

TEXTILE ROAD RAIN GARDEN						
Pittsfield Charter Township						
June 24, 2020						Source
1	Big Blue Stem - 1 gallon	28	EA	\$10.50	\$294	Christensen
2	Switch Grass - 1 gallon	102	EA	\$7.00	\$714	Christensen
3	Swamp Milkweed - 3" pot	41	EA	\$4.50	\$185	Christensen
4	Tall Coreopsis- 3" pot	8	EA	\$8.00	\$64	Margolis
5	Purple Coneflower- 3" pot	8	EA	\$4.60	\$37	Christensen
6	Boneset- 3" pot	33	EA	\$6.00	\$198	Christensen
7	Joe Pye Weed- 3" pot	22	EA	\$6.00	\$132	Christensen
8	White Snakeroot- 3" pot	55	EA	\$6.00	\$330	Christensen
9	Sneezeweed- 3" pot	39	EA	\$6.00	\$234	Christensen
10	Blue Flag Iris- 3" pot	33	EA	\$4.60	\$152	Christensen
11	Bee Balm- 3" pot	28	EA	\$4.60	\$129	Christensen
12	Blazing Star- 3" pot	29	EA	\$4.60	\$133	Christensen
13	Black-Eyed Susan- 3" pot	34	EA	\$4.60	\$156	Christensen
14	Rough Goldenrod- 3" pot	29	EA	\$6.00	\$174	Christensen
15	Blue Vervain- 3" pot	17	EA	\$6.00	\$102	Christensen
16	Redosier Dogwood 5 Gallon	6	EA	\$30.00	\$180	Margolis
17	Fragrant Sumac 5 Gallon	12	EA	\$32.00	\$384	Margolis
18	Elderberry 5 Gallon	3	EA	\$40.00	\$120	Margolis
19	Witchhazel 5 Gallon	10	EA	\$36.00	\$360	Margolis
SUB TOTAL					\$4,078	
20	Large Boulders - approx 36" dia	13	EA	\$90.00	\$1,170	Margolis
21	Medium Boulders - approx 24" dia	12	EA	\$40.00	\$480	Margolis
22	Small Boulders (approx. 18" dia)	18	EA	\$25.00	\$450	Margolis
SUB TOTAL					\$2,100	
23	Silt Fence	170	LF	\$2.00	\$340	
24	Clean out	4	EA	\$50.00	\$200	
25	Concrete Flared End Section for 6" pipe	1	EA	\$30.00	\$30	
26	Rock Channel Protection	6	SF	\$10.00	\$60	
27	6" Storm Pipe - perforated underdrain	185	LF	\$12.00	\$2,220	
28	Decorative Gravel - Bio Swale (1,030 SF at 8" depth)	25	CY	\$65.00	\$1,625	
29	Non-Woven Geotextile Fabric per MDOT 910	1030	SF	\$2.00	\$2,060	
30	Sign	1	EA	\$300.00	\$300	
31	Seeding	725	SY	\$1.00	\$725	
32	Bioretention Soil 18" x 3088 / 27	171	CY	\$35.00	\$5,985	
33	Mulch 3" x 3088 sf / 27	29	CY	\$30.00	\$870	
34	Equipment at Township rates	1	EA	\$13,000.00	\$13,000	
35	Labor at Township rates	1	EA	\$12,000.00	\$12,000	
SUB TOTAL					\$39,415	
TOTAL					\$45,593	
10% CONTINGENCY					\$4,559	
TOTAL ESTIMATE					\$50,152	
Funding Sources: SEMCOG Grant = \$46,500						
Statements of Probable Construction Cost and Detailed Cost Estimates prepared by Stantec represent their best judgement as design professionals familiar with the construction industry. It is recognized, however, that these professionals have no control over the cost of labor, materials, or equipment, over the contractor's method of determining bid prices, or over competitive bidding or market conditions. Accordingly, Stantec cannot and does not guarantee that the bids will not vary from any Statement of Probable Construction Cost or other cost estimates that they have prepared.						



Pittsfield Charter Township  
May 13, 2020

	assume 3 weeks, 15 days, 8 hrs per day				
Number	Description	price/hr	est hours		
EQ-014	Cat 311 Excavator	\$43.39	40	\$1,735.60	
EQ-015	Cat 279 MTL	\$42.12	40	\$1,684.80	
EQ-016	Terex Backhoe	\$42.02	80	\$3,361.60	
TR-003	40' Trailer (King)	\$5.27	120	\$632.40	
16-01	Ford F250 4X4	\$12.06	120	\$1,447.20	
16-02	Ford F250 4X4	\$12.06	60	\$723.60	
16-03	Ford F250 4X4	\$12.06	60	\$723.60	
11--01	GMC 7500 5yrd dump box	\$20.42	60	\$1,225.20	
12--01	GMC 8500 5yrd dump box	\$20.42	60	\$1,225.20	
				<b>\$12,759.20</b>	

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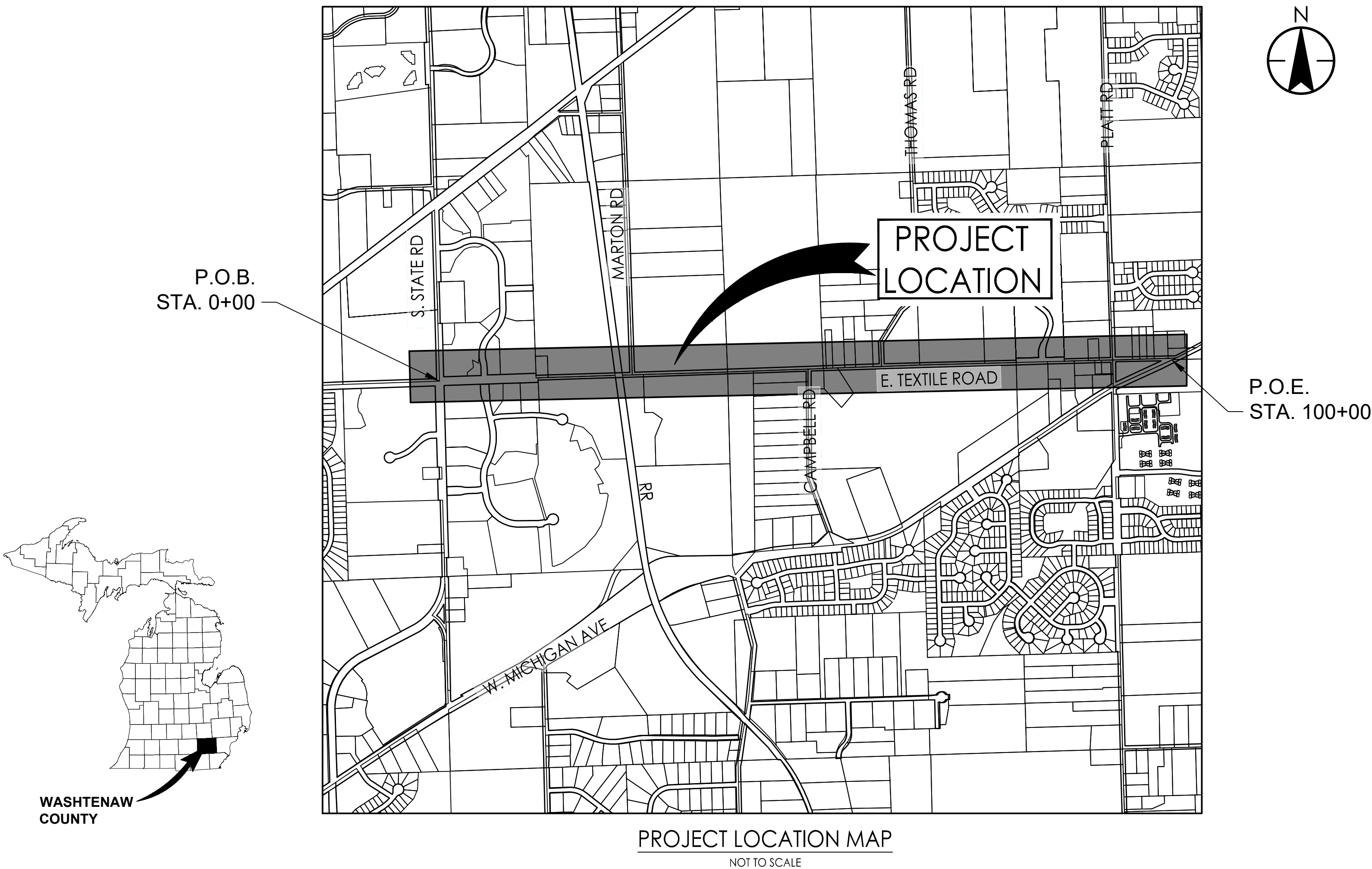




PITTSFIELD CHARTER TOWNSHIP



TEXTILE ROAD  
GREEN CORRIDOR



BID SET  
FEBRUARY 21, 2020  
PROJECT NUMBER: 2075001316

DRAWING INDEX:		
DWG	SHEET	TITLE
L-01	01	COVER SHEET
L-02	02	GENERAL NOTES, LEGEND, SYMBOLS AND ABBREVIATIONS
<del>L-03</del>	<del>03</del>	<del>OVERALL PLAN</del>
L-04	04	RAINGARDEN - GRADING PLAN
L-05	05	RAINGARDEN - PLANTING PLAN
<del>L-06</del>	<del>06</del>	<del>BIO SWALE GRADING AND PLANTING PLAN</del>
<del>L-07</del>	<del>07</del>	<del>STREET TREE PLANTING PLAN</del>
<del>L-08</del>	<del>08</del>	<del>STREET TREE PLANTING PLAN</del>
<del>L-09</del>	<del>09</del>	<del>MARSHVIEW MEADOWS - SAVANNA PLANTING PLAN</del>
<del>L-10</del>	<del>10</del>	<del>PITTSFIELD PRESERVE - SAVANNA PLANTING PLAN</del>
L-11	11	PROJECT DETAILS







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Notes

- 1 PROPOSED GRADING PERFORMED WITH INSTALLATION OF GREENWAY
- 2 170 FEET OF SILT FENCE. SEE SHEET 2 FOR NOTES AND DETAILS
- 3 WEIR ELEVATION SETS TOP OF RAIN GARDEN AT 837.4
- 4 DAYLIGHT UNDERDRAIN IN THIS APPROXIMATE LOCATION AT 834.2. INSTALL CONCRETE FLARED END SECTION PER MANUFACTURER. INSTALL ROCK CHANNEL PROTECTION 2 FEET WIDE, 3 FEET LONG.
- 5 CLEANOUT PER DETAIL THIS SHEET. TC=836.5. INV=834.5
- 6 CLEANOUT PER DETAIL THIS SHEET. TC=837.0. INV=834.7
- 7 CLEANOUT PER DETAIL THIS SHEET. TC=837.5. INV=834.8
- 8 CLEANOUT PER DETAIL THIS SHEET. TC=838.0. INV=834.9
- 9 45-DEGREE BEND
- 10 EXISTING TREE TO BE REMOVED. DISPOSE OR REPLANT PER PITTSFIELD TOWNSHIP'S PREFERENCE.
- 11 INTERPRETIVE SIGN TO BE PROVIDED BY THE TOWNSHIP
- 12 PROPOSED MUDMAT/ACCESS DRIVE. SEE SHEET L-11
- 13 PROPOSED BOULDERS, SEE SHEET L-05
- 14 TREE PROTECTION FENCE (TYP.)
- 15 ACCESS FOR MARSHVIEW MEADOWS SAVANNA PLANTINGS, SEE SHEET L-09 (PROTECT EXISTING PATHWAY)

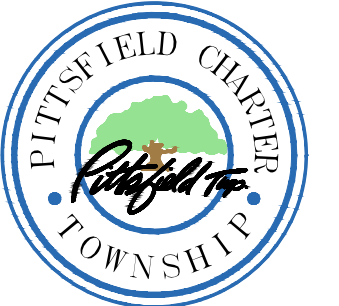
C	BID SET	JEL	MDP	2020.02.21
B	PRELIMINARY PLAN	JEL	MDP	2019.09.10
A	CONCEPT PLAN	JEL	MDP	2019.08.02
Issued		By	Appd	YYYY.MM.DD
File Name: 001316L-04-05		BWA	JEL	MDP
		Dwn.	Dsgn.	Chkd.
				YYYY.MM.DD

Permit/Seal

PRELIMINARY  
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CONSTRUCTION

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purposes. This document has not been  
completed or checked and is for  
general information or comment only.

Client/Project Logo



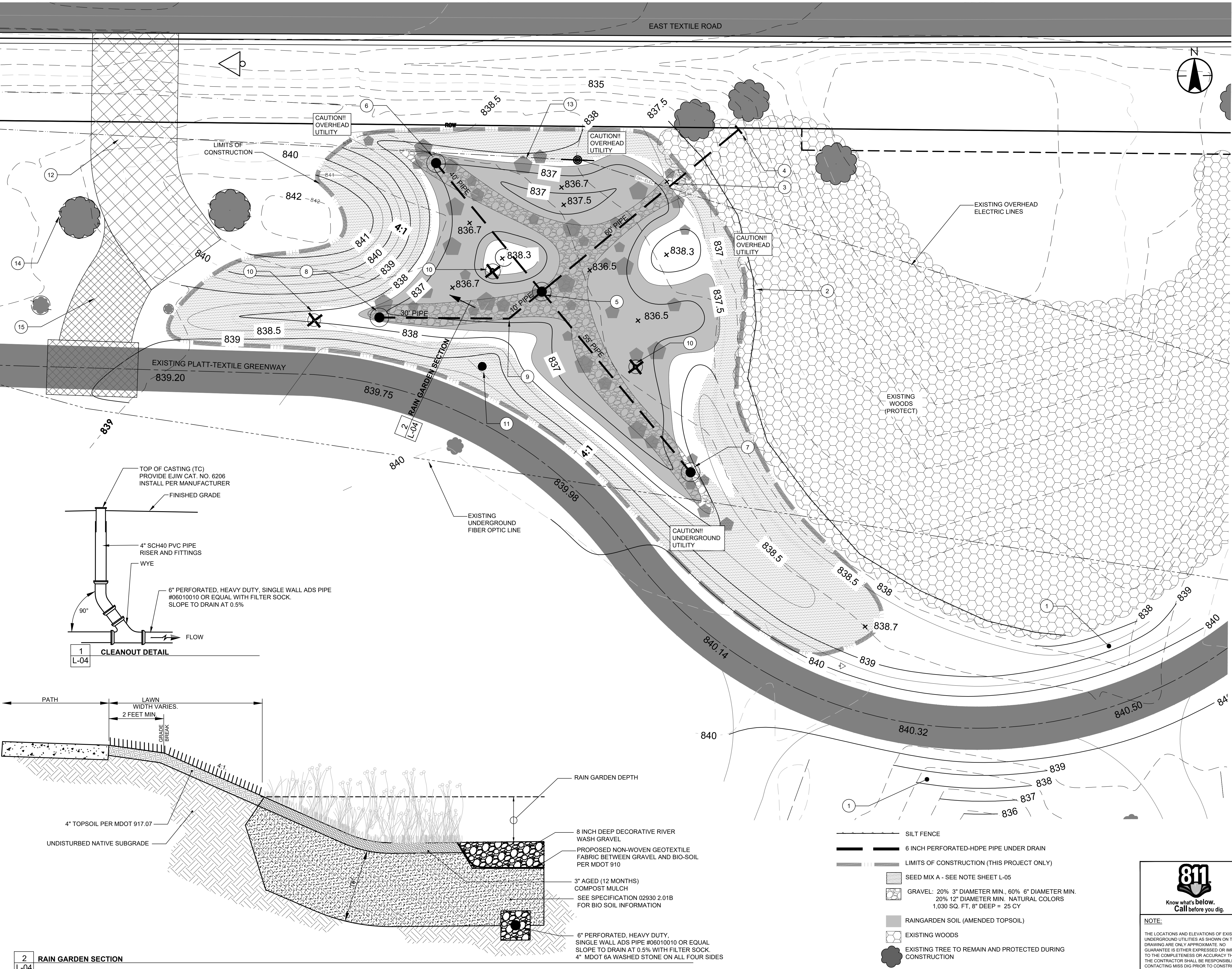
Client/Project  
PITTSFIELD CHARTER TOWNSHIP

TEXTILE ROAD  
GREEN CORRIDOR  
Pittsfield Township, MI

Title

RAIN GARDEN - GRADING PLAN

Project No.  
2075001316  
Revision Sheet  
0 4 of 11  
Scale  
0 10' 20'  
Drawing No.  
L-04





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The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.

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Consultant

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## Notes

## GENERAL NOTES

1. PROTECT EXISTING ROAD, PATHWAY AND TREES.
2. ALL DISTURBED AREAS TO BE RESTORED.
3. COORDINATE STAGING AREAS WITH PITTSFIELD TOWNSHIP.
4. COORDINATE ROAD ACCESS WITH THE WASHTENAW COUNTY ROAD COMMISSION.

C	BID SET	JEL	MDP	2020.02.21	
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A	CONCEPT PLAN	JEL	MDP	2019.08.02	
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Client/Project Logo



Client/Project  
PITTSFIELD CHARTER TOWNSHIP

TEXTILE ROAD  
GREEN CORRIDOR  
Pittsfield Township, MI

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Title

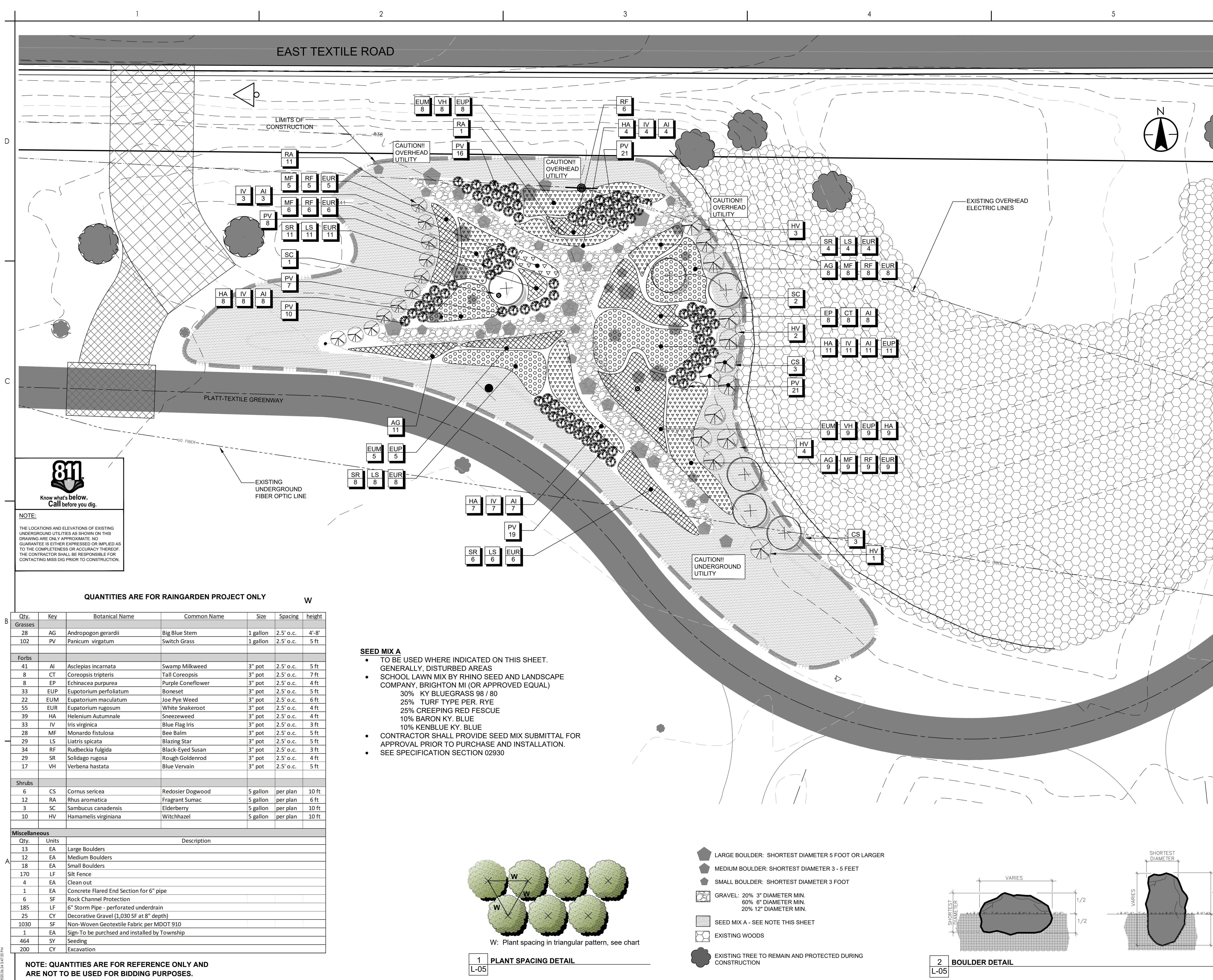
## RAIN GARDEN - PLANTING PLAN

Project No.  
2075001316

Scale  
0 10' 20'

Revision Sheet  
0 5 of 11

Drawing No.  
1.05





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**1.00 GENERAL****1.01 DESCRIPTION OF WORK**

- A. Work under this contract consists of installation of a rain garden, bioswale, aggregate pathway connection, two savanna planting areas, street tree planting, soil erosion control, restoration, and related improvements.
- B. Contract Drawings are included which give specific locations for all work under this contract.

**1.02 EXISTING FACILITIES ACCESS**

- A. Access to existing facilities shall not be temporarily disrupted without coordination with and prior approval of the OWNER.

**1.03 CONSTRUCTION WATER**

- A. Water for construction is NOT available on site. The CONTRACTOR shall furnish all water and equipment required for delivery and distribution of water for construction of the proposed facilities. The CONTRACTOR shall be responsible for providing water from offsite approved sources and will be solely responsible for the protection, cost and cleanup of the water source supply. All cost associated with furnishing, delivery and use of water will be included in the cost of the proposed construction item requiring the use thereof and is incidental to the construction of the proposed installation item.

**1.04 CONSTRUCTION POWER**

- A. Power for construction is NOT available on site. The CONTRACTOR shall furnish all power, equipment and appurtenances required for delivery and distribution of power for construction of the proposed facilities. The CONTRACTOR shall be responsible for providing power from approved sources and will be solely responsible for the protection, cost and cleanup of the power source supply. All cost associated with furnishing, delivery and use of power will be included in the cost of the proposed construction item requiring the use thereof and is incidental to the construction of the proposed installation item.

**1.05 CONSTRUCTION STAGING AREA**

- A. If the CONTRACTOR requires a construction staging area for the storage of equipment and materials during the project, he will need to secure such space on his own and at his sole costs. No construction staging or storage area will be provided on this project by the OWNER.

**1.06 NOTIFICATION OF UTILITIES**

- A. The CONTRACTOR shall notify all utilities prior to any excavation. Information regarding size and location is available from the utility.
- B. MISS DIG - DTE Energy, Consumers Energy Co., Comcast, Frontier, and AT&T are members of a utility communication system called "MISS DIG" that provides service to participating utilities. The CONTRACTOR shall contact "MISS DIG" not less than 72 hours before starting construction for assistance in locating utilities or for any work to be done on utilities. The phone number is 811.



**1.07 MAINTENANCE OF EXISTING SEWER FLOW**

- A. The CONTRACTOR shall be responsible for providing and maintaining all temporary pumping necessary to maintain existing stormwater runoff and drainage on the site.
- B. All existing utilities, including drainage through existing sewers and drains shall be maintained at all times during construction. Where existing sewers are encountered in the line of the work which interfere with the construction, the flow in the sewers, including both dry weather flow and storm flow, shall be maintained.

**1.08 WORK SCHEDULE**

- A. The CONTRACTOR shall provide a work schedule. The schedule shall be complete and shall show in detail the manner in which he/she proposes to complete the work under this contract and approximately monthly billing of the Contract. The purpose of the schedule is to assist the OWNER in notifying the public of inconveniences and to anticipate cash-flow on the job, and to determine if the CONTRACTOR is reasonably proceeding with the work to assure completion within the specified time.

**1.09 CONSTRUCTION SEQUENCE**

- A. Prior to commencing the work, the CONTRACTOR shall provide the ENGINEER a detailed schedule of the proposed work. The schedule shall include a list of tasks required to complete the work; their relevancy to each other; expected duration; and completion dates.
- B. As a guide in preparing a construction sequence for the most significant portions of the project, the CONTRACTOR shall follow the construction sequence detailed in the Contract Drawings. All other proposed improvements may be constructed concurrently in accordance with an approved schedule.

**1.10 TRAFFIC MAINTENANCE**

- A. Because the availability of roads and streets is critical for the traveling public, the CONTRACTOR shall not close the road to traffic at any time. If shoulder closures are required, through and local traffic shall always be maintained by the use of 2-lane construction techniques and by the use of temporary roadways and flaggers.
- B. The Platt Textile Greenway must remain open to the public during construction. Where crossing the pathway is necessary to complete the work, the CONTRACTOR must protect the pathway. The CONTRACTOR shall provide a submittal detailing the means of pathway protection to the ENGINEER prior to starting work. Any damage to the pathway must be prepared at the CONTRACTOR'S expense.
- C. The CONTRACTOR shall provide all required Type II and Type III barricades, flashers, flashing arrows, flaggers, and all signing required to properly and safely maintain traffic flow through the construction area in accordance with the Michigan Manual of Uniform Traffic Control Devices. The CONTRACTOR shall provide as many signs and barricades as required by the ENGINEER to protect and maintain traffic through this area at all times. The CONTRACTOR shall add any additional devices required by the ENGINEER to provide a smooth flow of traffic. Traffic control beyond the temporary access driveways shown in the Contract Drawings must be approved by the Washtenaw County Road Commission.



- D. The construction influence zone shall be properly signed in accordance with the recommendations outlined in the latest edition of the Michigan Manual of Uniform Traffic Control Devices (MMUTCD).
- E. The CONTRACTOR shall provide all dust control and other means to reduce dust during construction. The CONTRACTOR shall grade and maintain the area of the road being used as traveling surface for the through, as well as the local traffic. Grading of the road and application of dust control measures shall be made on a weekly basis at minimum, or as often as required by the ENGINEER.
- F. In the event of the CONTRACTOR'S failure to comply with these provisions, the OWNER may with or without notice, cause the same to be done; and will deduct the cost of such work from any money due or to become due the CONTRACTOR under this contract, but the performance of such work by the OWNER or at his insistence, shall serve in no way to release the CONTRACTOR from his general or particular liability for the safety of the Public or the work.
- G. Access to fire hydrants and water valves shall always be maintained. The contractor's truck and equipment operations on public streets shall be governed by County regulations, and all local traffic ordinances, and regulations of the Fire and Police Departments.
- H. Where streets or pathways are partially obstructed, the CONTRACTOR shall place and maintain temporary driveways, ramps, bridges and crossings which in the opinion of the OWNER are necessary to accommodate the public at no extra cost to the OWNER. In the event of the CONTRACTOR'S failure to comply with the foregoing provisions, the OWNER may, with or without notice, cause the same to be done and deduct the cost of such work from any monies due or to become due the contractor under this contract, but the performance of such work by the OWNER, or at his insistence, shall serve in no way to release the contractor from his liability for the safety of the traveling public.
- I. The CONTRACTOR shall inform the local fire department in advance of his program of street obstruction and detours, so that the fire department can set up plans for servicing the area in case of an emergency. He shall also notify the governing police department and the OWNER at least one week prior to obstructing any street according to the specifications set forth herein and/or as may be required elsewhere on the drawings or specifications.
- J. Payment for traffic maintenance, the furnishing of flaggers, barricades, flashers and maintenance of these shall be included in the Traffic Maintenance and Control pay item.

**1.11 CONSTRUCTION PERMITS**

- A. The CONTRACTOR will be required to follow the requirements established by all permits necessary for the construction of this project. The following permits must be obtained by the CONTRACTOR prior to the beginning of construction. In addition, if other permits are necessary they are the CONTRACTORS responsibility.
  - 1. The Soil Erosion Sedimentation Control Permit, as part of Public Act 451 (1994), Part 91 (Pittsfield Twp.) will be obtain by the CONTRACTOR. All costs associated with the permit, including inspection fees will be the responsibility of the OWNER. The CONTRACTOR will be required to adhere to all requirements of the Permit.
  - 2. The permit to construct, operate, use, and/or maintain within the Washtenaw County Road Commission (WCRC) road right-of-way will be obtained by the CONTRACTOR. All costs associated with the permit, including inspection fees and bonds will be the responsibility of



the OWNER. The CONTRACTOR will be required to adhere to all requirements of the Permit.

**1.12 SOIL AND CONCRETE TESTING**

- A. The CONTRACTOR shall be responsible for providing a testing firm (acceptable to the ENGINEER) to perform soil compaction tests and concrete quality control including concrete compression tests, at CONTRACTOR cost.
- B. The CONTRACTOR shall provide and pay for the service of an independent materials testing laboratory to provide material and compaction testing. The type and minimum frequency of testing shall be as follows:
  - 1. Utility Trenches
    - Sieve analysis per source
    - Proctor per source
    - Compaction testing at 50' intervals per lift, as required
  - 2. Aggregate Base
    - Sieve analysis per source
    - Proctor per source
    - Compaction test at each location. Where length exceeds 100', one test per 50'
  - 3. Asphalt Pavement
    - Extraction per day
    - Thickness and density at each location. When length exceeds 100', one test per 50'
  - 4. Concrete Pavement, Sidewalks and Curb & Gutter
    - Slump, minimum 50 CYD or load
    - Air entrainment, minimum 50 CYD or load
    - Comprehensive strength, minimum 50 CYD or load
- C. The ENGINEER shall determine the exact location of all tests. The CONTRACTOR shall notify the ENGINEER of all other test results at least 48 hours in advance of all new materials to be used. Any area failing tests shall be corrected and retested at the CONTRACTOR's expense.
- D. Copies of test reports shall be furnished to the OWNER and distributed to parties designated by the OWNER, including the CONTRACTOR and the ENGINEER.
- E. The costs associated with providing soil and material testing as defined in Section 1.10 Soil and Material Testing shall be considered in the contract pay item General Conditions and Mobilization and will not be paid for separately.

**1.13 DUST CONTROL**

- A. All haul roads, detour roads, and other public and private roads, driveways and parking lots used by the CONTRACTOR must be maintained in a dust free condition during the life of this Contract. The control of the dust shall be accomplished by the application of dust control materials and methods of application as approved and as directed by the ENGINEER. Such dust control materials shall be applied as often as is necessary to control the dust.



- B. Cost of providing dust control shall be included as part of traffic maintenance.
- C. Should the CONTRACTOR be negligent of his duties in providing dust control, the OWNER may, with or without notice, cause the same to be done and deduct the cost of such work from any monies due or to become due the CONTRACTOR under this Contract, but the performance of such work by the OWNER, or at his insistence, shall serve in no way to release the CONTRACTOR from his liability for dust control.
- D. Dust Palliative may be any of the following:
  - 1. Road oil of 30% asphalt base applied at the rate of 0.5 gallons per square yard.
  - 2. Type 1-calcium chloride applied at the rate of 6 pounds per ton of aggregate.
  - 3. Water, as required.
  - 4. Other methods as approved by the ENGINEER.

**1.14 CONSTRUCTION STAKING**

- A. The CONTRACTOR will be required to contact the ENGINEER for staking 48 hours in advance of necessary staking. The ENGINEER will provide construction staking, one time only, in accordance with the GENERAL CONDITIONS for the complete project only one time. Any and all stakes that are destroyed or tampered with after staking are to be replaced at the CONTRACTORS expense.

**1.15 AUDIO/VIDEO DVD COVERAGE**

- A. The CONTRACTOR shall furnish to the OWNER, a color audio-video DVD for all areas proposed for improvement.
- B. The audio/video taping shall be of such quality to accurately describe the existing conditions. The DVD shall be produced one (1) week prior to the placement of materials or equipment in the construction area. The DVD shall be of commercial quality and of size commonly used.
- C. Both sides of the entire area must be recorded with the rate of speed less than 48 ft per minute. Camera functions such as panning rate, zoom-in/ zoom-out shall be controlled to provide optimum object clarity.
- D. The DVD must be recorded while the visibility is clear and at no time will it be allowed during periods of ground cover.
- E. The DVD shall be continuous running and shall include date, time, and location at appropriate intervals. The location shall be easily referenced to the Contract Drawings.

**1.16 PROJECT PROGRESS MEETING**

- A. It shall be the responsibility of the CONTRACTOR to have a representative present at each meeting. The meetings shall be held at least once a month as directed by the ENGINEER.



**1.17 METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

A. General

1. The method of measurement and the basis of payment for each item in the Proposal will be as specified in the schedule attached. The items are generally grouped by the section of the Specifications under which the particular unit of work is detailed. There will be no payment allowed for any unit of work not specifically mentioned in the Proposal as a bid item, and any such unit of work not mentioned in the Proposal, but necessary for the completion of the Project, will be considered as incidental to the construction of the Project.

2. MEASUREMENT

Quantities of work completed under the Contract will be measured by the ENGINEER according to the United States standard measures. When tons are specified, the unit shall be the ton of 2,000 pounds. When measurements are stated in miles, stations, acres, they will be horizontal measurements unless specified otherwise. Where measurements are specified to be "in place," they will be taken along the actual surface of the completed item to obtain lineal, area, or volume measurements.

3. PAYMENT

In each and every instance in the schedule attached, where a Basis of Payment is specified, it shall be understood to be prefaced by the following statement, "The contract unit price bid in the Proposal will be payment in full for all labor, materials, and equipment necessary to do the following according to the Plans and Specifications." Payment shall be made on the basis of the actual quantity of the item completed and accepted at the unit price for such item named in the Proposal.

END OF SECTION



**1.00 GENERAL****1.01 DESCRIPTION**

- A. The CONTRACTOR shall provide all labor, materials, tools and equipment necessary for the preparation and completion of the site of the project.

**1.02 CLEARING AND GRUBBING**

- A. The CONTRACTOR shall clear the work area of all wild brush and debris which may be present and interfering with construction and shall remove and dispose of the same.
- B. Trees and shrubs are not to be removed unless required by the Plans and/or with the express permission of the ENGINEER. Where trees are to be removed or are permitted to be removed by the ENGINEER, the CONTRACTOR shall remove such trees and stumps to a depth of at least one foot below the proposed finish grade. All stumps, roots, logs, branches, brush and debris shall be removed from the site and disposed of by the CONTRACTOR.
- C. Grubbing shall consist of removing from the ground and disposing of all stumps and roots more than three inches in diameter to a depth of one foot.

**1.03 PROTECTION OF TREES**

- A. All trees which are to be preserved and which, in the opinion of the ENGINEER, might be subject to damage by the CONTRACTOR's operations, shall be adequately protected against damage to the bark by 2-inch thick vertical planking securely wired or tied completely around the tree trunk. Such protection shall not be removed until authorized by the ENGINEER.
- B. Machine excavation shall not be made within a circular area of any tree, the diameter of the area in feet being equal to the diameter of the tree in inches. If hand excavation within this area cuts across a large root of a tree, the cutting of which, in the opinion of the ENGINEER, would be injurious to the tree, the CONTRACTOR shall tunnel under such root and protect it from injury throughout the work.
- C. Trees which interfere with the work, and the removal of which is permitted, shall be removed by the CONTRACTOR at his expense and in a safe manner. Such tree removal shall not be a pay item but considered incidental to the work and included in the unit price bid for sanitary sewer. No trees are to be removed without the expressed approval of the governmental body having jurisdiction thereof, and of the ENGINEER.

**1.04 TEMPORARY ACCESS DRIVES**

- A. The CONTRACTOR may locate a temporary access drive along the lines of the permanent roadway, placing suitable subgrade and base materials, to meet the requirements of the permanent roadway.
- B. The location of the temporary access drives are proposed on the Contract Drawings. Changes in the proposed locations and/or access drives shall be subject to the approval of the ENGINEER. Temporary access drive locations must be approved by the Washtenaw County Road Commission.



**1.05 WORK AREA AND STORAGE OF MATERIALS**

- A. The working area shall be organized in an orderly manner with storage and tool sheds, offices and sanitary facilities, parking areas for employees, and all other necessary facilities developed and maintained by the CONTRACTOR. The CONTRACTOR shall keep the site and all haul roads reasonably clean and dust free.
- B. All materials, supplies and equipment, whether furnished by the CONTRACTOR or by the OWNER, shall be delivered, stored and handled as to prevent the inclusion of foreign materials and/or damage by water, freezing, breakage or other causes. The ENGINEER may require the CONTRACTOR to provide an enclosed storage shed for the storage of the above-mentioned materials, supplies and equipment. Packaged materials shall be delivered in the original unopened containers and shall be stored until ready for use. All materials which have been stored shall meet the requirements of the Specifications at the time they are used in the project.
- C. Where the CONTRACTOR is required to do work within the rights-of-way under the jurisdiction of governmental bodies, he shall meet the requirements of said governmental bodies for the work and storage within their jurisdiction. Such requirements must be met as a minimum requirement, and if the specifications given herein impose further limitations on the work, they shall also be met as the required work standard. The CONTRACTOR may not store items within the road right-of-way.

**1.06 EXISTING PUBLIC UTILITIES**

- A. Existing public utilities and underground structures, such as pipelines, electric conduits, sewers and water lines are shown on the Contract Drawings. The information shown is believed to be reasonably correct and complete; however, neither the correctness nor the completeness of such information is guaranteed.
- B. The CONTRACTOR shall conduct his operations so as not to damage any existing utility whether shown in the Contract Drawings or not. The CONTRACTOR shall correct, at his own expense, damaged caused during the operations of his subcontractors or suppliers.
- C. If the CONTRACTOR desires, or is required by the utility companies, to relocate or protect any power or telephone poles to facilitate his work, any expense encountered from such relocation shall be borne by the CONTRACTOR.

**1.07 NOTIFICATION TO UTILITIES**

- A. Prior to the start of any operations in the vicinity of any utilities, the CONTRACTOR shall notify the utility companies and request that they stake out the locations of the utilities in question.

**1.08 SANITARY REQUIREMENTS**

- A. The CONTRACTOR shall provide adequate sanitary facilities for all persons employed on the project. The sanitary facilities shall conform in every way to the requirements of the "General Safety Rules and Regulations for the Construction Industry."

**1.09 UTILITIES**

- A. The CONTRACTOR shall make all necessary arrangements for the provisions of all utility services, temporary or permanent, required under this contract. The CONTRACTOR shall pay all costs for such connections and services.



- B. All utility services shall be inspected by and shall meet the requirements of the applicable codes and governmental bodies.

**1.10 PUMPING AND DRAINAGE**

- A. Adequate pumping and drainage facilities shall be provided and water, from whatever source, entering the work during any stage of construction shall be removed promptly and disposed of in a manner satisfactory to the ENGINEER. All pumping and drainage shall be done with no damage to property or structures and without interference with the right of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors. Dewatering shall be done in such a manner that the soil under or adjacent to existing structures shall not be disturbed, removed or displaced.
- B. The overloading or obstructing of existing drainage facilities shall not be permitted, and the CONTRACTOR shall be solely responsible for any damages caused to such existing drainage facilities during his operations.

**1.11 WINTER CONSTRUCTION**

- A. The ENGINEER shall have permissive authority over the work which is proposed to be done during the winter months. The CONTRACTOR shall provide adequate weather protection, temporary heating and take any other measures which are necessary to ensure that the work performed during the winter months is properly installed and protected against damage from freezing.

**1.12 SITE PLAN OF CONTRACTOR'S PLANT**

- A. When two or more CONTRACTOR's are working on the site, each shall cooperate with the others in planning for CONTRACTOR's plant and storage areas, and plans shall be subject to approval and/or arbitration by the ENGINEER.

**2.00 PRODUCTS**

Not Applicable

**3.00 EXECUTION**

**3.01 CONTROL OF WATER POLLUTION AND SILTATION**

**A. General Requirements**

1. The CONTRACTOR shall conduct his work in a manner to comply with the Soil Erosion and Sedimentation Control Act of 1972, (MICH P.A. 347) that will not cause damaging siltation or pollution of the water in streams, rivers, lakes and reservoirs. The ENGINEER shall advise the Department of Environment, Great Lakes & Energy of the proposed work. All work of water pollution and siltation control is subject to inspection by the Department of Environment, Great Lakes & Energy.
2. All applicable regulations of fish and wildlife agencies and statutes relating to the prevention and abatement of pollution shall be complied with in the performance of the Contract.



3. Construction operations shall be conducted in such manner as to reduce erosion to the practicable minimum and prevent damaging siltation to streams or lakes. The area of erodible land exposed to the elements by grading operations, including gravel pits, waste or disposal areas and haul roads, at any one time shall be subject to approval of the ENGINEER and the duration of such exposure prior to final trimming and finishing of the areas shall be as short as practical. The ENGINEER shall have full authority to order the suspension of grading and other operations pending adequate and proper performance of trimming, finishing and maintenance work or to restrict the area of erodible land exposed to the elements.
4. Gravel or stone, consisting of durable particles of rock and containing only negligible quantities of fines, shall be used for construction pads, haul roads and temporary roads in or across streams.
5. The disturbance of lands and waters that are outside the limits of construction as staked is prohibited, except as found necessary and approved by the ENGINEER.
6. The CONTRACTOR shall conduct his work in such manner as to prevent the entry of fuels, oils, bituminous materials, chemicals, sewage or other harmful materials into streams, rivers, lakes or reservoirs.
7. Water from aggregate washing or other operations containing sediment shall be treated by filtration, by use of a settling basin or other means to reduce the sediment content to a level acceptable to the Department of Environment, Great Lakes & Energy.
8. All waterways shall be cleared as soon as practical of falsework, piling, debris or other obstructions placed during construction operations not a part of the finished work. Care shall be taken during construction and removal of such barriers to minimize the muddying of a stream.

**B. Temporary Control Requirements**

1. The CONTRACTOR shall provide temporary soil erosion and sedimental controls according to current local soil conservation district soil erosion and sedimentation control standards and specifications or revisions thereof.
2. The CONTRACTOR shall not pump water directly from the excavation into the river but shall construct and maintain stilling basins to receive the pumpage with an overflow from the basins to the river. The basins shall be of sufficient size to allow proper settling of sediment before the water flows into the river. The CONTRACTOR shall remove and/or restore the basin area to original condition after backfilling is complete. Water from well points may be discharged directly into the river providing such operation does not result in erosion of riverbanks.
3. Permanent soil erosion control measures for all slopes, channels, ditches or any disturbed land area shall be completed within 15 calendar days after final grading or the final earth change has been completed or where significant earth change activity ceases, temporary soil erosion control measures shall be implemented within 30 calendar days. All temporary soil erosion control measures shall be maintained until permanent soil erosion control measures are implemented.



**3.02 FINISH GRADING, TOPSOIL**

- A. After all backfilling and rough grading has been completed and thoroughly compacted, the entire disturbed area at the site shall be graded to smooth, even surfaces as shown by the proposed new contours shown on the Contract Drawings. The portion of the disturbed area where no new contours are shown shall be graded to smooth, even surfaces approximating the original surfaces.
- B. All debris and larger stones and sticks and the like shall be removed and disposed of and the entire disturbed area made ready for the addition of topsoil and seeding.
- C. After all construction has been completed, the CONTRACTOR shall spread 4 inches of approved topsoil over all graded areas. The stockpiled material may be used for this purpose. If there is not sufficient topsoil on the site, the CONTRACTOR shall secure and deliver to the site whatever amount is required at his own expense.

**3.03 MEASUREMENT AND PAYMENT**

- A. All work associated with site clearing and grubbing, and tree protection shall be considered included in the lump sum contract pay items for Rain Garden, Bioswale, and Aggregate Path, and they will not be paid for separately.
- B. All work associated with furnishing, placing and, upon the establishment of permanent SESC measures, the removal of temporary SESC measures, shall be included in the contract pay item SESC Measures, they will not be paid for separately.

END OF SECTION



**1.00 GENERAL****1.01 DESCRIPTION**

- A. The CONTRACTOR shall perform all excavation and backfilling necessary to complete the work. This shall include the excavation of earth and rock, the removal and disposal of unsuitable material, dewatering, placement of suitable fill and backfill material, pipe boring and jacking, and the restoration and final grading for all earth surfaces.

**1.02 WORK WITHIN RIGHTS-OF-WAY**

- A. Where the governmental bodies having jurisdiction of the streets or rights-of-way have specific specifications relating to the requirements for work within their jurisdiction, such requirements must be met as a minimum requirement, and if these Specifications impose further limitation on the work, they shall also be met as the required work standard.
- B. During all operations of the CONTRACTOR in the streets and roadways, the CONTRACTOR shall maintain barricades, lights, and warning signs as required by the agency having jurisdiction.

**1.03 WORK WITHIN EASEMENTS**

- A. During construction within any easements, the CONTRACTOR shall confine himself to the limits shown on the Plans. He shall notify property owners in advance of moving equipment on easements and use of the access routes which will be designated by the OWNER. The OWNER will cooperate in working out the details of access. The topsoil over the trench shall be removed and carefully replaced upon completion of the work. The backfill of the trench in the easement may be left slightly high to provide for any slight residual settlement. Any trees, shrubs, or bushes removed shall be replaced to the satisfaction of the property owner.

**2.00 PRODUCTS****2.01 BACKFILL MATERIAL**

- A. For areas not requiring "granular backfill" material, backfill shall be of the excavated material, with the exception that materials such as soft clay, topsoil, muck, cinders, vegetable matter, refuse, boulders and other objectionable and non-packing earth shall be excluded from the backfill and removed from the site. Stone larger than 3 inches in any dimension shall be excluded from the backfill and removed from the site by the CONTRACTOR.
- B. Where "granular material" backfill is required as specified herein, backfill material shall be defined as a material meeting granular material Class II as defined in 2012 MDOT 902.07.

**3.00 EXECUTION****3.01 GENERAL EXCAVATION**

- A. Excavation shall be performed by any practicable method consistent with the integrity and protection of the work and neighboring structures, workmen, and the public. Topsoil shall be separately removed and stockpiled for reuse.



- B. All excavation, except where necessary to tunnel, bore or jack under roads, railroads, tree roots and other obstructions within the limits indicated on the Plans, may be open cut from the surface. Tunneling or boring under trees shall be considered as incidental to construction and will not be considered as cause for request for additional payment.
- C. Foreign material or unsuitable foundation material encountered such as wood, boulders, etc., which obstruct the excavation, shall be removed. Such materials found at the bottom of the excavation shall be removed and the foundation restored with approved materials.
- D. If excess excavation is made or the material becomes disturbed so as to require removal beyond the prescribed limits, the resulting space shall be filled with selected material solidly tamped into place, in not more than 6-inch layers to the satisfaction of the ENGINEER, before the construction work proceeds.
- E. The excavation shall be kept dry during the work. Where water is encountered in the excavation, it shall be removed by pumping or well points. All necessary precautions shall be taken to prevent damage to existing wells and to completed or partially completed structures. The CONTRACTOR shall be responsible for all damages caused by him due to inadequate or improper protection.

### 3.02 EXCAVATION FOR SEWERS AND WATER MAINS

- A. Trenches shall be excavated to the depth required with allowance for bedding the pipe. The trench shall be cut wider and deeper at each pipe joint location to provide for properly completing the pipe joint and to relieve the joint of all loadings.
- B. The width of the trench at the top of a rigid pipe shall be sufficient to allow the pipe to be laid and jointed properly and shall provide for a minimum net clearance of 6-inches and a maximum net clearance of 12-inches on each side of the barrel of the pipe and to allow the backfill to be placed and properly compacted.
- C. The width of trench at the top of a flexible pipe backfill when using concrete bedding shall be sufficient to allow the pipe to be laid and jointed properly with the minimum net clearance of 12-inches and a maximum net clearance of 18 inches on each side of the barrel of the pipe.
- D. Where the conditions of the ground require, or where the work is in close proximity of existing structures, the sides of excavation shall be securely held by bracing and/or sheeting which may be removed in units when the level of the backfill has reached a point where it is safe to pull the sheeting without disturbing the protected feature. No sheeting, bracing, or other timber shall be left in the excavation upon the completion of the main or other structures, except with the specific review and direction of the ENGINEER.
- E. Other underground mains, sewers or structures encountered in the excavation shall be adequately supported during the CONTRACTOR's operations, and before backfilling, shall be given permanent support as directed by the ENGINEER to meet the standards or requirements of the owning utility or agency.
- F. Water, sewer, gas and other utility services disturbed by the CONTRACTOR in his operations shall be repaired or replaced in a manner equal to the original condition by the CONTRACTOR at his own expense. Where these services are encountered and are undamaged, they shall be supported and/or protected by the CONTRACTOR at his expense against later settlement and/or damage after backfill. The CONTRACTOR shall consult the agency or the utility firm having jurisdiction over any duct line, gas main, etc., which may cross the excavation to determine method of supporting such duct or pipe.



- G. All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve manhole covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clean, or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed except as otherwise provided for herein on a temporary basis.

### 3.03 EXCAVATION FOR STRUCTURES

- A. Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for form construction and for practicable construction methods to be followed.
- B. Requirements for excavation of sewers and water mains shall also apply to this Section.

### 3.04 EXCAVATION FOR PAVED SURFACES

- A. In excavating around manholes and catch basins or inlets, care shall be exercised to avoid removing the casings and pushing dirt into the structures. Dirt pushed into manholes, catch basins or inlets by the CONTRACTOR's operations shall be immediately removed so that the dirt will not be carried into the sewer by the flow of sewage or storm water.
- B. The CONTRACTOR shall take ample precautions to protect all trees and ornamental shrubbery not within the limits of the construction area, or within the construction areas shown on the Plans to be retained from injury by workmen, equipment, or any other agencies connected with the work, including subcontractors. Such protection shall be provided during the progress of the excavation, grading, or other phases of the work as necessary. Such trees or shrubbery shall be surrounded by protective posts and fencing before construction begins, when in the judgment of the ENGINEER, such precautionary measures are necessary. If, as a result of any phase of the work, trees are damaged or it is necessary to remove limbs in the way of construction, the repair of the damage and such limb removal shall be done by the CONTRACTOR as directed by the ENGINEER. All costs for the protective work shall be borne by the CONTRACTOR as incidental to the Contract work.

### 3.05 SHORING, SHEETING AND BRACING

- A. Where sheet piling, shoring, sheeting, bracing, or other supports are necessary, they shall be furnished, placed, maintained, and except as shown or specified otherwise, removed by the CONTRACTOR.
- B. All sheet piling, shoring, sheeting and bracing shall be designed by a professional engineer engaged by the CONTRACTOR with demonstrated competence and experience in such work. The sheeting system shall be designed to prevent bottom failure and hydrostatic uplift within the excavation. Provision shall also be made in the design for lateral pressures due to side slope and construction equipment or other surcharge loads, as applicable.
- C. The CONTRACTOR shall provide to the ENGINEER for his review, design calculation and arrangement drawings of the sheeting system prior to ordering any materials for bracing, sheeting, etc., and prior to the commencement of the excavation.
- D. All materials, except as otherwise specified, used for sheeting and sheet piling, lagging, braces, shores, and stringers, or waling strips shall be of approved quality and dimensions throughout.



- E. Materials for sheeting systems shall be furnished and driven or set in place by the CONTRACTOR, where necessary or wherever ordered by the ENGINEER, whether the same is or is not considered necessary by the CONTRACTOR. If, in the opinion of the ENGINEER, the materials furnished by the CONTRACTOR are not of proper quality or sufficient size or not properly placed to ensure the safety of the work or of adjacent structures and property, the CONTRACTOR shall, upon notice from the ENGINEER to that effect, forthwith procure, furnish and set in place or drive other and satisfactory materials, or place the material in a satisfactory manner; and if he shall fail or neglect to do so, the ENGINEER may order all or any part of the work to be stopped until such materials so used are furnished and placed; and the CONTRACTOR shall not be entitled to claim, demand, or receive any compensation for larger size or better quality or different disposal of materials ordered by the ENGINEER, nor any compensation for allowance of any kind whatsoever for or on account of any damage or delay resulting from such stoppage of work.
- F. Steel sheet piling may be either new or used. It shall be of adequate strength, straight and properly braced. Steel sheet piling shall be of the interlocking type. Friction in the interlocks shall not be assumed to contribute to the strength of the sheet piling.
- G. The design, planning, installation and removal, if required, of all sheet piling, shoring, sheeting, and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.
- H. Steel sheet piling for the excavation shall be driven straight and in-line. The piling shall be supported aboveground, before driving, by a guide frame at least 20 ft high which will keep the piling accurately in the required position and vertical. Each piece of piling shall be driven only a few feet at a time and driving shall proceed continuously around the perimeter so that the piles shall reach their full penetration together.
- I. Walers and bracing shall be supplied and installed as required to complete the sheeting system. Walers and braces shall be of adequate strength for the load imposed. Splices in walers shall develop the full strength of the member in bending, shear, and axial compression.
- J. If bracing members are to be removed during construction, the timing and procedure for removal shall not induce excessive stresses in the permanent structures or in steel sheet piling and bracing members.
- K. If the construction sequence of structures requires the transfer of bracing to the completed portions of any structure, the CONTRACTOR shall secure written acceptance of the ENGINEER prior to the installation of such bracing.
- L. In trenching operations, the use of horizontal strutting below the barrel of pipe or the use of the pipe as support for trench racing will not be permitted. The use of a traveling shield for sewer construction shall require that the device be approved for use by a professional engineer. Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loadings which might overload the pipe.
- M. The neglect, failure, or refusal of the ENGINEER to order the use of sheeting, or sheet piling or steel, or to order the same to be left in place, or the giving or failure to give of any order or directions as to the manner or methods of driving or placing sheeting, sheet piling, bracing, shores, etc., shall not in any way relieve the CONTRACTOR of any or all obligations under this Contract. Sheeting left in place shall be cut off one (1) ft below existing grade.
- N. The rules of the OSHA and the State Department of Labor with respect to excavation and construction shall at all times be strictly observed.



**3.06 BACKFILLING FOR SEWERS**

- A. Backfilling shall consist of placement of the prescribed materials from a level 12 inches above the crown of the pipe. Placement shall be as follows:
1. Under gravel driveways, gravel roads and shoulders, the backfill shall be granular material which shall be solidly compacted by mechanical tamps in layers of not more than 12 inches loose thickness with backfilling carried up to within 12 inches of finished grade. Compaction of backfill shall be such as to obtain 98% of the maximum unit density as determined at the optimum moisture content.
  2. Under pavements, curb, paved driveways, and sidewalks, the backfill shall be granular material compacted in layers not to exceed 12 inches loose thickness with backfilling carried up to subgrade. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content. After a period of about 60 days or less, if the backfill compaction is satisfactory to the ENGINEER, to provide for any slight settlement, the CONTRACTOR shall retrim neatly any broken edges of pavement and replace the top surface of the backfill within the pavement area with pavement surface equal to that surface which was removed. The pavement shall be replaced in accordance with the standard specifications of the agency having jurisdiction.
  3. Backfill around lift stations, or buried underground structures shall be granular material compacted in 12-inch lifts. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content.
  4. For all other areas, backfilling shall consist of placing excavated material as defined in Paragraph 2.01.A. of this Section, in 12-inch lifts to finish grade. Compaction of backfill shall be such as to obtain 90% of the maximum unit density as determined at the optimum moisture content.

**3.07 FILLING AND BACKFILLING FOR STRUCTURES**

- A. Embankments underlying structural footings, streets and drives, sidewalks and around structures shall be granular material meeting the requirements of the Michigan Department of Transportation for granular material compacted to 95% density.
- B. In all other areas, material required for embankments and backfilling shall be soil or soil-rock mixture free of organic and other deleterious matter and shall contain no more than 15% rocks or lumps larger than 2-1/2 inches in the greatest dimension, compacted to 90% density.
- C. Under all interior and exterior floor slabs, an 8-inch thick granular cushion shall be placed. This material shall be clean mineral aggregate meeting the following gradation requirements:

Passing the No. 4 Sieve 100%  
Passing the No. 200 Sieve 0-3%

- D. Where embankment material is placed to achieve a new surface elevation, the top 4 inches shall be approved topsoil either salvaged from the site or hauled in by the CONTRACTOR.

**3.08 FILLING AND BACKFILLING FOR PAVED SURFACES**

- A. Embankments, including sand cushions and granular fills, shall be placed in successive layers not more than 6 inches in depth the full width of the cross section, each layer to be thoroughly compacted by means of vibratory compactors or by an approved pneumatic-tired roller or combination thereof, as required by the ENGINEER. Each layer shall be compacted to not less



than 98% of the maximum unit density as determined at the optimum moisture content. All parts of the embankment shall be uniformly compacted, and the CONTRACTOR shall so direct all earthmoving equipment used in the work so that the same shall be attained. Embankment or fill outside the limits of the subgrade where sand or gravel is not required shall be made with suitable material, which is free from perishable organic matter, rubbish, stones, broken concrete, roots, or other foreign materials, at no additional compensation. Before any embankments are begun, the base shall be made firm and cleared of topsoil, sod or other perishable material. The sides of the embankment shall be neatly and evenly dressed to the slope shown on the Plans, or such other slope as the ENGINEER may direct.

- B. Upon completion of the placing of the curbs, and after the concrete has cured sufficiently, forms shall be removed and the excavated space behind the curb shall be backfilled with a good quality of surface soil, free of rubbish, stone, broken concrete, roots or other foreign material. Where adequate acceptable material for backfill behind the curb is not available, granular fill conforming to 2012 MDOT 902, Class II, shall be used. Where the area behind the curb is in cut, it shall be trimmed from the top of the curb on the slope shown on the Plans. If the area is in embankment or fill, an earth berm shall be placed immediately adjacent to the top of the curb and then the embankment of fill shall be finished to the slope shown on the Plans. All trimming and finishing shall be done in a neat, workmanlike manner. All excess concrete and debris shall be removed from the excavation behind the curb line before backfilling begins.
- C. In construction of non-rigid pavements, backfilling back of curb and gutter shall be completed before placement and compaction of the base course of the roadway.

### 3.09 PREPARATION OF SUBGRADE FOR PAVED SURFACES

- A. The bottom of the excavation for the pavement or top of the fill shall be known as the pavement subgrade and shall be smoothed, trimmed and compacted to the required line, grade and cross section to receive the road metal. It shall be thoroughly compacted by rolling with a roller of approved type weighing not less than 8 tons. The subgrade shall be compacted to at least 98% of the maximum density as designated by the test method AASHTO T-180. Inaccessible areas, where rolling is not practical, shall be thoroughly compacted by mechanical tampers capable of striking a blow equivalent to at least 250 foot-pounds per square foot. The subgrade thus formed shall be maintained in a smooth and compacted condition until the pavement has been placed. No base course, surfacing, curb, or curb and gutter shall be placed until the subgrade has been reviewed by the ENGINEER. The subgrade shall be finished in an acceptable condition at least one day in advance of the pavement construction at all times. Six inches of compacted depth of granular material shall be used where uncompactable soil is encountered. The granular fill shall conform to the 2012 MDOT 902, Class II, compacted to 98% of its density.
- B. Immediately prior to placing the pavement, the subgrade shall be tested for conformity with the cross section shown on the Plans by means of an approved template riding on the curb and gutter sections or on side forms. If necessary, materials shall be removed or added, as required, to bring all portions of the subgrade to the correct elevation. Corrected portions shall then be thoroughly compacted and again tested with the template. Pavement material shall not be placed at any portion of the subgrade which has not been tested for correct elevation.
- C. The finished subgrade shall be maintained in a smooth and compacted condition until the pavement is placed. No storage piles of fine or coarse aggregate shall be placed directly upon the finished subgrade. Should the subgrade become rutted or disturbed in any manner, it shall be reshaped and recompact.



**3.10 GRADING**

- A. The CONTRACTOR shall grade the site to achieve the elevations as shown on the Plans. All disturbed areas beyond the grading limits shall be restored to prior condition.
- B. Surplus excavated material not needed for embankment shall be disposed of by the CONTRACTOR. Headwalls, culverts, drains, sewers and appurtenances filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, repaired, or replaced at his expense.
- C. All temporary earth changes shall be in conformance with the Soil and Erosion Control Act.

**3.11 RESTORATION**

- A. Headwalls, culverts, and drainage systems filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, re-laid or rebuilt with new materials to a condition equal to the original state, and of thickness equal to the original structure and to the original line and grade at the CONTRACTOR's expense.
- B. Where the excavation is located beside a ditch and/or where an existing ditch is filled or disturbed in the CONTRACTOR's operations, the CONTRACTOR shall clean, repair, or replace the ditch with properly pitched bottom and side slopes and of section and capacity not less than the original section.
- C. Where excavation has been through lawn areas, the CONTRACTOR shall restore the disturbed area by placing topsoil and seeding or sodding over the final backfill material. Turf establishment shall be done using the Special Provision on the plans. In landscape areas, seed mixes specified within the plans must be followed.
- D. The CONTRACTOR shall remove excess dirt and other construction material from the site of the work and leave the site in a condition equal to its original state.
- E. The final condition of the streets and roadways shall be subject to the approval of the governmental body having jurisdiction thereof, as well as review by the ENGINEER.

END OF SECTION



**1.00 GENERAL****1.01 DESCRIPTION**

- A. Furnish all labor, tools, equipment and materials to construct all storm sewers, and drainage structures as herein specified. No sewers shall be accepted until the sewer system has passed the system acceptance tests.

**1.02 TESTING****A. General**

- 1. The CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein on all completed sewers. All tests shall be conducted under the supervision of the ENGINEER. No acceptance tests shall be conducted until the entire sewer system is constructed or just prior to placing the line in service providing the sewer pipe has been installed for not less than 30 days.

**B. Test for Alignment**

- 1. All sewers shall be laid accurately to the line and grade established by the ENGINEER. The sewers will be tested for alignment by shining a light through the pipe at a manhole and viewing the light from an adjacent manhole. Any section of sewer in which a light cannot be seen from one manhole to the next shall be corrected to the satisfaction of the ENGINEER to pass this test.

**C. Material Tests**

- 1. The CONTRACTOR shall have tests of pipe and strength made by an independent testing laboratory. Tests of up to four (4) lengths of sewer pipe per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturer's certificate of compliance to the Specifications.

**D. Submittals**

- 1. The CONTRACTOR shall submit shop drawings or data sheets for all castings, steps and pipe materials.

**2.00 PRODUCTS****2.01 PIPE**

- A. Reinforced concrete pipe and manhole tees shall be no less than the latest revision of ASTM C76, with the class designation as shown on the Plans or in the Proposal.
- B. Concrete pipe shall have tongue and groove joints and shall be made with an approved mastic.
- C. Corrugated steel pipe shall meet the requirements of AASHTO M-190 for coated pipe latest revision. Minimum gage thickness shall be as shown on the Plans or in the Proposal.
- D. High density polyethylene pipe and fittings shall meet the requirements in the AASHTO M326-08 specification.



**2.02 PRECAST CONCRETE**

- A. Reinforced concrete structures and grade rings shall conform to the current ASTM Specifications for Precast Reinforced Concrete Manhole Sections, Serial Designation C478. Manhole section joints shall be made with mortar. Dome sections shall be straight side type.

**2.03 HEADWALLS**

- A. Headwalls shall be constructed of concrete in accordance with MDOT Specifications.

**2.04 BRICK AND BLOCK**

- A. Clay brick to be used in the construction of manholes, catch basins, and similar structures shall conform to the current ASTM C32, Grade MS. Concrete brick shall conform to the requirements for concrete building brick and structural masonry of current ASTM C55, Grade S-II. Concrete block for manholes, catch basins, and inlets shall conform to the current ASTM C139. Mortar for plastering drainage structures shall be made of one-part Portland cement and two parts fine aggregate.
- B. The concrete block masonry used to construct manhole and catch basin walls shall be solid curved blocks with the inside and outside surfaces curved to the required radii. The blocks shall have tongue and groove or other approved type of joint at the ends so that the units interlock to form a strong, rigid structure. Curved blocks shall have the inside and outside surfaces parallel.
- C. The block shall not exceed 18 inches in length or 8 inches in depth (height). No block shall be less than 6 inches in width (thickness). All blocks in one structure shall be of the same height dimension. The blocks shall be designed for length so that only full-length or half-length blocks are required to lay the circular wall of any one course.
- D. Blocks intended for use in the cones or tops of manholes and catch basins shall have such shape as may be required to form the structure as shown on the Plans with inside and outside joint not to exceed 1/4-inch in thickness.

**2.05 CASTINGS**

- A. Castings shall conform to the latest revision of the ASTM Specification A48, Gray Iron Castings, and be coated by the manufacturer with coal tar pitch, varnish, or other asphaltum coating reviewed by the ENGINEER.
- B. Frames and lids shall be as follows:
  - 1. For use on manholes: Neenah R-1642 with type C solid cover, or East Jordan Type A solid cover, or equal.
  - 2. For use on drainage structures designated to receive "Type B" cover: Neenah R-2560-E4 Beehive cover or East Jordan Beehive grate or equal.
  - 3. For use on drainage structures in curbed areas: Neenah R-3031-B, or East Jordan 7045 with Type M1 grate, or equal.
  - 4. For use on drainage structures in curbed areas with a curb cut: Neenah R-3034B, or East Jordan 7065 with Type M1 grate, or equal.



5. For use on drainage structures in non-curbed areas: East Jordan 5080 with Type M1 grate, or equal.

**2.06 STEPS**

- A. Manhole steps shall be cast iron or plastic coated steel. They shall be Neenah R-1981-J, East Jordan 8512, M.A. Industries PSI-PF, or equal.

**3.00 EXECUTION****3.01 EXCAVATION AND BACKFILL**

- A. All excavation and backfill above the pipe shall conform to Section 2.04, Earthwork.
- B. Concrete pipe shall be laid on a compacted aggregate material placed on the bottom of the trench to a depth of not less than 3 inches for 24-inch and smaller pipe and not less than 4 inches for pipe larger than 24-inch. Where indicated on the Plans or required by the ENGINEER, concrete encasement or cradle shall be used.
- C. Compacted aggregate material shall be placed at the sides of the pipe and cover not less than 12 inches over the pipe.
- D. "Aggregate Material" shall be pea gravel, or crushed stone conforming to ASTM C33 Size No. 67 placed in not more than 6-inch layers and compacted to not less than 90% standard density.

**3.02 PIPE PLACEMENT**

- A. Pipe shall be laid true to the required lines and grades. All trenches when pipe laying is in progress, shall be kept dry; and all pipes and fittings shall be uniformly supported on a properly trimmed bedding with holes at each joint to receive bells. All pipe shall be laid with bells uphill.
- B. The grade as shown on the profiles is that of the pipe invert and that to which the work must conform. The grade shall be kept by batter boards, levels, laser or other tools which shall be furnished by the CONTRACTOR at his expense. Each pipe shall be laid accurately to the line and grade in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the invert. The interior of sewers shall, as the work progresses, be cleaned of all dirt, cement, debris and other superfluous materials of every description. Bulkheads shall be used to keep foreign materials out of the open end of the sewer when work is not in progress.
- C. The CONTRACTOR shall be responsible for providing and maintaining all temporary pumping necessary to maintain existing storm water run-off and drainage at the site, including both dry weather flow and storm flow. At the end of each work day, the CONTRACTOR shall reconnect storm sewer system to allow the existing flow to be maintained through storm sewer without the need for bypass pumping.
- D. The locations of the piping as shown on the Plans has been determined to avoid, insofar as possible, interference with trees or structures or fixtures above ground and other underground mains, services, utilities or structures. Any change in location or alignment of piping, which may be found more feasible or practicable as the work progresses, shall be made by the CONTRACTOR, as the ENGINEER may direct.



- E. Whenever it is necessary to deflect pipe from a straight line either in the horizontal or vertical plane to avoid obstructions, or where long radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory jointing and shall be reviewed by the ENGINEER.

**3.03 PIPE CONNECTIONS**

- A. When a sewer is connected to an existing manhole, a hole adequate to receive the new pipe shall be cut into the manhole.
- B. If the existing manhole is of brick construction, a single rowlock of brick shall be turned over the new pipe and the existing manhole brick work shall be cleaned, pointed and given a 2-inch mortar coat on the outside surface.
- C. For connections to existing precast reinforced concrete manholes, a hole shall be cut into the concrete manhole wall to receive the pipe. Reinforcing steel shall not be cut but shall be bent and replaced in the area that is to be patched. A form shall be constructed over the area of pipe penetration. The formed area shall then be filled with concrete.

**3.04 DRAINAGE STRUCTURES**

- A. Manhole and catch basin bottoms shall be concrete and top of slab shall have a troweled finish.
- B. The manhole and catch basin walls may be constructed of concrete block masonry or concrete manhole pipe conforming to the requirements of the Specifications previously listed. Construction shall be in accordance with the details for "Storm Catch Basin" and "Storm Manhole" shown on the Plans or the Michigan Department of Transportation Standard Drawings.
- C. A plaster coat of mortar 2-inch in thickness shall be applied to the outer surface of all manholes and catch basins constructed with concrete block masonry.
- D. Final adjustment of the top of manholes and catch basins, so that the manhole or catch basin cover is at finished elevation as shown on the Plans or meets the finished surface, may be accomplished with sewer brick conforming to the previously listed Specifications. The total height of brick for this purpose shall not exceed 12 inches. The inside and outside surfaces of all manholes and catch basins constructed with sewer brick will receive a plaster coat of mortar 2-inch in thickness. The inside coat of mortar shall be applied in a smooth, neat workmanlike manner.
- E. All block and brick masonry units shall be laid in a full bed of mortar. The inside joints of the block masonry construction shall be tooled in a neat and workmanlike manner.
- F. If precast manhole pipe is used for manholes and catch basins, the bottom barrel section shall be placed in a full bed of mortar and each succeeding joint shall also be filled with mortar. The pipe shall be set in a true vertical position.

END OF SECTION



**1.00 GENERAL****1.01 DESCRIPTION**

- A. To assure quality landscaping and lawn restoration work is completed on the project, the restoration contractor/subcontractor shall be named and approved at the time of contract award, and have a minimum of 5 years of experience with the main business of providing landscaping services.
- B. Furnish all labor, materials, tools, and equipment required to restore the ground surface to original conditions and to remove from the site all tools, equipment, rubbish, and construction debris of all designation. This will include dormant seeding as specified herein. All work shall be performed in accordance with the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction unless otherwise noted.
- C. Related work that is not a part of this Section and is specified elsewhere includes:

Site General Provisions	Section 2.01
Earthwork	Section 2.04
Landscaping	Sections 02930, 02931, 02932

**2.00 PRODUCTS****2.01 HYDROSEEDING MIXTURE**

- A. Meet requirements of Section 02930 Landscaping and as show on the Contract Drawings.

**2.02 FERTILIZER**

- A. Meet requirements of Section 02930 Landscaping and as show on the Contract Drawings.

**2.03 TOPSOIL**

- A. Meet requirements of Section 02930 Landscaping and as show on the Contract Drawings.

**2.04 WATER**

- A. Meet requirements of Section 02930 Landscaping and as show on the Contract Drawings.

**3.00 EXECUTION****3.01 CLEANUP**

- A. All disturbed areas not within roadways or driveways shall be seeded as noted in the Contract Drawings. Rain gardens, savanna areas, and bioswales require special seed mixes, which are indicated in the Drawings and in the Landscaping specifications. All debris shall be removed from the site.

**3.02 TOPSOIL AND HYDROSEEDING**

- A. Topsoil and hydroseeding shall be based on the Turf Establishment, Performance special provision in the Contract Drawings.



**3.03 WATERING**

- A. The CONTRACTOR shall supply the necessary water and continuously water the seeded areas until the turf is established.

**3.04 MEASUREMENT AND PAYMENT**

- A. All work associated with reestablishment of turf areas as shown on the Contract Drawings or as directed by the ENGINEER shall be considered included in the contract pay item Restoration and Cleanup, and they will not be paid for separately. This pay item shall also include the removal and proper disposal offsite by the CONTRACTOR, of all excess excavated materials, debris and materials generated by removal items. It shall also include furnishing, placing and compacting ENGINEER approved fill if site soils are determined deficient in quantity or quality, or unsuitable in the opinion of the ENGINEER, for incorporation into the work, or if the ENGINEER determines that undercutting soils and the placement of approved fill is necessary to satisfactorily complete the work. This pay item shall restore the entire site, including work that is not specifically called out by separate pay items, all as directed by the ENGINEER.
- B. All work associated with seeding rain garden, bioswale, and savanna areas shall be included in their respective pay item and will not be paid for separately.

END OF SECTION



**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. All labor, materials, equipment necessary to provide finished site revegetation. Work includes planting preparation, topsoil, seeding, planting accessories, and tree and shrub planting installation.

**1.02 REFERENCES**

- A. ANSI - American National Standards Institute:
  - 1. American Standard for Nursery Stock, ANSI Z60.12014

**1.03 DEFINITIONS**

- A. Plant Stock: This includes plant material that is to be introduced to Site regardless of its form or maturity. Plant stock may be referred to as woody, such as trees, shrubs, and some varieties of vines; or herbaceous, such as forbs, grasses, sedges, and some varieties of vines. Immature plant stock may be in form of germinated and ungerminated seeds. Mature herbaceous plant stock is generally in form of potted or containerized whole plants. Mature woody plant stock is generally in form of containerized, balled and burlapped, or bare root trees and shrubs.
- B. Acceptance: Wherever the terms "acceptance" or "accepted" are used herein, they mean acceptance of OWNER/ENGINEER in writing.
- C. Planting Installation Acceptance: This refers to the written acceptance by the OWNER/ENGINEER of the installed plant material.
- D. Product Purchase and Delivery Documentation: Product order sheet and delivery manifest

**1.04 SUBMITTALS**

- A. All submittals shall be clearly identified by reference to Section Specification number, Paragraph, and Drawing number as applicable. Submittals shall be clear and legible and of sufficient size for clear presentation of data.
- B. Product data as specified in individual Specification Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the work.
- C. Samples
  - 1. Samples specified in individual Specification Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the ENGINEER or OWNER for



independent inspection and testing, as applicable to the work.

- D. All substitutions, materials, or execution shall be approved by the OWNER/ENGINEER, in writing, a minimum of 1 month prior to installation. The OWNER/ENGINEER reserves the right to require a sample of substituted material(s) prior to approval for construction.
- E. Soil Test:
1. Provide Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
  2. Topsoil Analysis (existing surface soil and imported topsoil): Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
    - a. Report suitability of topsoil for plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- F. Landscape Plan: CONTRACTOR to provide ENGINEER one month prior to initiation of landscape work and shall include:
1. All relevant permits, licenses, and authorizations.
  2. Written detail for all planting methods, schedule and certificates.
  3. Plant Stock Certificates from woody plant stock suppliers which shall include:
    - a. Botanical name, including cultivar, and common name.
    - b. Quantity.
    - c. Size.
    - d. Type (B&B, Container, Bare Root...etc.)
    - e. Origin (Location grown).
    - f. Name, address, and phone number of supplier.
  4. Seed Certificates from seed suppliers which shall include:
    - a. Botanical names and common names.
    - b. Net weight.
    - c. Percentage of seeds by weights.
    - d. Purity of seed.
    - e. Amount of undesirable plant seeds present in mixture.
    - f. Germination percentage.
    - g. Date of production.
    - h. Date of packaging.
    - i. Location of packaging.
    - j. Name, address, and phone number of supplier.
  5. Material test reports for imported AND native soils.
  6. Name and address of mulch supplier(s) and a small physical sample of the material to be used.



**1.05 QUALITY ASSURANCE****A. Plant Stock Suppliers:**

1. Obtain plant stock only from established suppliers capable of providing quantities adequate to complete this project. Suppliers shall be required to provide data requested for required submittals prior to use of stock. Suppliers shall be located in Southeast Michigan, when possible, and not outside of the Great Lakes ecoregion.

**B. Contractor Qualifications:**

1. All landscaping work shall be performed by a Landscape Contractor experienced in planting and establishing the specified plant stock herein. Personnel used to perform installation of plant materials shall have occupational experience in landscape planting projects similar to the scope and size of this project.
2. Installation of bioretention facilities and site landscape installation shall be performed only by experienced workmen familiar with planting procedures under the supervision of a qualified supervisor

**C. Regulatory Requirements:**

1. Perform all work in accordance with all applicable laws, codes, and regulations required by authorities having jurisdiction over such work.
2. Adhere to all federal, state, and local regulations for all phases of the project regarding erosion and sediment control measures.
3. Anticipate field conditions that may result in erosion, fires, noise, dust, and other potentially problematic situations and take steps necessary to reduce or eliminate these conditions in compliance with relevant ordinances and regulations.
4. All plant stock, original and replacement, shall comply with state and federal Laws and Regulations with respect to inspection for plant diseases and insect infestations. Quality and size shall conform to the current edition of *American Standard for Nursery Stock* (ANSI Z60.1) as published by AmericanHort, formed in 2014 with the consolidation of the American Nursery & Landscape Association and OFA—The Association of Horticultural Professionals.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Pack, handle, and transport plant stock in a manner approved for that species and size by OWNER/ENGINEER. Take precautions that are customary in good trade practice to ensure proper transport and arrival of plant stock.
- B. Anti-Desiccant: Spray all evergreen or deciduous plant material in full leaf immediately before transporting with anti-desiccant. Apply an adequate film over trunks, branches, twigs and foliage.
- C. Digging: Dig ball and burlap (B & B) plants with firm, natural balls of earth of diameter meeting requirements of ANSI Z60.1-2014, and of sufficient depth to include the fibrous and feeding roots.
- D. Furnish standard products in unopened manufacturer's standard containers bearing original labels showing quantity, analysis and name of manufacturer.



- E. Store plant stock in a manner to prevent damage or deterioration. Plant stock stored for excessive lengths of time or at a time of year which is not suitable by standard horticultural practice shall not be accepted for planting. Store products with protection from weather or other conditions that would damage or impair the effectiveness of the product.
- F. Store plant stock in aboveground locations in non-construction areas approved by OWNER/ENGINEER if not transplanted directly. Keep woody and herbaceous plant stock stored cool and sheltered from drying effects of direct sunlight, unless specifically required by plant stock, and prevailing winds. Place sufficient soil or mulch about roots of plant stock to protect them from desiccation and to provide nourishment during storage. Supply adequate water to maintain plant stock in a healthy and vigorous state suitable for transplanting.
- G. The following conditions shall render Plant Stock Unacceptable:
  - 1. Plant stock that arrives dried out, exposed to excessive heat, wind burn or that has been in storage for extended periods of time.
  - 2. Plant stock displaying mold, decay, or physical damage.
  - 3. Seeds in wet or damaged packaging are not acceptable.
- H. Deliver and store seed mixtures in original sealed containers. Store seeds in weatherproof and rodent-proof enclosures. Reject seed when it becomes wet, moldy, or otherwise damaged.
  - 1. Seed container labels should have the following minimum information:
    - a. Botanical name and common name.
    - b. Net weight.
    - c. Percentages of seeds by weight.
    - d. Percentage of germination.
    - e. Amount of undesirable plant seeds present in mixture.
    - f. Pure Live Seed (PLS)
    - g. Date of production.
    - h. Name and address of supplier.
- I. The OWNER/ENGINEER shall reserve the right to refuse any plant material that is unacceptable upon delivery to site.
- J. Changes and/or substitutions of plant materials from what is specified on the Drawings are unacceptable without prior written authorization from OWNER/ENGINEER.
- K. All plant materials shall be inspected and approved by OWNER/ENGINEER prior to installation on-site.
- L. Do not lift or handle plants by tops, stems or trunks at any time. Do not bind or handle plants with wire or rope at any time.

#### 1.07 SEQUENCING AND SCHEDULING

- A. Installation
  - 1. Installation of plant stock per the contract documents and this specification section.
- B. Maintenance Period per Section 02931 – Landscape Maintenance.



C. Warranty Period per section 02932 – Landscape Warranty.

## PART 2 – PRODUCTS

### 2.01 TOPSOIL

A. Topsoil for Savannas: Contractor shall anticipate that existing soils will be used and that no additional topsoil or amendments will be imported to the site or incorporated into the soil layer. Contractor shall provide a soils report from a certified lab to demonstrate the existing soil is suitable for supporting the Savanna installation. If substantial modifications to the existing soil are necessary, the Contractor shall submit an estimate for additional compensation to do so.

#### B. BIORETENTION PLANTING SOIL

1. The soil shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the Bioretention area that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The planting soil shall be free of Bermuda grass, Quackgrass, Johnson grass, or other noxious weeds. The planting soil for Bioretention facilities shall consist of a mixture of sand, topsoil, and compost. In addition, the soil shall have infiltration rates no less than 0.5 inches per hour. To achieve this, typical soil mixes consist of approximately 20-30% organic compost (i.e. leaf compost), 20-30% top soil, and 40-60% sand or roughly a 4:2:2 ratio of sand, soil and compost.
2. Additional recommendations for the planting soil include a 1.5 to 3 percent organic content and a maximum 500 ppm concentration of soluble salts.
3. If the existing soil does not meet the above characteristics, then it shall either be adjusted to meet the criteria or removed and replaced with an acceptable planting soil. Soil tests shall be performed for every 500 cubic yards of planting soil, with the exception of pH and organic content tests, which are required only once per Bioretention area and shall meet the following criteria:
  - a. PH range 5.2 – 7.0.
  - b. Organic matter 1.5 - 3% (by weight).
  - c. Magnesium 35 lb./ac.
  - d. Phosphorus (phosphate - P<sub>2</sub>O<sub>5</sub>) 75 lb./ac.
  - e. Potassium (potash - K<sub>2</sub>O) 85 lb./ac.
  - f. Soluble salts not to exceed 500 ppm.
4. All Bioretention areas shall have a minimum of one test. Each test shall consist of both the standard soil test for pH, phosphorus, and potassium and additional tests of organic matter, and soluble salts. A textural analysis is required from the site stockpiled topsoil. If topsoil is imported, then a texture analysis shall be performed for each location where the top soil was excavated. Should the pH fall out of the acceptable range, it may be modified (higher) with lime or (lower) with iron sulfate plus sulfur.
5. To prevent root intrusion into the underdrain system, the depth of the planting soil shall be no shallower than the root zone of the vegetation planted in the Bioretention cell. In addition, the depth shall be at least 4 inches below the largest root ball.



**2.02 SOIL AMENDMENTS**

- A. If deemed necessary, application of various soil amendments can be made as follows and in coordination with OWNER/ENGINEER.
  - 1. Manure: 2 to 3 years old, well-rotted, animal manure, free from shavings, refuse, and other materials harmful to plant growth.
  - 2. Bonemeal: commercial, raw, finely ground; 4% nitrogen and 20% phosphoric acid.
  - 3. Commercial fertilizer: complete fertilizer of neutral character, with at least some elements derived from organic sources and containing the percentages of available plant nutrients.
  - 4. Wood chips: wood chips and shredded bark may be coarse- or fine-screen graded.
- B. PH Adjuster:
  - 1. Lime: ground dolomite limestone containing not less than 85% calcium and magnesium carbonates, 50% passing through a 100-mesh screen, 98% passing through a 20-mesh screen.
  - 2. Elemental sulfur: finely ground horticultural grade material containing at least 95% purity. Material will be delivered in unopened containers with the manufacturer's guaranteed analysis.

**2.03 PLANT STOCK**

- A. Furnish plant species and sizes as indicated on the Plans. Substitutions in plant species or size can be made only by written approval of the OWNER/ENGINEER.
- B. Plant stock shall be true to their name as specified. Plant species must be of native stock; horticultural cultivars will not be accepted.
- C. Use commercially available plant stock that has been raised in local (Southeast Michigan) nurseries under similar climatic conditions. No plant stock shall be accepted from outside the Great Lakes ecoregion without prior written approval from the OWNER/ENGINEER.
- D. Trees shall be field grown (balled and burlapped), grown in field soil for at least 12 months prior to harvest.
- E. Plants shall be free of insects and diseases.
- F. Plants shall exhibit a balanced growth habit and shall show appearance of healthy growth and vigor.
- G. Trees shall have intact root balls with original earth firmly in place around roots. Non-containerized trees and shrubs shall be wrapped tightly and securely with untreated burlap and, if necessary, shall be tied securely with a biodegradable natural fiber twine such as jute to provide further protection for root ball. Plants balled using non-biodegradable burlap will not be accepted.

**2.04 SEED STOCK**

- A. Use commercially available native seed that has been raised in local (Southeast Michigan) nurseries under similar climatic conditions. No seed shall be accepted from outside the Great Lakes basin without prior written approval from the OWNER/ENGINEER.



- B. Seed Mixes shall include species and pounds per acre (LB/AC) as indicated on the plans.
1. Seed mixtures shall be blended by supplier at specified ratios of various species and shall be guaranteed by supplier as being true to specifications.
  2. Seed shall be "clean" according to industry quality standards.
  3. It is acceptable to use more than one seed supplier if necessary to fulfill the specified species list, provided the rates in LB/AC are retained.
  4. Turf grass seed mix shall be a mix of turf forming grasses adapted to cool-season growth in the Midwest Region of the United States, adapted to part sun and part shade, with moderate drought tolerance. Seed landscape plans for seed mix and general notes.
- C. Seed Mixes shall contain no more than 1 percent by weight of undesirable plants species determined by standard purity tests, including but not limited to the species below.

Scientific Name	Common Name
<i>Agrostis gigantea</i>	redtop
<i>Ailanthus altissima</i>	tree-of-heaven
<i>Alliaria petiolata</i>	garlic mustard
<i>Ambrosia artemisiifolia</i>	common ragweed
<i>Ambrosia trifida</i>	giant ragweed
<i>Arctium minus</i>	common burdock
<i>Barbarea vulgaris</i>	yellow rocket
<i>Berberis thunbergii</i>	japanese barberry
<i>Berteroa incana</i>	hoary alyssum
<i>Bolboschoenus maritimus</i>	bulrush
<i>Brassica nigra</i>	black mustard
<i>Celastrus orbiculatus</i>	oriental bittersweet
<i>Centaurea stoebe</i>	spotted knapweed
<i>Chenopodium album</i>	lambs-quarters
<i>Cirsium arvense</i>	canada thistle
<i>Cirsium vulgare</i>	bull thistle
<i>Convallaria majalis</i>	lily-of-the-valley
<i>Convolvulus arvensis</i>	field bindweed
<i>Cynodon dactylon</i>	bermuda grass
<i>Cyperus esculentus</i>	yellow nutsedge
<i>Daucus carota</i>	queen-annes-lace
<i>Digitaria ischaemum</i>	smooth crab grass
<i>Digitaria sanguinalis</i>	hairy crab grass
<i>Dipsacus fullonum</i>	wild teasel
<i>Dipsacus laciniatus</i>	cut-leaf teasel
<i>Elaeagnus umbellata</i>	autumn-olive
<i>Elymus repens</i>	quack grass



Scientific Name	Common Name
<i>Fallopia convolvulus</i>	false buckwheat
<i>Fallopia japonica</i>	japanese knotweed
<i>Frangula alnus</i>	glossy buckthorn
<i>Hesperis matronalis</i>	dames rocket
<i>Ipomoea purpurea</i>	common morning-glory
<i>Ligustrum vulgare</i>	common privet
<i>Lonicera maackii</i>	amur honeysuckle
<i>Lonicera tatarica</i>	tartarian honeysuckle
<i>Lysimachia nummularia</i>	moneywort
<i>Lythrum salicaria</i>	purple loosestrife
<i>Melilotus albus</i>	white sweet-clover
<i>Melilotus officinalis</i>	yellow sweet-clover
<i>Morus alba</i>	white mulberry
<i>Pastinaca sativa</i>	wild parsnip
<i>Phragmites australis</i>	reed
<i>Rhamnus cathartica</i>	common buckthorn
<i>Robinia pseudoacacia</i>	black locust
<i>Rosa multiflora</i>	multiflora rose
<i>Rumex crispus</i>	curly dock
<i>Scilla luciliae</i>	glory-of-the-snow
<i>Sinapis arvensis</i>	wild mustard
<i>Sonchus arvensis</i>	perennial sow-thistle
<i>Sorghum halepense</i>	johnson grass
<i>Stellaria media</i>	common chickweed
<i>Tanacetum vulgare</i>	garden tansy
<i>Taraxacum officinale</i>	common dandelion
<i>Vincetoxicum nigrum</i>	black swallow-wort

- B. Seed shall contain no federal or state listed noxious or invasive weeds (an amount within the tolerance of zero percent) as determined by a standard purity test.
- C. Seed mix shall contain no Federal or State listed threatened or endangered plant species, unless otherwise authorized by ENGINEER.
- D. Seed mix substitutions can be made only by written approval of the OWNER/ENGINEER.

## 2.05 MULCH

- A. Mulch for all woody plant stock shall be composed of shredded hardwood bark. Mulch shall not contain any foreign material, debris, or compounds that may be detrimental to plant growth.
- B. Obtain OWNER/ENGINEER's approval prior to use of other types of mulch.



**2.06 TREE WRAP FOR SEEDLINGS:**

- A. Install per manufactures instructions. The wrap is necessary to reduce potential damage from deer and rodents. Include with pay item for trees under 2-inch caliper.
- B. TREE WRAP MANUFACTURES:
  - 1. Itasca greenhouse inc, 1-800-538-8733 rigid seedling protector tube
  - 2. MDI, 218-326-9544, tree wrap for seedlings
  - 3. Stuewe and Sons, 800-553-5331, zipset tree wrap
  - 4. Approved equal, biodegradable preferred

**2.07 BACKFILL SOIL**

- A. Backfill soil for planting pits shall consist of 50% excavated material and 50% imported topsoil and shall be finely divided, loose, and free of clods. Lumps, stone, litter, and other foreign non-organic material larger than 1 inch shall be removed. Non-desirable organic matter, including plants, roots, weeds, and perennial rhizomes shall also be removed. If additional soil is required, topsoil shall be used.

**2.08 ACCESSORIES**

- A. CONTRACTOR to install tree guards on all trees less than 2-inch caliper to protect against damage due to deer antler rub.

**2.09 HERBICIDES AND PESTICIDES**

- A. Any herbicide or pesticide intended for use on site must be approved by the OWNER/ENGINEER prior to use.
- B. Herbicides shall have Glyphosate as the primary active ingredient, unless otherwise approved by the OWNER/ENGINEER. Herbicides shall be approved for aquatic use where applicable.
- C. The use of pesticides is not recommended and will only be approved under extreme circumstances. Under no circumstances will pesticide application be allowed where the risk of surface water contamination exists unless the pesticide is approved for aquatic use.

**2.10 EQUIPMENT**

- A. Seeding Equipment: Obtain OWNER/ENGINEER's approval prior to use. The following requirements apply to specific equipment that may be used in seeding activities:
  - 1. Tractors and Crawlers: Shall have low-pressure flotation tires or broad tracks so that soil compaction is minimized in areas of Site preparation or seeding activities.
  - 2. Disc: In good repair with sound unbroken blades; weighted as necessary to achieve required tillage depth.
  - 3. Rollers or Cultipackers: Minimum 6-inch diameter rollers; of sufficient weight to pulverize clods of soil. To be used following rough grading on subgrade soils as a preparation for installation of seedbed soils.



4. Airway Shattertyne: Roller tynes shall be 10 to 12-inch OD so that topsoil or organic-rich common fill and surface mulches are mixed into top 2 to 4 inches of subgrade. Weighting of this equipment should be minimal so as to avoid compaction of organic-rich common fill.
5. Spinning Disc Seeder: When spinning disc seeders are used, mix individual seeds comprising mixture with an appropriate dispersal medium such as damp sterile sand or sawdust prior to sowing.
6. Tractor-drawn or Mounted Seeders: Provide with a calibrated adjustable gate opening providing uniform flow over a width adapted to work and able to drop seed directly on prepared seedbed. Obtain OWNER/ENGINEER'S approval prior to using this system. Equipment shall be equipped with low pressure/high flotation tires or wide tracks which shall result in minimal disruption and compaction of graded wetland surfaces.
7. Broadcast Seeders: Hand methods (cyclone seeders) and mechanical tractor-drawn methods.
8. o-Till Planters and Drills: Rangeland type grass drills and no-till rangeland grass drill planters shall be designed specifically for seeding native grasses and forbs.

### **PART 3 – EXECUTION**

#### **3.01 SEQUENCING AND SCHEDULING**

- A. Submit a Landscaping Work Plan for approval prior to mobilization to Site for landscaping.
- B. Incorporate sequencing and scheduling aspects of Sediment and Erosion Control Plan.
- C. Use every possible precaution to prevent damage to existing conditions to remain such as structures, utilities, plant materials on or adjacent to the site of the work.
- D. Schedule topsoil placement to permit seeding and planting operations under optimum growing conditions during specified planting time frames. Plant and seed soils within 7 days of topsoil placement.
- E. Plant stock shall be installed according to the following time frames:
  1. Plant stock March 1 through May 15, and October 15 through November 30.
  2. Seeding: April 20, or as soon thereafter as soil is free of frost and in workable condition, through June 15, and September 15 through November 1.

#### **3.02 PLANTING – GENERAL**

- A. Do not proceed with planting in any area until necessary modifications and/or corrections determined during pre-planting examination are completed and approved by OWNER/ENGINEER. Begin installation within 48 hours after approval by OWNER/ENGINEER. If conditions detrimental to installation or plant growth or safety of planting crew are encountered, immediately notify OWNER/ENGINEER prior to planting. Support approvals, disapprovals, and notifications by written documents containing details of circumstances involved.
- B. Maintain Sediment and Erosion Control Plan in conformance with applicable regulations and as approved by OWNER/ENGINEER.



- C. Protect finish-graded areas from damage by vehicular or pedestrian traffic and erosion. Maintain drainage patterns as indicated on the drawings. Re-till areas compacted by construction equipment to a minimum depth of 6 inches. Rework and restore any areas compacted or damaged by rain, traffic, or other cause, prior to planting.
- D. Environmental Requirements
  - 1. Do not conduct seeding or planting operations when soil is frozen. Materials shall not be applied over snow or ice.
  - 2. Do not undertake seeding and planting activities during stormy weather when excessive precipitation may result in washing of seed away from location intended.
  - 3. Do not install plant materials during periods of temperature extremes when atmospheric temperature may drop below 36 degrees F or rise above 90 degrees F.
  - 4. Do not apply seeds, seed mixtures, slurries with seeds, or mulch when wind conditions are such that materials would be carried beyond designated areas or materials would not be uniformly applied.
  - 5. When drought, excessive moisture, or other unsatisfactory conditions prevail, as determined by the OWNER/ENGINEER, the CONTRACTOR will stop work.

### 3.03 CONSTRUCTION (BIORETENTION)

- A. Excavated materials shall be placed away from the facility sides to avoid contamination and possible sidewall instability. The sidewalls of the trench shall be scarified or roughened where sheared and sealed by heavy equipment.
- B. Underdrain and Outlet Requirements
  - 1. A perforated pipe underdrain shall be provided beneath the planting soil. The underdrain shall have a minimum grade of 0.5 percent. The perforated pipe shall have a diameter of 4 or 6 inches and shall meet the requirements of city and state regulations. A granular backfill of durable CA-6 aggregate shall be provided up to a minimum of 4 inches above the outside diameter of the pipe.
  - 2. Underdrains are to be placed on geotextile fabric. Pipe shall be placed next, followed by the gravel bedding. Geotextile fabric shall be placed at the top of the gravel bedding to separate the gravel from the soil media. The ends of underdrain pipes not terminating in an observation well shall be capped.
  - 3. Clean-out pipes shall be provided per plans,
- C. Erosion and Sediment Control
  - 1. Prior to construction of the Bioretention facilities, proper planning for sediment control is required. Utilizing the approved sediment and erosion control plans, install the necessary sediment control devices to protect the Bioretention facilities from contamination by sediment. At a minimum, silt fence material shall be placed around the perimeter of each cell.
  - 2. The proposed Bioretention cells should not be disturbed after the initial rough grading and temporary stabilization has been performed. During the construction phase, all drainage shall be directed away from the facility location to avoid excessive



sedimentation. Flows can be directed away from the Bioretention facilities by utilizing silt fencing materials and temporary diversion swales that direct flows to small on-lot silt traps.

3. The area proposed for the Bioretention facility may be used for the installation of a sediment control facility. However, if a sediment control facility is to become a Bioretention facility, the following conditions must be met:
  - a. All remnant sedimentation shall be removed
  - b. The in-situ soils and ponded sediment materials shall be removed and the remaining surface scarified to expose undisturbed soil that is not clogged with sediment.
  - c. No sediment removed from the basin shall be used in the soil media mix for the Bioretention facilities
4. Grading of any catchment area draining to the facility should be done sparingly and stabilized immediately within 14 days.
5. Erosion and sediment control practices must be inspected and maintained on a routine schedule during and construction and installation of the Bioretention facilities. After every major storm, facilities shall be inspected for accumulation of sediment. All sediment shall be removed. Particular attention should be paid to the stabilization of disturbed areas and integrity of the sediment control devices. It is best to construct Bioretention facilities after all contributing drainage areas have been stabilized.

D. Soil Compaction

1. Installation of soils must be done in a manner that will ensure adequate filtration. It is very important to minimize compaction of both the base of the Bioretention area and the required backfill.
2. Where possible, use excavation hoes to remove original soil. If Bioretention areas are excavated using a loader, the CONTRACTOR shall use wide track or marsh track equipment. There shall be no use of equipment with narrow tracks or narrow tires, rubber tires with large lugs, or high pressure tires as they will cause excessive compaction resulting in reducing infiltration rates and storage volumes and is not acceptable.
3. Soil surfaces shall be scarified by manually raking to aerate and reduce soil compaction. Soil shall be placed in 8"-12" lifts. Lifts are performed in order to reduce the possibility of excessive settlement. Minimal compaction of soil may be performed using mechanical equipment (such as a backhoe bucket) to reduce the possibility of excessive settlement. Lifts may also be watered to encourage natural compaction.
4. Do not use heavy equipment within the Bioretention basin. Heavy equipment can be used around the perimeter of the basin to supply soils and sand. Overfill to allow for natural settlement.

E. Excavation for trees and shrubs

1. Plant per 3.05
2. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
3. Do not place root ball directly on any underdrain structures. Adjust root ball such that it is adjacent to but not resting on any underdrain structures.



4. Subsoil and topsoil removed from excavations may not be used as planting soil

### 3.04 PLANT STOCK PLANTING

- A. Perform planting within time guidelines specified.
- B. Install species at locations as indicated on the drawings.
- C. Obtain OWNER/ENGINEER's approval of soil bed preparation, Plant Stock Certificates, and layout before planting. No plant material shall be installed until it has been inspected and approved for planting by the OWNER/ENGINEER.
- D. The CONTRACTOR shall verify all plant locations with ENGINEER prior to installation. The ENGINEER reserves the right to adjust plant material locations to meet field conditions, without additional cost to the OWNER.
- E. If obstructions are encountered that are not indicated, do not proceed with planting operations until alternative plant locations have been selected and approved in writing by the OWNER/ENGINEER. Where location or spacing dimensions are not clearly shown, request clarification by the OWNER/ENGINEER.
- F. If drainage conditions are questionable, the CONTRACTOR shall bring it to the attention of the OWNER/ENGINEER. Adjustment in planting pit locations or elevations to accommodate drainage concerns shall be approved by the OWNER/ENGINEER. Surface drainage problems discovered after plant material is installed shall be corrected to the satisfaction of the OWNER/ENGINEER at the CONTRACTOR's expense.
- G. Excavate planting pits as shown on the plans. Scarify sides of the pit prior to planting.
- H. Remove non-biodegradable containers prior to planting. Remove plants from containers without disturbing the root ball. All circling roots (root bound) shall be cut and straightened to ensure correct directional root growth after planting.
- I. For balled and wrapped plant stock remove burlap and ropes from top 1/3 of ball after placing plant in pit. If metal baskets are present, remove baskets prior to installation unless this practice voids the plant material warranty.
- J. All plants shall be set plumb and straight, and centered in the pit. Plant root masses shall be in relation to finish grade as shown on the plans.
- K. After positioning plant, place specified backfill soil around root mass and compact lightly. When pit is 2/3 full, add water to soak thoroughly, then backfill to surrounding grade. Gently tamp soil firm.
- L. Create a continuous saucer around the perimeter of each plant pit to aid retention of irrigation water as shown on the plans.
- M. Water plant stock again immediately after planting such that root zone is thoroughly soaked and air pockets are removed.
- N. Any unused soil shall be removed from planting area to preserve finished grades.
- O. Any tree thrown out of plumb by wind action or other causes shall be replanted by loosening the soil around the root system and re-plumbing the tree or shrub by adjusting the position of the root system. Adjustment shall not be made by pushing, pulling, or restraining the trunk or



stem. If, in the opinion of the OWNER/ENGINEER, damage to the root system has occurred as a result of re-plumbing, the tree or shrub shall be replaced by the CONTRACTOR.

- P. Provide specified mulch for woody plants. Mulch plants within 24 hours of planting or as directed by OWNER/ENGINEER.
- Q. Prune each tree and shrub upon completion of planting to remove dead, broken, or injured branches and to compensate for any root loss incurred during transplanting. Retain natural shape of tree and leave as little stub as possible. Never cut leader. Cuts not made at the base of a branch shall be at a 45-degree angle and approximately ½-inch above a live leaf or bud. Pruning shall be done with a sharp tool to produce a clean cut without bruising or tearing the bark. Pruning shall be carried out in accordance with accepted arboricultural practices for size and species of vegetation.

### 3.04 SEEDING

- A. Perform seeding within time guidelines specified. Seed must be applied to seedbed within 5 days after topsoil placement.
- B. All areas intended for seeding shall be free of weeds and other vegetation. Where necessary, infested areas shall be treated by the CONTRACTOR with an approved selective herbicide as approved by OWNER/ENGINEER.
- C. Seedbed soil shall be finely divided, loose, and free of clods. Lumps, stone, litter, and other foreign non-organic material larger than 1 inch shall be removed. Non-desirable organic matter, including plants, roots, weeds, and perennial rhizomes shall also be removed.
- D. Use seeding rates as indicated on the plans unless alternative mixtures and application formulas are reviewed and approved by OWNER/ENGINEER.
- E. Follow seed manufacturer recommendations for seed installation. Seeding method selected shall ensure complete coverage of designated area. Re-seed areas with gaps in seeding at no additional cost to OWNER.
- F. Where obstacles, saturated soils, slopes, or other site conditions make use of mechanical seeding equipment impractical, hand broadcast techniques shall be used.
- G. For hand broadcasting, broadcast seed into soil to a maximum depth of ¼ inch by raking soil or chain dragging, then lightly compacting seedbed with roller or approved equivalent.
- H. All seeded areas with discernable slopes shall be covered with specified Erosion Control Blanket. Use specified stakes to secure blanket to slope per manufacturer's recommendation. Provide 2-4 inches of overlap along edges of blanket sections, and 6 inches of overlap at blanket ends.

### 3.05 SITE CLEAN UP

- A. Immediately clean up excess soil, mulch, or other debris and properly dispose of deleterious materials legally off-site in a manner consistent with local laws. Take necessary precautions to prevent contamination of clean areas as a result of cleaning operations.
- B. All paved areas shall swept free of soil, stains and debris.
- C. Promptly remove equipment and unused materials at completion of activities in given area.



- D. Return stockpile and storage areas to their original grade and restore ground surfaces after stored material has been removed.
- E. Immediately repair damaged vegetation and aerate soil over root zone of negatively impacted vegetation.

### **3.06 PROTECTION OF FINISHED WORK**

- A. Mark seeded and planted areas to prevent intrusion by foot traffic and/or equipment.
- B. Immediately restore areas disturbed by continuing operations.
- C. CONTRACTOR to provide wrap or other protection against damage due to deer antler rub.

### **3.07 PLANTING INSTALLATION ACCEPTANCE**

- A. Planting Installation Acceptance Inspections and Acceptance Issuance:
  - 1. Upon completion of the landscape work, the CONTRACTOR shall request an inspection by the ENGINEER to determine whether all landscape work conforms to the requirements of the Contract Documents.
  - 2. All landscape work must be protected and maintained until Planting Installation Acceptance is issued.
  - 3. If it is found that the landscape work does not conform to the requirements of the Contract Documents, the CONTRACTOR will receive written notification from the OWNER of all corrective work preventing Planting Installation Acceptance of the landscape work within five working days following the inspection. No partial approvals shall be given.
  - 4. Upon completion of the corrective work, the CONTRACTOR shall request another inspection to determine whether all landscape work conforms to the requirements of the Contract Documents.
  - 5. Corrective work followed by review will be required until the corrective work is found to be complete and acceptable by the OWNER.
  - 6. The CONTRACTOR shall reimburse OWNER for expenses and fee required to have OWNER make additional field trips after the second inspection.
  - 7. When the ENGINEER determines that the landscape work conforms to the requirements of the Contract Documents, the CONTRACTOR will receive a written notification of Planting Installation Acceptance within five working days following the Inspection.
  - 8. The Maintenance Period will commence upon the date specified by the notification of Planting Installation Acceptance.
  - 9. Refer to Section 02931 for Landscape Maintenance.

END OF SECTION