLERANCES

A. Flatness: Maximum variation of 1/4 inch as measured with 10-foot straight edge.

B. Scheduled Compacted Thickness: No less than specified on the Drawings.

C. Variation from Indicated Elevation: Within 1/4 inch.

3.9 FIELD QUALITY CONTROL

A. The Owner shall hire a 3rd party testing company to test compliance with the requirements for density and thickness per the latest version of ASTM and MDOT Standard Specifications for Construction.

B. Record the locations where samples are taken to correlate with subsequent testing.

C. Sample asphalt paving in accordance with ASTM D979.

D. Asphalt Paving Mix Temperature: Measure and record temperature at time of placement.

E. Asphalt Paving Thickness: Owner's 3rd party testing company will verify loose thickness during placement.

F. Asphalt Paving Density: ASTM D2950 nuclear method; perform minimum of three tests and one test per 5,000 sft for each day of paving unless otherwise directed or specified by the Owner. In-place Density shall be 92 – 97% of ASTM D2041 maximum density shall be based on either the value in the JMF or the daily testing value by the plant, if available.

G. Additional testing may be required if any of the previous tests indicate insufficient values. If two successive tests indicate insufficient values, contact the Owner for a course of action.

H. Asphalt concrete materials not complying with specified requirements shall be repaired or removed and replaced with new paving.

3.10 PROTECTION OF FINISHED WORK

A. Immediately after placement, protect paving from mechanical injury for at least 6 hours or until surface temperature is less than 140 degrees F.

END OF SECTION

DATE:

CONTRACTOR:

STREET ADDRESS:

CITY, STATE, ZIP:

AGENT:

GUARANTEE FOR BITUMINOUS PAVEMENT

We hereby guarantee that the Asphalt Pavement which we have installed at for _____has been done in strict accordance with the Drawings and Specifications. We will repair or replace, or agree to have repaired or replaced, all Work which may prove to be defective in workmanship or materials. We will repair or replace, or agree to have repaired or replaced, any adjacent Work which required repair or replacement because of our defective Work. We guarantee the Work for two years from the date of acceptance by the Owner

Failure to comply with the above paragraph within 10 days after receipt of written notice from the Owner, or failure to Work with diligence authorizes the Owner to proceed with repair of the defective Work. We shall pay the costs and charges for the repairs along with interest at the maximum rate permitted by law upon demand. If we fail to fulfill the preceding obligation, and if the Owner brings an action to enforce this guarantee, we agree to pay the Owner's reasonable attorney fees incurred.

CONTRACTOR'S SIGNATURE

(a) The Paving Contractor shall execute the Guarantee Form as shown above.

(b) All Manufacturer's Warranties for materials shall be filled out, dated, signed and submitted to Owner.

CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete paving for:

a. Concrete sidewalks
b. Concrete curbs and gutters
c. Concrete parking areas and roads

B. Related Sections:

1. Section 32 17 23 - Pavement markings

2. Section 31 22 13 - Rough Grading

3. Section 31 23 23 - Fill

4. Section 32 05 16 – Soils and Aggregates

5. Section 32 12 16 - Asphalt Paving

6. Section 32 91 19 - Landscape Grading

7. Section 33 05 13 - Manholes and Structures

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M213 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

B. American Concrete Institute:

1. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

2. ACI 305R - Hot Weather Concreting.

3. ACI 306R - Cold Weather Concreting.

4. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.

C. ASTM International:

1. ASTM A184 - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

2. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

3. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.

4. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

5. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

6. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

7. ASTM C94 - Standard Specification for Ready-Mixed Concrete.

8. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.

9. ASTM C150 - Standard Specification for Portland Cement.

10. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.

11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.

13. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

14. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.

15. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.

16. ASTM C994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

17. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.

18. ASTM D994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

1.3 SUBMITTALS

19.

A. Submittal of Ready-Mixed Concrete Information

1. Statement of Purchase for Ready-Mixed Concrete: Prior to actual delivery of concrete, submit, to the Owner, the Statement of Purchase, giving the dry weights of cement and saturated surface dry weights of fine and coarse aggregates and quantities, type and name of admixtures (if any) and of water per cu. yd., that will be used in the manufacture of the concrete. The Contractor shall also furnish evidence satisfactory to

the Owner that the materials to be used and proportions selected will produce concrete of the quality specified. Whatever strengths are obtained, the quality of cement used shall not be less than the minimum specified. The information must follow the current MDOT Review Checklist (Form 2000).

2. Reports: Submit four copies of reports, to the Engineer/Owner, for ready-mix concrete slump, air content, unit weight, yield and strength tests as specified in Section 15 and 17 of ASTM C94.

3. Ready-Mixed Concrete Delivery Tickets: Submit one copy of each delivery ticket to the Owner and Contractor in accordance with Section 16 of ASTM C94.

4. Submit manufacturers complete technical data sheet for colored admixtures and curing compounds for any colored concrete pavement and sidewalk areas. Include color charts for initial selection of color by Owner.

B. The paving contractor shall execute the Guarantee for Concrete Pavement, Guarantee for Concrete Curb, and Guarantee for Concrete Sidewalk forms located at the end of this section per the requirements set forth on the forms.

C. Design Data:

1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:

a. Hot and cold weather concrete work.

2. Identify mix ingredients and proportions, including admixtures.

3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

1.4 QUALITY ASSURANCE

A. Testing and Inspection Service: The Owner will engage a testing agency to sample and test concrete materials proposed for use in the Work, perform tests and calculations for concrete mixtures and perform testing during paving operations.

B. Submit to the Owner, materials certificates signed by Material Producer and Contractor per the plans. Certificates shall state that each material item meets specified requirements.

C. Submit to the Owner, job-mix formulas for each required cement-aggregate mixture per the plans. Mix designs shall be within allowable tolerances as specified for the particular application. The job-mix formula must follow the current MDOT Review Checklist (Form 2000).

D. All testing/material data must be dated within the previous two months of the date of the submittal.

E. Obtain cementitious materials from same source throughout.

F. Perform Work in accordance with local governing agency standards.

1.5 QUALIFICATIONS

A. Manufacturer: All ready-mixed concrete suppliers must be Michigan Department of Transportation certified and approved by the Engineer/Owner. Concrete shall be manufactured and delivered to the job Site by a ready-mixed concrete manufacturer thoroughly experienced in ready-mixed concrete. If requested by the Owner, submit a written description of proposed ready-mixed concrete Manufacturer, giving qualifications of Personnel, location of batching plant, list of Projects similar in scope to specified Work, and other information as may be requested by the Owner.

B. Installer: All concrete installers must be approved by the Owner. If requested by the Owner, submit a written description of proposed ready-mixed concrete Installer, giving qualifications of Personnel, list of Projects similar in scope to specified Work, and other information as may be requested by the Owner.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Construct concrete surface course only when ground temperature is above 35-degrees F and base is dry. Base course must be laid when temperature is above 35-degrees F and rising.

1.7 TRAFFIC CONTROL

A. Maintain vehicle and pedestrian traffic during paving and repair operations in such a manner as to not disrupt normal business activities of adjacent enterprises.

B. Protect newly placed concrete from traffic.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Wood, steel or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required.

B. When forms are used and the pavement radius is less than 200 feet, the curved alignment shall be provided for by either standard steel forms equipped with flexible liners or by flexible forms. The forms shall be of the full depth of the section. Curb and gutter forms shall be so constructed as to permit the inside of the form to be securely fastened to the outside forms.

2.2 JOINT MATERIALS

A. Asphalt Expansion Joint Filler: Per Section 914 of the Michigan Department of Transportation Specification (latest edition).

B. Hot Poured Joint Sealer: Per Section 914 of the Michigan Department of Transportation Specification (latest edition).

C. Cold Applied Joint Sealer: Per Section 914 of the Michigan Department of Transportation Specification (latest edition).

D. Expansion papers shall be of the pre-molded non-extruding, asphalt impregnated type, not less than ½-inch thick. The length shall be equal to the width of the slab and the depth equal to the thickness of the slab plus 1-inch.

2.3 REINFORCING

A. Deformed Reinforcing Bars: Steel: ASTM A615, 60 ksi yield grade, deformed billet-steel bars, epoxy coated finish.

B. Deformed Bar Mats: ASTM A184; fabricated from ASTM A615; 60 ksi yield strength, steel bars, epoxy coated finish.

C. Welded Deformed Wire Fabric: ASTM A497; in flat sheets; epoxy coated finish.

D. Welded Plain Wire Fabric: ASTM A185; in flat sheets; epoxy coated finish.

E. Dowels: ASTM A615; 60ksi yield strength, plain steel bars; cut to length indicated on Drawings, square ends with burrs removed; epoxy coated finish.

F. Tie Wire: Black, Minimum 16-gauge annealed steel type, epoxy coated.

G. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.

H. Supports for Reinforcements: Bar supports conforming to “Bar Support Specifications” contained in the ACI “Manual of Standard Practice”. Provide chairs, spacers and other devices suitable for proper spacing, supporting and fastening reinforcing bars.

I. Shop fabricated reinforcing bars to conform to the shapes and dimensions shown on the reviewed Shop Drawings and in accordance with ACI “Manual of Standard Practice”.

2.4 CONCRETE MATERIALS

A. Cement: All cement used in pavement construction shall be Portland Cement per Section 901 of the Michigan Department of Transportation Specification (latest edition) or as approved by the Engineer/Owner.

B. Fine and Coarse Aggregates:

1. The fine aggregate shall meet all requirements of Section 902 of the Michigan Department of Transportation Specification (latest editions) for 2NS-Natural Sand

2. The coarse aggregate shall meet all requirements of Section 902 of the Michigan Department of Transportation Specification (latest edition) for No. 6A Coarse Aggregate.

C. Air Entrainment: Air-entraining admixture shall be in accordance with ASTM C260.

D. Chemical Admixture: ASTM C494.

E. Concrete must be ready-mixed concrete.

2.5 ACCESSORIES

A. Curing Compound: The curing compound ASTM C309, Type II, Class B, or approved equal. It shall not allow a moisture loss of more than 0.055 gr./sq. cm. when applied at 200 sft./gallon.

2.6 CONCRETE MIX

A. Production of Ready-Mixed Concrete:

1. Ready-mixed concrete shall be batched, mixed and transported in accordance with ASTM C94, and comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete," except as otherwise specified herein.

2. Ready-mixed concrete shall be mixed and delivered to the point of discharge at the job by means of a ready-mix concrete truck.

3. No water from the truck water system or elsewhere shall be added after the initial introduction of the mixing water for the batch. Under no circumstances shall the approved maximum water content be exceeded nor shall the slump exceed the maximum specified.

4. Discharge of the concrete shall be completed within 1-1/2 hours or before the drum has revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates.

5. In hot weather (air temperature 80-degrees F. and above) or under conditions contributing to quick stiffening of the concrete, the time shall be reduced to one hour.

6. Concrete delivered in cold weather (air temperature 45-degrees F. and lower) shall have a temperature not less than 60-degrees F. at the point of discharge at job, and in compliance with ACI 306 R "Cold Weather Concreting". Concrete placing will not be permitted when the air temperature is 35-degrees F. or lower.

7. Concrete delivered under hot weather conditions contributing to quick stiffening of concrete, or in air temperature of 80-degrees F. and over, shall have a temperature between 60- and 80-degrees F. at the point of discharge at job, and in accordance with ACI 305 R "Hot Weather Concreting."

B. Provide concrete to the following criteria:

1. Per Table 1004-1: Concrete Mixtures of the Michigan Department of Transportation Specification (latest edition).

C. Use calcium chloride only when approved by the Engineer in writing.

2.7 CLEANING OF THE MIXER OR TRUCK

A. In no case shall the mixer or truck be flushed out onto the street pavement, in a catch basin or sewer manhole, or in any public right-of-way. The contractor will be responsible for clean-up of all washout areas at no additional expense to the Owner.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.

C. Verify compacted subgrade is dry and ready to support paving and imposed loads.

1. Proof roll subbase with a (25-ton minimum weight) rubber-tired roller, loaded front-end loader or loaded dump truck in a minimum of two perpendicular passes to identify soft spots.

2. Remove soft subbase and replace with compacted fill as specified in Section 31 23 23.

D. Verify gradients and elevations of base are correct.

E. Verify all manhole, catch basin and inlet grates and frames (and any other type of casting within the area to be paved) are installed in correct position and at correct elevation.

3.2 BASE COURSE

A. Aggregate Base Course shall be installed per Section 32 05 16.

3.3 PREPARATION

A. Moisten substrate to minimize absorption of water from fresh concrete.

B. Coat surfaces of manholes, catch basins and inlets (and any other type of casting within the area to be paved) with oil to prevent bond with concrete paving.

3.4 LINE AND GRADE

A. The contractor will hire a Registered Land Surveyor to establish the line and grade from the Construction Plans.

3.5 PROPERTY MARKERS

A. All property stakes, irons, monuments, etc. shall be protected and shall not be moved without the written permission of the Property Owner.

3.6 FORMING

A. Compact and cut-to-grade subgrade under forms so that forms when set will be uniformly supported for the entire length. Securely stake and brace or tie forms to prevent leakage of mortar. Bracing with piles of earth will not be permitted.

B. Coat surfaces of forms to be in contact with concrete with light clear paraffin oil or parting compound which will not stain the concrete.

C. Before start of concrete placing, formwork shall be complete and approved by the Geotechnical Engineer.

D. Hardened concrete, debris and foreign material shall be removed from interior of forms.

3.7 REINFORCING

A. Provide reinforcement for concrete pavement as shown on the Drawings. Reinforcement shall be kept clean and free from objectionable rust. Bends or kinks in reinforcing bars shall be corrected before placing. All reinforcement shall be accurately located in forms and securely held in place, before and during concrete placing, by supports adequate to prevent displacement during the course of construction.

3.8 PLACING CONCRETE

A. Concrete shall be handled from the point of delivery and to concrete conveying equipment, and to the location of final deposit by methods which will prevent segregation and loss of concrete mix materials and in a manner, which will assure that the required quality of concrete is maintained.

B. Equipment for Conveying Concrete:

1. Runways for wheeled concrete conveying equipment shall be provided for the ready-mix concrete delivery point to the locations of final deposit.

2. The interior surfaces of concrete conveying equipment shall be maintained free of hardened concrete, debris, water, snow, ice and other deleterious materials.

C. When the temperature of the surrounding air is expected to be below 40-degrees F. during concrete placing or within 24-hours thereafter, the temperature of the plastic concrete, as placed, shall be no lower than 60-degrees F. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set of cold joints, and should not exceed 90-degrees F. When the temperature of the concrete exceeds 80-degrees F., precautionary measures approved by the Engineer shall be put into effect. When the temperature of steel forms is greater than 120-degrees F., the steel surfaces shall be sprayed with water just prior to placing the concrete.

D. Concrete shall be deposited continuously. Concrete which has partly hardened or has been contaminated by foreign materials shall not be placed; such concrete shall be removed from the Site and disposed of in a location approved by the Owner or Governing Agency.

E. Pavement may be constructed either by use of forms or by a mechanical paver, provided the required finish, and cross-section, as shown on Drawings, are obtained. Concrete shall be placed to provide one course monolithic structure without the use of mortar topping or sand-cement drier. Concrete shall be spaded or vibrated sufficiently to ensure satisfactory consolidation.

F. The concrete surface shall be struck off to a plane surface with a straightedge. After the surface has been floated to an even surface, the contraction joint shall be cut and all slab edges rounded with a 1/2-inch radius edging tool that will finish to a width of 2-inches. After the concrete has slightly set, a broom shall be brushed lightly across the surface at right angles to forms so as to impart the required finish per Section 3.13.

3.9 JOINTS FOR CONCRETE PAVEMENT

A. Per Section 902 of the Michigan Department of Transportation Specification (latest edition) and as listed in the Plans.

B. Provide contraction joints in concrete pavement at the end of each day's pour, unless the pour ends at an expansion joint; in line with all contraction joints and end-of-pour joints of abutting concrete placements, maximum intervals listed in the Plans..

C. Form contraction joints by sawing a 1/4" wide cut perpendicular to the surface and at right angles to the edge of pavement, to a depth of at least 1/4 the slab thickness with a minimum depth of 3 inches.

D. Longitudinal joints shall be placed parallel to edge of pavement and located at 1/3 points or as listed in the Plans. Depth and width are specified in paragraph 3.9B above.

E. Provide expansion joints in concrete pavement at tangent points or radius returns at intersections as listed in the Plans.

F. Provide expansion joints between concrete pavement and adjacent rigid structures not specified herein before.

G. Fill expansion joints with expansion joint filler strips, 1-inch thick unless otherwise shown on the Drawings. The strap shall extend the full depth of the concrete complying with AASHTO M-213, Type III.

H. Where the expansion joint will not be sealed, install joint filler strips with top flush with concrete finish elevation.

I. All contraction joints in concrete pavement sections shall be sealed with either hot-poured joint sealer or cold-applied joint sealer as listed in the Plans

J. Prior to applying joint sealer, remove wood strips. Clean joint groove of foreign matter and loose particles, and dry surface.

K. Slightly underfill joint groove with joint sealer to prevent extrusion of the sealer. Remove excess joint sealer material as soon after sealing as possible.

L. Subsequent to joint sealing, protect sealed areas from contact with injurious substances or damage from construction traffic or operations until project completion.

3.10 JOINTS FOR CONCRETE SIDEWALK

A. Contraction joints shall be placed at right angles to the edge of the sidewalk and perpendicular to the surface and at a depth of at least 1/4 the slab thickness with a minimum depth of 1-1/4 inches.

B. Where along a curve, joints must be perpendicular to the curve with a minimum length of 1 foot before intersecting another joint(s) in any direction. No joints are allowed to be cut at an angle other than 90° at the curb line.

C. Contraction joints shall be spaced as listed in n the Plans.

D. The concrete surface shall be struck off to a plane surface with a straightedge. After the surface has been floated to an even surface, the contraction joint shall be cut and all slab edges rounded with a ½-inch radius edging tool that will finish to a width of 2-inches.

E. After the concrete has set, a broom shall be brushed lightly across the surface at right angles to forms so as to impart the required finish per Section 3.13.

F. Expansion joints shall be placed at the following locations:

1. At the back of the curb and front edge of the sidewalks adjacent to each driveway.

2. At any place where a sidewalk abuts a building or fixed structure.

3. At any other locations listed in the Plans.

3.11 JOINTS FOR CONCRETE CURB AND GUTTER

A. Provide contraction joints in concrete curb and gutter at the end of each day's pour, unless the pour ends at an expansion joint, in line with all contraction joints and end-of-pour joints of the abutting concrete placements, at 40-foot maximum intervals and elsewhere as listed in the Plans.

B. Form contraction joints by steel templates ¼-inch in thickness, shaped to conform to the required cross-section of the curb. Leave templates in place until the concrete has set sufficiently to hold its shape.

C. Provide expansion joints in concrete curb and gutter at tangent points of curb returns, at intersections and in straight runs at uniform intervals not exceeding 400-feet on centers.

D. Provide expansion joints with expansion joint filler strips, 1-inch thick, unless otherwise shown on the Drawings. The strips shall extend the full depth of the concrete complying with AASHTO M-213, Type III.

E. After the concrete has set, a broom shall be brushed lightly across the surface at right angles to forms so as to impart the required finish per Section 3.13.

F. Install joint filler strips at the proper depth below the finished concrete construction with a slightly tapered, dressed-and-oiled wood strip temporarily secured to the top of the filler strip to form a groove not less than ¼-inch in depth.

G. All contraction joints in concrete curb sections shall be sealed with either hot-poured joint sealer or cold-applied joint sealer.

H. Prior to applying joint sealer, remove wood strips. Clean joint groove of foreign matter and loose particles and dry surface.

I. Slightly underfill joint groove with joint sealer to prevent extrusion of the sealer. Remove excess joint sealer materials as soon after sealing as possible.

J. Subsequent to joint sealing, protect sealed areas from contact with injurious substances or damage from construction traffic or operations until project completion.

K. Joints in curbing should align with joints in adjacent concrete paved sidewalk or site concrete.

3.12 FINISHING

A. Paving: Light broom.

B. Sidewalk Paving: Light broom, radius to1 inch radius, and trowel joint edges.

C. Curbs and Gutters: Light broom.

D. Direction of Texturing: Transverse to paving direction.

E. Place curing compound on exposed concrete surfaces immediately after finishing.

3.13 CURING AND WEATHER PROTECTION

A. Freshly placed concrete shall be protected as required to maintain the temperature of the concrete at not less than 50-degrees F nor more than 80-degrees F and in a moist condition continuously for a period of time necessary for the concrete to cure per Section 3.14B and 3.14C. Changes in temperature of the concrete during curing shall be as uniform as possible and shall not exceed 5-degrees F in any one hour, or 50-degrees F in any 24 hour period.

B. Cold Weather Protection: When the temperature of the atmosphere is 40-degrees F and below, the concrete shall be protected by heating, insulation covering, housing or combination thereof as required to maintain the temperature of the concrete at or above 50-degrees F and in a moist condition continuously for the concrete curing period. Cold weather protection shall meet the requirements of ACI 306R “Cold Weather Concreting”.

C. Hot Weather Protection: When the temperature of the atmosphere is 90-degrees F and above, or during other climatic conditions which will cause too rapid drying of the concrete, the concrete shall be protected by windbreaks, shading, fog spraying light-colored moisture-retaining covering, or a combination thereof as required to maintain the temperature of the concrete below 80-degrees F and in a moist condition continuously for the concrete curing period. Hot weather protection shall meet the requirements of ACI 305R “Hot Weather Concreting”.

3.14 IDENTIFICATIONS

A. Prior to the application of the curing compound, the Contractor shall clearly and neatly mark the pavement with the Contractor’s name and year of construction. This identification shall be stamped in the concrete at both ends of a length of pavement construction, at intersection locations of the pavement constructed, at both ends of a length of curb constructed and once in the middle, at both ends of a length of sidewalk constructed and at one spot in a driveway approach.

3.15 REMOVAL OF FORMS AND CLEAN UP

A. All forms, rails and stakes shall be removed within 24-hours after placing the pavement, sidewalk or curbs.

B. After completion of concrete curing in an area, remove all weather protection materials and rubbish and debris resulting from the specified Work, sweep concrete curbs clean and seal joints as specified in Sections 3.9 through 3.11.

3.16 ERECTION TOLERANCES

A. Maximum Variation of Surface Flatness: 1/8 inch in 10 ft.

B. Variation from Indicated Elevation: Maximum 1/4 inch.

C. Maximum Variation from True Position: 1/4 inch.

D. Scheduled Thickness: No less than specified on the Drawings.

3.17 FIELD QUALITY CONTROL

A. The Owner shall hire a 3rd party testing company to test in-place materials for compliance with the latest version of ASTM and MDOT Standard Specifications for Construction.

B. Perform field inspection and testing in accordance with ASTM C94 and local governing agency standards.

C. Inspect reinforcing placement for size, spacing, location, support.

D. Quality Control During Paving Operations:

1. Sampling Procedures: ASTM C172.

2. Cylinder Molding and Curing Procedures: ASTM C31, cylinder specimens.

3. Sample concrete and make three cylinders for each day of paving unless otherwise specified by the Owner. Record the locations where the samples are taken to correlate with subsequent testing.

4. Test one cured concrete cylinder from each sample set per ASTM C39 at 7-day and 28-day periods and report the type of failure and compressive strength at failure. Note the third cylinder is to be stored for future use.

5. Test slump in-field per ASTM C143 for each sample.

6. Test mix for air-entrainment per ASTM C231 for each sample.

E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

F. Additional testing may be required if any of the previous tests indicate insufficient values. If two successive tests indicate insufficient values, contact the Owner for a course of action.

G. Concrete materials not complying with the specified requirements shall be repaired or removed and replaced with new paving.

3.18 PROTECTION

A. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury. Refer to section 3.14 for additional detail.

B. Do not permit vehicular traffic over paving for a minimum of 14 days after finishing.

END OF SECTION

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Traffic lines and markings
2. Legends
3. Paint

B. Related Sections:

1. Section 32 12 16 - Asphalt Paving
2. Section 32 13 13 - Concrete Paving

1.2 PERFORMANCE REQUIREMENTS

A. Paint Adhesion: Adhere to road surface forming smooth continuous film one minute after application.

B. Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within two minutes after application.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit paint formulation for each type of paint.

C. Manufacturer's Installation Instructions: Submit instructions for application temperatures, eradication requirements, application rate, line thickness, and any other data on proper installation.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with local governing agency standards.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Invert containers several days prior to use when paint has been stored more than 2 months. Minimize exposure to air when transferring paint. Seal drums and tanks when not in use.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer

C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

D. Do not apply paint when temperatures are expected to fall below 40 degrees F for 24 hours after application.

E. Volatile Organic Content (VOC). Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint.

PART 2 PRODUCTS

2.1 PAINTED PAVEMENT MARKINGS

A. Furnish materials in accordance with local governing agency standards.

B. Color:

1. Traffic lane striping shall be white or yellow reflectorized as shown on the Plans.

2. Traffic marking, curb faces and light pole bases shall be yellow reflectorized as shown on the Plans.

3. Parking lot striping shall be yellow unless otherwise noted.

4. Handicap stall striping meeting current ADA guidelines shall be blue unless noted otherwise.

2.2 EQUIPMENT

A. Continuous Longitudinal Line Application Machine: Use application equipment with following capabilities.

1. Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.

2. Pressurized bead-gun to automatically dispense glass beads onto painted surface, at required application rate.

3. Measuring device to automatically and continuously measure length of each line placed, to nearest foot.

4. Device to heat paint as necessary for fast dry applications.

B. Machine Calibration:

1. Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of plus or minus 25 feet per mile.

2. Cycle Length/Paint Line Length Timer: Calibrate cycle length to maintain tolerance of plus or minus 6 inches per 40 feet; calibrate paint line length to maintain tolerance to plus or minus 3 inches per 10 feet.

3. Paint Guns: Calibrate to simultaneously apply paint binder at uniform rates as specified with an allowable tolerance of plus or minus 1 mil.

C. Other Equipment:

1. For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind stripers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Do not apply paint to pavement surfaces until it has cured for 28 days, unless approved by Owner.

3.2 PREPARATION

A. Maintenance and Protection of Traffic:

1. Prevent interference with marking operations and to prevent traffic on newly applied markings before markings dry.

2. Maintain access to existing businesses, and other properties requiring access.

B. Surface Preparation.

1. Clean and dry paved surface prior to painting.

2. Blow or sweep surface free of dirt, debris, oil, grease or gasoline or other material that would adversely affect paint bonding with pavement.

3. Pavement surface shall be protected during any paint transfer operations to contain spillage and splatter.

3.3 APPLICATION

A. Agitate paint for 1-15 minutes prior to application to ensure even distribution of paint pigment.

B. Dispense paint per manufacturer's recommendations to a wet-film thickness of 15 mils, except dispense edge markings to wet-film thickness of 12 mils.

C. Apply markings to indicated dimensions at indicated locations.

D. Prevent splattering and over spray when applying markings.

E. Unless material is track free at end of paint application, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking and apply new markings.

F. Collect and legally dispose of residues from painting operations.

G. Install Work in accordance with local governing agency standards.

3.4 APPLICATION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Wet Film Thickness: 1 mil.

C. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.

D. Maintain cycle length for skip lines at tolerance of plus or minus 6 inches per 40 feet and line length of plus or minus 3 inches per 10 feet.

E. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect for incorrect location, line length, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.

C. Repair lines and markings, which after application and curing do not meet following criteria:

1. Incorrect Location: Remove and replace incorrectly placed patterns.

2. Insufficient Thickness, Line Width, Paint Coverage, Glass Bead Coverage or Retention: Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface. Remove loose particles and debris. Apply new markings on cleaned surface in accordance with this Section.

3. Uncured or Discolored Material, Insufficient Bonding: Remove defective markings in accordance with this Section and clean pavement surface one foot beyond affected area. Apply new markings on cleaned surface in accordance with this Section.

D. When eradication of existing paint lines is necessary, eradicate by shot blast or water blast method. Do not gouge or groove pavement more than 1/16 inch during removal. Limit area of removal to area of marking plus 1 inch on all sides. Prevent damage to transverse and longitudinal joint sealers, and repair any damage according to requirements in Section 32 13 13 or Section 32 12 16.

E. Maintain daily log showing work completed, results of above inspections or tests, pavement and air temperatures, relative humidity, presence of any moisture on pavement, and any material or equipment problems. Make legible entries in log in ink, sign and submit to owner by end of each work day. Enter environmental data into log prior to starting work each day and at two additional times during day.

3.6 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time.

END OF SECTION

SOIL PREPARATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparation of subsoil.
2. Soil testing.
3. Placing topsoil.

B. Related Sections:

4. Section 31 22 13 - Rough Grading: Rough grading of site.
5. Section 31 23 17 - Trenching: Rough grading over cut.
6. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.
7. Section 32 92 19 - Seeding

1.2 REFERENCES

A. ASTM International:

1. ASTM D2607 – Classification of Peats, Mosses, Humus, and Related Products

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with local governing agency standards regarding materials, methods of work, and disposal of excess and waste materials.

PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil: As specified in Section 310516 Type S2. Frozen or muddy topsoil is not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify prepared soil base is ready to receive the Work of this section.

C. Locate and identify existing underground and overhead services and utilities within contract limit work areas. (Call private utility locating service and Miss Dig: 1-800-482-7171 or 811).

D. Provide adequate means to protect utilities and services designated to remain.

E. Repair utilities damaged during site work operations at Subcontractor's expense.

F. When uncharted or incorrectly charted underground piping or other utilities and services are encountered during site work operations, notify the applicable utility company and Engineer immediately to obtain procedure directions. Cooperate with applicable utility company in maintaining active services in operation.

G. Locate, protect and maintain bench marks, monuments, control points and project engineering reference points. Re-establish disturbed or destroyed items at Subcontractor's expense.

H. Perform landscape work operations and the removal of debris and materials to ensure minimum interference with streets, walks, and other adjacent facilities.

I. Protect existing trees scheduled to remain against injury or damage including cutting, breaking or skinning of roots, trunks or branches, smothering by stockpiled construction materials, excavated materials or vehicular traffic within branch spread.

3.2 DISPOSAL OF WASTE MATERIALS

A. Stockpile, haul from site and legally dispose of waste materials and debris. Accumulation is not permitted.

B. Maintain disposal routes, clear, clean and free of debris.

C. On site burning of combustible cleared materials is not permitted.

D. Upon completion of landscape preparation work, clean areas within contract limits, remove tools and equipment. Site to be clear, clean, and free of materials and debris and suitable for site work operations

E. Materials, items and equipment not scheduled for reinstallation or salvaged for the General Contractor are the property of the Landscape Contractor. Remove cleared materials from the site as the work progresses. Storage and sale of Landscape contractors salvage items on site is not permitted.

END OF SECTION

LANDSCAPE GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Final grade topsoil for finish landscaping.

B. Related Sections:

2. Section 31 22 13 - Rough Grading: Site contouring.
3. Section 31 23 17 - Trenching: Backfilling trenches.
4. Section 31 23 23 - Fill: Backfilling at building areas.
5. Section 32 05 16 - Soils and Aggregates.
6. Section 32 92 19 - Seeding.

1.2 SUBMITTALS

A. Materials Source: Submit name of imported materials source.

B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Furnish each topsoil material from single source throughout the Work.

B. Perform Work in accordance with local governing agency standards.

PART 2 PRODUCTS

2.1 MATERIAL

A. Topsoil: Fill Type S2 as specified in Section 32 05 16.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate base has been contoured and compacted.

3.2 PREPARATION

A. Protect landscaping and other features remaining as final Work.

B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

3.3 SUBSTRATE PREPARATION

A. Eliminate uneven areas and low spots.

B. Remove debris, roots, branches, stones, in excess of 1 inch in size. Remove contaminated subsoil.

C. Scarify surface to depth of 4 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.4 PLACING TOPSOIL

A. Prior to placing topsoil Contractor must call for an inspection by the Owner/Engineer to verify that the grading is within tolerance for installing the proper depth of topsoil.

B. Place topsoil in areas where seeding is required to compacted depth of 3 inches. Place topsoil during dry weather.

C. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

D. Remove roots, weeds, rocks, and foreign material while spreading.

E. Lightly compact placed topsoil.

F. Remove surplus subsoil and topsoil from site.

3.5 TOLERANCES

A. Top of Topsoil: Plus or minus 1/2 inch.

3.6 PROTECTION OF INSTALLED WORK

A. Prohibit construction traffic over topsoil.

END OF SECTION

SEEDING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.
2. Hydroseeding.
3. Mulching.

B. Related Sections:

1. Section 31 22 13 - Rough Grading: Rough grading of site.
2. Section 31 23 17 - Trenching: Rough grading over cut.
3. Section 32 05 16 - Soils and Aggregates.
4. Section 32 91 13 - Soil Preparation
5. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.

1.2 DEFINITIONS

A. Weeds: Vegetative species other than specified species to be established in given area.

1.3 SUBMITTALS

A. Product Data: Submit data for seed mix, fertilizer, mulch, and other accessories.

B. Submit seed vendor’s certification for required grass seed mixture, indicating percentage by weight, and percentage of purity, germination, and weed seed for each grass species.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Include maintenance instructions, cutting method and maximum grass height and types, application frequency, and recommended coverage of fertilizer.

1.5 QUALITY ASSURANCE

A. Provide seed mixture in original unopened containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging. Store in manner to prevent wetting and deterioration.

B. Perform Work in accordance with local governing agency standards.

1.6 QUALIFICATIONS

A. Seed Supplier: Company specializing in manufacturing Products specified in this section with minimum three years' experience.

B. Installer: Company specializing in performing work of this section with minimum 3 years' experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

PART 2 PRODUCTS

2.1 SEED MIXTURE

A. Lawn seeded areas: Fresh, clean and new crop seed mixture. Mixed by approved methods.

B. Seed mixture composed of the following varieties, mixed to the specified proportions by weight and tested to minimum percentages of purity and germination.

C. Detention Basin Embankment Seed Mixture as indicated below:

SEED TYPE	**OUNCES/ACRE**
Permanent Grasses/Sedges/Rushes:	
River Bulrush	1.00
Crested Oval Sedge	0.50
Bottlebrush Sedge	3.00
Brown Fox Sedge	2.00
Virginia Wild Rye	24.00
Fowl Manna Grass	1.00
Common Rush	1.00
Rice Cut Grass	1.00
Switch Grass	2.00
Great Bulrush	3.00
Dark Green Rush	2.00
Wool Grass	1.00
Temporary Cover:	
Common Oat	512.00
Forbs/Shrubs	
Common Water Plantain	2.50
Swamp Milkweed	2.00
Bidens Species	2.00
Common Boneset	1.00
Sneezeweed	2.00
Blue Flag	4.00

Common Water Horehound	0.50
Monkey Flower	1.00
Ditch Stonecrop	0.50
Pinkweed Species	2.00
Sweet Black-Eyed Susan	1.00
Brown-Eyed Susan	1.50
Common Arrowhead	1.00
Wild Senna	2.00
Panicled Aster	0.50
New England Aster	0.50
Purple Meadow Rue	2.00

No noxious weed seeds permitted

Basis of design is Cardno Stormwater Mix. Install per manufacturer's recommended application rates.

D. Irrigated Seed Mixture for grass areas proportioned by volume as indicated below:

SEED TYPE	PROPORTION	PURITY	GERMINATION
Penn Lawn Fescue	30%	95%	80%
Kentucky Bluegrass	50%	90%	75%
Annual Ryegrass	20%	95%	80%

No noxious weed seeds permitted.
(Fertilizer for irrigated lawn 12-12-12)

E. Non-irrigated Seed Mixture for grass areas proportioned by volume as indicated below:

SEED TYPE	PROPORTION	PURITY	GERMINATION
Penn Lawn Fescue	60%	90%	85%
Kentucky 28# common Bluegrass	20%	90%	90%
Pennfine Perennial Rye	20%	90%	90%

No noxious weed seeds permitted.
(Fertilizer for non-irrigated lawn 10-10-10)

2.2 EROSION CONTROL BLANKETS

A. The use of erosion control blankets will not be allowed on sloped earth/embankments flatter than 6H:1V.

B. For sloped earth/embankments between 3H:1V and 6H:1V the following erosion control blankets shall be used.

1. AEC Curlex Netfree

2. Engineer and owner approved equal

C. If the specified erosion control blanket will not work properly due to site conditions, as agreed to by the Owner and Engineer, and/or greater than a 3V:1H sloped earth/embankment, then the following erosion control blankets shall be used.

1. AEC Premier Straw FibreNet SN MSMC s75bn

2. AEC Premier Straw FibreNet DN MSMC s150bn

3. Engineer and owner approved equal

D. If erosion control blankets with netting are approved for use, then the Contractor must remove the blankets once there is 80% uniform growth established for the entire area. If the Contractor refuses to remove the netting 14 days after initial notification, then the Owner will remove the netting at Contractor's expense in the form of a deduct change order/credit to the contract. Final payment will not be issued to the Contractor until the netting has been removed to the satisfaction of the Owner.

2.3 ACCESSORIES

A. Water: Free of substance harmful to seed growth. Hoses or other methods to transpiration furnished by Sub Contractor.

2.4 SOURCE QUALITY CONTROL

A. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify prepared soil base is ready to receive the Work of this section.

C. Work notification: Notify Owner or General Contractor's representative at least seven (7) working days prior to start of seeding operation.

D. Protect existing utilities, paving, and other facilities from damage caused by seeding operations.

E. Perform seeding work only after planting and other work affecting ground surface has been completed.

F. Provide hose and lawn watering equipment as required.

3.2 SURFACE PREPARATION

A. After lawn areas have been prepared, take no heavy objects over them except lawn rollers.

B. After preparation of lawn areas and with topsoil in semi-dry condition, roll lawn planting areas in two directions at approximately right angles with water ballast roller weighing 100 to 300 lbs according to soil type.

C. Rake or scarify and cut or fill irregularities that develop as required until area is true and uniform, free from lumps, depressions, and irregularities.

D. Restore prepared areas to specified condition if eroded, settled or otherwise disturbed after fine grading and prior to seeding.

3.3 HYDROSEEDING

A. Hydro-seeding: The application of grass seed and a wood cellulose fiber mulch tinted green shall be accomplished in one operation by use of an approved spraying machine.

B. Mix seed, fertilizer, and wood cellulose fiber in required amount of water to produce homogenous slurry. Add wood cellulose fiber after seed, water, and fertilizer have been thoroughly mixed and apply at the rate of 200 pounds per acre dry weight.

C. For hydro-seeding, wood cellulose fiber shall be used. Silva-Fiber Mulch by Weyerhaeuer Company, Tacoma WA (800-443-9179) or approved equal.

D. Hydraulically spray material on ground to form a uniform cover impregnated with grass seed.

E. Immediately following application of slurry mix, make separate application of wood cellulose mulch at the rate of 1,000 pounds, dry weight, per acre.

F. Apply cover so that rainfall or applied water will percolate to underlying soil.

3.4 ESTABLISH LAWN

A. Establish dense lawn of permanent grasses, free from lumps and depressions. Any area failing to show uniform germination to be reseeded; continue until dense lawn established.

B. Damage to seeded area resulting from erosion to be repaired by Subcontractor.

C. In event Subcontractor does not establish dense lawn during first germination period, return to project to re-fertilize and reseed to establish dense lawn.

D. Should the seeded lawn become largely weeds after germination, Subcontractor is responsible to kill the weeds and reseed the proposed lawn areas to produce a dense turf, as specified.

3.5 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work to the approval of the Owner. Remove from site all excess materials, debris, and equipment. Repair damage resulting from seeding operations.

END OF SECTION

MANHOLES AND STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Monolithic concrete manhole section with masonry transition to cover frame, covers, anchorage, and accessories.

2. Modular precast concrete manhole section with tongue-and-groove joints [with masonry transition to cover frame,] covers, anchorage, and accessories.

3. Monolithic FRP manhole section with transition to cover frame, covers, anchorage, and accessories.

4. Masonry manhole section with masonry transition to cover frame, covers, anchorage, and accessories.

5. Outlet Control Structures for detention areas.

6. Bedding and cover materials.

B. Related Sections:

1. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill in trenches.

2. Section 31 23 16 - Excavation: Excavating for manholes.

3. Section 31 23 23 - Fill: Backfilling after manhole installation.

1.2 REFERENCES

A. American Concrete Institute:

1. ACI 318 - Building Code Requirements for Structural Concrete.

2. ACI 530/530.1 - Building Code Requirements for Masonry Structures and Specifications for Masonry Structures.

B. ASTM International:

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.

2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

3. ASTM C55 - Standard Specification for Concrete Brick.

4. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale).

5. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.

6. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

7. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.

8. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

9. ASTM D3753 - Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wet wells.

10. ASTM A760/A760M-15 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains

1.3 DESIGN REQUIREMENTS

A. Equivalent strength: Based on structural design of reinforced concrete as outlined in ACI 318.

B. Design of Lifting Devices for Precast Components: In accordance with ASTM C913.

C. Design of Joints for Precast Components: In accordance with ASTM C913; maximum leakage of 0.025 gallons per hour per foot of joint at 3 feet of head.

1.4 SUBMITTALS

A. Shop Drawings: Indicate manhole locations, elevations, piping with sizes and elevations of penetrations.

B. Product Data: Submit manhole cover and frame construction, features, configuration, dimensions.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with local governing agency standards.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum of three years experience.

1.7 DELIVERY, STORAGE AND HANDLING

A. Comply with precast concrete manufacturer’s instructions for unloading, storing and moving precast manholes.

B. Store precast concrete manholes to prevent damage to Owner’s property or other public or private property. Repair property damaged from materials storage.

C. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

PART 2 PRODUCTS

2.1 MANHOLES

A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C923.

B. Mortar and Grout: Mortar for finishing and sealing shall be Class “C”. Honeycombing less than 2 inches deep shall be repaired using Class “D” mortar.

C. Brick Transition Reinforcement: Formed steel 8 gage wire with galvanized finish.

2.2 OUTLET CONTROL STRUCTURES

A. Structure shall be material and size as indicated on Drawings.

B. Casting shall be material and size as indicated on Drawings.

C. Base shall be material and size as indicated on Drawings.

D. Bedding and backfill shall be material and sizes as indicated on Drawings.

2.3 FRAMES AND COVERS

A. Manufacturers:

1. EJ or approved equal.

B. Product Description: ASTM A48, Class 30B Heavy-Duty Cast-iron construction, machined flat bearing surface, removable lid, closed or open as indicated on Drawings; sealing gasket; cover molded with identifying name and logo as required by local governing agency.

2.4 COMPONENTS

A. Manhole Steps: M.A. Industries P.S.I. Polypropylene or approved equal.

B. Base Pad: Cast-in-place concrete 3,000 psi at 28 days, leveled top surface.

2.5 CONFIGURATION

A. Manhole Section Construction: Concentric with eccentric cone top section.

B. Shape: Cylindrical.

C. Clear Inside Dimensions: 48-inch diameter or as indicated on Drawings.

D. Design Depth: As indicated on Drawings.

E. Clear Lid Opening: 24-inch minimum diameter or as indicated on Drawings.

F. Pipe Entry: Provide openings as indicated on Drawings.

G. Steps: 16 inches on center vertically, set into manhole wall. As indicated on Drawings.

2.6 BEDDING AND COVER MATERIALS

A. Bedding: Fill Type A1 as specified in Section 31 05 16 and as indicated on Drawings.

B. Cover: Fill Type A2, as specified in Section 31 05 16 and as indicated on Drawings.

2.7 FINISHING - STEEL

A. Galvanizing: ASTM A123, hot dip galvanized after fabrication.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify items provided by other sections of Work are properly sized and located.

C. Verify built-in items are in proper location, and ready for roughing into Work.

D. Verify correct size of manhole excavation.

3.2 PREPARATION

A. Coordinate placement of inlet and outlet pipe required by other sections.

B. Do not install structures where site conditions induce loads exceeding structural capacity of structures.

C. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage. Remove and replace damaged units.

3.3 INSTALLATION

A. Excavation and Backfill:

1. Excavate for manholes in accordance with Section 31 23 16 in location and to depth shown. Provide clearance around sidewalls of structure for construction operations.

2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes in dry trench.

3. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation.

B. Place base pad, trowel top surface level.

C. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.

D. Backfill excavations for manholes in accordance with Section 31 23 16 and 31 23 23.

E. Form and place manhole cylinder plumb and level, to correct dimensions and elevations.

F. Cut and fit for pipe.

G. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour to form continuous drainage channel as indicated on Drawings.

H. Set cover frames and covers level without tipping, to correct elevations.

I. Coordinate with other sections of Work to provide correct size, shape, and location.

3.4 PRECAST CONCRETE MANHOLE INSTALLATION

A. Lift precast components at lifting points designated by manufacturer.

B. When lowering manholes into excavations and joining pipe to units, take precautions to ensure interior of pipeline and structure remains clean.

C. Set precast structures bearing firmly and fully on crushed stone bedding, compacted in accordance with provisions of Section 31 23 16, Section 31 23 23 or on other support system shown on Drawings.

D. Assemble multi-section structures by lowering each section into excavation. Lower, set level, and firmly position base section before placing additional sections.

E. Remove foreign materials from joint surfaces and verify sealing materials are placed properly. Maintain alignment between sections by using guide devices affixed to lower section.

F. Joint sealing materials may be installed on site or at manufacturer’s plant.

G. Verify manholes installed satisfy required alignment and grade.

H. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe. Fill annular space with mortar.

I. Cut pipe to finish flush with interior of structure.

J. Shape inverts through manhole as shown on Drawings.

3.5 CAST-IN-PLACE CONCRETE MANHOLE INSTALLATION

A. Prepare crushed stone bedding or other support system shown on Drawings, to receive base slab as specified for precast structures.

B. Erect and brace forms against movement.

C. Install reinforcing steel as indicated on Drawings.

D. Place and cure concrete.

3.6 FRAME AND COVER INSTALLATION

A. Set frames using mortar and masonry. Install radially laid concrete brick with 1/4-inch-thick vertical joints at inside perimeter. Lay concrete brick in full bed of mortar and completely fill joints. Where more than one course of concrete brick is required, stagger vertical joints.

B. Set frame and cover 2 inches above finished grade for manholes with covers located within unpaved areas to allow area to be graded away from cover beginning 1 inch below top surface of frame.

3.7 FIELD QUALITY CONTROL

A. Test concrete manhole and structure sections in accordance with ASTM C497.

B. Vertical Adjustment of Existing Manholes:

1. Where required, adjust top elevation of existing manholes to finished grades shown on Drawings.

2. Reset existing frames, grates and covers, carefully removed, cleaned of mortar fragments, to required elevation in accordance with requirements specified for installation of castings.

3. Remove concrete without damaging existing vertical reinforcing bars when removal of existing concrete wall is required. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement, as indicated Drawings.

4. Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete.

END OF SECTION

STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Storm drainage piping.
2. Accessories.
3. Catch basins.
4. Bedding and cover materials.

B. Related Sections:

1. Section 31 05 16 – Soils and Aggregates: Aggregate for backfill in trenches.
2. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this section.
3. Section 31 23 17 - Trenching: Execution requirements for trenching required by this section.
4. Section 31 23 23 - Fill: Requirements for backfill to be placed by this section.
5. Section 33 05 13 - Manholes and Structures.
6. Section 33 46 00 - Subdrainage: Termination of catch basin subdrain system for connection to Work of this Section.

1.2 REFERENCES

A. ASTM International:

1. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
2. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
4. ASTM D1785 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe
5. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

6. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

7. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.

8. ASTM D3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

9. ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

10. ASTM A760/A760M-15 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains

1.3 SUBMITTALS

A. Product Data: Submit data indicating pipe and pipe accessories.

B. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents:

1. Accurately record actual as-built locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with local governing agency standards.

1.6 COORDINATION

A. Coordinate the Work with termination of storm sewer connection outside building, trenching, and connection to private or municipal sewer utility service.

PART 2 PRODUCTS

2.1 STORM DRAINAGE PIPING

A. Reinforced Concrete Pipe: ASTM C76, Class IV unless indicated otherwise on Drawings.

1. Fittings: Reinforced concrete.

2. Joints: ASTM C443, rubber compression gasket.

B. Corrugated Metal Pipe: A760/A760M-15 material, fittings and joints as indicated on Drawings.

C. Plastic Pipe: ASTM D1785, SCH 26, Poly (Vinyl Chloride) (PVC) material; bell and spigot style rubber ring sealed gasket joint.

1. Fittings: PVC.

2. Joints: ASTM D3212, elastomeric gaskets.

2.2 CATCH BASINS

A. Catch Basin Lid and Frame Manufacturers:

1. EJ or approved equal.

B. Catch Basin Lid and Frame:

1. Construction: Cast iron or ductile iron construction as indicated on Drawings.

C. Shaft Construction and Cone Top Section: Reinforced precast concrete pipe sections, lipped male/female joints, nominal shaft diameter as indicated on Drawings, conforming to City of Troy Standard Details and Specifications.

D. Base Pad: Pre-cast or cast-in-place concrete of type specified on Drawings.

2.3 CLEANOUTS

A. Cleanout Lid and Frame Manufacturers:

1. EJ or approved equal.

2.4 BEDDING AND COVER MATERIALS

A. Bedding: Fill Type A1 as specified in Section 31 05 16.

B. Cover: Fill Type A2, as specified in Section 31 05 16.

C. Soil Backfill from Above Pipe to Finish Grade: Soil Type A2, as specified in Section 31 05 16.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify trench cut and excavation is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

C. Contractor shall hire a Registered Land Surveyor to establish lines and grades for storm sewer installation.

3.3 BEDDING

A. Excavate pipe trench in accordance with Section 31 23 17 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level materials in continuous layers not exceeding 6 inches compacted depth, each layer. Place compacted bedding material to elevation of paving subgrade as indicated on Drawings.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with ASTM D2321, ASTM C12 or manufacturer's published instructions, and state or local requirements. Seal joints watertight. Pipe shall be +/- 0.10' of the elevation shown on Drawings.

B. Install pipe on minimum 6-inch bedding, ½" to 1 ½" crushed angular graded stone compacted to 95% maximum dry unit weight per ASTM D1557.

C. Lay pipe to slope gradients indicated on Drawings.

D. Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness equal to paving subgrade elevation indicated on Drawings.

E. Refer to Section 31 23 23 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.

F. Refer to Section 33 05 13 for manhole requirements.

G. Connect to private or municipal storm sewer system, manholes, catch basins, and inlets as indicated on Drawings.

H. Install site storm drainage system piping to 5 feet of building. Coordinate with other trades/contractors to ensure depth and location are adequate for connection.

I. Install Work in accordance with local government standards.

3.5 INSTALLATION - CATCH BASINS

A. Form bottom of excavation clean and smooth to elevation indicated on Drawings.

B. Form and place cast-in-place concrete base pad, with provision for storm sewer to be placed at required elevations.

C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.

D. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.

E. Mount grate and frame level, in grout, secured to top section to elevation indicated.

F. Connect to catch basin subdrainage system piping. Refer to Section 33 46 00.

G. Install Work in accordance with local government standards.

3.6 FIELD QUALITY CONTROL

A. The Owner shall hire a 3rd party testing company to test in-place materials for compliance with the requirements for density and thickness per the latest version of ASTM and MDOT Standard Specifications for Construction.

B. Request inspection prior to and immediately after placing aggregate cover over pipe.

C. Compaction Testing: In accordance with ASTM D1557.

D. When tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Compaction Tests: One test for each 50 lineal feet of trench.

F. Infiltration Test: Test in accordance with applicable local Public Works Department Standard Specifications and requirements.

G. Deflection Test: Test in accordance with applicable local Public Works Department Standard Specifications and requirements.

H. Pressure Test: Test in accordance with applicable local Public Works Department Standard Specifications and requirements.

3.7 PROTECTION OF FINISHED WORK

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.

2. Repair or replace pipe that is damaged or displaced from construction operations.

END OF SECTION

SUBDRAINAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Catch basin finger drain system.

2. Pavement underdrain system

B. Related Sections:

1. Section 31 05 16 – Soils and Aggregates.

2. Section 31 23 23 – Fill.

3. Section 33 41 00 - Storm Utility Drainage Piping: Connection to catch basin.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M252 – Standard Specification for Corrugated Polyethylene Drainage Pipe.

1.3 SUBMITTALS

A. Shop Drawings: Indicate dimensions, layout of piping, high and low points of pipe inverts.

B. Product Data: Submit data on pipe drainage products and pipe accessories.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with local governing agency standards.

PART 2 PRODUCTS

2.1 PIPE MATERIALS

A. Furnish materials in accordance with local governing agency standards.

B. HDPE corrugated polyethylene pipe: AASHTO M-252 Type CP; perforated, flexible type, with required fittings per Plans.

2.2 AGGREGATE AND BEDDING

A. Filter Aggregate and Bedding Materials: Drainage aggregate as specified in Section 31 05 16.

2.3 ACCESSORIES

A. Pipe Coupling: Pre-fabricated coupling with soil tight gasketed joint.

B. Filter Fabric: Water pervious type, polyester; with filter pipe sock, or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify excavated base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations.

B. Remove large stones or other hard matter which could damage drainage piping or impede consistent backfilling or compaction.

3.3 INSTALLATION

A. Place drainage pipe on aggregate pipe bedding.

B. Lay pipe to slope gradients noted on Drawings; with maximum variation from indicated slope of 1/8 inch in 10 feet.

C. Place pipe with perforations facing down.

D. Install pipe couplings as needed.

E. Install Drainage aggregate at sides, over joint covers and top of pipe.

F. Place filter fabric over leveled top surface of aggregate cover prior to subsequent backfilling operations.

G. Place trench backfill aggregate in maximum 6-inch lifts, consolidating each lift.

H. Refer to Section 31 23 23 for compaction requirements. Do not displace or damage pipe when compacting.

3.4 FIELD QUALITY CONTROL

A. The Owner shall hire a 3rd party testing company to test in-place materials for compliance with the requirements for density and thickness per the latest version of ASTM and MDOT Standard Specifications for Construction.

B. Request inspection prior to and immediately after placing aggregate cover over pipe.

C. When inspections indicate work does not meet specified requirements, remove work, replace and retest.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation begins.

END OF SECTION

SLURRY SEAL

I. SCOPE:

The work covered by this specification consists of furnishing all labor, equipment and materials to perform all operations necessary in connection with the application of an emulsified asphalt slurry seal surface upon the designated surface, in complete and strict accordance with this specification.

II. CONTRACTOR'S OUALIFICATION:

A. The contractor submitting a bid shall have a current pre-qualification with the MDOT for Slurry Seal.

B. The contractor shall have performed successful Slurry Seal in at least four (3) communities or sites of similar type work, specifically, parking lots.

C. The bidder's general questionnaires attached to this specification shall be completed to the satisfaction of the engineer.

III. APPLICABLE SPECIFICATIONS: The following specifications and methods form a part of this specification:

- ASTM - American Society for Testing and Materials
- ISSA - International Slurry Seal Association

A. AGGREGATE AND MINERAL FILLER

- ASTM D75 Sampling Stone, Slag Gravel, Sand and Stone Block for use as Highways Materials.
- ASTM C136 Sieve Analysis of Fine or Coarse Aggregate.
- ASTM C117 Amount of Material Finer than No. 200 Sieve in Aggregate.
- ASTM D24l9 Plastic Fines in Graded Aggregate and Soils by use of the Sand Equivalent Test.
- ASTM C128 Specific Gravity and Absorption of Fine Aggregate.
- ASTM C29 Unit Weight of Aggregate.
- ASTM C131 Abrasion of Coarse Aggregate by use of the Los Angeles Machine.
- ASTM C183 Sampling Hydraulic Cement.
- ASTM D546 Sieve Analysis of Mineral Filler.
- ASTM D242 Mineral Filler for Bituminous Paving Mixtures.

B. EMULSIFIED ASPHALT

- ASTM Dl40 Sampling Bituminous Materials. :
- ASTM D244 Testing Emulsified Asphalt

- ASTM D977 Specifications for Anionic Emulsified Asphalt.
- ASTM D2397 Specifications for Cationic Emulsified Asphalt.
- ASTM D2172 Bitumen Content of Paving Mixture by Centrifuge.
- ISSA T100 Measurement of Wear of Slurry Seal Mixtures by Wet Tract Abrasion.

IV. DESCRIPTION:

The slurry seal surface shall consist of a mixture of emulsified asphalt, mineral aggregate, and water, properly proportioned, mixed and spread evenly on the surface as specified herein and as directed by the engineer. The cured slurry shall have a homogeneous appearance, fill all cracks, adhere firmly to the surface and have a skid resistant texture.

V. MATERIALS:

A. ASPHALT EMULSION. The emulsified asphalt shall conform to the requirement of International Slurry Seal Association Specification, for type CSS-1H.

B. AGGREGATE. The mineral aggregate shall consist of natural or manufactured sand, slag, crusher fines, and others, or a combination thereof. Smooth-textured sand of less than 1.25 percent water absorption shall not exceed 50 percent of the total combined aggregate. The aggregate shall be clean and free from vegetable matter and other deleterious substances. When tested by ASTM D24 19, the aggregate blend shall have a sand equivalent of not less than 45. When tested according to ASTM C88 the aggregate shall show a loss of not more than 15%. When tested according to ASTM C131 the aggregate shall show a loss of not more than 30%.

Mineral fillers such as Portland cement, limestone dust, fly ash, and others shall be considered as part of the blended aggregate and shall be used if required by the mix design. They shall meet the gradation requirements of ASTM D242.

The combined mineral aggregate shall conform to the following gradation when tested by the previously mentioned test.

TYPE II

SIEVE SIZE	PERCENT PASSING
3/8	100
No. 4	90-100
No. 8	65-90
No. 16	45-70
No. 30	30-50
No. 50	18-30
No. 100	10-21
No. 200	5-15

Theoretical Asphalt Content
% Dry Aggregate 7.5-13.5

TYPE II. This aggregate blend is used when it is desired to fill surface voids, correct severe surface conditions, and provide sealing and a minimum wearing surface. An application rate of 15 (plus or minus) 2 pounds per square yard based on dry aggregate weight is used when standard aggregates are utilized.

C. WATER. All water used with the slurry mixture shall be potable and free from harmful soluble salts.

D. LABORATORY TESTING. Sources of all materials shall be selected prior to the time that the materials are required for use *in* the work. All samples shall be taken according to procedures previously mentioned. All materials shall be pretested in a qualified laboratory as to their suitability for use in slurry. The theoretical asphalt content shall be determined. The laboratory shall also determine if a mineral filler is required, and if so, how much should be used. Test samples shall be made and tested on Wet Track Abrasion Machine. A complete laboratory analysis and test report accompanied by abraded and unabraded slurry test samples shall be submitted by the Contractor before the job starts.

E. STOCKPILING OF AGGREGATES. Precautions shall be taken to ensure that stockpiles do not become contaminated with over-sized rock, clay, silt, or excessive amounts of moisture. The stockpile shall be kept in areas that drain readily. Segregation of the aggregate will not be permitted

F. STORAGE. The contractor shall provide suitable storage facilities for the asphalt emulsion. The container shall be equipped to prevent water from entering the emulsion. Suitable heat shall be provided if necessary, to prevent freezing.

G. SAMPLING. Samples of materials and of the finished slurry surfaces shall be furnished by the Contractor as directed by the Engineer during progress of the work. Test reports may be requested from the Contractor as additional materials arrive.

H. DESIGN. The bidder shall submit to the Engineer a **complete laboratory design** made in a qualified laboratory before the work commences. A complete analysis of the materials and job Mix Formula proposed for use in the performance of the work shall be made in accordance with procedures outlined in the current issue of International Slurry Seal Association Technical Bulletin No. 11, or as indicated by the engineer. The Contractor shall select the optimum design for the materials selected and provide them to the Engineer for review. The bidder shall follow the recommendations and calibrate their machines to apply the materials including mineral filler if called for by the mix design for better mix performance. The Engineer may waive the design submittals provided the bidder has previously applied in this subdivision a satisfactorily designed and applied slurry with substantially the same materials proposed for this work. In any case, untried materials may not be introduced into this work without complete analysis and design of a Job Mix Formula for each new material approved by the Engineer.

VI. EQUIPMENT:

All equipment used in the performance of this work shall l be maintained in satisfactorily working order at all times.

A. SLURRY MIXING EOUIPMENT: A minimum of two (2) continuous flow slurry machines, minimum capacity of eight (8) tons shall be provided. They shall be capable of delivering accurately a predetermined proportion of aggregate, water and asphalt emulsion to the mixing chamber and to discharge the thoroughly mixed product on a continuous basis. The aggregate shall be pre-wetted immediately prior to mixing with the emulsion. The mixing unit of the mixing chamber shall be capable of thoroughly blending all ingredients together. No violent mixing shall be permitted.

The mixing machine shall be equipped with an approved fines feeder that provides a calibrated and accurate metering device or method to introduce a predetermined proportion of mineral filler into the mixer at the same time and location that the aggregate is fed. The feeder shall be used whenever added mineral filler is a part of the aggregate blend. The mixing machine shall be equipped with a water pressure system and fog type spray bar adequate for complete fogging the surface preceding spreading equipment with a maximum application of 0.05 gallons per square yard.

Contractor shall submit, as part of their bid package, a list of critical equipment for this process and the maintenance and calibration records.

B. CALIBRATION- Each material delivery function (a) fines feed, (b) aggregate feed, and (c) emulsion feed, shall be independently operated and monitored with digital counters capable of giving accumulated readings of the material usage on a daily basis.

All instruments, gauges and meters shall be accurate within +/- 5% of the operating range required. All instruments and controls shall be centrally mounted in a protected console and shall be readily accessible during operation to the Engineer or his designated representative.

The bidder will **submit calibration sheets** for each machine to substantiate meter readings and aggregate openings (gal/count, #/count). Daily counter readings will be supplied to the inspector with yardage applied to verify application rates. If readings do not confirm correct application rates, recalibration on site will be required before additional work is applied.

C. SLURRY SPREADING EQUIPMENT. Attached to the mixer machine shall be a mechanical type squeegee box equipped with flexible material in contact with the surface to prevent loss of slurry from the box. It shall be maintained so as to prevent loss of slurry on varying grades and crown by rotating at center of box. There shall be a steering device and a flexible strike-off. The spreader box shall have an adjustable width from 8 to 12 feet. The box shall be kept clean, and build-up of asphalt and aggregate on the box shall not be permitted. The use of burlap drags or other drags shall be approved by the Engineer.

D. CLEANING EOUIPMENT. Power brooms, power blowers, air compressors, water flushing equipment, and hand brooms shall be suitable for cleaning the surface and cracks of the old surfaces.

E. AUXILLIARY EOUIPMENT. Hand squeegees, shovels and other equipment shall be provided as necessary to perform work.

VII. PREPARATION OF SURFACE:

A. Contractor will sweep/vacuum/blow the surfaces before the slurry seal application.

B. Contractor shall route and seal all joints and cracks greater than ¼-inch in width prior to placing of slurry seal.

C. A tack coat will be applied if the slurry is being placed over a brick or concrete surface, highly absorbent asphalt surface, or over a surface where the aggregate has become exposed and is polished and slick, a 1-part emulsion, 3-part water, tack coat of the same asphalt emulsion type and grade as specified for the slurry is recommended. This can be applied with an asphalt distributor or slurry machine adapted to apply tack coat. The normal application rate of 0.05 to 0.10 gallons of the diluted emulsion per square yard of surface. The Engineer should give final approval. Areas requiring tack coat shall be included in the Contractor's base bid. If area where a tack coat is required are not clear, the Contractor shall ask a question during the bidding process so a clarification can be provided.

VIII. COMPOSITION AND RATE OF APPLICATION OF THE SLURRY MIX:

The amount of asphalt emulsion to be blended with the aggregate shall be that as determined by the laboratory report after final adjustment in the field. A minimum amount of water shall be added as necessary to obtain a fluid and homogeneous mixture. The Engineer shall give final approval to the design and rate of application used.

IX. WEATHER LIMITATION:

The slurry seal surface shall not be applied if either the pavement or air temperature are 55 F or below and falling, but may be applied with both the air and pavement temperature are 45 F or above and rising. The mixture should not be applied if high relative humidity prolongs the curing beyond a reasonable time.

X. TRAFFIC CONTROL.

Suitable methods such as barricades, flag-men, pilot cars, etc., shall be used to protect the uncured slurry surface from all type of traffic, owner to do necessary barricading and/or flagging of traffic. Any damage to the uncured slurry will be the responsibility of the Contractor.

XI. APPLICATION OF THE SLURRY SURFACES:

A. GENERAL. The surface shall be fogged with water directly preceding the spreader. The slurry mixture shall be of the desired consistency when deposited on the surface and no additional elements shall be added. Total time of mixing shall not exceed four (4) minutes. A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that complete coverage is obtained. No lumping, bailing or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate fines shall be permitted. If the coarse aggregate settles to the bottom of the mix, the slurry will be removed from the pavement. No excessive breaking of the emulsion will be allowed in the spreader box. No streaks caused by oversized or clumped aggregate will be left in the finished surface. The approved final surface will have uniform color and texture. Areas deemed not in compliance with this requirement are subject to rework or replacement.

B. JOINTS. No excessive build-up or unsightly appearance shall be permitted on longitudinal or transverse joints.

C. HAND WORK. Approved squeegees shall be used to spread slurry in non-accessible areas to the slurry mixer. Care shall be exercised in leaving no unsightly appearance from hand work.

D. CURING. Treated areas will be allowed to cure until such time as the Owner or Engineer permits their opening to traffic. Contractor shall schedule the work to permit adequate cure time for the owner to resume operations with no visual impact to the finished surface.

E. INTERSECTION. Care should be taken to achieve a clean straight line as directed by the Engineer by use of 15-pound roofing felt or equal. All roofing felt will be removed at completion of work.

END OF SECTION

BIDDER'S GENERAL QUESTIONNAIRE

Please give the following information regarding your proposal for this bid:

1. Number of years experience in this work:
2. List number and types of equipment to be used if awarded this bid:

_____ _____

_____ _____

_____ _____

3. List the municipalities/school districts that you have contracted with during the past 10 years for this type work:

_____

_____

_____

_____

4. Name of your bank and other financial reference:
5. Name of your insurance carrier:
   - PL/PD/BI Insurance Carrier:
   - Workmen's Compensation:
6. Comments:

_____

_____

Signed: _____

Title: _____

Name and Address of Firm:

_____

_____

_____

Date: