SECTION 9

SPECIFICATIONS FOR SHARED USE PATHS AND SIDEWALKS

9.01 DESCRIPTION OF WORK

The work must consist of furnishing and installing Shared Use Paths and Sidewalks (Paths) of the specified widths and thicknesses as shown on the details specified herein, and furnishing all labor, materials, tools, and equipment for receiving, unloading, transporting, laying, and testing of the path. Contractor must furnish all necessary accessories to complete the path work as shown on the Drawings and specified herein.

The work must be performed in accordance with the Project Specifications and Drawings, the MDOT 2020 Standard Specifications for Construction and the following specifications.

9.02 PATH GRADING

9.02.01 Excavation & Embankment

This work must be in conformance with Section 806 of the MDOT 2020 Standard Specifications for Construction except as modified herein. This work must consist of all excavating; filling with material approved by the Engineer; grading, shaping, and compacting of the subgrade required to construct surface improvements such as concrete path or sidewalk; curb and gutter along the path; ADA ramps; intersecting driveways; etc. to the required lines and grades indicated on the Drawings or as noted in the Project Specifications.

Adjacent trees must be trimmed and debris disposed of by the Contractor to allow for a minimum of ten (10) feet overhead clearance and two (2) feet side clearance to the edge of the path. All stumps and root material within two (2) feet of the path must be completely removed and disposed of by the Contractor. Grinding stumps down will not be permitted except as specifically authorized by the Engineer. Tree branches and roots must be pruned neatly and the scars must be covered with an approved tree dressing. Unless otherwise specified, costs related to the above work will be considered part of the Path Grading pay item.

Path Grading must also include stripping and stockpiling topsoil for use in turf establishment; clearing brush, including trees less than six (6) inches in diameter; removing rocks or boulders less than one-half (1/2) cubic yards in volume; removing and relocating existing signs and mailbox posts; matching drive and approach grades to new pavement grades; disposing of excess and unsuitable material according to Section 205 of the MDOT 2020 Standard Specifications for Construction; and trimming of overhanging branches to provide ten (10) feet of overhead clearance.

Materials must be provided in accordance with Section 205 of the MDOT 2020 Standard Specifications for Construction. Additional material must be furnished and placed as necessary to achieve the required typical cross sections. Excavated material may be used for embankment if approved by the Engineer. Suitable embankment within the pavement influence area of roads, drives and parking areas must be MDOT Class II granular material.

9.02.02 Grade

The path must be constructed to match the existing grade, or as noted on the Drawings. The path will have a maximum two (2%) percent transverse slope either toward or away from the road to maintain existing drainage patterns and meet current ADA requirements for longitudinal slope. Minor fills and cuts will be made in the field during construction to provide smooth transition of the path and maintain existing drainage patterns.

9.02.03 Subbase Preparation

Existing vegetation and organic material in the subbase must be removed and topsoil excavated to provide the minimum depth specified in the Project Specifications. Additional depth may be required depending on subsurface soil materials as determined on the Drawings or in the field by the Engineer. Where fill is required, MDOT Class II or MDOT Class III granular material must be used and must be compacted to achieve ninety-five (95%) percent maximum unit weight in accordance with MDOT procedures.

9.02.04 Measurement and Payment

Unless otherwise noted, the completed work, as described and including making all cuts and fills required to construct the path to grade and preparing the subbase will be measured and paid for as Path Grading at the contract unit price per foot as measured along the centerline of constructed path.

If a pay item for Path Grading is not included in the Bid Proposal, this work will be considered a part of the major items of work.

9.03 HOT MIX ASPHALT (HMA) PATH CONSTRUCTION

HMA path must conform to MDOT 2020 Standard Specifications for Construction Sections 501 and 806 except as specified herein.

9.03.01 Aggregate Base

The aggregate base must extend one (1) foot beyond the edge of path and consist of six (6) inches of compacted MDOT 21AA aggregate in accordance with the section as indicated on the Drawings. Density of the gravel must be ninety-eight (98%) percent.

9.03.02 Hot Mix Asphalt (HMA) Surface

The HMA surface must consist of 165 lbs/syd MDOT 5EL hot mix asphalt (top) over 165 lbs/syd of MDOT 5EL HMA (base) placed in accordance with the section as indicated on the Drawings. Construction must be in accordance with Section 501 of the MDOT 2020 Standard Specifications for Construction including material performance grades, mix designs, and application methods.

9.03.03 Measurement and Payment

Aggregate Base for HMA placement will be measured in square yards per the specified depth. HMA placement will be measured in tons. Load tickets for HMA clearly stating the mix, date, and other information as required by Section 401 of the MDOT 2020 Standard Specifications for Construction are required. If tonnage remains after the paving operation, a weigh-back will be required to be supplied from the Contractor to the Engineer. Payment for all HMA items must be limited to the measured area multiplied by the proposed application rate plus ten (10%) percent, or the actual tons installed, whichever is less. Any overruns will not be paid for by the Township.

9.04 CONCRETE PATH CONSTRUCTION

Concrete path must conform to MDOT 2020 Standard Specifications for Construction Section 803 and 806 as specified herein.

9.04.01 Concrete

Concrete must meet the requirements of and must be placed in accordance with Sections 806, 1001, and 1004 of the MDOT 2020 Standard Specifications for Construction. Concrete must be air-entrained and must be Grade 3500 Concrete. Other materials must meet the requirements of the applicable portions of the MDOT 2020 Standard Specifications for Construction.

All concrete paths must be paved with a single course of concrete. Paths through driveways must be six (6) inches thick and extend twenty-four (24) inches beyond the driveway edges on both sides. All other paths must be four (4) inches thick. Unless otherwise specified, saw cuts and removal of existing path will be considered incidental to the major items of work.

The Contractor must provide concrete testing in accordance with the minimum frequency of Quality Control testing in accordance with the MDOT 2020 Standard Specifications for Construction, and the Manual for Michigan Test Methods. Prior to placement of concrete the Contractor must provide a concrete testing plan for review by the Engineer.

9.04.02 Joints

Full depth transverse expansion joints must be constructed perpendicular to the surface of the path at intervals not to exceed fifty (50) feet. Expansion joint material must be one-half (1/2) inch pre-molded expansion joints and must be set one-quarter (1/4) inch below the surface of the path, completely bisecting the concrete. Sealing of joints will not be required.

One (1) inch pre-molded expansion joints must be placed between the path and back-of-curb when path is constructed between the curb and building or other rigid structures. Sealing of joints will not be required. Transverse plane of weakness joints must be true to line and grade and must be placed at intervals matching the width of the path. Paths less than eight (8) feet must have transverse plane of weakness joints formed with a grooving tool. Paths eight (8) feet or wider must have transverse plane of weakness joints formed by saw cutting. Saw cutting must be in accordance with Section 602 of the MDOT 2020 Standard Specifications for Construction. Planes of weakness joints must be constructed to a depth of at least one quarter (1/4) the thickness of the path and a width of one-eighth (1/8) inch to one-quarter (1/4) inch. Sealing of joints will not be required.

9.04.03 Surface

The surface of the concrete must be floated to a level uniform surface and left with a slightly rounded surface. The surface must be roughened with mechanic's brush to prevent smooth and slippery surfaces. No surface must be troweled to a glassy finish. Edges at the forms and joints must be rounded with an edging tool.

The Contractor must protect the surface of the concrete from all types of environmental hazards until the concrete has cured. The Township reserves the right to reject the concrete if the surface has an inconsistent finish. The Contractor must then replace any concrete that does not meet an acceptable surface finish at no additional cost to the Township.

9.04.04 Measurement and Payment

Concrete sidewalk will be measured in square feet of actual concrete surface placed. Concrete that has been broken by the Contractor outside of the limits of the project will not be considered for payment unless otherwise specified.

9.05 CONCRETE CURB RAMP OPENING

At locations where path is constructed to meet a concrete curb, the curb must be constructed in accordance with the latest MDOT Special Detail for curb ramps. If the curb is existing and does not meet the current standard, the curb must be saw cut at the nearest joint of removal and must be completely removed. Unless otherwise specified, this item of work (including removal if needed) will be paid by the foot as measured along the edge of metal from top of transition to top of transition.

9.06 CONCRETE CURB RAMP

Curb ramps must be constructed to conform with the latest MDOT Standard Plans; Sections 803, 806, and 1004 of the MDOT 2020 Standard Specifications for Construction; and with current ADA standards. Detectable warning surfaces must be installed per Sections 803 of the MDOT 2020 Standard Specifications for Construction. Unless otherwise specified, concrete curb ramp will be paid by the square foot of concrete sidewalk ramp installed and detectable warning surface will be paid by the foot as measured at the center of the detectable warning surface installed.

9.07 ADJUSTMENTS OF PUBLIC UTITILIES

All existing valves for water mains, including valves for water services, manhole and catch basin castings, etc. must be adjusted to meet the path elevations. These adjustments must be made in accordance with the utility owner's specifications. All castings and valves must be recessed one-half (1/2) inch below the top of an HMA path and flushed with the top of surface for concrete path. Unless otherwise specified, the cost for this work will be considered part of the major items of work.

9.08 DRIVEWAYS/PAVED PARKING AREAS

Unless otherwise noted on the Drawings or as directed by the Engineer, all existing driveways/hard surface parking areas must be saved. Where driveways/hard surface parking areas are to be removed, a clean saw cut smooth joint the full depth of the material must be made. Bond coat or joint material will be applied if necessary. Unless otherwise specified, cost of saw cut/removal and appurtenances will be considered part of the major items of work.

9.09 GRAVEL DRIVEWAYS

Path must be constructed through gravel driveways. Additional gravel may be necessary to match the existing driveway to the new finished grade of the path. Additional gravel added to the existing driveways must be compacted MDOT 23A gravel. This item will be included in the price bid for Path Grading.

9.10 DITCH/SWALE CONSTRUCTION

All ditch/swale construction, as required to maintain existing drainage patterns and as shown on the Drawings, will be considered part of the major items of work, unless otherwise specified.

9.11 EXCESS EXCAVATION

Excess excavation will be the property of the Contractor and must be disposed of by the Contractor.

9.12 TREATED LUMBER RETAINING WALL

9.12.01 Description

This work must consist of furnishing and installing Treated Lumber Retaining Wall in accordance with these specifications and with the lines, grades, design, and dimensions shown on the Drawings.

9.12.02 Materials

Lumber must be treated Grade No. 2 in accordance with Section 912 of the MDOT 2020 Standard Specifications for Construction.

Drain tile and geotextile separator must be per Sections 308, 404, and 910 of the MDOT 2020 Standard Specifications for Construction.

9.12.03 Construction Method

Installation must be in accordance with Section 709 of the MDOT 2020 Standard Specifications for Construction.

9.12.04 Measurement and Payment

The completed work, as described, will be measured, and paid for per square foot of total face of wall installed as given in the proposal, measured to the nearest one-tenth (1/10) feet, and computed to the nearest square foot, including buried lumber at the contract unit price for treated lumber retaining wall.

9.13 GRAVITY MODULAR CONCRETE BLOCK RETAINING WALL (LARGE BLOCK)

9.13.01 Description

This work must consist of furnishing and construction of a gravity modular concrete block retaining wall system or equal in accordance with these specifications and with the lines, grades, design, and dimensions shown on the Drawings.

The Contractor must have a registered professional engineer in the State of Michigan prepare engineering drawings and design calculations for the retaining wall system that must bear their signature and seal. The Contractor must submit the signed and sealed engineering drawings and design calculations to the Engineer for approval prior to beginning construction.

9.13.02 Certification

Contractor must submit a Manufacturer's certification, prior to start of work, that the retaining wall system components meet the requirements of this specification.

Contractor must submit engineering drawings prepared by a professional engineer, licensed in the State of Michigan, and experienced with Mechanically Stabilized Earth retaining wall systems. The engineering designs, techniques, and material evaluations must be in accordance with NCMA Design Manual for Segmental Retaining Walls, 3rd Edition, 2010 or AASHTO LRFD Bridge Design Specifications, 9th Edition, 2020, or whichever is applicable.

9.13.03 Materials

9.13.03.01 Modular Concrete Block Retaining Wall Units

Modular concrete units must be wet cast conforming to ASTM C1776 and to the following architectural requirements:

Face color: Standard manufacturers' color or custom color as specified by the Engineer.

Face finish: Sculptured rock face in angular multiplanar configuration. Other face finishes will not be allowed without written approval of Engineer.

Bond Configuration: Running with bonds nominally located at midpoint vertically adjacent units, in both straight and curved alignments.

Exposed surfaces of units must be free of chips, cracks, or other visual imperfections.

Modular concrete units must be produced using a concrete mix meeting the requirements of ASTM C94 and conforming to the manufacturer’s material requirements.

9.13.03.02 Base Leveling Pad Material

Material must consist of a compacted crushed stone base or non-reinforced concrete as shown on the Drawings. The leveling pad must be a minimum of twelve (12) inches thick.

9.13.03.03 Drain Pipe

Corrugated plastic pipe indicated at the base of the wall must be six (6) inch diameter polyethylene underdrain with continuous nylon fabric wrap and conform to Section 909 of the MDOT 2020 Standard Specifications for Construction.

9.13.04 Construction Method

9.13.04.01 Excavation

Contractor must excavate to the lines and grades shown on the Drawings. Engineer will inspect the excavation and approve prior to placement of leveling material or fill soils.

9.13.04.02 Base Leveling Pad

Leveling pad material(s) must be placed to the lines and grades shown on the Drawings, to a minimum thickness of twelve (12) inches.

Soil leveling pad materials must be mechanically compacted until no additional compaction is observed.

Leveling pad must be prepared to insure full contact to the base surface of the concrete units.

9.13.04.03 Unit Installation

First course of units must be placed on the leveling pad, and alignment and level checked. Pins or molded surfaces of modular concrete units must be used for alignment control.

Units must be positioned vertically adjacent to other modular concrete units as recommended by the Manufacturer.

Maximum stacked vertical height of wall units, prior to wall drain fill and backfill placement and compaction, must not exceed two courses.

Whole, or cut, units on curves and corners must be erected with running bond approximately centered on units above and below.

Cap units must be glued to underlaying units with an adhesive recommended by the manufacturer.

9.13.04.04 Backfill Placement

Backfill materials must be placed as shown on the Drawings.

Backfill must be placed and compacted in lifts not to exceed eight (8) inches where hand compaction is used, or twelve (12) inches where heavy compaction equipment is used.

Backfill must be mechanically compacted until no additional compaction is observed.

Only lightweight hand-operated equipment will be allowed within three (3) feet from the tail of the modular concrete unit.

9.13.05 Measurement and Payment

The completed work, as described, will be measured and paid for per square foot of total face of wall installed as given in the proposal, measured to the nearest one-tenth (1/10) feet, and computed to the nearest square foot, including buried blocks at the contract unit price for gravity modular concrete block retaining wall (large block). Payment for walls will include all excavation, installation, drainpipe, and backfill as required.

9.14 MODULAR CONCRETE BLOCK RETAINING WALL (SMALL BLOCK)

9.14.01 Description

This work must consist of furnishing and construction of a modular concrete block retaining wall system (small block) or equal in accordance with these specifications and with the lines, grades, design, and dimensions shown on the Drawings.

The Contractor must have a registered professional engineer in the State of Michigan prepare engineering drawings and design calculations for the retaining wall system that must bear their signature and seal. The Contractor must submit the signed and sealed engineering drawings and design calculations to the Engineer for approval prior to beginning construction.

9.14.02 Certification

Contractor must submit a Manufacturer's certification, prior to start of work, that the retaining wall system components meet the requirements of this specification.

Contractor must submit certification, prior to start of work, that the retaining wall system (modular concrete units and specific geogrid) has been successfully utilized on a minimum of five (5) similar projects, i.e., height, soil fill types, erection tolerances, etc.

9.14.03 Materials

9.14.03.01 Modular Concrete Block Retaining Wall Units

Blocks must be eight (8) inches high x eighteen (18) inches wide x twelve (12) inches deep with matching cap units. The block must be precast interlocking block.

All voids must be filled with MDOT Class II granular material compacted to ninety-five (95%) percent. Installation and accessory materials mist be per the manufacturer’s recommendations.

9.14.04.02 Base Leveling Pad

Material must consist of a compacted crushed stone base or non-reinforced concrete as shown on the Drawings. The leveling pad must be a minimum of six (6) inches thick. As an option, concrete may be three (3) inches thick with a compacted granular base for a total thickness of eight (8) inches.

9.14.04.03 Geogrid

Geogrid reinforcing must consist of high density polyethylene or polyester yarns encapsulated in a protective coating specifically fabricated for use as a soil reinforcement material.

The maximum design tensile load of the geogrid must not exceed the laboratory tested ultimate strength of the geogrid/facing unit connection as limited by the "Hinge Height" divided by a factor of safety of 1.5. The connection strength testing and computation procedures must be in accordance with NCMA test methods.

Soil Interaction Coefficient (Ci) values must be determined per GRI:GG5 at a maximum three-quarter (3/4) inch displacement.

The geogrid manufacturer must have a manufacturing quality control program that includes quality control testing for each forty thousand (40,000) square feet of production, each lot, or each production day. The quality control testing must include Tensile Modulus, Specific Gravity, Melt Flow Index (PP&HDPE), and Molecular Weight (PETP).

9.14.03.04 Drain Pipe

Corrugated plastic pipe indicated at the base of the wall must be four (4) inch diameter polyethylene underdrain with continuous nylon fabric wrap.

Drainpipe must be installed continuously along the base of the proposed wall, graded at a minimum one-half (0.5%) percent from center to each end. Outlets and endings must be placed perpendicular to the proposed wall with twenty-four (24) inches minimum cover and extend to six (6) inches beyond the lower gabion or graded slope.

9.14.04 Construction Method

9.14.04.01 Excavation

Contractor must excavate to the lines and grades shown on the Drawings. Engineer will inspect the excavation and approve prior to placement of leveling material or fill soils.

9.14.04.02 Base Leveling Pad

Leveling pad material(s) must be placed to the lines and grades shown on the Drawings, to a minimum thickness of eight (8) inches.

Soil leveling pad materials must be compacted to a minimum of ninety-five (95%) percent standard or ninety (90%) percent modified Proctor.

Leveling pad must be prepared to insure full contact to the base surface of the concrete units.

9.14.04.03 Unit Installation

First course of units must be placed on the leveling pad, and alignment and level checked. Pins or molded surfaces of modular concrete units must be used for alignment control.

Position vertically adjacent modular concrete units as recommended by the Manufacturer.

Maximum stacked vertical height of wall units, prior to wall drain fill and backfill placement and compaction, must not exceed two courses.

Whole, or cut, units on curves and corners must be erected with running bond approximately centered on units above and below.

Cap units must be glued to underlaying units with an adhesive recommended by the manufacturer.

9.14.04.04 Structural Geogrid Installation

Geogrid must be oriented with the highest strength axis perpendicular to the wall alignment.

Geogrid reinforcement must be placed at the elevations and to the extent specified by the manufacturer's engineer or as directed by the construction engineer.

The geogrid must be laid horizontally on compacted backfill. Place the next course of modular concrete units over geogrid. The geogrid must be pulled taut and anchored prior to backfill placement on the geogrid.

Geogrid reinforcements must be continuous throughout their embedment lengths. Spliced connections between shorter pieces of geogrid are not allowed unless preapproved by the Engineer prior to construction.

9.14.04.05 Reinforced Backfill Placement

Reinforced backfill must be placed, spread, and compacted in such a manner that minimizes the development of slack in the geogrid.

Reinforced backfill must be placed and compacted in lifts not to exceed eight (8) inches where hand compaction is used, or twelve (12) inches where heavy compaction equipment is used.

Reinforced backfill must be compacted to ninety-five (95%) percent of the maximum density as determined by ASTM D695. The moisture content of the backfill material prior to and during compaction must be uniformly distributed throughout each layer and must be within two (2%) percentage points dry of optimum.

Only lightweight hand-operated equipment will be allowed within three (3) feet from the tail of the modular concrete unit.

9.14.05 Measurement and Payment

The completed work, as described, will be measured, and paid for per square foot of total face of wall installed as given in the proposal, measured to the nearest one-tenth (1/10) feet, and computed to the nearest square foot, including buried blocks at the contract unit price for modular concrete block retaining wall (small block). Payment for walls will include all excavation, installation, anchorage, drainpipe, and backfill as required.

9.15 PEDESTRIAN STRIPING

Where indicated on the Drawings, existing paved streets, driveways, and parking areas must be striped with white stripes with a six (6) inches width. All marking materials must be in accordance with the Section 811 of the MDOT 2020 Standard Specifications for Construction and must be approved by the Engineer prior to placement. No additional payment will be made for striping material changes based on seasonal limitations.

Clear space between crosswalk stripes must meet the width of path.

Unless otherwise specified, pedestrian striping is a pay item measured per foot of stripe, not including gaps or breaks in the stripe. The Contractor is responsible for placing temporary signage during the placement of pedestrian striping as indicated in these specifications.

9.16 EXISTING PATH, CROSSINGS/REPLACEMENT/SAFETY

Where existing paths are disturbed/removed they must be replaced as soon as possible. The Contractor must place barricades and warning signs to alert the path users of the work occurring and the path closure.

9.17 LAWN AND YARD RESTORATION

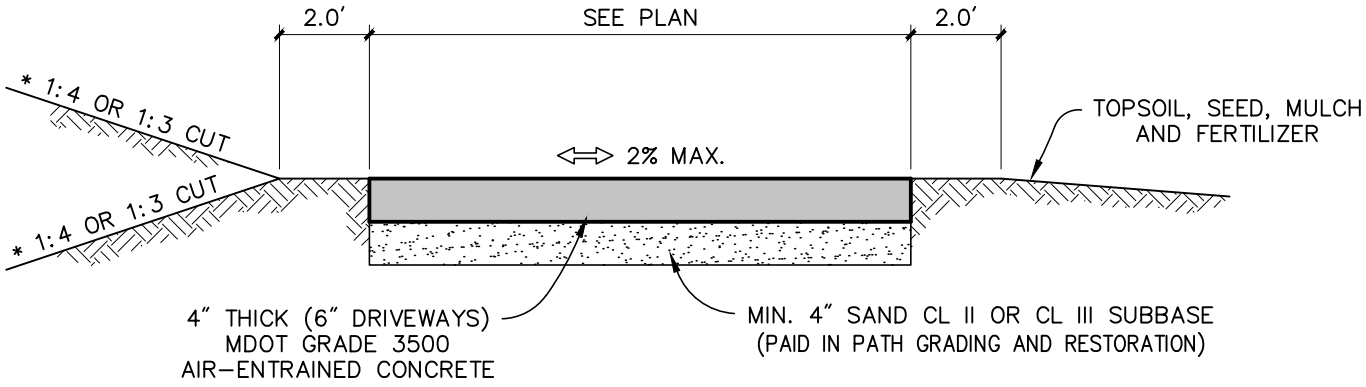
Lawn restoration must be done in accordance with the Prein&Newhof Specifications for Construction Section 3.09.

After construction is complete, all disturbed lawn areas, including adjacent cut and fill areas as required to blend into existing yards, must be repaired using a maximum of 1 on 4 back slope.

With approval by the Engineer, the existing topsoil may be salvaged and reused. Restored areas must be repaired and reseeded as often as necessary in order to produce a close stand of weed free grass to the edges of the path.

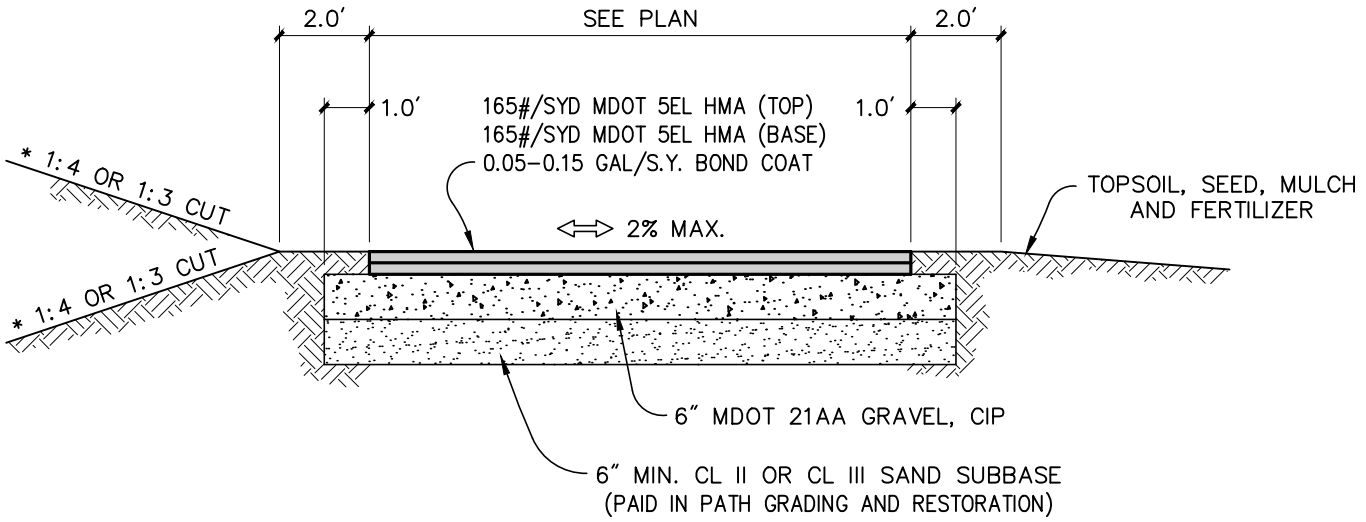
9.18 PROTECTION OF WORK

The Contractor must protect the work until it is accepted by the Engineer. Any part of the completed work that is damaged prior to acceptance by the Township must be replaced at the Contractor's expense.



CONCRETE PATH DETAIL

SCALE : NONE



HMA PATH DETAIL

SCALE : NONE

SHARED USE PATH DETAILS

SCALE : NONE

NOTE

* – CUT OR FILL TO 1:4 SLOPES IN YARD AREAS AND 1:3 SLOPES IN NON–YARD AREAS.