STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND TRAIL BRIDGES ON HOWARD COUNTY DEPARTMENT OF RECREATION & PARKS PROJECTS

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Section 100
General Specifications

Section 101—Terms, Format, Abbreviations and Definitions

101.01 Meaning of Terms. These specifications are generally written in the imperative mood. In sentences using the imperative mood, the subject "the Contractor," is implied. Also, implied in this language is "shall," "shall be," or similar words or phrases. In material specifications, the subject may also be the supplier, fabricator, or manufacturer supplying material, products, or equipment for use on the project.

Wherever *"directed," "required," "prescribed,"* or similar words are used, the *"direction," "requirement,"* or *"order"* of the Appointed Authority of the Howard County Department of Recreation & Parks is intended. Similarly, wherever *"approved," "acceptable," suitable," "satisfactory,"* or similar words are used, they mean *"approved by," "acceptable to,"* or *"satisfactory to"* the Appointed Authority of the Howard County Department of Recreation & Parks.

The word *"will"* generally pertains to decisions or actions of the Appointed Authority of the Howard County Department of Recreation & Parks.

Whenever in these specifications, or in other contract documents, the following terms (or pronouns in place of them) are used, the intent and meaning shall be interpreted as follows: reference to a specific standard, test, testing method, or specification shall mean the latest published edition or amendment that is in effect at the solicitation issue date for the public works contracts.

101.02 Specification Format These specifications are divided into Sections.

Sections 100 through 106, 108 and 109 consist of general contract requirements for which no direct payment is made. The requirements contained in Sections 100 through 106 are applicable to all contracts.

Sections 107, 108, 101 and 110 through 189 consist of construction contract requirements for specific items of work. Work under these Sections is paid for directly or indirectly according to Subsection 106.04 and the Section ordering the work. When there is no pay item in the bid schedule, no direct payment is made.

Sections 190 through 199 contain the material requirements for Sections 110 through 189. No direct payment is made in Sections 190 through 199. Payment for material is included as part of the work required in Sections 110 through 189.

The first three digits of the pay item number identify the Section under which the work is performed.

101.03 Abbreviations. Whenever these abbreviations are used in the specifications, they represent the following:

(a) Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ABS	Acrylonitrile-Butadiene-Styrene
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute
AQ	Actual Quantities
APA	American Plywood Association
ASTM	American Society for Testing and Material
AWPA	American Wood Protection Association
C.F.	Cubic Feet
C.Y.	Cubic Yard
DQ	Design Quantities
EA	Each
g	Grams
FTDS	Federal Trail Data Standards
HDPE	High-Density Polyethylene
hr	Hour
kg	Kilogram
kN	Kilonewtons
lb	Pound
L.F.	Linear Feet
LS	Lump Sum
LSQ	Lump Sum Quantities
m	Meter
m^2	Square Meter
m^3	Cubic Meter
mi	Mile
mm	Millimeter
MPa	Megapascals
MSE	Mechanically Stabilized Earth
N	Newton
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
OSHA	Occupational Safety & Health Administration
Pa	Pascal
PE	Polyethylene
PS	Product Standard Issued by The U.S. Department of Commerce
psi	Pounds Per Square Inch
PVC	Polyvinyl Chloride
S.F.	Square Feet
SQ	Staked Quantities

S.Y.	Square Yard
WCLIB	West Coast Lumber Inspection Bureau
WWPA	Western Wood Products Association
WWPI	Western Wood Preservers Institute

Additional abbreviations may be found in Section 101.03 of the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-03).

(b) Slope notation (vertical: horizontal). For slopes flatter than 1:1, express the slope as the ratio of one unit vertical to a number of units horizontal. For slopes, steeper than 1:1, express the slope as the ratio of a number of units vertical to one unit horizontal.

101.04 Definitions The following terms, or pronouns in place of them, are used in these specifications or in other contract documents, the intent and meaning are as follows:

Barriers. A fence or other obstacle that prevents movement or access.

Base Course. The layer or layers of specified material of designed thickness placed on a trailbed to support surfacing.

Batter. A backward and upward slope of the face of a wall.

Berm. The ridge of material formed on the outer edge of the trail that projects higher than the tread.

Borrow. Suitable materials taken from approved sources designated on the plans or on the ground, to be used for embankments and backfilling.

Bridge. A trail structure, including supports, erected over a depression or obstruction such as a body of water, a road, a trail, or a railroad that provides a continuous pathway and that has a deck for carrying traffic or other loads.

Cap Rock. Rock placed in the top or uppermost layer in a constructed rock structure, such as a rubble rock section or rock retaining wall.

Catch Point. The outer limits of a trailway where the excavation and/or embankment intersect with the ground line.

Clearing Limit. The area over and beside the trail that is cleared of trees, limbs, and other obstructions.

Climbing Turn. A reverse in direction of trail grade without a level landing used to change elevation on a steep slope.

Compacted. Consolidation that is obtained by tamping or rolling suitable material until no noticeable displacement of material is observed.

Culvert. Any structure with a bottom, regardless of the fill depth, the depth of invert, or the presence of a horizontal driving surface, or any bottomless (natural

channel) structure with footings that does not have wheel loads in direct contact with the top of the structure.

Curb. A border defining the edge of the trail or trail bridge.

Cushion Material. Native or imported material generally placed over rocky section of unsurfaced trail to provide a usable and maintained traveled way.

Designated on the Ground. The location of materials, work areas, and construction items, including lines and grades, marked on the ground with stakes, flagging, tags, or paint.

Drawings. Design sheets or fabrication, erection, or construction details submitted to the Howard County Department of Recreation & Parks by the Contractor according to *Howard County Department of Recreation & Parks Specifications and Drawings for Construction* or as SHOWN ON THE PLAN. Also refers to submissions and submittals.

Duff. Organic material overlying rock or mineral soil.

Embankment. A structure of suitable material placed on the prepared ground surface and constructed to the trailbed elevation.

Excess Excavation. Material in the trailway in excess of that needed for construction of designed trailways.

Falsework. Temporary construction work on which a main work is wholly or partly built and supported until the main work is strong enough to support itself.

Federal Trail Data Standards. The FTDS enable national, regional, state, and trail-level managers, partners, and the public to use a common and mutually understood terminology for recording, retrieving and applying spatial and tabular information. The FTDS also make it easier for trail information to be accessed and combined by individuals, agencies, or groups. Ease in sharing data improves the ability for enhanced and consistent mapping, inventory, condition assessment, management, budgeting, monitoring, and information retrieval for internal and external needs.[i] In Howard County, the effort is underway to develop a trails database based on Federal Geographic Data Committee standards. Using the same standard for all trails data will allow land managers and recreational users throughout the county to access and use the data regardless of administrative boundary.

Ford. A water-level stream crossing constructed to provide a level surface for safe traffic passage.

Full Bench. Trailbed constructed entirely on undisturbed material.

Gabion Basket. Rectangular wire baskets filled with rock used as pervious, semi flexible building blocks for slope and foundation stabilization.

Grade. The vertical distance of ascent or descent of the trail expressed as a percentage of the horizontal distance.

Hazard Tree. An unstable tree that is likely to fall across the trail.

Header Rock. Rock laid with the narrow end towards the face of the wall.

Inslope. Where the trails tread is sloped downward toward the backslope.

Leave Tree. Trees designated to be left or to remain undisturbed after trail construction.

Mineral Soil. Soil or aggregate that is free from organic substances and contains no particles larger than 2 inches at their greatest dimension.

Outslope. Where the trail tread is sloped downward toward the embankment or daylight side of the trailway.

Plans. The contract plans furnished by the Howard County Department of Recreation & Parks showing the location, type, dimensions, and details of work.

Retainers. Embedded border of wood or rock used to retain fill and/or surface material.

Sideslope. The natural slope of the ground, usually expressed as a percentage.

Slough. That material from the backslope or the area of the backslope that has raveled onto the trailbed.

Slump. Where the trailbed material has moved downward, causing a dip in the trail grade.

Special Contract Requirements. Specifications that detail the conditions and requirements peculiar to an individual project, including additions and revisions to the standard specifications.

Standard Plans. Detailed plans approved for repetitive use and included as part of the plans.

Standard Specifications. The Standard Specifications for Construction of Trails on Howard County Department of Recreation & Parks approved for general application and repetitive use.

Surfacing. Material placed on top of the trailbed or base course that provides the desired tread.

Suitable Material. Rock that can be accommodated in the trail structure, and soil free of duff with a recognizable granular texture.

Switchback. A reverse in direction of trail grade with a level landing used to change elevation on a steep slope, usually involving special treatment of the approaches, barriers, and drainages.

Trailbed. The finished surface on which base course or surfacing may be constructed. For trails without surfacing the trailbed is the tread.

Trailway. The portion of the trail within the limits of the excavation and embankment.

Tread. The surface portion of the trail upon which traffic moves.

Turnout. A short section of extra trail width to provide for passage of trail users.

Waterbar. A structure used for turning water off the trail, usually made of logs or stones.

Water Courses. Any natural or constructed channel where water naturally flows or will collect and flow during spring runoff, rainstorms, etc.

Additional definitions may be found in Section 101.03 of the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-03).

Section 102—Intent of Contract

102.01 Intent of Contract. The intent of the contract is to provide for the construction and completion of the work described. The precise details of performing the work are not stipulated except as considered essential for the successful completion of the work. Furnish all labor, material, equipment, tools, transportation, and supplies necessary to complete the work according to the contract.

Section 103—Control of Work

103.01 Specifications and Drawings. Follow the requirements of HOWARD COUNTY DEPARTMENT OF RECREATION & PARKS Specifications and Drawings for Construction.

(a) General. Prepare drawings as necessary to construct the work. Drawings include, but are not limited to, layouts that show the relative position (vertical and horizontal as appropriate) of work to be performed, fabrication details for manufactured items and assemblies, installation and erection procedures, details of post-tensioning and other systems, detailed trench and excavation procedures that conform to OSHA requirements, traffic control implementation drawings, and methods for performing work near existing structures or other areas to be protected. Show all the drawing dimensions in United States customary units.

Drawings shall be a minimum size of 11 by 17 inches and a maximum size of 24 by 36 inches. All text should have a minimum height of 1/8 inch for 24 by 36 inch drawings (D size sheets). Include on each drawing and calculation sheet, the project number, name, and other identification as shown in the contract.

Furnish ___ sets of drawings and supporting calculations for acceptance before performing work covered by the drawings. If drawings are returned for revision, correct and resubmit for acceptance. Allow ___ days per submission for railroad structures and ___ days per submission for all other structures. The review time as specified is applied separately to each drawing submitted. The Appointed Authority of the Howard County Department of Recreation & Parks may request additional specific drawings for unique situations in order to clarify layout, construction details, or methodology. If drawings must be resubmitted, the time for acceptance starts over. Obtain written approval before changing or deviating from the accepted drawings.

(b) Specific requirements for concrete and miscellaneous structures.

(1) Furnish drawings for the following:

(a) Site-specific layouts for all wall types and gabion installations;

(b) Gabion and revet mattress details and installation procedures;

(c) Forms and falsework for reinforced concrete box culverts less than or equal to 6 feet in height;

(d) Fabrication drawings for bridge railings and parapets;

(e) Fabrication drawings for prestressed members;

(f) Fabrication and installation drawings for expansion joint assemblies;

(g) Fabrication drawings for bearing assemblies;

(h) Construction joint location and concrete deck placement sequences not shown on the plans;

(i) Erection diagrams for Soil-Corrugated Metal Structure interaction systems (multi-plate structures);

(j) Structural steel fabrication drawings;

(k) Utility hangar details; and

(l) Fabrication and installation drawings for precast items.

(2) Furnish drawings that bear the seal and signature of a professional engineer proficient in the pertinent design field for the following:

(a) Erection plans;

(b) Reinforced soil slopes details;

(c) MSE wall and crib wall details;

(d) Details and installation procedures for proprietary wall systems;

(e) Temporary bridge structures for public use;

(f) All bridge forms except for railings, parapets, and components less than 6 feet in height;

(g) Shoring systems and cofferdams greater than 6 feet in height;

(h) All shoring systems that support traffic loadings;

(i) Forms and falsework for all structures greater than 6 feet in height;

(j) Post-tensioning systems;

(k) Ground anchors, soil nail, and rock bolt assembly details, layout, and installation and testing procedures;

(l) Tie back wall details; and

(m) Alternate retaining wall details.

(3) Furnish drawings that bear the seal and signature of a professional engineer who is proficient in forms and falsework design and licensed in the state where the project will be constructed for the following:

(a) Falsework for any structure with a span exceeding 16 feet;

(b) Falsework for any structure with a height exceeding 14 feet; and

(c) Falsework for structures where traffic, other than workers involved in constructing the structure, will travel under the structure.

Section 104—Control of Materials

104.01 Handling Materials. Transport and handle all materials to preserve their quality and fitness for the work. Stockpile, load, and transport aggregates in a manner that will preserve specified gradation and avoid contamination.

Store materials to assure the preservation of their quality and fitness for the work. Locate stored materials to facilitate their prompt inspection. Sites on Howard County Department of Recreation & Parks managed land that are not already designated may be used for storage purposes and for placing of equipment only when approved in advance by the Howard County Department of Recreation & Parks. Restore all storage sites in accordance with requirements SHOWN ON THE PLANS or as otherwise specified. Arrangements for storage on other than designated sites are the responsibility of the contractor.

104.02 Material Sources

(a) Designated Sources. Sources for materials such as, but not limited to, soil, rock, or logs that are not available from trailway excavation or clearing operations will be designated. Sources of local materials designated in the SPECIAL CONTRACT REQUIREMENTS or SHOWN ON THE PLANS are guaranteed by the Howard County Department of Recreation & Parks for the quality and quantity of material in the source.

Use all needed suitable material from the source. The designation of a source includes the right to use areas SHOWN ON THE PLANS for the purposes designated (such as plant sites, stockpiles, and haul roads). Operations are restricted to the confines of the area(s) designated.

When required, re-establish vegetation in disturbed areas according to section 181.

(b) Contractor-Furnished Sources. Furnish material that produces an end product equivalent in performance to that specified.

104.03 Restoration. Shape and grade borrow areas on Howard County Department of Recreation & Parks-managed land to make them stable and to minimize future erosion. Dispose of debris resulting from development of material sources by scattering, unless otherwise specified. Do not scatter debris within the clearing limits of trails or within roadsides. Cut off stumps to less than 12 inches above the ground as measured on the uphill side of the stump.

Section 105—Quality Assurance and Quantity Measurement

Description

105.01 This work consists of providing certification that the quality and quantity of construction conform to the plans, specifications, and requirements of the contract.

Construction

105.02 Certification and Measurements

(a) Offsite-Produced Materials. Furnish signed certificates executed by the manufacturer, supplier, or vendor, stipulating that all offsite-produced materials incorporated in the work meet applicable requirements SHOWN ON THE PLANS or stated in the specifications. Furnish a certificate for each commodity or invoice.

(b) Quantity Measurements. Submit quantities to the Appointed Authority of Howard County Department of Recreation & Parks for periodic progress payments, and the Appointed Authority of Howard County Department of Recreation & Parks will compute payments. Quantities are subject to verification.

105.03 Records. Maintain a set of contract plans depicting as-built conditions resulting from approved changes. Maintain the plans in a current condition and indicate changes from the original contract plans in red. Give the plans to the Appointed Authority of Howard County Department of Recreation & Parks upon the completion of the contract work.

Measurement

105.04 Method. There will be no separate measurement for this item.

Payment

105.05 Payment will be considered incidental to other pay items in this contract.

Section 106—Measurement and Payment

106.01 General. Measurement and payment for contract work will be made only for and under those pay items included in the SCHEDULE OF ITEMS. All other work and materials will be considered incidental and included in the payment of the PAY ITEMS in the SCHEDULE OF ITEMS.

When more than one class, size, or thickness is specified in the SCHEDULE OF ITEMS for any PAY ITEM, suffixes will be added to the item number to differentiate between the items.

106.02 Determination of Quantities. The following measurements and calculations are to be used to determine contract quantities for payment:

Make measurements for seeding, geotextiles, and erosion control blankets along slope lines.

For retaining walls, measure by the square foot of front wall face.

Measure structures according to neat lines SHOWN ON THE PLANS or as altered by the Appointed Authority of Howard County Department of Recreation & Parks in writing to fit field conditions. Make measurements along the centerline and parallel to the specified grade or foundation or as SHOWN ON THE PLANS.

Deduct lengths for stairways, turnpike, puncheon, retaining walls, wire baskets, switchbacks, bridges, and bridge approaches from the measurement of excavation in Section 111 unless these items are specified as incidental to excavation in Section 111.

For standard manufactured items, such as fence, wire, plates, rolled shapes, and pipe conduits identified by gage, weight, section dimensions, and the like, such identification shall be considered the nominal weights or dimensions. Manufacturer's tolerances will be accepted unless controlled by tolerances in the cited specifications.

106.03 Units of Measurement. Payment will be made by units defined and determined according to U.S. Customary measure and by the following:

(a) Cubic Yard. A measurement computed by one of the following methods:

(1) Excavation, embankment, or borrow. The measurement computed by the average-end-area method from measurements made longitudinally along a centerline or other reference line.

(2) Material in place or stockpiled. The measurement computed with the dimensions of the in-place material using average-end-area method or prismodial formula.

(3) Material in the Delivery Vehicle. The measurement computed using measurements of material in the hauling vehicles at the point of delivery.

Vehicles shall be loaded to at least their water-level capacity. Leveling of the loads may be required when vehicles arrive at the delivery point.

(b) Each (EA). One complete unit, which may consist of one or more parts.

(c) Lump Sum (LS). The quantities that denote one complete unit of work as required by or described in the contract, including necessary materials, equipment, and labor to complete the job.

106.04 Methods of Measurement. One of the following methods of measurement for determining final payment is DESIGNATED ON THE SCHEDULE OF ITEMS for each PAY ITEM:

(a) Designed Quantities. These quantities denote the final number of units to be paid for under the terms of the contract. They are based upon the original design data available prior to advertising the project. Original design data include the preliminary survey information, design assumptions, calculations, and plans. Changes in the number of units DESIGNATED IN THE SCHEDULE OF ITEMS may be authorized under the following conditions:

(1) As a result of changes in the work approved by the Howard County Department of Recreation & Parks.

(2) As a result of the Appointed Authority of Howard County Department of Recreation & Parks determining that errors exist in the original design that cause a PAY ITEM quantity to change by 15 percent or more.

(3) As a result of the contractor submitting to the Appointed Authority of Howard County Department of Recreation & Parks a written request showing evidence of errors in the original design that cause a PAY ITEM quantity to change by 15 percent or more. The evidence must be verifiable and consist of calculations, plans, or other data that show how the designed quantity is believed to be in error.

(b) Staked Quantities (SQ). These quantities are determined from staked measurements prior to the construction.

(c) Actual Quantities (AQ). These quantities are determined from measurement of completed work.

(d) Vehicle Quantities. These quantities are measured or weighed in hauling vehicles.

(e) Lump Sum Quantities (LSQ). These quantities denote one complete unit of work as required by or described in the contract, including necessary materials, equipment, and labor to complete the job.

106.05 Howard County Department of Recreation & Parks-Furnished Materials. When materials are furnished by the HOWARD COUNTY

DEPARTMENT OF RECREATION & PARKS, the note "Howard County Department of Recreation & Parks-Furnished Materials" will be added to the description of the PAY ITEM.

Section 107—Mobilization

Description

107.01 This work consists of moving personnel, equipment, material, and incidentals to the project and performing all work necessary before beginning work at the project site. Mobilization includes the costs associated with obtaining permits, insurance, and bonds. Mobilization is not intended to pay for the costs of materials before they are used on the project site.

Payment

107.02 The accepted quantity, measured as provided in Subsection 106.02, will be paid at the contract price per unit of measurement for the Section 107 pay item shown in the bid schedule. Payment will be full compensation for the work prescribed in this Section.

Progress payments for mobilization lump sum will be paid as follows:

(a) Bond premiums will be reimbursed according to HOWARD COUNTY DEPARTMENT OF RECREATION & PARKS Payments Under Fixed-Price Construction Contracts, after receipt of the evidence of payment. Reimburse for bond premiums before issuing the Notice to Proceed if evidence of payment is received.

(b) When 5 percent of the original contract amount is earned from other bid items, 50 percent of the mobilization item, or 5 percent of the original contract amount, whichever is less, will be paid.

(c) When 10 percent of the original contract amount is earned from other bid items, 100 percent of the mobilization item, or 10 percent of the original contract amount, whichever is less, will be paid.

(d) Any portion of the mobilization item in excess of 10 percent of the original contract amount will be paid after final acceptance. Pay any unpaid amount for mobilization upon final acceptance of all work items.

Section 108—Construction Staking, Flagging, and Cleanup

Description

108.01 This work consists of establishing any control points needed in addition to existing staking, and removing and disposing of all construction stakes, tags, flagging, and plastic ribbon from the project area.

Construction

108.02 General. The Howard County Department of Recreation & Parks will set initial construction stakes or flagging, and control points, and furnish the contractor with all necessary information relating to lines, slopes, and grades. These stakes and flagging constitute the field control.

Furnish and maintain additional stakes, flagging, templates, batter boards, and other materials and supplies necessary for marking and maintaining points and lines established. Do not perform work in the absence of control points. If any construction control points are destroyed, displaced, or erroneous, notify the Howard County Department of Recreation & Parks. Uniformly contour alignment and construct grade from control point to control point.

Remove all construction stakes, tags, flagging, and plastic ribbon from the project area within 7 days after the final inspection of all other work on the project. Dispose of all stakes, tags, flagging, and plastic ribbon off Howard County Department of Recreation & Parks-managed lands unless otherwise designated.

Measurement

108.03 There will be no separate measurement for this item.

Payment

108.04 Trail staking, flagging, and cleanup will be considered incidental to other pay items in this contract, and additional payment will not be made.

Section 109— Maintenance for Traffic and Temporary Construction Access

Description

109.00.01 This work consists of maintaining existing trails that are undergoing improvements open and maintained in such a condition as to safely accommodate traffic and providing temporary construction access to the site. Maintaining the trail for traffic and temporary access may be covered by subsection:

109.10	Maintenance for Traffic
109.20	Temporary Construction Access

Measurement

109.00.02 There will be no separate measurement for these items.

Payment

109.00.03 Maintaining the trail for public access and providing temporary construction access will be considered incidental to other pay items in this contract, and additional payment will not be made.

109.10 - Maintenance for Traffic

Description

109.10.01 Keep existing trails that are undergoing improvements open and maintained in such a condition as to safely accommodate traffic. Provide and maintain temporary detours, approaches, or crossings and intersections with trails, roads, businesses, parking lots, and campgrounds in a safe and passable condition. Perform no work that interferes or conflicts with traffic until a plan for handling traffic has been submitted and approved. Specific requirements for detours or closures are SHOWN ON THE PLANS or in the SPECIAL CONTRACT REQUIREMENTS.

Before any suspension of work, take precautions necessary to prevent damage to the project, such as temporary detours, approaches, crossings, or intersections, and make provisions for normal drainage and to minimize erosion. Leave all trailways in a condition suitable for traffic unless otherwise specified.

The Howard County Department of Recreation & Parks may permit use of portions of the project during periods when operations are shut down. All maintenance attributable to permitted use during periods of work suspension will be provided by the Howard County Department of Recreation & Parks. The contractor is responsible for any maintenance that is not attributable to use or that is necessary during suspensions resulting from fault or negligence of the contractor.

109.20 - Temporary Construction Access

Description

109.20.01 The Howard County Department of Recreation & Parks may provide temporary access for the contractor from another route or trail other than the trail being constructed. The contractor will be responsible for maintaining the temporary access, removing and rehabilitating the temporary access route and any damaged area after construction is completed.

Section 110—Trailways

Section 111 - Trail

Description

111.00.01 This work consists of constructing trails, restoration of existing trails or obliteration of abandoned trails. The earthwork and associated trail tread work may be covered by one or more of the following subsections:

111.10.	Excavation and Embankment
111.20.	Borrow
111.30.	Existing Trail Restoration
111.40.	Slide Maintenance
111.50.	Slough and Berm Removal
111.60.	Obliteration of Abandoned Trails
111.70.	Retainers

Measurement

111.00.02 Measure the section 111 items listed in the bid schedule according to subsection 106.

Payment

111.00.03 The accepted quantities will be paid at the contract price per unit of measurement for the section 111 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 106.04.

111.10 - Excavation and Embankment

Description

111.10.01 This work consists of the excavation and placement of excavated material, regardless of its nature, from within the trailway or from other sources, except for material included under other pay items SHOWN IN THE SCHEDULE OF ITEMS.

Includes excavation, embankment, and backfill construction required to shape and finish the trailbed, ditches, backslopes, fill slopes, drainage dips, trail passing sections, and turnouts. Also includes excavation and embankment work required to construct culverts, trail bridges, shallow stream fords and gully crossings, rubble rock sections, and climbing turns.

Materials

111.10.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	111

Geosynthetics	194
Material for Timber Structures	195

Construction

111.10.03 Use and Disposal of Excavated Material. Conserve and use all suitable material for specified work. Conserve excess excavated rock suitable for specified project work and use in place of materials from designated sources.

Remove all duff and debris from within trailway limits and uniformly spread outside the clearing limits, not more than 4 inches in depth (unless otherwise SHOWN ON THE PLANS). Do not obstruct drainage or create piles, berms, or windrows of debris.

Place excess and unsuitable excavation beyond the downslope edge of the trailbed. Do not obstruct drainage and spread to a depth not exceeding 4 inches. This includes any material removed in the grubbing operation and deposited in the same area.

Place rocks over 4 inches in greatest dimension not used in construction beyond the hinge point on the downslope side. Place rocks so that the tops are at least 6 inches lower than the trailbed surface. Ensure that no blockage of drainage or creation of a windrow effect occurs.

111.10.04 Trailway Excavation and Embankment. Minor deviations of ± 12 inches in vertical alignment and 36 inches in horizontal alignment with smooth transitions of at least 30 feet on each side of the deviation are acceptable unless otherwise SHOWN ON THE PLANS.

Construct embankments with suitable compacted material. Compact all disturbed soil within the trailbed area.

Remove any rock within or above the backslopes that is unstable. Use or dispose of rock in accordance with Subsection 112.03.

Leave the finished slope in a uniform and roughened condition.

Make necessary adjustments of horizontal or vertical alignment, within the tolerances specified in this subsection, to produce the designed trailway section and balance earthwork. Such adjustments shall not be considered as changes.

111.10.05 Trailbed Finish. Fill holes with suitable material, compact, and cut high points to provide a uniform trailbed finish.

111.10.07 Ditches. Construct ditches to be free of loose rocks, roots, sticks, and other obstructions.

111.10.08 Geosynthetics. Where SHOWN ON THE PLANS, place geosynthetics flat and parallel to centerline of the trail before placing embankment. Overlap geosynthetics a minimum of 24 inches. Install anchors or fasteners as recommended by the geosynthetic manufacturer.

111.20 - Borrow

Description

111.20.01 This work consists of placing select borrow material on the trailbed.

Materials

111.20.02 Requirements. Obtain borrow materials from locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Obtain the Howard County Department of Recreation & Parks approval before using borrow from other locations. Suitable material from slough and berm removal may also be used as borrow material. Use suitable borrow material and aggregate under 2 inches in the greatest dimension.

Construction

111.20.03 General. On sideslopes where water can drain away from the trailbed, provide a sufficient depth of borrow material to obtain the outslope as SHOWN ON THE PLANS.

Across meadows and on turnpike sections, provide a sufficient depth of borrow material to produce a crowned trailbed as SHOWN ON THE PLANS.

Compact all material placed. Compact borrow material placed on the approaches of bridges and puncheon to provide a smooth surface and a smooth transition from the structure to the adjoining trail tread surface.

Cover any culvert surfaces that have become exposed with a minimum depth of 6 inches of suitable material over the full length of the exposed culvert and of sufficient length along the trail to present a uniform trail grade.

Provide free-draining borrow sites and backslopes no steeper than 3:1.

111.30-Existing Trail Restoration

Description

111.30.01 This work consists of restoring the original trail template, including clearing, removing slough and berm, borrow, filling ruts and troughs, reshaping backslopes, excavation, reshaping trail tread, restoring drainage and other trail structures, constructing check dams, and removing protruding rocks, roots, stumps, slough, and berms.

Construction

111.30.03 Clearing and Grubbing. Clear and grub in accordance with the requirements of section 112 and as SHOWN ON THE PLANS.

111.30.04 Excavation and Embankment. Excavate and place all excavated material in accordance with the requirements of section 111.10.04 and as SHOWN ON THE PLANS.

111.30.05 Rock and Root Removal. Uniformly scatter the removed rocks and roots below the trailway and distribute to ensure no blockage of watercourses or creation of a windrow. Fill holes with suitable material and compact.

111.30.06 Slough and Berm Removal and Excess Material. Use suitable slough and berm material within the trailway to restore the trailbed as SHOWN ON THE PLANS. Place all unsuitable and excess material beyond the downslope edge of the trailbed and uniformly spread to a depth not exceeding 4 inches and so as not to obstruct drainage or interfere with the drainage of outsloped tread.

Remove berm when daylight can be obtained within a distance of 5 feet from the outslope edge of finished tread unless otherwise DESIGNATED ON THE GROUND or SHOWN ON THE PLANS.

111.30.07 Fill Material and Borrow. Use suitable material to fill ruts, troughs, and potholes in the tread that cannot be leveled and outsloped through performance of work in Subsection 115.06. Compact and shape as SHOWN ON THE PLANS.

Obtain borrow from areas SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

111.30.08 Drainage. Restore drainage dips and ditches to reestablish drainage as SHOWN ON THE PLANS by removing obstructions such as rocks, roots, and sticks to make ditches and culverts free draining.

Restore rock spillways in accordance with section 123 and as SHOWN ON THE PLANS.

111.30.09 Stream Channel Cleaning. Clean channel of obstructions in areas SHOWN ON THE PLANS. Remove debris and rocks from the stream channel and scatter outside of the side slopes of the stream channel and beyond the clearing limits.

111.30.10 Check Dams. When constructing check dams for gullies, use dimensional lumber, sound peeled logs, or a row of stones placed across the gully in the subgrade with the ends securely embedded in the banks as SHOWN ON THE PLANS and at locations STAKED ON THE GROUND.

Use suitable material for backfill as SHOWN ON THE PLANS. Place and compact backfill to meet the density of the existing trailbed and to form a smooth tread.

111.30.11 Switchbacks. Restore switchbacks in accordance with section 114 and as SHOWN ON THE PLANS.

111.30.12 Waterbars. Restore waterbars in accordance with section 122 and as SHOWN ON THE PLANS. Reestablish drainage by removing accumulated material and replacing loose or missing rocks, unsuitable logs, and deteriorated rubber belting.

111.30.13 Turnpikes. Restore turnpikes in accordance with section 113 and as SHOWN ON THE PLANS by replacing missing, rotten, or loose retainer logs and stakes, or missing or loose retainer rocks. Backfill with suitable material.

111.30.14 Trail Structures. Restore all trail structures at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

111.30.15 Reshaping and Finishing Trailbed and Backslopes. Provide a firm and uniformly finished trailbed in accordance with cross-sections SHOWN ON THE PLANS.

Provide a uniform and roughened surface on disturbed backslopes in accordance with cross-sections SHOWN ON THE PLANS. Cut all roots flush.

111.40 - Slide Maintenance

Description

111.40.01 This work consists of the removal and disposal of slide material from the trailbed and the restoration of all sections of trail that have been damaged.

Maintenance

111.40.02 General. Conserve and use suitable material from the slide on the trailbed for tread surfacing. Spread this material at a maximum depth of 3 inches for a distance not exceeding 100 feet in each direction from the site of the slide unless otherwise SHOWN ON THE PLANS.

Place all excess and unsuitable material beyond the downslope edge of the trailbed. Uniformly spread unsuitable material to a depth not exceeding 4 inches and do not obstruct drainage.

Reshape the backslope that contributed to the slide to reduce future sloughing and to conform to adjacent undamaged sections unless otherwise SHOWN ON THE PLANS.

Re-grade sections of trailbed that have been damaged to a width and finish that conform to adjacent undamaged sections unless otherwise SHOWN ON THE PLANS.

111.50 - Slough and Berm Removal

Description

111.50.01 This work consists of the removal and disposal of slough and berm material that has accumulated on the trailway.

Construction

111.50.02 Slough and Berm Removal and Excess Material. Remove all slough material within the trailway. Remove all material from the trailbed when daylight can be obtained within a distance of 4 feet from the outsloped edge of the finished tread unless otherwise DESIGNATED ON THE GROUND or SHOWN ON THE PLANS. Conserve and use suitable material to restore the trail tread as SHOWN ON THE PLANS.

Place all excess and unsuitable material beyond the downslope edge of the trailbed. Uniformly spread to a depth not exceeding 4 inches and do not obstruct drainage or interfere with the drainage of outsloped tread.

111.60 - Obliteration of Abandoned Trails

Description

111.60.01 This work consists of removal and disposal of existing structures, including turnpikes, walkways, bridges, culverts, signs and posts, and other material within the trailway, above or below ground. Work also includes salvaging DESIGNATED materials and backfilling the resulting trenches, holes, and pits.

Construction

111.60.02 Removal of Culverts and Bridges. Remove existing culverts within embankment areas at locations SHOWN ON THE PLANS.

Remove existing structures down to the natural stream bottom, and remove parts outside the water course to at least 12 inches below natural ground surface or finish ground surface, whichever is lower. Where portions of an existing structure lie wholly, or in part, within the limits of a new structure, remove parts to accommodate the installation of the proposed structure.

Avoid damage to bridges being dismantled for salvage. Match mark steel and/or wood members and prepare drawings showing the structural location of each member.

111.60.03 Signs and Posts. Remove signs, posts, and associated hardware at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Backfill post hole, compact, and contour area to match existing ground.

111.60.04 Removal of Other Obstructions. Remove other obstructions at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

111.60.05 Disposal. Dispose of native log and rock material by scattering below the trailway and outside clearing limits. Do not place debris in water courses, snow ponds, lakes, meadows, or locations where it could impede the flow to, though, or from the drainage structures. Dispose of metal, treated timber, and other manufactured products by removing from Howard County Department of Recreation & Parks-managed lands and placing in approved waste disposal sites.

111.70 - Retainers

Description

111.70.01 This work consists of furnishing and installing log, sawn timber and rock retainers, including excavation and backfill, wood stakes and/or metal anchors and selecting and hauling of retainer materials.

Materials

111.70.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Material for Timber Structures	195

Construction

111.70.03 General. Place log, sawn timber, or rock retainers in continuous rows. Bed retainers along their entire length and so they are stable. When retainers are constructed of logs or sawn timber use lengths greater than or equal to 10 feet.

Section 112 - Clearing Limits

Description

112.00.01 This work consists of clearing, grubbing, trimming, removing, and treating trees, logs, limbs, branches, brush, plants, and other vegetation along with removal of rocks, undermined roots and hazard trees within the clearing limits. Clearing and removal of trees, vegetation and rocks may be covered by one or more of the following subsections:

112.10.	Clearing and Grubbing
112.20.	Brush Cutting
112.30.	Logging Out
112.40.	Hazard Tree Removal
112.50.	Loose Rock Removal
112.60.	Rock and Root Removal

Measurement

112.00.02 Measure the section 112 items listed in the bid schedule according to subsection 106.

Payment

112.00.03 The accepted quantities will be paid at the contract price per unit of measurement for the section 111 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 106.04.

112.10 - Clearing and Grubbing

Description

112.10.01 This work consists of clearing, grubbing, trimming, removing, and treating trees, logs, limbs, branches, brush, plants, and other vegetation within the clearing limits. Work includes the felling and treatment of designated trees outside the clearing limits. Also, included are the protection from injury or defacement of trees and other objects not designated for removal and treatment of damaged trees.

Construction

112.10.02 Clearing Limits. Clear to the dimensions SHOWN ON THE PLANS or 12 inches beyond the fill and backslope catch points, whichever is greater.

112.10.03 Material to Be Cleared. Remove and dispose of trees, logs, limbs, branches, brush, herbaceous plants, and other vegetation within the clearing limits, except for the following:

a) Live, sound, and firmly rooted trees of the size SHOWN ON THE PLANS.

b) Live brush, herbaceous plants, and trees between the trailway and the clearing limits that are less than 12 inches in height and less than ½ inch in diameter at ground line.

Except as provided above, cut all limbs and branches more than ½ inch in diameter that extend into the clearing limits. Cut limbs flush with the tree trunks or stems or cut at the ground surface as SHOWN ON THE PLANS.

Fall and limb designated trees.

112.10.04 Damaged Trees. When felling, cutting, or trimming, do not cause bark damage to standing timber. If damage does occur to standing trees, treat the injured trees as SHOWN ON THE PLANS. Remove and dispose of trees with major roots exposed by construction that are rendered unstable.

112.10.05 Removal of Stumps. Remove all stumps within the trailbed. Remove stumps located between the edge of the trailbed and the edge of the trailway that cannot be cut flush with the finished slope or that are not tightly rooted.

112.20 - Brush Cutting

Description

112.20.01 This work consists of removing brush, trees less than 4 inches in diameter, and shrubs within the clearing limits.

Construction

112.20.02 General. Remove all limbs of shrubs and trees that extend across or into the clearing limits as SHOWN ON THE PLANS. Saw or cut limbs flush with the tree trunk. Make cuts in a manner that will not tear or strip bark from the trees.

Cut and remove from the clearing limits all woody plants exceeding ½ inch in stem diameter or 12 inches in height. The maximum size material to be cut under this specification is 4 inches in diameter when measured at a height of 6 inches above the ground on the uphill side of the stump.

Cut all brush and small, woody plants as near flush to the ground surface as possible. When impractical to cut plants flush, the maximum stem length shall be 2 inches.

Remove all woody material for a minimum of 3 inches below the trail tread surface. Fill holes in the trail tread caused by removing woody material with suitable material.

Scatter the clearing debris removed from the clearing limits outside and below the clearing limits. Do not place materials in stream channels, drainage ways, ditches, culvert inlets, or other locations where they would prevent the free flow of water away from the trailbed.

112.30 - Logging Out

Description

112.30.01 This work consists of removing brush, logs, and down trees from the clearing limits.

Construction

112.30.02 Clearing Out. Cut and remove all logs that extend across or into the clearing limits. The portions of cut logs that remain on the upper side of the trail shall be either firmly anchored to prevent sliding or rolling onto the trailway or moved across the trail to the lower side and scattered outside the clearing limits.

Fell all trees over 4 inches in diameter that are leaning into the clearing limits and that are within 10 feet above the trailbed. Stump height of leaning trees that are cut outside the clearing limits shall not exceed 12 inches as measured on the uphill side of the stump. Disposal and payment for the leaning trees described above will be the same as for down logs and trees. Remove roots and stumps from trees within the trailway that have been uprooted.

Rerouting the trail around windfalls, uprooted trees, and other obstacles will not be permitted. Ramp or reroute sections of the trail tread that have been damaged by uprooted stumps as necessary to provide safe passage on the trail. Payment for such work will be incidental to the specified work item, and no extra payment will be made.

Remove sticks or wood chunks exceeding 2 inches in diameter and 12 inches in length that have fallen onto the trailbed.

Scatter the down trees on the lower side of the trailway outside the clearing limits. Do not place such materials in stream channels, drainage ways, ditches, culvert catch basins or other locations where they would prevent the free flow of water away from the trailbed.

112.40 - Hazard Tree Removal

Description

112.40.01 This work consists of felling, bucking, and limbing trees and scattering slash.

Construction

112.40.02 Hazard Trees. Remove trees and snags that are broken off or that are in a leaning, unstable position over the trailway to designated areas as SHOWN ON THE PLANS. Cut designated danger trees so that stump heights do not exceed 12 inches as measured on the uphill side of the stump. Maximum stump height of designated trees within 4 feet of the trail centerline is 4 inches. Do not leave felled trees parallel with the trail unless there are sufficient barriers to keep them from rolling or sliding onto the trail. Lop limbs to reduce slash concentration and scatter the clearing debris outside and below the clearing limits. If the trunk or a portion thereof, falls within the trailway, remove that portion within 4 feet of either side of the trail centerline and scatter a minimum distance of 4 feet beyond and below the trail centerline.

112.50 - Loose Rock Removal

Description

112.50.01 This work consists of removal and disposal of loose rock from the trail tread.

Construction

112.50.02 General. Remove loose rocks that are larger than 2 inches at their greatest dimension from the trailbed. Remove any loose rock in drainage dips or ditches that may impede water flow off the trail. Loose rocks are rocks that are not firmly embedded in the trail and can be removed by hand. Where the trailbed consists predominantly of rock with little or no soil present, remove all loose rock larger than 3 inches.

Fill any holes remaining from rock removal with suitable material and compact. If the rock removed is not needed for other items of maintenance work, scatter the rock by side-casting to the lower side of trailway beyond the clearing limits, and distribute rock to ensure that no blockage of drainage or creation of a windrow occurs. Do not dispose of waste materials in water courses.

112.60 - Rock and Root Removal

Description

112.60.01 This work consists of removal and disposal of rocks and roots from the tread.

Construction

112.60.02 Rock Removal. Remove surface rocks that are larger than 2 inches at their greatest dimension, and rocks that project more than 2 inches above the surface of the trail tread, when removal can be accomplished by hand or when rocks can be pried out with a pick mattock, shovel, pry bar, or similar tool. Where the trailbed consists predominantly of rock with little or no soil present, remove loose rock in excess of 3 inches.

Shatter any protruding rocks in trail tread that are too large to be pried out with a pick and bar by using either a rock sledge or explosives. Remove the protrusion down to the level of the tread surface. Fill any resulting depressions with suitable material and compact by tamping. If rock removed is not needed for other items of maintenance work, scatter the rock by side-casting to the lower side of the trailway and beyond the clearing limits and distribute rock to ensure that no blockage of drainage

or creation of windrow occurs. Do not dispose any waste material in water courses.

112.60.03 Root Removal. Remove exposed tree roots on or in the trail tread that are greater than 1 inch in diameter. Cut embedded roots that project more than 2 inches above the trail tread flush with the trail tread. Scatter removed roots on the lower side of the trailway beyond the clearing limits and outside of water courses.

Fill holes caused by rock and root removal with suitable material and compact to form a smooth trail tread.

Maintain trail tread to the width as SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Section 113 – Surfacing

Description

113.00.01 This work consists of furnishing, hauling, watering, placing, and compacting surfacing and other associated work. Trail surfacing may be covered by one or more of the following subsections:

113.10.	Aggregate Surfacing and Base Course
113.20.	Hot Asphalt Plant Mix Trail Surfacing
113.30.	Cold Asphalt Mix Trail Surfacing
113.40.	Grid Unit Surfacing
113.50.	Riprap Surfacing
113.60.	Imported Dirt Surfacing
113.70.	Geosynthetic Surfacing
113.80.	Surface Maintenance

Materials

113.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Geosynthetics	914
Material for Timber Structures	195

Construction

113.00.02 Preparation of Subgrade. Prepare and finish trailbed as required under section 111. Obtain written approval of the Appointed Authority of Howard County Department of Recreation & Parks before placing aggregate.

113.00.03 Retainers. Construct retainers in accordance with Section 111.70 and as SHOWN ON THE PLANS.

Measurement

113.00.04 Measure the section 113 items listed in the bid schedule according to subsection 106.

Payment

113.00.05 The accepted quantities will be paid at the contract price per unit of measurement for the section 113 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 106.04.

113.10 - Aggregate Surfacing and Base Course

Description

113.10.01 This work consists of furnishing, hauling, watering, placing, and compacting aggregate surfacing or base course; furnishing and installing retainers; and geosynthetics.

Materials

113.10.02 Materials. Produce aggregate by pit run, screening, or crushing. Obtain materials from sources SHOWN ON THE PLANS or other sources approved by Appointed Authority of the Howard County Department of Recreation & Parks in writing.

113.10.03 Handling Materials. Stockpile, remove, transport, and spread aggregates in a manner that will preserve specified gradation and avoid contamination. Do not intermingle stockpiles of aggregate having different gradations.

113.10.04 Sampling Aggregate. Submit test results and a Certificate of Compliance verifying that aggregate gradation meets contract requirements.

Sample the material before incorporation into the work as follows:

(a) for onsite-produced materials at crushing or screening plants, after additions of any necessary blending material.

(b) for commercially produced aggregates, at the producer's plant or stockpile.

The sampling will not be considered a final acceptance and will not preclude later sampling and testing after final processing of the material. Such sampling does not relieve the contractor of responsibility of providing quality control measures to ensure compliance with contract requirements.

Construction

113.10.05 Preparation of Subgrade. Prepare and finish trailbed as required under section 112. Obtain written approval of the Appointed Authority of the Howard County Department of Recreation & Parks before placing aggregate.

113.10.06 Spreading and Compacting. Use aggregate that is uniformly mixed at optimum moisture content and spread and compact in layers to the final thickness and width SHOWN ON THE PLANS. The maximum thickness of any one layer shall be 3 inches. Obtain compaction by one of the following methods as SHOWN IN THE SCHEDULE OF ITEMS:

(a) by hand, using non-mechanized compaction tools over the full area of each layer until visual displacement ceases;

(b) by mechanical vibratory compactors over the full area of each layer until visual displacement ceases, but not fewer than three complete passes;

(c) by using a roller or mechanical hand tamper until the density is at least 90 percent of the maximum density, as determined by AASHTO T 99, Method C or D.

Immediately following final spreading, smoothing, and compacting, correct any irregularities or depressions that develop by adding or removing material until the surface is smooth, uniform, and compacted.

113.10.07 Acceptance, Testing, Sampling, and Tolerances. Do not vary the total compacted thickness of the aggregate by more or less than ¾ inch from the specified thickness or place it consistently below or above the specified depth.

Do not vary the aggregate width by more than ± 3 inches from the specified width or place it consistently narrower or wider than the specified width.

113.20 - Hot Asphalt Plant Mix Trail Surfacing

Description

113.20.01 This work consists of constructing a single course of hot asphalt plant mix on a prepared base course or trailbed and furnishing or installing retainers and geosynthetics.

Materials

113.20.02 Materials. Use hot plant mix design that is currently in use by the local State department of transportation, the county, or city, and submit a certificate of compliance that the mix meets their requirements. Certify the locations of past projects for the CO's inspection prior to approval.

Construction

113.20.03 Weather Limitations. Do not place the asphalt mixture when weather conditions prevent the proper compaction of the mixture, the base course is frozen, or the average temperature of the underlying surface upon which the asphalt mixture is to be placed is less than 55°F. Do not place when it is raining or snowing.

113.20.04 Mixing. Do not allow the temperature of the mix to exceed 320°F when discharging from the mixer.

113.20.05 Surface Preparation. Remove loose aggregate, soil, or other deleterious materials from the surface to be paved. Prepare base or trailbed by shaping, watering, and compacting before placing plant mix. Obtain the CO's approval before placing plant mix on prepared base.

113.20.06 Placement and Compaction. Place and compact plant mix to meet the lines, grades, and thicknesses SHOWN ON THE PLANS. Avoid segregation of the mix. Hand or small machine placement of mix is permitted, except where the use of asphalt paving machines is required for areas SHOWN ON THE PLANS. Use only self-contained, power-propelled paving machine units, provided with an adjustable activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing courses of asphalt plant mix to the required widths and thicknesses.

Start compaction when the mix is above 230°F. Compact the mix with at least three passes over the entire trail surface. Use a steel wheel power roller that is of a minimum weight of 1 ton. Use vibratory plate compactors in areas that are not accessible to rollers. Continue compaction over the full width of the layer until visible deformation of the layer ceases.

113.20.07 Thickness. Do not vary the thickness of the compacted hot mix by more or less than 15 percent from the thickness SHOWN ON THE PLANS and not consistently above or below the specified thickness.

113.30 - Cold Asphalt Mix Trail Surfacing

Description

113.30.01 This work consists of constructing a single course of cold bituminous mix on a prepared base course or trailbed and furnishing and installing retainers.

Materials

113.30.02 Requirements. Use cold bituminous mix design that is currently in use by the local State department of transportation, the county, or city, and submit a certificate of compliance that the mix meets their requirements. Certify the locations of past projects for the CO's inspection prior to approval.

Use either MC250 liquid asphalt that conforms to AASHTO M 82 or CMS-2 emulsion that conforms to AASHTO M 208.

For the cold bituminous mix, use aggregate with a maximum size of ¾ inch and no more than 10 percent by weight passing the No. 200 sieve.

Construction

113.30.03 Weather Limitations. Place cold asphalt concrete on an unfrozen, reasonably dry surface. Place when the air temperature in the shade is above 50°F, the temperature of the road surface is above 40°F, and it is not raining or snowing or predicted to rain or snow within 24 hours after placement.

113.30.04 Surface Preparation. Clean the surface to be paved of all loose aggregate, soil, or other deleterious materials. Shape, water, and compact the base course or trailbed with a compactor to prepare the base and subgrade just before placing cold mix. Obtain the CO's approval before placing mix on prepared bases.

113.30.05 Mixing. If liquid asphalt is used, use aggregate that contains no more than 3 percent moisture and is at a temperature between 60 and 220°F during mixing. If emulsified asphalt is used, use aggregate that is at a temperature between 60 and 175°F during mixing.

Mix the aggregate and bituminous material until the aggregates are thoroughly coated and the mass is a uniform color.

113.30.06 Placement and Compaction. Place and compact the mix to meet the lines, grades, and cross-section SHOWN ON THE PLANS. Avoid segregation of the mix. Hand or small machine placement of mix is permitted, except where the use of bituminous paving machines is required for areas SHOWN ON THE PLANS. Use self-contained, power-propelled paving machine units, provided with an adjustable activated screed or strike off assembly, heated if necessary, and capable of spreading and finishing courses of bituminous plant mix to the required widths and thicknesses.

Compact the mix with at least three passes over the entire trail surface. Use a steel wheel power roller that is of a minimum weight of 1 ton. Use vibratory plate compactors in areas that are not accessible to rollers. Continue compaction over the full width of the layer until visible deformation of the layer ceases.

113.30.07 Thickness. Do not vary the thickness of the compacted hot mix by more or less than 15 percent from the thickness SHOWN ON THE PLANS and not consistently above or below the specified thickness.

113.40 - Grid Unit Surfacing

Description

113.40.01 This work consists of furnishing and installing grid pavement units, including excavation, backfilling, and geosynthetics.

Construction

113.40.02 Excavation and Embankment. Perform excavation and embankment in accordance with section 111 and as SHOWN ON THE PLANS.

Excavate to the depth of the grid pavement units to be installed after first removing all duff and debris.

Stockpile all excavated suitable material adjacent to the trail for later use as backfill.

Obtain approval before placing grid pavement units.

113.40.03 Laying Grid Block. Place and bed blocks so they rest firmly against adjacent blocks, are stable, and form a smooth and uniform tread surface. Blocks designed to be interlocked must be interconnected. Fill void areas to full depth with fractured or cut pieces of block on curves or where needed to establish the grid pavement units in which native surface areas are no larger than 6 inches in greatest dimension. Bury beginning and ending blocks at a 30° angle to the tread.

Dispose of unused block material by removing from Howard County Department of Recreation & Parks-managed lands to an appropriate site or by burying it at a location DESIGNATED ON THE GROUND.

113.40.04 Backfilling. After approval of the grid block installation by the CO, place and compact suitable material into holes between and around grid pavement units. For block surfacing used in shallow stream fords and gully crossings, substitute native gravels for suitable materials.

113.50 - Riprap Surfacing

Description

113.50.01 This work consists of construction of riprap surfacing, including excavation, furnishing, hauling, and placing rock and aggregate, compacting surfacing, and associated barriers, ditches, retaining walls, and approach sections.

Construction

113.50.02 Construct riprap surfacing as required under the construction section of 114.00. and/or as SHOWN ON THE PLANS.

113.60 - Imported Dirt Surfacing

Description

113.60.01 This work consists of construction of imported dirt surfacing, including excavation, furnishing, hauling, and placing dirt, compacting surfacing, and associated barriers, ditches, retaining walls, and approach sections.

Construction

113.60.02 Construct imported dirt surfacing as required under the construction section of 114.00. and/or as SHOWN ON THE PLANS.

113.70 - Geosynthetic Surfacing

Description

113.70.01 This work consists of construction of geosynthetic surfacing, including excavation, furnishing, hauling, and placing geosynthetics and aggregate, compacting surfacing, and associated barriers, ditches, retaining walls, and approach sections.

Construction

113.70.02 Construct geosynthetic surfacing as required under the construction section of 114.00. and/or as SHOWN ON THE PLANS.

113.80 – Surface Maintenance

Description

113.80.01 This work consists of maintenance of surfacing, including excavation, furnishing, hauling, and placing rock, aggregate and other surfacing, compacting surfacing, and associated barriers, ditches, and retaining walls to bring surface up to good condition.

Maintenance

113.80.02 Perform maintenance of surfacing as required under the construction section of 114.00. and/or as SHOWN ON THE PLANS.

114 - Climbing Turn

Description

114.00.01 This work consists of construction or maintenance of climbing turns, including excavation, furnishing, hauling, and placing rock and aggregate, compacting aggregate surfacing, and associated barriers, ditches, retaining walls, and approach sections. Construction or maintenance of the climbing turn may be covered by one or more of the following subsections:

114.10.	Climbing Turn
114.20.	Climbing Turn Maintenance

Materials

114.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Geosynthetics	194
Material for Timber Structures	195

Construction

114.00.03 Preparation of Subgrade. Prepare and finish trailbed as required under section 111 and/or as SHOWN ON THE PLANS. Obtain written approval of Appointed Authority of the Howard County Department of Recreation & Parks before placing aggregate.

114.00.04 Retaining Walls. When SHOWN ON THE PLANS, construct retaining walls in accordance with section 135.

114.00.05 Barriers. When SHOWN ON THE PLANS, construct barriers at each climbing turn in accordance with section 133.

114.00.06 Ditches. When SHOWN ON THE PLANS, construct ditches in accordance with section 125.

Measurement

114.00.07 Measure the section 114 items listed in the bid schedule according to subsection 106.

Payment

114.00.08 The accepted quantities will be paid at the contract price per unit of measurement for the section 114 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 106.04.

114.10 - Climbing Turn

Description

114.10.01 This work consists of construction of climbing turns, including excavation, furnishing, hauling, and placing rock and aggregate, compacting aggregate surfacing, and associated barriers, ditches, retaining walls, and approach sections.

Construction

114.10.02 Construct climbing turn as required under the construction section of 114.00. and/or as SHOWN ON THE PLANS.

114.20 - Climbing Turn Maintenance

Description

114.20.01 This work consists of maintenance of climbing turns, including excavation, furnishing, hauling, and placing rock and aggregate, compacting aggregate surfacing, and associated barriers, ditches, retaining walls, and approach sections to bring the climbing turn up to good condition.

Maintenance

114.20.02 Perform maintenance of climbing turn as required under the construction section of 114.00. and/or as SHOWN ON THE PLANS.

115 - Rubble Rock Section

Description

115.00.01 This work consists of furnishing, hauling, and placing rock and aggregate, and compacting aggregate surfacing and through rubble rock sections of trail. Construction or maintenance of the Rubble Rock section may be covered by one or more of the following subsections:

115.10.	Rubble Rock Section
115.20.	Rubble Rock Section Maintenance

Materials

115.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Geosynthetics	194
Material for Timber Structures	195

Construction

115.00.03 Preparation of Subgrade. Prepare and finish trailbed as required under section 111. Obtain written approval of Natural Resources Manager before placing aggregate

115.00.04 Rubble Rock Sections. Through rubble rock slide areas, fill all voids with suitable material to the depth SHOWN ON THE PLANS. Use cap rocks that weigh a minimum of 130 lbs. and have a length of at least twice their width. At least 50 percent of all hand-placed outer rocks should weigh a minimum of 130 lbs. Construct tread by building out rather than by removing material from the inner bank.

Measurement

115.00.05 Measure the section 115 items listed in the bid schedule according to subsection 106.

Payment

115.00.06 The accepted quantities will be paid at the contract price per unit of measurement for the section 115 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 106.04.

115.10 - Rubble Rock Section

Description

115.10.01 This work consists of construction of Rubble Rock section, including furnishing, hauling, and placing rock and aggregate, and compacting aggregate surfacing and through rubble rock sections of trail.

Construction

115.10.02 Construct Rubble Rock section as required under the construction section 115.00., and and/or as SHOWN ON THE PLANS.

115.20 - Rubble Rock Section Maintenance

Description

115.10.01 This work consists of maintenance of Rubble Rock section, including furnishing, hauling, and placing rock and aggregate, and compacting aggregate surfacing and through rubble rock sections of trail.

Maintenance

115.10.02 Perform maintenance of Rubble Rock section as required under the construction section 115.00., and/or as SHOWN ON THE PLANS.

116 - Turnout and Passing Section

Description

116.00.01 This work consists of construction or maintenance of turnout and passing sections, including excavation, furnishing, hauling, and placing rock and aggregate, compacting aggregate surfacing, and associated barriers, ditches, retaining walls, and approach sections. Construction or maintenance of the turnout and passing section may be covered by one or more of the following subsections:

116.10.	Turnout and Passing Section
116.20.	Turnout and Passing Section Maintenance

Materials

116.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Geosynthetics	194
Material for Timber Structures	195

Construction

116.00.03 Preparation of Subgrade. Prepare and finish trailbed as required under section 111 and/or as SHOWN ON THE PLANS. Obtain written approval of Natural Resources Manager before placing aggregate.

116.00.04 Retaining Walls. When SHOWN ON THE PLANS, construct retaining walls in accordance with section 135.

116.00.05 Barriers. When SHOWN ON THE PLANS, construct barriers at each switchback in accordance with section 133.

116.00.06 Ditches. When SHOWN ON THE PLANS, construct ditches in accordance with section 125.

Measurement

116.00.07 Measure the section 116 items listed in the bid schedule according to subsection 106.

Payment

116.00.08 The accepted quantities will be paid at the contract price per unit of measurement for the section 116 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 106.04.

116.10 - Turnout and Passing Area

Description

116.10.01 This work consists of construction of turnout and passing sections, including furnishing, hauling, and placing rock and aggregate, and compacting aggregate surfacing and through rubble rock sections of trail.

Construction

116.10.02 Construct turnout and passing sections as required under the construction section 116.00., and/or as SHOWN ON THE PLANS.

116.20 - Turnout and Passing Area Maintenance

Description

116.10.01 This work consists of maintenance of turnout and passing sections, including furnishing, hauling, and placing rock and aggregate, and compacting aggregate surfacing and through rubble rock sections of trail.

Maintenance

116.10.02 Perform maintenance of turnout and passing sections as required under the construction section 116.00., and /or as SHOWN ON THE PLANS.

117 – Fords

Description

117.00.01 This work consists of construction or maintenance of fords or stepping stones, including excavation, furnishing, hauling, and placing rock and aggregate, compacting aggregate surfacing, and associated barriers, ditches, retaining walls, and approach sections. Construction or maintenance of the ford or stepping stones may be covered by one or more of the following subsections:

117.10.	Natural Ford
117.20.	Constructed Ford
117.30.	Stepping Stones
117.40.	Ford Maintenance

Materials

117.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Geosynthetics	194
Material for Timber Structures	195

Construction

117.00.03 Preparation of Subgrade. Prepare and finish trailbed as required under section 111 and 112 and/or as SHOWN ON THE PLANS. Obtain written approval of Natural Resources Manager before placing aggregate.

117.00.04 Retaining Walls. When SHOWN ON THE PLANS, construct retaining walls in accordance with section 135.

117.00.05 Barriers. When SHOWN ON THE PLANS, construct barriers at each ford in accordance with section 133.

117.00.06 Ditches. When SHOWN ON THE PLANS, construct ditches in accordance with section 125.

Measurement

117.00.07 Measure the section 117 items listed in the bid schedule according to subsection 106.

Payment

117.00.08 The accepted quantities will be paid at the contract price per unit of measurement for the Section 117 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 106.04.

117.10 - Natural Ford

Description

117.10.01 This work consists of construction of natural ford, approaches and surfacing, including excavation, furnishing, hauling, and placing rock and aggregate, compacting aggregate surfacing, and associated barriers, ditches, retaining walls, and approach sections.

Construction

117.10.02 Construct natural ford, approaches and surfacing as required under the construction section 117.00., and/or as SHOWN ON THE PLANS.

117.20 - Constructed Ford

Description

117.20.01 This work consists of construction of ford, approaches and surfacing, including excavation, furnishing, hauling, and placing rock and aggregate, compacting aggregate surfacing, and associated barriers, ditches, retaining walls, and approach sections.

Construction

117.20.02 Construct ford, approaches and surfacing as required under the construction section 117.00., and/or as SHOWN ON THE PLANS.

117.30 - Stepping Stones

Description

117.30.01 This work consists of construction of stepping stones and approaches, including excavation, furnishing, hauling, and placing rock and aggregate, compacting aggregate surfacing, and associated barriers, ditches, retaining walls, and approach sections.

Construction

117.30.02 Construct stepping stones and approaches as required under the construction section 117.00., and/or as SHOWN ON THE PLANS.

117.40 – Ford Maintenance

Description

117.40.01 This work consists of maintenance of fords and approaches, including excavation, furnishing, hauling, and placing rock and aggregate, compacting aggregate surfacing, and associated barriers, retaining walls, and approach sections to bring the ford up to good condition.

Maintenance

117.40.02 Maintain stream fords and gully crossings as SHOWN ON THE PLANS. Remove debris and loose rocks over 3 inches from existing stream crossings to provide the tread width. Maintain and replace missing or rotted log or rock barriers that form the dam at fords and gully crossings. Level and smooth the stream bottom with gravel or rock less than 3 inches in greatest dimension to provide a crossing.

Re-grade or fill the approaches to the stream fords and gully crossings to provide for safe use. Replace missing stepping stones.

118.00. – Foundations

Description

118.00.01 This work consists of construction or maintenance of foundations for trailways, including excavation, furnishing, hauling, placing and compacting rock, aggregate, geosynthetics, wire baskets and timber materials, and associated barriers, ditches, retaining walls, and approach sections. Construction or maintenance of the foundations may be covered by one or more of the following subsections:

118.10. Rock
118.20. Geosynthetics

118.30.	Gabion Basket
118.40.	Crib Foundation
118.50.	Corduroy Foundation
118.60.	Foundation Maintenance

Materials

118.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Geosynthetics	194
Material for Timber Structures	195
Wire Basket Materials	196

Construction

118.00.03 Preparation of Subgrade. Prepare and finish subgrade as required under section 111 and/or as SHOWN ON THE PLANS. Obtain written approval of Natural Resources Manager before placing rock, geosynthetics, gabion baskets or crib foundations.

118.00.03 Foundation Construction. Construction foundation as SHOWN ON THE PLANS, construct with approved backfill material in accordance with section 111 and 112.

118.00.04 Retaining Walls. When SHOWN ON THE PLANS, construct retaining walls in accordance with section 135.

118.00.05 Barriers. When SHOWN ON THE PLANS, construct barriers at each switchback in accordance with section 133.

118.00.06 Ditches. When SHOWN ON THE PLANS, construct ditches in accordance with section 125.

Measurement

118.00.07 Measure the section 118 items listed in the bid schedule according to subsection 106.

Payment

118.00.08 The accepted quantities will be paid at the contract price per unit of measurement for the Section 118 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 106.04.

118.10. – Rock

Description

118.10.01 This work consists of construction of rock foundation for trailways, including excavation, furnishing, hauling, and placing rock, aggregate, and geosynthetics.

Construction

118.10.02 Construct foundation as required under the construction section 118.00. and/or as SHOWN ON THE PLANS.

118.20. – Geosynthetics

Description

118.20.01 This work consists of utilizing geosynthetics for foundation construction for trailways, including excavation, furnishing, hauling, and placing rock, aggregate, and geosynthetics.

Construction

118.20.02 Construct foundation as required under the construction section 118.00. and/or as SHOWN ON THE PLANS.

118.30. - Gabion Basket

Description

118.30.01 This work consists of utilizing wire baskets for foundation construction for trailways, including excavation, furnishing, hauling, and placing rock, aggregate and wire baskets.

Construction

118.30.02 Construct foundation as required under the construction section 118.00. and/or as SHOWN ON THE PLANS.

118.40. - Crib Foundation

Description

118.40.01 This work consists of utilizing timber cribs for foundation construction for trailways, including excavation, furnishing, hauling, and placing rock, aggregate and timber cribs.

Construction

118.40.02 Construct foundation as required under the construction section 118.00. and/or as SHOWN ON THE PLANS.

118.50. – Corduroy Foundation

Description

118.50.01 This work consists of utilizing corduroy for foundation construction for trailways, including excavation, furnishing, hauling, and placing logs, aggregate and geosynthetics.

Construction

118.50.02 Construct foundation as required under the construction section 118.00. and/or as SHOWN ON THE PLANS.

118.60. - Foundation Maintenance

Description

118.60.01 This work consists of maintenance of foundation for trailways, including excavation, furnishing, hauling, placing and compacting rock, aggregate, geosynthetics, wire baskets and timber materials, and associated barriers, ditches, retaining walls, and approach sections.

Maintenance

118.60.02 Perform maintenance on foundation as required under the construction section 118.00. and/or as SHOWN ON THE PLANS.

Section 120—Drainage Structures

121 – Culverts

Description

121.00.01. This work consists of furnishing and installing culverts, including excavation and backfill, selecting and hauling of log and rock materials, and constructing catch basins, and headwalls. Construction of culverts may be covered by one or more of the following subsections:

121.10. Standard Culvert
121.20. Standard Culvert with Headwall
121.30. Rock Culvert
121.40. Treated Timber Box Culvert
121.50. Open-Top Drain
121.60. Bottomless Arch Culvert
121.70. Culvert Maintenance

Materials

121.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Drainage Pipe	192
Geosynthetics	194
Material for Timber Structures	195

Construction

121.00.03 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

121.00.04 Placement. Place culverts to provide for unobstructed inlet and outlet flow. Remove logs, debris, soil, rock, and other obstructions above and below the culvert that would impede flow into the culvert or away from the trailway. Minimize disturbance to streambeds.

Construct a catch basin to facilitate flow from trail ditches into the culvert.

121.00.05 Installation. Install culverts of the types and at the locations SHOWN ON THE PLANS or as DESIGNATED ON THE GROUND.

(a) Placing. Skew ditch relief culverts as staked to provide a downgrade equal to or greater than the uphill ditch. Place culverts at stream crossings in the natural streambed on stream grade.

Attach end sections to the pipe by connecting bands or other means as recommended by the manufacturer.

(b) Bedding. Excavate and remove all unsuitable material and rocks over 3 inches to a minimum depth of 6 inches below the pipe invert and to a minimum width of 1.5 pipe diameters. Bed pipe with compacted suitable material free of rocks larger than 3 inches and in a stable foundation of undisturbed or compacted soil. Make the bed shaped to fit the lower quadrant of the pipe exterior and provide uniform continuous support along the entire length of the pipe.

121.00.06 Backfilling. Backfill and compact around culverts with suitable material that is free of rocks over 3 inches. Provide for the cover height as SHOWN ON THE PLANS.

Measurement

121.00.07 Measure the section 121 items listed in the bid schedule according to section 106.

Payment

121.00.08 The accepted quantities will be paid at the contract price per unit of measurement for the Section 121 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

121.10 - Standard Culvert

Description

121.10.01 This work consists of furnishing and installing culverts without headwalls, including excavation and backfill, selecting and hauling of log and rock materials, and constructing catch basins.

Construction

121.10.02 Install culverts as required under construction section 121.00 and/or as SHOWN ON THE PLANS.

121.20 - Standard Culvert with Headwalls

Description

121.20.01 This work consists of furnishing and installing culverts with headwalls, including excavation and backfill, selecting and hauling of log and rock materials, and constructing catch basins.

Construction

121.20.02 Install culverts and headwalls as required under construction section 121.00 and/or as SHOWN ON THE PLANS.

121.20.03 Headwalls. Install headwalls at the locations SHOWN ON THE PLANS or as DESIGNATED ON THE GROUND.

Provide a compacted bench as a foundation for the wall.

Select rocks that have a general rectangular shape with flat top and bottom faces. Place the largest rocks on the bottom. Lay each rock stable on the course that supports it, interlocking with surrounding rocks. Do not break, jar, or displace rocks already set. Place the exposed face of each rock parallel to the face of the wall. Stagger vertical joints a minimum of 4 inches horizontally from vertical joints in adjoining courses.

121.30 - Rock Culvert

Description

121.30.01 This work consists of furnishing and installing rock culverts, including excavation and backfill, selecting and hauling of rock material, and constructing catch basins.

Construction

121.30.02 Install culverts as required under construction section 121.00 and/or as SHOWN ON THE PLANS.

121.30.03 Rock Culverts. Install rock culverts at the locations SHOWN ON THE PLANS or as DESIGNATED ON THE GROUND.

Firmly embed selected sidewall rocks below the natural ground or streambed as SHOWN ON THE PLANS. Use flat cover rocks long enough to bridge between outside faces of the sidewalls. Select and place rocks so as to fit snugly with firm bearing on underlying rocks. Fill voids with small rock to prevent entry of soil into the culvert.

121.40 – Treated Timber Box Culvert

Description

121.40.01 This work consists of furnishing and installing treated timber box culverts, including excavation and backfill, and constructing catch basins.

Construction

121.40.02 Install culverts as required under construction section 121.00 and/or as SHOWN ON THE PLANS.

121.40.03 Treated Timber Box Culverts. Install treated timber box culverts at the locations SHOWN IN THE PLANS or as DESIGNATED ON THE GROUND.

Place the box culvert walls on a firm foundation of undisturbed or compacted suitable material shaped to fit the bottom of the culvert walls and free of rocks larger than 3 inches in size.

121.50 - Open-Top Drain

Description

121.50.01 This work consists of furnishing and installing open-top drains, including excavation and backfill, and constructing catch basins.

Construction

121.50.02 Install open-top drains as required under construction section 121.00 and/or as SHOWN ON THE PLANS.

121.60 - Bottomless Arch Culvert

Description

121.50.01 This work consists of furnishing and installing bottomless arch culverts, including excavation and backfill, selecting and hauling of log and rock materials for headwalls, and constructing catch basins.

Construction

121.50.02 Install culverts as required under construction section 121.00 and as SHOWN ON THE PLANS.

121.70. - Culvert Maintenance

Description

121.50.01 This work consists of maintenance of culverts, including excavation and backfill, selecting and hauling of log and rock materials, and constructing catch basins, and headwalls.

Maintenance

121.50.02 General. Where trail drainage facilities have been plugged and the water has been diverted from the intended channel, remove the debris causing the diversion and return the drainage to the channel. Divert water off and away from the trailbed. If washing or ponding of water has been or is occurring, dig a shallow ditch sloped 2 percent to 5 percent to the downstream side of the trail and 3 inches minimum deep and 12 inches minimum wide across the trail at the point where water enters the trail.

Clean ditches to permit the free flow of water into culverts and away from the trail.

Scatter all unusable or unneeded material that is cleared from the drainage structures 3 feet or more beyond and below the trail or drainage facility and out of water courses.

121.50.03 Remove debris and soil from catch basins and inlet and outlet ditches and inside culverts to permit the unobstructed flow of water into, through and away from the culvert. Replace any missing or loose rocks or logs in culvert headwalls. Fit replacement rocks for rock culverts so that they have a firm bearing on adjacent and underlying rocks. Place rocks snugly and fill voids with small rocks to prevent material from sifting into the drain. Fill and compact with suitable material all disturbed areas in the trail tread over or adjacent to rock culverts.

122 - Waterbars

Description

122.00.01 This work consists of installing and maintaining waterbars, including excavation and backfill; selecting and hauling of log and rock materials; and furnishing treated timber, belting, and other materials. Construction and maintenance of waterbars may be covered by one or more of the following subsections:

122.10. Rock Waterbar
122.20. Log or Treated Timber Waterbars
122.30. Belted Waterbar
122.40. Waterbar Maintenance

Materials

122.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Drainage Pipe	192
Geosynthetics	194
Material for Timber Structures	195

Use rubber belting that is single-ply, non-reinforced material 3/8 inch to 1/2 inch thick.

Construction

122.00.03 General. Install waterbars of the types and at the locations SHOWN ON THE PLANS or as DESIGNATED ON THE GROUND.

122.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111. Around waterbars, backfill and compact suitable material that is free of rocks larger than 3 inches in size. Compact material on the downgrade side of rock, log, and treated timber waterbars, flush with the top of waterbars.

Outslope the trailbed on the upgrade side of the waterbar with a slope equal to or greater than the trail grade leading into the waterbar. Provide a uniform outsloped plane that forms a gutter against the waterbar.

Measurement

122.00.05 Measure the Section 122 items listed in the bid schedule according to section 106.

Payment

122.00.06 The accepted quantities will be paid at the contract price per unit of measurement for the Section 122 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

122.10 - Rock Waterbar

Description

122.10.01 This work consists of installing rock waterbars, including excavation and backfill; selecting and hauling of rock materials; and other materials.

Construction

122.10.02 Install rock waterbars as required under construction section 122.00 and/or as SHOWN ON THE PLANS.

122.10.03 Rock Waterbar. Tightly embed selected rocks into the trailbed. Place waterbar rocks with tops relatively even, with no sharp points. Use rocks with lengths greater than or equal to 1.5 times the width.

122.20 - Log or Treated Timber Waterbars

Description

122.20.01 This work consists of installing log or treated timber waterbars, including excavation and backfill; selecting and hauling of log materials or furnishing treated timbers and other materials.

Construction

122.20.02 Install waterbars per as required under construction section 122.00 and/or as SHOWN ON THE PLANS.

122.20.03 Log or Treated Timber Waterbars. Embed peeled native logs or treated timbers into the trailbed to form a waterbar across the trail. Use anchor methods as SHOWN ON THE PLANS at log or treated timber ends outside the trail tread. Pre-drill pilot holes (for steel pins) through timbers prior to treatment. Anchor stakes firmly in the ground, and tightly nail to the log without splitting. In the absence of a backslope, anchor the upgrade end of the log or timber waterbar in the same manner as the downgrade end.

122.30 - Belted Waterbar

Description

122.30.01 This work consists of installing belted waterbars, including excavation and backfill; furnishing treated timbers and other materials.

Construction

122.30.02 Install waterbars as required under construction section 122.00 and/or as SHOWN ON THE PLANS.

122.30.03 Rubber Belting Waterbars. Tightly secure one continuous piece of rubber belting between treated timbers as SHOWN ON THE PLANS.

122.40. - Waterbar Maintenance

Description

122.40.01 This work consists of maintenance of waterbars, including excavation and backfill, selecting and hauling of log and rock materials, and constructing catch basins, and headwalls.

Maintenance

122.40.02 General. Where trail drainage facilities have been plugged and the water has been diverted from the intended channel, remove the debris

causing the diversion and return the drainage to the channel. Divert water off and away from the trailbed. If washing or ponding of water has been or is occurring, dig a shallow ditch sloped 2 percent to 5 percent to the downstream side of the trail and 3 inches minimum deep and 12 inches minimum wide across the trail at the point where water enters the trail.

Clean ditches to permit the free flow of water into culverts and away from the trail.

Scatter all unusable or unneeded material that is cleared from the drainage structures 3 feet or more beyond and below the trail or drainage facility and out of water courses.

122.40.03. Clean the upgrade side of all existing waterbars and maintain them as SHOWN ON THE PLANS. Remove material accumulated against rubber belting waterbars. Use and compact suitable material removed from the upgrade side of all waterbars to bring the trail tread flush with the top of those waterbars on the downgrade side. Remove all debris from the lead-off area of all waterbars that restricts the free flow of water away from the trail. Firmly embed replacement rocks for rock waterbars into the trailbed and fit the rocks together. Make the tops of the rocks even, with no sharp points. Peel native replacement logs before using them. Anchor stakes tightly in the ground without splits and nail tightly to the log.

123 – Rock Spillways

Description

123.01 This work consists of constructing or maintenance of spillways, including selecting, excavating, and placing geotextile and rock material. Construction and maintenance of spillways may be covered by one or more of the following subsections:

123.10.	Rock Spillway
123.20.	Rock Spillway Maintenance

Materials

123.02 Requirements. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	191
Drainage Pipe	192
Geosynthetics	194
Material for Timber Structures	195

Construction

123.03 General. Construct rock spillways at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Construct spillways so the flow of water from

the facility being drained is centered on and flows down the full length of the spillway.

123.04 Excavation. Excavate for the spillway in accordance with Section 111. Construct a horizontal bench into undisturbed material and compact it as a foundation for the toe of the rock spillway.

123.05 Placement. Place geotextile under the rock as required or as SHOWN ON THE PLANS.

123.06 Rock Placement. Construct the spillway by hand-placing rock, with the larger rock in the bottom layers. Place each rock to provide a stable course. Interlock each rock with adjacent rocks, and minimize voids. Use small rocks to fill voids. Do not break, jar, or displace rocks already set.

Measurement

123.06 Measure the Section 123 items listed in the bid schedule according to section 106.

Payment

123.07 The accepted quantities will be paid at the contract price per unit of measurement for the Section 123 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

123.10. – Rock Spillway

Description

123.10.01 This work consists of constructing or maintenance of spillways, including selecting, excavating, and placing rock material.

Construction

123.10.02 Install rock spillway as required under construction section 123.00 and/or as SHOWN ON THE PLANS.

123.20. – Rock Spillway Maintenance

Description

123.20.01 This work consists of maintenance of spillways, including excavation and backfill, selecting and hauling of log and rock materials, and constructing catch basins, and headwalls.

Maintenance

123.20.02 General. Where trail drainage facilities have been plugged and the water has been diverted from the intended channel, remove the debris causing the diversion and return the drainage to the channel. Divert water off and away from the trailbed. If washing or ponding of water has been or is occurring, dig a shallow ditch sloped 2 percent to 5 percent to the

downstream side of the trail and 3 inches minimum deep and 12 inches minimum wide across the trail at the point where water enters the trail.

Clean ditches to permit the free flow of water into culverts and away from the trail.

Scatter all unusable or unneeded material that is cleared from the drainage structures 3 feet or more beyond and below the trail or drainage facility and out of water courses.

123.20.03. Maintain rock spillways to conform as SHOWN ON THE PLANS. Replace missing rocks, interlocking each rock with adjacent rocks. Place the rocks to ensure that the water flows down the spillway and away from the facility being drained. Use small rocks to fill voids. Clean all material from the spillway that restricts the flow of water away from the trail.

124 – Underdrains

Description

124.00.01 This work consists of constructing or maintaining underdrains, including excavation and backfill and obtaining and installing filter rock, geosynthetics, and drainpipe with necessary fittings. Construction and maintenance of underdrains may be covered by one or more of the following subsections:

124.10.	Rock Underdrain
124.20.	Sheet Underdrain
124.30.	Underdrain Maintenance

Materials

124.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	111
Drainage Pipe	112
Geosynthetics	114
Material for Timber Structures	115

Construction

124.00.03 General. Construct underdrains at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

124.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

124.00.05 Trench Construction. Grade underdrain trenches to provide complete drainage of the underdrain system. Obtain County approval of the trench system prior to placement of underdrain materials.

124.00.06 Pipe Installation. Ensure positive drainage from the underdrain pipes and drainage system. Place pipe in the trench with the perforations down.

Measurement

124.00.07 Measure the Section 124 items listed in the bid schedule according to section 106.

Payment

124.00.08 The accepted quantities will be paid at the contract price per unit of measurement for the Section 124 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

124.10 - Rock Underdrain

Description

124.10.01 This work consists of constructing rock underdrains and associated drainage ditches, including excavation and backfill and obtaining and installing filter rock, geosynthetics, and drainpipe with necessary fittings.

Construction

124.10.02 Install underdrain as required under construction section 124.00 and/or as SHOWN ON THE PLANS.

124.20 - Sheet Underdrain

Description

124.20.01 This work consists of constructing sheet underdrains or sheet drains, including excavation and backfill and obtaining and installing filter rock, geosynthetics, and drain pipe with necessary fittings.

Construction

124.20.02 Install underdrain as required under construction section 124.00 and/or as SHOWN ON THE PLANS.

124.30. - Underdrain Maintenance

Description

124.30.01 This work consists of maintenance of rock and sheet underdrains and associated drainage ditches, including excavation and backfill and obtaining and installing filter rock, geosynthetics, and drainpipe with necessary fittings.

Maintenance

124.30.02 Perform maintenance on underdrains and associated ditches as required under construction section 124.00 and/or as SHOWN ON THE PLANS.

Where ditches have been plugged and the water has been diverted from the intended underdrain, remove the debris causing the diversion and return the drainage to the ditch.

125 – Ditches

Description

125.00.01 This work consists of construction and maintenance of ditches, including excavation and backfill. Construction and maintenance of ditches may be covered by one or more of the following subsections:

125.10. Side Ditch
125.20. Leadoff Ditch
125.30. Ditch Maintenance

Construction

125.00.02 General. Construct ditches at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

125.00.03 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

Measurement

125.00.04 Measure the Section 125 items listed in the bid schedule according to section 106.

Payment

125.00.05 The accepted quantities will be paid at the contract price per unit of measurement for the Section 125 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

125.10. - Side Ditch

Description

125.10.01 This work consists of construction of side ditches, including excavation and backfill.

Construction

125.10.02 Construct side ditches as required under construction section 125.00 and/or as SHOWN ON THE PLANS.

125.20. - Leadoff Ditch

Description

125.20.01 This work consists of construction of leadoff ditches, including excavation and backfill.

Construction

125.20.02 Construct leadoff ditches as required under construction section 125.00 and/or as SHOWN ON THE PLANS.

125.30. - Ditch Maintenance

Description

125.30.01 This work consists of maintenance of leadoff ditches, including excavation and backfill.

Maintenance

125.30.02 General. Where ditches have been plugged and the water has been diverted from the intended ditch, remove the debris causing the diversion and return the drainage to the ditch. Clean deposited material and restore ditches as SHOWN ON THE PLANS. Remove all debris from the lead-off ditches that restricts the free flow of water away from the trail.

Clean ditches to permit the free flow of water into culverts and away from the trail.

Scatter all unusable or unneeded material that is cleared from the drainage structures 3 feet or more beyond and below the trail or drainage facility and out of water courses.

126 – Berms

Description

126.00.01 This work consists of construction and maintenance of berms and associated drainage ditches, including excavation and backfill. Construction of berms may be covered by one or more of the following subsections:

126.10. Berms
126.20. Berm Maintenance

Construction

126.00.02 General. Construct berms at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

126.00.03 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

Measurement

126.00.04 Measure the Section 126 items listed in the bid schedule according to section 106.

Payment

126.00.05 The accepted quantities will be paid at the contract price per unit of measurement for the Section 126 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

126.10. – Berms

Description

126.10.01 This work consists of constructing berms and associated drainage ditches, including excavation and backfill.

Construction

126.10.02 Construct berms as required under construction section 126.00 and/or as SHOWN ON THE PLANS.

126.20. - Berm Maintenance

Description

126.10.01 This work consists of maintaining berms, including excavation and backfill.

Maintenance

126.10.02 Perform maintenance of berms as required under construction section 126.00 and/or as SHOWN ON THE PLANS.

127 - Drain Dips

Description

127.00.01 This work consists of construction and maintenance of drainage dips, including excavation and backfill. Construction and maintenance of drainage dips may be covered by one or more of the following subsections:

124.10.	Drain Dip
124.20.	Drain Dip Maintenance

Materials

127.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	111
Geosynthetics	114
Material for Timber Structures	115

Construction

127.00.03 General. Construct drainage dips at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

127.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

Measurement

127.00.05 Measure the Section 124 items listed in the bid schedule according to section 106.

Payment

127.00.06 The accepted quantities will be paid at the contract price per unit of measurement for the Section 124 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

127.10. - Drain Dip

Description

126.10.01 This work consists of constructing drain dips and associated drainage ditches, including excavation and backfill.

Construction

126.10.02 Construct drain dips as required under construction section 127.00 and/or as SHOWN ON THE PLANS.

127.20. - Drain Dip Maintenance

Description

127.20.01 This work consists of maintenance of drain dips, including excavation and backfill, selecting and hauling of log and rock materials, and constructing catch basins, and headwalls.

Maintenance

127.20.02 General. Where trail drainage facilities have been plugged and the water has been diverted from the intended channel, remove the debris causing the diversion and return the drainage to the channel. Divert water off and away from the trailbed. If washing or ponding of water has been or is occurring, dig a shallow ditch sloped 2 percent to 5 percent to the downstream side of the trail and 3 inches minimum deep and 12 inches minimum wide across the trail at the point where water enters the trail.

Clean ditches to permit the free flow of water into culverts and away from the trail.

Scatter all unusable or unneeded material that is cleared from the drainage structures 3 feet or more beyond and below the trail or drainage facility and out of water courses.

127.20.03 Clean deposited material and restore drainage dips as SHOWN ON THE PLANS. Remove all debris from the lead-off area of dips that restricts the free flow of water away from the trail. Use suitable material obtained by cleaning dips for fill on the downgrade side, removing rock more than 3 inches at its greatest dimension. Compact all material placed in the trail tread.

128 - Check Dams

Description

128.00.01 This work consists of construction and maintenance of check dams, including excavation and backfill, and obtaining and installing of log and rock materials. Construction and maintenance of check dam may be covered by one or more of the following subsections:

128.10.	Check Dam
128.20.	Check Dam Maintenance

Materials

128.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	111
Geosynthetics	114
Material for Timber Structures	115

Construction

128.00.03 General. Construct check dams at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

128.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

Measurement

128.00.05 Measure the Section 128 items listed in the bid schedule according to section 106.

Payment

128.00.06 The accepted quantities will be paid at the contract price per unit of measurement for the Section 128 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

128.10. - Check Dams

Description

128.00.01 This work consists of construction of check dams, including excavation and backfill and obtaining and installing rocks.

Construction

128.10.02 Construct check dams as required under construction section 128.00 and/or as SHOWN ON THE PLANS.

128.20. - Check Dam Maintenance

Description

128.20.01 This work consists of maintenance of check dams, including excavation and backfill and obtaining and installing rocks.

Maintenance

128.20.02 General. Where check dams have been plugged and the water has been diverted from the intended channel, remove the debris causing the diversion and return the drainage to the channel. Divert water off and away from the trailbed. If washing or ponding of water has been or is occurring, dig a shallow ditch sloped 2 percent to 5 percent to the downstream side of the trail and 3 inches minimum deep and 12 inches minimum wide across the trail at the point where water enters the trail.

Clean ditches to permit the free flow of water into culverts and away from the trail.

Scatter all unusable or unneeded material that is cleared from the drainage structures 3 feet or more beyond and below the trail or drainage facility and out of water courses.

128.20.03 Clean deposited material and restore check dams as SHOWN ON THE PLANS. Remove all debris from the lead-off area of dips that restricts the free flow of water away from the trail. Use suitable material obtained by cleaning dips for fill on the downgrade side, removing rock more than 3 inches at its greatest dimension. Compact all material placed in the trail tread.

Section 130 – Trail Structures

Section 131 – Switchbacks

Description

131.00.01 This work consists of construction and maintenance of switchbacks, including excavation, associated barriers, ditches, retaining walls, and approach sections. Construction and maintenance of switchbacks may be covered by one or more of the following subsections:

131.10.	Type 1 – Radius Switchback
131.20.	Type 2 – Circular Landing Switchback
131.30.	Type 3 – Rectangular Landing Switchback
131.40.	Switchback Maintenance

Materials

131.00.02 Materials. Conform to the following Sections and Subsections:

Rock, Grid Pavement Units, and Aggregate	111
Material for Timber Structures	115

Construction

131.00.03 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

131.00.04 Retaining Walls. When SHOWN ON THE PLANS, construct retaining walls in accordance with Section 135.

131.00.05 Barriers. When SHOWN ON THE PLANS, construct barriers at each switchback in accordance with Section 133.

131.00.06 Ditches. When SHOWN ON THE PLANS, construct ditches in accordance with Section 125.

131.00.07 Limits of Switchback. Beginning and ending of switchback will be as SHOWN ON THE PLAN or as DESIGNATED ON THE GROUND.

Measurement

131.00.08 Measure the Section 131 items listed in the bid schedule according to section 106.

Payment

131.00.01 The accepted quantities will be paid at the contract price per unit of measurement for the Section 131 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

131.10 - Type 1 – Radius Switchbacks

Description

131.10.01 This work consists of construction of radius switchbacks, including excavation, associated barriers, ditches, retaining walls, and approach sections.

Construction

131.10.02 Construct radius switchback as required under construction section 131.00 and/or as SHOWN ON THE PLANS.

131.20 - Type 2 – Circular Landing Switchbacks

Description

131.20.01 This work consists of construction of circular landing switchbacks, including excavation, associated barriers, ditches, retaining walls, and approach sections.

Construction

131.20.02 Construct circular landing switchback as required under construction section 131.00 and/or as SHOWN ON THE PLANS.

131.30 - Type 3 – Rectangular Landing Switchbacks

Description

131.30.01 This work consists of construction of rectangular landing switchbacks, including excavation, associated barriers, ditches, retaining walls, and approach sections.

Construction

131.30.02 Construct rectangular landing switchback as required under construction section 131.00 and/or as SHOWN ON THE PLANS.

131.40 - Switchback Maintenance

Description

131.40.01 This work consists of replacing or maintaining retaining walls, trail tread, barriers, and drain ditches on existing switchbacks.

Maintenance

131.40.02 General. Perform maintenance on switchbacks as required under construction section 131.00 and/or as SHOWN ON THE PLANS.

131.40.03 Retaining Walls. When needed in rock retaining wall maintenance, use replacement rock that is sound, durable, and free from rifts, seams, laminations, and minerals that could cause deterioration through weathering.

131.40.04 Barriers. Perform barrier maintenance where needed. Use the same type of materials as in the original construction.

131.40.05 Ditches. Clear switchback ditches to permit the free flow of water. Construct ditches as SHOWN ON THE PLANS.

131.40.06 Tread. Maintain trail tread to the original designed tread width.

Section 132 – Turnpikes

Description

132.00.01 This work consists of construction and maintenance of turnpike sections, including excavation, embankment, retainers, geosynthetics, backfill, and drainage features. Construction and maintenance of turnpike sections may be covered by one or more of the following subsections:

132.10.	Type 1 – Standard Turnpike
132.20.	Type 2 – Standard Turnpike with Foundation
132.30.	Turnpike Maintenance

Materials

132.00.02 Materials. Conform to the following Sections and Subsections:

Rock, Grid Pavement Units, and Aggregate	111
Geosynthetics materials	114
Material for Timber Structures	115

Construction

132.00.03 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

132.00.04 Retainers. Construct retainers in accordance with Section 111.70 and as SHOWN ON THE PLANS. Place retainers in a continuous row along each shoulder of the turnpike section as SHOWN ON THE PLANS. Bed the parallel retainers so they are stable and at approximately the same top elevation.

132.00.05 Geosynthetics. Where SHOWN ON THE PLANS, place geosynthetics flat and parallel to centerline of the trail before placing embankment. Overlap geosynthetics a minimum of 2 feet. Install anchors or fasteners as recommended by the geosynthetic manufacturer.

132.00.06 Backfill. Backfill and compact with suitable material.

132.00.07 Drainage. Construct side ditches, cross-drainage, and culverts at locations SHOWN ON THE PLANS and/or DESIGNATED ON THE GROUND. Provide leadoff ditches from side ditches on the lower side of trail at points DESIGNATED ON THE GROUND or SHOWN ON THE PLANS.

Measurement

132.00.08 Measure the Section 132 items listed in the bid schedule according to section 106.

Payment

132.00.01 The accepted quantities will be paid at the contract price per unit of measurement for the Section 132 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

132.10 - Type 1 – Standard Turnpikes

Description

132.10.01 This work consists of construction of standard turnpike sections, including excavation, embankment, retainers, geosynthetics, backfill, and drainage features.

Construction

132.10.02 Construct standard turnpike sections as required under construction section 132.00. and/or as SHOWN ON THE PLANS.

132.20 - Type 2 – Standard Turnpikes with Foundation

Description

132.20.01 This work consists of construction of standard turnpike sections with foundation, including excavation, embankment, retainers, geosynthetics, rocks, backfill, and drainage features.

Construction

132.20.02 Standard turnpike sections with foundation as required under construction section 132.00. and/or as SHOWN ON THE PLANS.

132.30 - Turnpike Maintenance

Description

132.30.01 This work consists of maintaining turnpike sections.

Maintenance

132.30.02 General. Perform maintenance on turnpikes as required under construction section 132.00. and/or as SHOWN ON THE PLANS.

132.30.03 Obtain logs, staking material, and suitable material for backfill from locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

132.30.04 Replace missing rocks, or missing or decayed retaining logs or lumber, with rocks, logs, or dimensional lumber as SHOWN ON THE PLANS. Secure loose or dislocated retainers. Drive stakes 2-3 inches in diameter and 18-24 inches in length along the outside edge of each log or lumber retainer to hold them in place at a maximum of 3 feet.

132.30.05 Clear all drainage structures of obstructions, silt, and debris so as to permit the free flow of water away from the trail.

132.30.06 If necessary, use suitable material removed from the drainage structures to build up the crown. Shape the tread with suitable material to provide a 2-inch crown measured from the top of the crown at the centerline to the top of the retainers.

Section 133 – Side Barriers

Description

133.00.01 This work consists of construction and maintenance of side barriers, including excavation, embankment, widening, debris disposal and backfill. Construction and maintenance of side barriers may be covered by one or more of the following subsections:

133.10.	Stacked Rock Barrier
133.20.	Masonry Rock Barrier
133.30.	Barrier Rail on Grade
133.40.	Barrier Rail on Posts
133.50.	Curb
133.60.	Guardrail

Materials

133.00.02 Materials. Conform to the following Sections and Subsections:

Rock, Grid Pavement Units, and Aggregate	111
Material for Timber Structures	115

Construction

133.00.03 General. Construct barriers of the type and at the locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Use logs in which the true centerline deviates no more than 2 inches from the line between the centers of the ends of the log.

133.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

133.00.05 Backfill. Backfill and compact with suitable material.

Measurement

133.00.06 Measure the Section 133 items listed in the bid schedule according to section 106.

Payment

133.00.07 The accepted quantities will be paid at the contract price per unit of measurement for the Section 133 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

133.10. – Stacked Rock Barrier

Description

133.10.01 This work consists of construction of stacked rock barrier, including excavation, embankment, widening, debris disposal and backfill.

Construction

133.10.02 Construct stacked rock barrier as required under construction section 133.00. and/or as SHOWN ON THE PLANS.

133.20. – Masonry Rock Barrier

Description

133.20.01 This work consists of construction of masonry rock barrier, including excavation, embankment, widening, debris disposal and backfill.

Construction

133.20.02 Construct masonry rock barrier as required under construction section 133.00. and/or as SHOWN ON THE PLANS.

133.30. – Barrier Rail on Grade

Description

133.30.01 This work consists of construction of barrier rail on grade, including excavation, embankment, widening, debris disposal and backfill.

Construction

133.30.02 Construct barrier rail on grade as required under construction section 133.00. and/or as SHOWN ON THE PLANS.

133.40. – Barrier Rail on Posts

Description

133.40.01 This work consists of construction of barrier rail on posts, including excavation, embankment, widening, debris disposal and backfill.

Construction

133.40.02 Construct barrier rail on posts as required under construction section 133.00. and/or as SHOWN ON THE PLANS.

133.50. – Curb

Description

133.50.01 This work consists of construction of curbing, including excavation, embankment, debris disposal and backfill.

Construction

133.50.02 Construct curbing as required under construction section 133.00. and/or as SHOWN ON THE PLANS.

133.60. – Guardrail

Description

133.60.01 This work consists of construction of guardrail, including excavation, embankment, widening, debris disposal and backfill.

Construction

133.60.02 Construct guard as required under construction section 133.00. and/or as SHOWN ON THE PLANS.

133.70 – Side Barrier Maintenance

Description

133.70.01 Work consists of maintaining rock, log, and timber barriers.

Maintenance

133.70.02 General. Perform maintenance on barriers as required under construction section 133.00. and/or as SHOWN ON THE PLANS.

133.70.03 Restore rock, log, and timber barriers to their original lines and grades unless otherwise SHOWN ON THE PLANS.

133.70.04 Rock Barriers. Replace missing rocks, using rocks of general rectangular shape between 45 lbs. and 120 lbs., with the larger rocks placed on the bottom. Use rock chips to wedge larger rocks in place to form a stable wall. Stagger all vertical joints.

Stabilize and reset loose rocks.

Form a continuous grade with the top of the restored barrier consistent with adjacent segments of the barrier.

133.70.05 Log or Timber Barriers. Replace missing, damaged, and unsound logs or timbers using material similar to that used in the original barrier unless otherwise SHOWN ON THE PLANS. The location of trees for native timber materials will be DESIGNATED ON THE GROUND.

Stabilize and re-attach loose logs or timbers that are in sound condition.

Section 134 – Puncheons

Description

134.00.01 This work consists of construction and maintenance of puncheon, including excavation, embankment, backfill, and drainage features. Construction and maintenance of puncheon may be covered by one or more of the following subsections:

134.10.	Standard Puncheon
134.20.	Puncheon Maintenance

Materials

134.00.02 Materials. Conform to the following Sections and Subsections:

Rock, Grid Pavement Units, and Aggregate	111
Material for Timber Structures	115

The location of trees for native timber materials will be SHOWN ON THE PLANS and DESIGNATED ON THE GROUND.

Construction

134.00.03 General. Construct puncheon at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Pre-drill holes for fasteners when necessary to prevent splitting and drive spikes flush.

134.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with the requirements of Section 111 and as SHOWN ON THE PLANS.

134.00.05 Mud Sills. Bury mud sills to a depth that provides a finished walking surface that is less than or equal to 3 feet above the surrounding ground. Hew sill logs to provide a bearing surface for the log stringers and to provide the log stringers with a level top surface. Do not hew sill logs more than one-third their diameter. Do not level the top surfaces of the log stringers by shimming or notching their ends.

134.00.06 Log Stringers. Use logs greater than or equal to 10 feet in length. Use logs greater than or equal to 8 inches in diameter before the top is flattened. Fasten each stringer to each mud sill with drift pins that penetrate a minimum of 4 inches into the mud sill unless otherwise SHOWN ON THE PLANS.

When plank decking is used, hew the top surfaces of log stringers up to 2 inches deep, as necessary, to provide bearing surfaces for deck planks.

134.00.07 Sawn Timber Stringers. Use sawn timber greater than or equal to 10 feet in length. Fasten each stringer to each mud sill with drift pins that penetrate a minimum of 4 inches into the mud sill unless otherwise SHOWN ON THE PLANS.

134.00.08 Finished Walkway. Construct abutting ends of sections of log or plank puncheon flush with each other. Do not slope the surface of the completed walkway to either side. Construct the puncheon with a grade that does not exceed 5 percent and where no change in grade exceeds 6 percent unless otherwise SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Construct the finished walking surface of the puncheon flush with the trail grade at each end of the structure.

134.00.01 Decking. Spike decking evenly at right angles to each stringer.

Lay split log decking alternately flat side down first, then round side down, ending with a flat side down. When round side is down, notch round log decking to provide 2 inches wide bearing surface.

Lay split and sawn deck planks on the stringer to provide bearing for the full width of the plank.

Trim protruding ends of the decking to give a straight-line appearance to the edges of the structure or as SHOWN ON THE PLANS.

134.00.10 Curbs. Construct curbs with logs or sawn timber as SHOWN ON THE PLANS. Use lengths greater than or equal to 10 feet and splice with a 6-inches half-lap joint at a spacer location. Match diameters of logs at lap joints and trim excess to provide a smooth transition between logs.

Counter bore lag screws in curbs so that heads are flush with the surface.

Finish curbs smooth and free from splinters and sharp projections.

134.00.11 Approach Fills. Construct the approach fills with compacted suitable material.

Measurement

134.00.12 Measure the Section 134 items listed in the bid schedule according to section 106.

Payment

134.00.13 The accepted quantities will be paid at the contract price per unit of measurement for the Section 134 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

134.10. – Standard Puncheon

Description

134.10.01 This work consists of construction of standard puncheon, including excavation, embankment, backfill, and drainage features.

Construction

134.10.02 Construct standard puncheon as required under construction section 134.00. and/or as SHOWN ON THE PLANS.

134.20. – Puncheon Maintenance

Description

134.20.01 This work consists of maintaining puncheon sections.

Maintenance

134.20.02 General. Perform maintenance on puncheon as required under construction section 134.00. and/or as SHOWN ON THE PLANS.

134.20.03 Obtain logs, staking material, and suitable material for backfill from locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

134.20.04 Replace missing rocks, or missing or decayed retaining logs or lumber, with rocks, logs, or dimensional lumber as SHOWN ON THE PLANS. Secure loose or dislocated retainers. Drive stakes 2-3 inches in diameter and 18-24 inches in length along the outside edge of each log or lumber retainer to hold them in place at a maximum of 3 feet.

134.20.05 Clear all drainage structures of obstructions, silt, and debris so as to permit the free flow of water away from the trail.

134.20.06 If necessary, use suitable material removed from the drainage structures to build up the crown. Shape the tread with suitable material to provide a 2-inch crown measured from the top of the crown at the centerline to the top of the retainers.

135 - Retaining Walls

Description

135.00.01 Work consists of construction or maintenance of retaining walls, including excavating, placing borrow, backfilling, geosynthetics, trailbed construction and slope finishing. Construction and maintenance of retaining walls may be covered by one or more of the following subsections:

135.10.	Log Crib
135.20.	Stacked Rock Retaining Wall
135.30.	Wire Basket Retaining Wall
135.40.	Masonry Rock Retaining Wall
135.50.	Cast-in-place Concrete Retaining Wall
135.60.	Post and Plank Retaining Wall (Soldier Pile)
135.70.	Retaining Wall Maintenance

Materials

135.00.02 Requirements. Use materials meeting the requirements of the following section:

Rock, Grid Pavement Units, and Aggregate	111
Geosynthetics Materials	114
Material for Timber Structures	115
Wire Basket Material	116

The location of trees for native timber materials is SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Construction

135.00.03 Installation. Install retaining walls of the types and at the locations SHOWN ON THE PLANS or as DESIGNATED ON THE GROUND.

135.00.04 Excavation. Excavate in accordance with Section 111 to provide a full bench foundation of stable undisturbed soil or compacted suitable material. Construct the finished foundation grade parallel with the trail profile grade.

135.00.05 Backfill. Place geosynthetics before backfilling and compaction. Backfill and compact with suitable material.

Measurement

135.00.06 Measure the Section 135 items listed in the bid schedule according to section 106.

Payment

135.00.07 The accepted quantities will be paid at the contract price per unit of measurement for the Section 135 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

135.10 - Log Crib

Description

135.10.01 This work consists of constructing log or split timber retaining walls. Work includes excavation, notching, pre-drilling, pinning, borrow, backfilling, tread and slope finishing.

Construction

135.10.02 Install retaining walls as required under construction section 135.00. and/or as SHOWN ON THE PLANS.

135.10.03 Log Notching. Notch logs only on bottom side.

Do not notch sill and filler logs. Individually notch all face, rear, and header logs to fit as the wall construction proceeds vertically. Do not pre-notch.

Provide a notch depth between one-fourth and one-third the log diameter. Vary notching depth and width as required to obtain a snug fit between interlocking logs of varying diameter. Do not exceed 1/2 inch of space between filler and face logs.

135.20 - Stacked Rock Retaining Wall

Description

135.20.01 This work consists of constructing stacked rock retaining walls, including excavating, placing borrow, backfilling, tread and slope finishing.

Construction

135.20.02 Install retaining walls as required under construction section 135.00. and/or as SHOWN ON THE PLANS.

135.20.03 Wall Construction. Construct rock retaining walls at locations SHOWN ON THE PLANS and DESIGNATED ON THE GROUND. Stagger vertical joints a minimum of 4 inches horizontally from vertical joints in adjoining courses.

Use uniformly distributed header rocks for at least 25 percent of the rocks in the front and rear faces of the wall each having a length at least 2.5 times its width. Place all header rocks with the greatest dimension extending into the wall (at right angle to trail centerline), except at corners. At corners, lay alternating courses containing headers with greatest dimension parallel with wall.

Place the exposed face of each rock parallel to the face of the wall in which it is set.

Stabilize each rock on the course that supports it. Do not break, loosen, or displace rocks already set.

Use rocks of a general rectangular shape. Fill voids with small rock fragments or fine aggregate.

135.30 - Wire Basket Retaining Wall

Description

135.30.01 Work consists of furnishing and constructing wire basket structures, including excavating, placing borrow, backfilling, tread and slope finishing.

Construction

135.30.02 Install retaining walls as required under construction section 135.00. and/or as SHOWN ON THE PLANS.

135.30.03 Basket Assembly. Do not damage wire coatings during basket assembly, structure erection, cell filling, or backfilling. Rotate the basket panels into position and join the vertical edges with fasteners. Where lacing wire is used, wrap the wire with alternating single and double loops every other mesh opening. Where spiral binders are used, crimp the ends to secure the binders in place. Where alternate fasteners are used, space the fasteners in every other mesh opening.

Rotate the diaphragms into position and join the vertical edges with fasteners, lacing wire, or spiral binders as specified above.

135.30.04 Structure Erection. Place the empty baskets on the foundation and interconnect the adjacent baskets along the top and vertical edges using fasteners.

Where lacing wire is used, wrap the wire with alternating single and double loops every other mesh opening. Install the other fasteners according to Subsection 135.30.03, but space alternate fasteners in every other mesh opening.

In the same manner, interconnect each horizontal layer of baskets to the underlying layer of baskets along the front, back, and sides. Stagger the vertical joints between the baskets of adjacent rows and layers by at least one cell length.

135.30.05 Cell Filling. Remove all kinks and folds in the wire mesh and properly align all the baskets. Place rock carefully in the basket cells to prevent the baskets from bulging and to minimize voids in the rock fill.

Maintain the basket alignment and shape by placing the basket in tension during the filling operation.

Place internal connecting wires in each unrestrained exterior basket cell greater than 12 inches in height. This includes interior basket cells left temporarily unrestrained. Place internal connecting wires concurrently with rock placement.

Fill the cells in any row or layer so that no cell is filled more than 12 inches above an adjacent cell. Repeat this process until the basket is full and the lid bears on the final rock layer.

Secure the lid to the sides, ends, and diaphragms according to Subsection 135.00.04. Make all exposed basket surfaces smooth and neat, with no sharp rock edges projecting through the wire mesh.

135.30.06 Geotextile Installation. Place the geotextile as SHOWN ON THE PLANS. Ensure that the surfaces upon which geotextile is to be placed have a uniform slope and are reasonably smooth and free of obstructions, depressions, and debris that could damage the geotextile. Have the surface approved by Natural Resources Managerbefore placing geotextile.

Loosely lay the geotextile without wrinkles or creases. Sew or overlap adjacent strips a minimum of 12 inches at joints.

Insert securing pins through both strips of overlapped geotextile at maximum intervals of 36 inches, but no closer than 2 inches to each edge, to prevent the geotextile from being displaced.

135.30.07 Basket Mattresses. Construct wire baskets for mattresses less than 12 inches thick according to Subsections 135.30.03 through 135.30.05. Note that alternate fasteners for basket assembly may be used for structure erection. Anchor the mattress in place as SHOWN ON THE PLANS. Place geotextile against the vertical edges of the mattress and backfill against the geotextile, using structural backfill material or other approved material.

135.40. – Masonry Rock Retaining Wall

Description

135.40.01 This work consists of constructing masonry rock retaining walls. Work includes excavation, borrow, backfilling, tread and slope finishing.

Construction

135.40.02 Install masonry rock retaining walls as required under construction section 135.00. and/or as SHOWN ON THE PLANS.

135.50. – Cast-in-place Concrete Retaining Wall

Description

135.50.01 This work consists of constructing cast-in-place concrete retaining walls. Work includes excavation, borrow, backfilling, tread and slope finishing.

Construction

135.50.02 Construct cast-in-place concrete retaining walls as required under construction section 135.00. and/or as SHOWN ON THE PLANS.

135.60. – Post and Plank Retaining Wall (Soldier Pile)

Description

135.60.01 This work consists of constructing post and plank retaining walls. Work includes excavation, borrow, backfilling, tread and slope finishing.

Construction

135.60.02 Install post and plank retaining walls as required under construction section 135.00. and/or as SHOWN ON THE PLANS.

135.70 - Retaining Wall Maintenance

Description

135.70.01 This work consists of maintenance and repair of retaining wall sections.

Maintenance

135.70.02 General. Perform maintenance on retaining walls as required under construction section 135.00. and/or as SHOWN ON THE PLANS.

135.70.03 Obtain logs, rocks, and suitable material for backfill from locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

135.70.04 Replace missing rocks, or missing or decayed logs or lumber, with rocks, logs, or dimensional lumber as SHOWN ON THE PLANS. Secure loose or dislocated rocks and logs.

135.70.05 Repair walls back to a height that will provide a uniform grade consistent with segments of trail adjacent to each side of the damaged wall.

Section 136 – Trail Stairways

Description

136.00.01 This work consists of construction and maintenance of stairways, including excavation and placing embankment and constructing rock, log and treated timber riser, crib-ladder, stairways and railing systems. Construction and maintenance of stairways may be covered by one or more of the following subsections:

136.10.	Individual Steps
136.20.	Overlapping Steps
136.30.	Crib Ladder
136.40.	Staircase
136.50.	Ladder
136.60.	Stairway Maintenance

Materials

136.00.02 Requirements. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	111
Geosynthetics Materials	114
Material for Timber Structures	115

Construction

136.00.03 General. Construct stairways of the type and at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

136.00.04 Excavation and Embankment. Excavate and place embankment in accordance with Section 111. Backfill with suitable compacted material after stairs are constructed.

Measurement

136.00.05 Measure the Section 136 items listed in the bid schedule according to section 106.

Payment

136.00.06 The accepted quantities will be paid at the contract price per unit of measurement for the Section 136 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

136.10. – Individual Steps

Description

136.10.01 This work consists of construction of individual steps, including excavation and placing embankment and constructing rock, log and treated timber steps.

Construction

136.10.02 Install steps as required under construction section 136.00. and/or as SHOWN ON THE PLANS.

136.10.03 Log or Treated Timber Steps. Use single logs or timbers for the entire riser.

136.10.04 Rock Steps. Lay rock with the greatest dimension horizontally and embed a minimum of one-third the height of the rock. Use single rocks to form the entire riser, unless otherwise DESIGNATED ON THE GROUND.

136.10.05 Pinned Steps. Provide a rock base clean of loose materials, roots, soil, and other obstructions.

Drill two 3/4 inch holes into the treads from the bottom side to match the positions of the holes in the rock and provide for the correct position of the step. Do not allow holes to penetrate the top of the tread. Hew the bottom of the tread to provide a firm, solid contact with the rock base. This contact does not need to be continuous but must provide a firm solid bearing.

Place the timber tread on the reinforcing bars and drive the tread down to its solid position.

136.20. – Overlapping Steps

Description

136.20.01 This work consists of construction of overlapping steps, including excavation and placing embankment and constructing rock steps.

Construction

136.20.02 Install overlapping steps as required under construction section 136.00. and/or as SHOWN ON THE PLANS.

136.20.03 Overlapping Rock Stairways. Construct steps starting with the bottom rock. Form the entire tread and riser with single rocks and provide two or more contact points for stability.

136.30. – Crib Ladder

Description

136.30.01 This work consists of construction of crib ladders, including excavation and placing embankment and constructing log and treated timber risers.

Construction

136.30.02 Install crib ladder as required under construction section 136.00. and/or as SHOWN ON THE PLANS.

136.30.03 Crib Ladder Stairway. Construct by laying two carriages parallel to each other. Construct sills and risers between carriages. Excavate location for crib ladder so that the ladder is firmly supported for their entire length. Backfill around carriages and behind the risers with suitable compacted material.

136.40. – Staircase

Description

136.40.01 This work consists of construction of staircases, including excavation and placing embankment and constructing log and treated timber riser.

Construction

136.40.02 Install staircase as required under construction section 136.00. and/or as SHOWN ON THE PLANS.

136.40.03 Plank Staircase. Construct plank staircase by laying two continuous and parallel carriages. Firmly embed the bottom of each carriage in the ground. Support each carriage by a sill at each end. Construct carriages and steps as SHOWN ON THE PLANS.

136.50. – Ladder

Description

136.50.01 This work consists of construction of ladders, including excavation and placing embankment and constructing log and treated timber riser.

Construction

136.50.02 Install ladders as required under construction section 136.00. and/or as SHOWN ON THE PLANS.

136.60. – Stairway Maintenance

Description

136.60.01 This work consists of maintaining stairways and ladders.

Maintenance

136.60.02 Perform maintenance on stairways and ladders as required under construction section 136.00. and/or as SHOWN ON THE PLANS.

Replace missing, broken or decayed logs or lumber with logs or dimensional lumber as SHOWN ON THE PLANS. Secure loose or dislocated stairs and steps.

Section 137— Railing System

Description

137.00.01 This work consists of construction and maintenance of railing system, including fasteners, posts and railing. Construction and maintenance of railing systems may be covered by one or more of the following subsections:

137.10.	Site-built Railing System
137.20.	Modular Railing System
137.30.	Railing System Maintenance

Materials

137.00.02 Materials. Conform to the following Sections and Subsections:

Material for Timber Structures	115
Steel	FP-03, Section 555

Construction

137.00.03 General. Construct Railing Systems at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

137.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with the requirements of Section 111 and as SHOWN ON THE PLANS.

137.00.05 Log Rails and Posts. Use logs greater than or equal to 10 feet in length. Use logs greater than or equal to 4 inches in diameter for rails and posts. Fasten each rail to posts with spikes that penetrate a minimum of 4 inches into the posts unless otherwise SHOWN ON THE PLANS.

137.00.06 Sawn Timber Rails and Posts. Use sawn timber rails greater than or equal to 10 feet in length. Use posts greater than or equal to 4 inches x 4 inches and rails greater than 2 inches by 4 inches. Fasten each rail to posts with spikes or fasteners as SHOWN ON THE PLANS that penetrate a minimum of 3 inches into the posts unless otherwise SHOWN ON THE PLANS. Pre-drill holes for fasteners to prevent splitting and drive spikes flush.

137.00.07 Metal Rails and Posts. Construct metal railing systems as SHOWN ON THE PLANS.

137.00.08 Finish railing systems smooth and free from splinters and sharp projections.

Measurement

137.00.01 Measure the Section 137 items listed in the bid schedule according to section 106.

Payment

137.00.10 The accepted quantities will be paid at the contract price per unit of measurement for the Section 137 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

137.10. — Site-Built Railing System

Description

137.10.01 This work consists of construction of site–built railing system, including fasteners, posts and rails.

Construction

137.10.02 Construct site-built railing system as required under construction section 137.00 and/or as SHOWN ON THE PLANS.

137.20. — Modular Railing System

Description

137.20.01 This work consists of installation of modular railing systems, including fasteners, and modular railing systems.

Construction

137.20.02 Install modular railing systems as required under construction section 137.00 and/or as SHOWN ON THE PLANS.

137.30. — Railing System Maintenance

Description

137.30.01 This work consists of maintaining railing systems.

Maintenance

137.30.02 General. Perform maintenance on railing systems as required under construction section 137.00 and/or as SHOWN ON THE PLANS.

Replace missing, broken or decayed logs or lumber with logs or dimensional lumber as SHOWN ON THE PLANS. Secure loose or dislocated curbing and railing systems.

Section 138—Boardwalks

Description

138.00.01 This work consists of construction and maintenance of boardwalks, including excavation, embankment, backfill, curbs and railing systems. Construction and maintenance of boardwalks may be covered by one or more of the following subsections:

138.10.	Standard Boardwalk
138.20.	Elevated Boardwalk
138.30.	Step and Run
138.40.	Boardwalk Maintenance

Materials

138.00.02 Materials. Conform to the following Sections and Subsections:

Material for Timber Structures	115

Construction

138.00.03 General. Construct boardwalks of the type and at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

138.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with the requirements of Section 111 and as SHOWN ON THE PLANS.

138.00.05 Mud Sills. Bury mud sills to a depth that provides a uniform walking surface as SHOWN ON THE PLANS.

138.00.06 Piers. Construct piers as SHOWN ON THE PLANS.

138.00.06 Approach Fills. Construct the approach fills with compacted suitable material.

Measurement

138.00.07 Measure the Section 138 items listed in the bid schedule according to section 106.

Payment

138.00.08 The accepted quantities will be paid at the contract price per unit of measurement for the Section 138 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

138.10. Standard Boardwalk

Description

138.10.01 This work consists of construction of standard boardwalks, including excavation, embankment, backfill, curbs and/or railing system.

Construction

138.10.02 Construct standard boardwalks as required under construction section 138.00 and/or as SHOWN ON THE PLANS.

138.10.03 Sawn Timber Stringers. Use sawn timbers that are continuous over 2 or more spans. Fasten each stringer to each mud sill with fasteners as SHOWN ON THE PLANS that penetrate a minimum of 4 inches into the mud sill unless otherwise SHOWN ON THE PLANS. Pre-drill holes for fasteners to prevent splitting and drive spikes flush.

138.10.04 Finished Walkway. Construct abutting ends of sections of boardwalk flush with each other. Do not slope the surface of the completed walkway to either side. Construct the boardwalk with a grade that does not exceed 5 percent and where no change in grade exceeds 5 percent unless otherwise SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Construct the finished walking surface of the boardwalk flush with the trail grade at each end of the structure.

138.10.05 Decking. Lay sawn deck planks on the stringer to provide bearing for the full width of the plank. Fasten decking evenly at right angles to each stringer. Trim protruding ends of the decking to give a straight-line appearance to the edges of the structure or as SHOWN ON THE PLANS.

138.10.06 Curbs and Railing Systems. Construct curbs and railing systems with sawn timber as SHOWN ON THE PLANS. Use lengths greater than or equal to 10 feet and splice with a 6-inch half-lap joint at a spacer location. Finish curbs and railing systems smooth and free from splinters and sharp projections.

138.20. Elevated Boardwalk

Description

138.20.01 This work consists of construction of elevated boardwalks, including excavation, embankment, backfill, curbs and/or railing system.

Construction

138.20.02 Construct elevated boardwalks as required under construction section 138.00 and/or as SHOWN ON THE PLANS.

138.20.03 Sawn Timber Stringers. Use sawn timbers that are continuous over 2 or more spans. Fasten each stringer to each mud sill with fasteners as SHOWN ON THE PLANS that penetrate a minimum of 4 inches into the

mud sill unless otherwise SHOWN ON THE PLANS. Pre-drill holes for fasteners to prevent splitting and drive spikes flush.

138.20.04 Finished Walkway. Construct abutting ends of sections of boardwalk flush with each other. Do not slope the surface of the completed walkway to either side. Construct the boardwalk with a grade that does not exceed 5 percent and where no change in grade exceeds 5 percent unless otherwise SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Construct the finished walking surface of the boardwalk flush with the trail grade at each end of the structure.

138.20.05 Decking. Lay sawn deck planks on the stringer to provide bearing for the full width of the plank. Fasten decking evenly at right angles to each stringer. Trim protruding ends of the decking to give a straight-line appearance to the edges of the structure or as SHOWN ON THE PLANS.

138.20.06 Curbs and Railing Systems. Construct curbs and railing systems with sawn timber as SHOWN ON THE PLANS. Use lengths greater than or equal to 10 feet and splice with a 6-inch half-lap joint at a spacer location. Finish curbs and railing systems smooth and free from splinters and sharp projections.

138.30. Step and Run

Description

138.30.01 This work consists of construction of step and runs, including excavation, embankment, and backfill.

Construction

138.30.02 Construct standard step and runs as required under construction section 138.00 and/or as SHOWN ON THE PLANS.

138.40. Boardwalk Maintenance

Description

138.40.01 This work consists of maintaining boardwalks.

Maintenance

138.40.02 General. Perform maintenance on boardwalks as required under construction section 138.00 and/or as SHOWN ON THE PLANS.

Replace missing, broken or decayed lumber with dimensional lumber as SHOWN ON THE PLANS. Secure loose or dislocated decking, curbing and railing systems.

Clear boardwalk of obstructions, silt, and debris so as to permit the free flow of water away under the boardwalk. Clean decking of all dirt and debris.

140 – Restriction Devices

Section 141 – Fences

Description

141.00.01 This work consists of construction and maintenance of fences, including excavation, backfill, and associated hardware. Construction and maintenance of fences may be covered by one or more of the following subsections:

141.10.	Post and Wire Fence
141.20.	Post and Rail Fence
141.30.	Woven Wire Fence
141.40.	Stacked Rail (Worm) Fence
141.50.	Remove and Reset Fence
141.60.	Fence Maintenance

Material

141.00.02 Conform to the following Sections and Subsections:

Concrete	FP-03, Section 601
Fence Material	113

Construction Requirements

141.00.03 General. Clear along the fence line. Remove and dispose of trees, brush, logs, upturned stumps, roots of downed trees, rubbish, and debris according to section 112. Clear a 3 feet width for wire fence.

Grubbing is not required except where short and abrupt changes in the ground contour require removal of stumps to properly grade the fence line. Remove or close cut stumps within the clearing limits.

Perform clearing and leveling with minimum disturbance to the terrain outside the fence line.

Schedule the fence installation, provide temporary fence, or other adequate means to prevent livestock from entering the project right-of-way, easements, or adjoining properties.

At bridges, cattle underpasses, and culverts, connect new fence to structure to permit free passage of livestock under or through the structure.

141.00.04 Posts. Excavate holes for posts, footings, and anchors as SHOWN ON THE PLANS. Space posts at intervals SHOWN ON THE PLANS for the type of fence being installed. Measure post spacing interval parallel to the existing ground slope. Set posts in a vertical position. Backfill post holes in 6 inch lifts. Tamp and compact each lift.

Wood posts may be driven in place if the method of driving does not damage the post. Metal posts may be driven. Set metal corner, gate, end, and pull posts in concrete.

Where solid rock is encountered without overburden, drill line post holes at least 14 inches deep, and end, corner, gate, and pull posts at least 20 inches deep in the solid rock. Make the hole width or diameter at least 1 inch greater than the post width or diameter. Cut the post to the required length before installation or drill the hole deep enough to set the post at the required height. Set and plumb the post and fill the hole with grout. Thoroughly work the grout into the hole to eliminate voids. Crown the grout to drain water away from the post. Metal posts set in this manner do not require anchor plates and concrete footings.

Where solid rock is covered with soil or loose rock overburden, set posts to the plan depth or to the minimum depth into the solid rock as specified above, whichever is less. When the depth of overburden is greater than 12 inches, use an anchor plate on steel line posts and backfill steel end, corner, gate, and pull posts with concrete from the solid rock to top of the ground. When the depth of overburden is 12 inches or less, anchor plates and concrete backfill are not required. Grout the portion of the post in solid rock.

Install corner posts at changes in alignment of 30 degrees or more. Where new fence joins an existing fence, set end or corner posts, as necessary, and attach in a manner satisfactory to the County

141.00.05 Braces. Limit fence runs to no more than 650 feet between adjacent corner braces, gate braces, end braces, or line braces. Install line braces at uniform intervals so the distance between any two braces is 650 feet or less. Construct braces before placing the fence fabric and wires on posts.

(a) Metal braces. Provide corner posts and pull posts with two braces, one each direction from the post in the main fence line. Provide end posts and gate posts with one brace in the line of the fence. Attach metal braces to the metal end, corner, pull, and gate posts and set in concrete as SHOWN ON THE PLANS.

(b) Wood braces. Tap the posts to receive the braces. Anchor the brace to the post with three 16d nails or a 3/8 inch by 4-inches dowel. Install brace wires as SHOWN ON THE PLANS and twist together until the entire assembly is taut and firm. Lightly notch the posts to position the brace wire. Drive three staples at each notch to secure wire.

Measurement

141.00.06 Measure the Section 141 items listed in the bid schedule according to section 106.

Payment

141.00.07 The accepted quantities will be paid at the contract price per unit of measurement for the Section 141 pay items listed in the bid schedule. Payment will

be full compensation for the work prescribed in this Section. See Subsection 106.04.

141.10. - Post and Wire Fence

Description

141.10.01 This work consists of furnishing and installing post and wire fence, including excavation, backfill, and any associated materials.

Construction

141.10.02 General. Construct post and wire fence as required under construction section 111 and 141.00 and/or as SHOWN ON THE PLANS.

141.10.03 Placement. Place barbed wire on the side of the post face away from the trail. On curved alignment, place the barbed wire on the post face on the outside of the curve. Tightly stretch and fasten barbed wire to the posts.

Apply tension according to the manufacturer's recommendations using a mechanical stretcher or other device designed for such use. Do not use a motor vehicle to stretch the wire.

Splicing of barbed wire between posts is permitted provided not more than two splices, spaced a minimum of 50 feet apart, occur in any one run of fence. Use wrap or telephone type splices for barbed wire with each end wrapped around the other wire for not less than six complete turns.

141.10.04 Fastening. Terminate the barbed wire at each end, corner, gate, and pull post. Wrap each line of barbed around the post and then itself with at least four turns. Where wood posts are used, staple the wires tightly to the posts.

Fasten each strand of barbed wire to each line post. Use wire ties or clamps to fasten the wires to metal posts. Securely splice tie wires to the fence on both sides of the post so there are two loops behind the post and one loop in front. On wood line posts, drive U-shaped staples diagonally across the wood grain so that both points do not enter between the same grain. In depressions where wire uplift occurs, drive staples with points slightly upward. On level ground and over knolls, slope the points slightly downward. Drive the staples just short of actual contact with the wires to permit free longitudinal movement of those lines and to prevent damage to the protective coating.

At grade depressions, alignment angles, and other locations where stresses tending to pull posts from the ground or out of alignment are created, snub or guy the wire fence. Attach the guy wire to each strand of barbed wire in a manner to maintain the entire fence in its normal shape. Attach the guy wire to a deadman anchor buried not less than 24 inches in the ground or to an approved anchor at a point that best serves to resist the pull of the wire

fence. If necessary to guy the fence in solid rock, grout the guy wire in a hole 2 inches in diameter and 10 inches deep. Deadman may also be fastened to posts. Place the deadman anchors at locations as directed.

Where required, install vertical cinch stays as SHOWN ON THE PLANS. Twist the wire to permit weaving into the horizontal fence wires to provide rigid spacing. Weave barbed wires and the top, middle, and bottom wire of the woven wire, as applicable, into the cinch stay.

Where existing fence intersects the new fence, cut the existing fence materials or, splice in kind, new material as necessary, and fasten each strand of the barbed wire to a new end post in line with or immediately adjacent to the new fence line.

141.20. – Post and Rail Fence

Description

141. 20.01 This work consists of furnishing and installing post and rail fence, including any associated materials.

Construction

141. 20.02 General. Construct post and rail fence as required under construction section 111 and 141.00 and/or as SHOWN ON THE PLANS.

141.30. – Woven Wire Fence

Description

141.30.01 This work consists of furnishing and installing woven wire fence including any associated materials.

Construction

141.30.02 General. Construct woven wire fence as required under construction section 111 and 141.00 and/or as SHOWN ON THE PLANS.

141.40. – Stacked Rail (Worm) Fence

Description

141.40.01 This work consists of furnishing and installing stacked rail (worm) fence including any associated materials.

Construction

141.40.02 General. Construct stacked rail (worm) fence as required under construction section 111 and 141.00 and/or as SHOWN ON THE PLANS.

141.50. – Remove and Reset Fences

Description

141.50.01 This work consists of removing and resetting of fencing, including excavation and backfill, including any associated materials.

Construction

141.50.02 General. Remove and reset fencing at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

141.50.03 Remove and Reset Fence. Remove existing fence and reset to approximately the same condition as the original fence. Salvage material in the existing fence and incorporate the material into the reset fence. When posts are set in concrete, remove concrete from old post and reset in concrete. Replace fence material damaged beyond reuse. Firmly reset posts on new alignment. Space posts and attach the horizontal members or wires to posts the same as the original fence. Furnish and use new material to fasten members or wires to posts.

141.60. – Fence Maintenance

Description

141.60.01 This work consists of maintenance of fences including any associated materials.

Maintenance

141.60.02 General. Perform maintenance on fences as required under construction section 111 and 141.00 and/or as SHOWN ON THE PLANS.

Section 142 – Gates

Description

142.00.01 This work consists of construction and maintenance of gates, including excavation, embankment, backfill and rails. Construction and maintenance of gates may be covered by one or more of the following subsections:

142.10. Wire Gate
142.20. Swing Gate
142.30. Loose Rail Gate
142.40. Accessible Gate – Kissing Gate
142.50. Accessible Gate - Chicane
142.60. Gate Maintenance

Material

142.00.02 Conform to the following Sections and Subsections:

Concrete	FP-03, Section 601
Fence Material	113

Construction Requirements

142.00.03 General. Construct gates at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Provide minimum 10 feet clear width along the fence line for gate construction and operation.

Remove and dispose of trees, brush, logs, roots of downed trees, rubbish, and debris according to section 112. All stumps and roots shall be removed to allow for unhindered operation of the gate.

Schedule the gate installation, provide temporary fence, or other adequate means to prevent livestock from entering the project right-of-way, easements, or adjoining properties.

142.00.04 Posts. Excavate holes for posts and install posts at locations as SHOWN ON PLANS. Set posts in a vertical position. Backfill post holes in 6 inch lifts. Tamp and compact each lift.

Wood posts may be driven in place if the method of driving does not damage the post. Metal posts may be driven.

Where solid rock is encountered without overburden, drill gate post holes at least 20 inches deep in the solid rock. Make the hole width or diameter at least 1 inch greater than the post width or diameter. Cut the post to the required length before installation or drill the hole deep enough to set the post at the required height. Set and plumb the post and fill the hole with grout. Thoroughly work the grout into the hole to eliminate voids. Crown the grout to drain water away from the post. Metal posts set in this manner do not require anchor plates and concrete footings.

Where solid rock is covered with soil or loose rock overburden, set posts to the plan depth or to the minimum depth into the solid rock as specified above, whichever is less. When the depth of overburden is greater than 12 inches, use an anchor plate on steel line posts and backfill steel end, corner, gate, and pull posts with concrete from the solid rock to top of the ground. When the depth of overburden is 12 inches or less, anchor plates and concrete backfill are not required. Grout the portion of the post in solid rock.

Measurement

142.00.06 Measure the Section 142 items listed in the bid schedule according to section 106.

Payment

142.00.07 The accepted quantities will be paid at the contract price per unit of measurement for the Section 142 pay items listed in the bid schedule. Payment will

be full compensation for the work prescribed in this Section. See Subsection 106.04.

142.10 – Wire Gates

Description

142.10.01 This work consists of furnishing and installing gates, including any associated hardware and materials.

Material

142.10.02 Wire gates to be constructed of the same material as the fence.

Construction

142.10.03 Construct gates as required under construction section 111 and 142.00 and/or as SHOWN ON THE PLANS.

Provide a taut and well-aligned closure of the opening, capable of being readily opened and closed by hand.

142.20 – Swing Gates

Description

142.20.01 This work consists of furnishing and installing gates, including any associated hardware and materials.

Material

142.20.02 Swing gates to be constructed from the material SHOWN ON THE PLANS.

Construction

142.20.03 Construct gates as required under construction section 111 and 142.00 and/or as SHOWN ON THE PLANS.

Install metal gates and fittings to gate posts previously set as SHOWN ON THE PLANS. Firmly attach the fittings to the posts and gates. Hinge each single gate to prevent removal of the gate without tools. Set the gate in an approximately horizontal plane. Set the gate so it swings freely inward and outward and fastens securely in its latch holder, or in the case of double gates, in its latch holder and gate stops. Set gates to swing open at least 10 degrees in each direction.

Install wood gates similar to metal gates and as SHOWN ON THE PLANS.

142.30 – Loose Rail Gates

Description

142.30.01 This work consists of furnishing and installing gates, including any associated hardware and materials.

Material

142.30.02 Loose rail gates to be constructed of the same material as the fence.

Construction

142.30.03 Construct gates as required under construction section 111 and 142.00 and/or as SHOWN ON THE PLANS.

142.40 – Accessible Gate – Kissing Gate

Description

142.40.01 This work consists of furnishing and installing gates, including any associated hardware and materials.

Material

142.40.02 Gates to be constructed from the material SHOWN ON THE PLANS.

Construction

142.40.03 Construct kissing gates as required under construction section 111 and 142.00 and/or as SHOWN ON THE PLANS.

142.50 – Accessible Gate – Chicanes

Description

142.50.01 This work consists of furnishing and installing gates, including any associated hardware and materials.

Material

142.50.02 Gates to be constructed from the material SHOWN ON THE PLANS.

Construction

142.50.03 Construct chicanes as required under construction section 111 and 142.00 and/or as SHOWN ON THE PLANS.

142.60 – Gate Maintenance

Description

142.60.01 This work consists of maintenance of gates and latches including any associated materials.

Maintenance

142.60.02 Perform maintenance on gates and latches as required under construction section 111 and 142.00 and/or as SHOWN ON THE PLANS.

Replace missing, broken or decayed logs or lumber as SHOWN ON THE PLANS. Adjust gate hinges to allow gate to open and close and gate latches to function properly.

Section 143 - Cattle Guard

Description

143.00.01 This work consists of construction and maintenance of cattle guards, including excavation, embankment, and backfill. Construction and maintenance of cattle guards may be covered by one or more of the following subsections:

143.10.	Standard Cattle Guard
143.20.	Above Ground Cattle Guard
143.30.	Cattle Guard Maintenance

Materials

143.00.02 Materials. Conform to the following Sections and Subsections:

Steel	FP-03, Section 555
Material for Timber Structures	115

Construction

143.00.03 General. Construct cattle guards at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

143.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with the requirements of Section 111 and as SHOWN ON THE PLANS. Excavate foundation to depth with sufficient space for proper installation of formwork.

When the cattle guard is to be installed on new embankment, complete and compact the embankment according to Section 111 before excavating for footing.

143.00.05 Concrete foundation. Construct concrete foundations according to FP-03, Section 601. Concrete units may be cast-in-place or precast.

Finish stringer bearings to allow full bearing under each stringer. The cattle guard shall rest on the concrete without rocking.

143.00.06 Cattle guard. Fabricate cattle guard as SHOWN ON THE PLANS. Assemble and place guards as shown on the plans. Securely fasten the cattle guard to the foundation. Fasten the metal wings to the cattle guard as shown on the plans. Connect fences and gates according to the plans. Weld according to ANSI/AASHTO/AWS D1.5.

Standard manufactured cattle guards may be used if approved. Designs shall provide for AASHTO loading H-10. Provide suitable cleanouts. Prepare and submit drawings according to Subsection 103.01. Acceptance of the drawings covers the requirements for strength and detail only. No responsibility is assumed for errors in dimensions.

143.00.07 Painting. All metal parts shall receive one shop coat. Two additional coats are required and may be applied in the shop or in the field.

143.00.08 Approach Fills. Construct the approach fills with compacted suitable material.

Measurement

143.00.01 Measure the Section 143 items listed in the bid schedule according to section 106.

Payment

143.00.10 The accepted quantities will be paid at the contract price per unit of measurement for the Section 143 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

143.10. - Standard Cattle Guard

Description

143.10.01 This work consists of furnishing and installing cattle guards, including excavation, embankment, backfill, and any associated materials.

Construction

143.10.02 Construct standard cattle guards as required under construction section 143.00 and/or as SHOWN ON THE PLANS.

143.20. – Above Ground Cattle Guard

Description

143.20.01 This work consists of furnishing and installing cattle guards, including excavation, embankment, backfill, and any associated materials.

Construction

143.20.02 Construct standard cattle guards as required under construction section 143.00 and/or as SHOWN ON THE PLANS.

143.30. Cattle Guard Maintenance

Description

143.30.01 This work consists of maintaining cattle guards.

Maintenance

143.30.02 Perform maintenance on cattle guards as required under construction section 143.00 and/or as SHOWN ON THE PLANS.

Replace missing, broken or decayed rails as SHOWN ON THE PLANS. Secure loose or dislocated rails.

144.00. – Stiles

Description

144.00.01 This work consists of construction and maintenance of stiles, including excavation, embankment, backfill and rails. Construction and maintenance of stiles may be covered by one or more of the following subsections:

144.10. Stile
144.20. Stile Maintenance

Materials

144.00.02 Materials. Conform to the following Sections and Subsections:

Material for Timber Structures	115

Construction

144.00.03 General. Construct stiles at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

144.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with the requirements of Section 111 and as SHOWN ON THE PLANS.

Measurement

144.00.05 Measure the Section 144 items listed in the bid schedule according to section 106.

Payment

144.00.06 The accepted quantities will be paid at the contract price per unit of measurement for the Section 144 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

144.10. – Stiles

Description

144.10.01 This work consists of furnishing and installing stile, including excavation, embankment, backfill, timbers and any associated hardware materials.

Construction

144.10.02 Construct stile as required under construction section 144.00. and/or as SHOWN ON THE PLANS.

144.20. – Stiles Maintenance

Description

144.20.01 This work consists of maintaining stiles.

Maintenance

144.20.02 General. Perform maintenance on stiles as required under construction section 144.00. and/or as SHOWN ON THE PLANS.

Replace missing or broken steps and rails as SHOWN ON THE PLANS. Secure loose or dislocated steps and rails.

Section 145 – Bollards

Description

145.00.01 This work consists of construction and maintenance of bollards, including excavation, embankment, and backfill. Construction and maintenance of bollards may be covered by one or more of the following subsections:

145.10.	Bollards
145.20.	Bollard Maintenance

Materials

145.00.02 Materials. Conform to the following Sections and Subsections:

Material for Timber Structures	115
Steel	555

Construction

145.00.03 General. Construct bollards of the type and at locations as SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

145.00.04 Bollards. Drill holes for bollards. Set posts plumb, backfill with approved material, and compact or as SHOWN ON THE PLANS.

Measurement

145.00.05 Measure the Section 145 items listed in the bid schedule according to section 106.

Payment

145.00.06 The accepted quantities will be paid at the contract price per unit of measurement for the Section 145 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

145.10. – Bollards

Description

145.10.01 This work consists of furnishing and installing bollards, including excavation, embankment, backfill, and any associated hardware materials.

Construction

145.10.02 Construct bollards as required under construction section 145.00 and/or as SHOWN ON THE PLANS.

145.20. – Bollard Maintenance

Description

145.20.01 This work consists of maintaining bollards.

Maintenance

145.20.02 General. Perform maintenance on bollards as required under construction section 145.00 and/or as SHOWN ON THE PLANS.

Replace missing, broken or decayed bollards as SHOWN ON THE PLANS. Secure loose or dislocated bollards as SHOWN ON THE PLANS.

Section 146 – Reserved for Restriction Devices Special Project Specifications

150. Signs and Markers

Section 151 - Signs

Description

151.00.01 This work consists of furnishing and installing or maintaining signs and posts, including excavation, backfill, and associated materials and hardware. Construction and maintenance of signs and posts may be covered by one or more of the following subsections:

151.10. Signs
151.20. Sign Repair and Replacement Maintenance

Material

151.00.02 All materials shall conform to Howard County Department of Recreation & Parks, Signage and Wayfinding Design Guidelines Manual, 2016, or as SHOWN ON THE PLANS.

Construction

151.00.03 General. Erect signs and posts of the type and at the locations as SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

151.00.04 Post Installation. Excavate post hole to the depth as SHOWN ON THE PLANS. The hole width should not be more than three times the width of the post. If necessary because of obstacles, the post hole may be moved within the tolerances as SHOWN ON THE PLANS.

Set posts in a plumb position. Backfill the post holes with suitable material in 6 inch layers and compact material to produce a solid installation. Stabilize the post with concrete or rock mounds built in accordance with rock cairn specifications when approved by the Howard County Department of Recreation & Parks.

151.00.05 Sign Installation. Pre-drill signs before mounting. Tighten hardware snug, but do not damage the sign panel surface.

For signs mounted on trees, remove obstructing limbs and notch the outer bark to provide a flat surface at the sign mounting position as necessary. Avoid removing the inner bark or cutting the cambium. Use 50-penny galvanized nails or spikes to fasten signs to trees and leave 1 inch of nail exposed to allow for tree to grow without impacting the sign.

Measurement

151.00.06 Measure the Section 151 items listed in the bid schedule according to section 106.

Rock cairns built to support posts will be considered incidental to the PAY ITEM for signs, and separate payment will not be made.

Payment

151.00.07 The accepted quantities will be paid at the contract price per unit of measurement for the Section 151 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

151.10 – Signs

Description

151.10.01 This work consists of furnishing and installing signs and posts, including excavation, backfill, and associated materials and hardware.

Construction

151.10.02 Install signs and posts as required under construction section 111 and 151.00 and/or as SHOWN ON THE PLANS.

151.20 – Sign Repair and Replacement Maintenance

Description

151.20.01 This work consists of repairing existing damaged signs, refastening existing signs to existing sign posts and resetting existing sign posts and furnishing and installing new replacement signs and new sign posts.

Maintenance

151.20.02 General. Repair signs at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Reattach designated signs that are out of their original position so that the lines of the sign legend are horizontal. Reset sign support posts to a plumb position and firmly tamp in place. Set sign posts designated for replacement in the ground to a depth as SHOWN ON THE PLANS at the approximate location of the original post.

Reset existing posts that are out of plumb and firmly tamp in place. Set posts that need to be reset and new replacement posts in a plumb position and to a depth of as SHOWN ON THE PLANS. Backfill and tamp holes from which posts are removed.

Pre-drill replacement signs before mounting. Tighten sign mounting bolts or lag screws to hold the sign snugly in place. Do not damage sign surface.

For signs mounted on trees, remove obstructing limbs and notch the outer bark to provide a flat surface at the sign mounting position as necessary. Avoid removing the inner bark or cutting the cambium. Use 50-penny galvanized nails or spikes to refasten signs to trees and leave 1 inch of nail exposed to allow for tree to grow without impacting the sign.

Section 152 – Route Markers

Description

152.00.01 This work consists of furnishing and installing or maintaining route markers or route markers on supports, including excavation, backfill, and associated materials and hardware. Construction and maintenance of route markers may be covered by one or more of the following subsections:

152.10. Route Markers
152.20. Route Marker Maintenance

Material

152.00.02 All materials shall conform to Howard County Department of Recreation & Parks, Signage and Wayfinding Design Guide manual, or as SHOWN ON THE PLANS.

Construction

152.00.03 General. Erect route markers of the type and at the locations as SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Measurement

152.00.04 Measure the Section 152 items listed in the bid schedule according to section 106.

Rock cairns built to support route marker posts will be considered incidental to the PAY ITEM for route markers, and separate payment will not be made.

Payment

152.00.05 The accepted quantities will be paid at the contract price per unit of measurement for the Section 152 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

152.10 – Route Markers

Description

152.10.01 This work consists of furnishing and installing route markers or route markers on supports, including associated materials and hardware.

Construction

152.10.02 Construct route markers as required under construction section 152.00 and/or as SHOWN ON THE PLANS.

152.10.03 Post Installation. Excavate post hole to the depth as SHOWN ON THE PLANS. The hole width should not be more than three times the width

of the post. If necessary because of obstacles, the post hole may be moved within the tolerances as SHOWN ON THE PLANS.

Set posts in a plumb position. Backfill the post holes with suitable material in 6 inch layers and compact material to produce a solid installation. Stabilize the post with concrete or rock mounds built in accordance with rock cairn specifications when approved by the CO.

152.10.04 Tree Installation. Remove obstructing limbs and notch the outer bark to provide a flat surface at the manufactured blaze mounting position as necessary. Avoid removing the inner bark or cutting the cambium.

152.10.05 Route Marker Installation. Pre-drill route markers before mounting. Tighten hardware snug, but do not damage the route marker surface. Use 50-penny galvanized nails or spikes to fasten route markers to trees and leave 1 inch of nail exposed to allow for tree to grow without impacting the markers.

152.20 – Route Marker Maintenance

Description

152.20.01 This work consists of refastening existing route markers to existing marker supports, resetting existing marker support posts, and furnishing and installing new replacement route markers and new route marker supports.

Maintenance

152.20.02 General. Repair route markers at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Reattach designated route markers that are out of their original position so that the lines of the marker legend are vertical. Reset route marker support posts to a plumb position and firmly tamp in place. Set route marker posts designated for replacement in the ground to a depth as SHOWN ON THE PLANS at the approximate location of the original post.

Reset existing supports that are out of plumb and firmly tamp in place. Set supports that need to be reset and new replacement supports in a plumb position and to a depth as SHOWN ON THE PLANS. Backfill and tamp holes from which posts are removed.

Tighten route marker mounting bolts or lag screws to hold the marker snugly in place. Do not damage route marker surface.

For route markers mounted on trees, remove obstructing limbs and notch the outer bark to provide a flat surface at the marker mounting position as necessary. Avoid removing the inner bark or cutting the cambium. Use 50-penny galvanized nails or spikes to refasten markers to trees and leave 1 inch of nail exposed to allow for tree to grow without impacting the marker.

Section 153 – Reassurance Markers

Description

153.00.01 This work consists of blazing trees, furnishing and installing manufactured blazers on supports, or maintaining blazed trees, manufactured blazers and/or supports, including excavation, backfill, and associated materials and hardware. Construction and maintenance of reassurance markers may be covered by one or more of the following subsections:

153.10. Standard Howard County Department of Recreation & Parks, Signage and Wayfinding Design Guide Manual Blaze
153.20. Manufactured Blazer
153.30. Reassurance Marker Maintenance

Material

153.00.02 All materials shall conform to Howard County Department of Recreation & Parks, Signage and Wayfinding Design Guide manual or AS SHOWN ON THE PLANS.

Construction

153.00.03 General. Construct a reassurance marker of the type and at the locations as SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Measurement

153.00.04 Measure the Section 153 items listed in the bid schedule according to section 106.

Rock cairns built to reassurance marker posts will be considered incidental to the PAY ITEM for markers, and separate payment will not be made.

Payment

153.00.05 The accepted quantities will be paid at the contract price per unit of measurement for the Section 153 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

153.10 – Standard Howard County Department of Recreation & Parks, Signage and Wayfinding Design Guide, Blaze

Description

153.10.01 This work consists of cutting, painting, branding or routing and/or scorching blazes on trees or rocks.

Construction

153.10.02 Cut, paint, brand or router and/or scorch blazes on trees or rocks as required under construction section 153.00 and/or as SHOWN ON THE PLANS.

153.20 – Manufactured Blazer

Description

153.20.01 This work consists of furnishing and installing manufactured blazers on supports.

Construction

153.20.02 Install the manufactured blazer on supports as required under construction section 153.00 and/or as SHOWN ON THE PLANS.

153.20.03 Tree Installation. Remove obstructing limbs and notch the outer bark to provide a flat surface at the manufactured blazer mounting position as necessary. Avoid removing the inner bark or cutting the cambium.

153.20.04 Post Installation. Excavate post hole to the depth as SHOWN ON THE PLANS. The hole width should not be more than three times the width of the post. If necessary because of obstacles, the post hole may be moved within the tolerances as SHOWN ON THE PLANS.

Backfill the post holes with suitable material in 6 inch layers and compact material to produce a solid and plumb installation. Stabilize the post with concrete or rock mounds built in accordance with rock cairn specifications when approved by the Howard County Department of Recreation & Parks.

153.20.05 Blazer Installation. Pre-drill blazers before mounting manufactured blazers on supports. Use 50-penny galvanized nails or spikes to fasten manufactured blazers to trees and leave 1 inch of nail exposed to allow for tree to grow without impacting the manufactured blazers. Tighten hardware snug for posts, but do not damage the manufactured blazer surface.

153.30 – Reassurance Marker Maintenance

Description

153.30.01 This work consists of maintaining manufactured blazers or blazed trees, including resetting supports, refastening or replacing manufactured blazers or re-blazing trees with an axe or paint.

Maintenance

153.30.02 General. Repair reassurance markers at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND and as required under construction section 153.

Reattach designated reassurance markers that are out of their original position so that the marker is vertical. Reset reassurance markers support posts to a plumb position and firmly tamp in place. Set reassurance marker

supports designated for replacement in the ground to a depth as SHOWN ON THE PLANS at the approximate location of the original post.

Reset existing supports that are out of plumb and firmly tamp in place. Set supports that need to be reset and new replacement supports in a plumb position and to a depth as SHOWN ON THE PLANS. Backfill and tamp holes from which posts are removed.

Tighten route marker mounting bolts or lag screws to hold the marker snugly in place. Do not damage route marker surface.

For reassurance markers mounted on trees, remove obstructing limbs and notch the outer bark to provide a flat surface at the marker mounting position as necessary. Avoid removing the inner bark or cutting the cambium. Use 50-penny galvanized nails or spikes to refasten markers to trees and leave 1 inch of nail exposed to allow for tree to grow without impacting the marker.

Section 154 – Mileage Markers

Description

154.00.01 This work consists of furnishing and installing or maintaining mileage markers or mileage markers on supports, including excavation, backfill, and associated materials and hardware. Construction and maintenance of mileage markers may be covered by one or more of the following subsections:

154.10 Mileage Markers
154.20 Mileage Marker Maintenance

Material

154.00.02 All materials shall conform to Howard County Department of Recreation & Parks, Signage and Wayfinding Design Guide manual or as SHOWN ON THE PLANS.

Construction

154.00.03 General. Erect mileage markers of the type and at the locations as SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Measurement

154.00.04 Method. Measure the Section 154 items listed in the bid schedule according to section 106.

Rock cairns built to support mileage marker posts will be considered incidental to the PAY ITEM for markers, and separate payment will not be made.

Payment

154.00.05 The accepted quantities will be paid at the contract price per unit of measurement for the Section 154 pay items listed in the bid schedule. Payment will

be full compensation for the work prescribed in this Section. See Subsection 106.04.

154.10 – Mileage Markers

Description

154.10.01 This work consists of furnishing and installing mileage markers or mileage markers on supports, including associated materials and hardware.

Construction

154.10.02 Construct mileage markers as required under construction section 154.00 and/or as SHOWN ON THE PLANS.

154.10.03 Post Installation. Excavate post hole to the depth as SHOWN ON THE PLANS. The hole width should not be more than three times the width of the post. If necessary because of obstacles, the post hole may be moved within the tolerances as SHOWN ON THE PLANS.

Set posts in a plumb position. Backfill the post holes with suitable material in 6 inch layers and compact material to produce a solid installation. Stabilize the post with concrete or rock mounds built in accordance with rock cairn specifications when approved by the CO.

154.10.04 Tree Installation. Remove obstructing limbs and notch the outer bark to provide a flat surface at the mileage marker mounting position as necessary. Avoid removing the inner bark or cutting the cambium.

154.10.05 Mileage Marker Installation. Pre-drill mileage markers before mounting. Tighten hardware snug, but do not damage the route marker surface. Use 50-penny galvanized nails or spikes to fasten mileage markers to trees and leave 1 inch of nail exposed to allow for tree to grow without impacting the markers.

154.20 – Mileage Marker Maintenance

Description

154.20.01 This work consists of refastening existing mileage markers to existing marker supports, resetting existing marker supports, and furnishing and installing new replacement mileage markers and new mileage marker supports.

Maintenance

154.20.02 General. Repair mileage markers at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Reattach designated mileage markers that are out of their original position so that the lines of the marker legend are vertical. Reset route marker support posts to a

plumb position and firmly tamp in place. Set route marker posts designated for replacement in the ground to a depth as SHOWN ON THE PLANS at the approximate location of the original post.

Reset existing supports that are out of plumb and firmly tamp in place. Set supports that need to be reset and new replacement supports in a plumb position and to a depth as SHOWN ON THE PLANS. Backfill and tamp holes from which posts are removed.

Tighten route marker mounting bolts or lag screws to hold the marker snugly in place. Do not damage marker surface.

For mileage markers mounted on trees, remove obstructing limbs and notch the outer bark to provide a flat surface at the marker mounting position as necessary. Avoid removing the inner bark or cutting the cambium. Use 50-penny galvanized nails or spikes to refasten markers to trees and leave 1 inch of nail exposed to allow for tree to grow without impacting the marker.

Section 155 – Cairns

Description

155.00.01 This work consists of furnishing and installing or maintaining cairns. Construction and maintenance of cairns may be covered by one or more of the following subsections:

155.10. Cairns
155.20. Cairn Maintenance

Material

155.00.02 Conform to the following Sections and Subsections:

Rock, Grid Pavement Units, and Aggregate	111

Construction

155.00.03 General. Erect cairns of the type and at the locations as SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

155.00.04 Rock Cairn Construction. Slope each rock layer toward the center. Place each rock with at least three points of contact. Do not wedge small rocks into cracks between large rocks to stabilize the large rocks.

Measurement

155.00.05 Measure the Section 155 items listed in the bid schedule according to section 106.

Payment

155.00.06 The accepted quantities will be paid at the contract price per unit of measurement for the Section 155 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

155.10 – Cairns

Description

155.10.01 This work consists of furnishing and installing cairns.

Construction

155.10.02 Construct cairns as required under construction section 155.00 and/or as SHOWN ON THE PLANS.

155.20 – Cairn Maintenance

Description

155.20.01 This work consists of maintenance of cairns.

Maintenance

155.20.02 Perform maintenance on cairns as required under construction section 155.00 and/or as SHOWN ON THE PLANS.

Section 156 – Reserved for Route Markers and Signs Special Project Specifications

160. Trail Bridges

Section 161- Native Log Stringer Trail Bridge

Description

161.00.01 This work consists of constructing native log stringer bridges, including mud sills, bulkheads, rail systems, curbs, decking, excavation, backfill, and approach fills as SHOWN ON THE PLANS. Construction of native log stringer trail bridges may be covered by one or more of the following subsections:

161.10. Single Log Stringer Trail Bridge
161.20. Multiple Log Stringer Trail Bridge

Materials

161.00.02 Materials. Conform to the following Sections and Subsections:

Rock, Grid Pavement Units, and Aggregate	111
Material for Timber Structures	115

The location of trees for native timber materials will be SHOWN ON THE PLANS and DESIGNATED ON THE GROUND.

Construction

161.00.03 General. Construct native log stringer trail bridges at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Pre-drill holes for fasteners when necessary to prevent splitting and drive spikes flush. Use washers with lag screws and bolts.

161.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

161.00.05 Hardware. Furnish and install hardware as SHOWN ON THE PLANS.

161.00.06 Mud Sills. Construct mud sills at each end of the span in the location staked on the ground. Construct mud sills to be level, bedded evenly, and buried to the depth necessary for the bottom of the log stringers to clear the ground surface by a minimum of 6 inches.

Hew sill logs to provide a bearing surface for the log stringers and to provide the log stringers with a level top surface. Do not hew sill logs more than one-third their diameter. Do not level the top surfaces of the log stringers by shimming or notching their ends.

161.00.07 Stringers. Fasten log stringer to each mud sill with a drift pin that penetrates a minimum of 8 inches into the mud sill.

When plank decking is used, hew the top surfaces of log stringers up to 2 inches deep, as necessary, to provide bearing surfaces for deck planks.

161.00.08 Decking. Spike decking evenly at right angles to each stringer, unless otherwise SHOWN ON THE PLANS.

Lay split log decking alternately flat side down first, then round side down, ending with a flat side down. When the round side is down, provide a bearing surface that is between 1½ inches and 2 inches wide.

Lay split and sawn deck planks on the stringer to provide bearing for the full width of the plank.

Trim protruding ends of the decking to give a straight-line appearance to the edges of the structure, except for decking that extends out to provide handrail support.

161.00.01 Curbs. Construct curbs with logs or sawn timber as SHOWN ON THE PLANS. Use lengths greater than or equal to 10 feet and splice with a 24-inch half-lap joint at a curb block location. Match diameters of logs at lap joints and trim excess to provide a smooth transition between logs.

Finish curbs smooth and free from splinters and sharp projections.

161.00.10 Rail Systems. Construct rail systems with logs or sawn timber as SHOWN ON THE PLANS and use lengths greater than or equal to 10 feet.

When rail systems are constructed of logs, splice them with a 6-inch half-lap joint at a post location. Notch surfaces of posts and rails 5/8 inch at connections. Match diameters of rails at lap joints and trim excess to provide a smooth transition between rails. Use timber bolts for fastening rails to posts as SHOWN ON THE PLANS.

When rail systems are constructed of sawn timber, splice them with a diagonal butt joint at a post location. Use S4S sawn timber, for all rails, posts, and top caps. Fasten each rail and top rail to each post with wood screws as SHOWN ON THE PLANS. Finish handrails and posts smooth and free from splinters and sharp projections.

161.00.11 Approach Fills. Construct the approach fills with compacted suitable material.

Measurement

161.00.12 Measure the Section 161 items listed in the bid schedule according to section 106.

Payment

161.00.13 The accepted quantities will be paid at the contract price per unit of measurement for the Section 161 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

161.10 – Single Log Stringer Trail Bridge

Description

161.10.01 This work consists of construction of a single log stringer bridge, including excavation, embankment, backfill, curbs and/or railing system.

Construction

161.10.02 Construct single log stringer bridge as required under construction section 161.00 and as SHOWN ON THE PLANS.

161.20 – Multiple Log Stringer Trail Bridge

Description

161.20.01 This work consists of construction of a multiple log stringer bridge, including excavation, embankment, backfill, curbs and/or railing system.

Construction

161.20.02 Construct multiple log stringer bridge as required under construction section 161.00 and as SHOWN ON THE PLANS.

Section 162 - Sawn Timber Trail Bridge

Description

162.00.01 This work consists of furnishing, fabricating, constructing sawn timber trail bridges, including all required lumber, hardware, sills, backwalls, rail systems, curbs, decking, excavation, backfill, and approach fills as SHOWN ON THE PLANS. Construction of sawn timber trail bridges may be covered by one or more of the following subsections:

162.10. Sawn Timber Stringer Trail Bridge
162.20. Longitudinal Nail-Laminated Trail Bridge

Materials

162.00.02 Materials. Conform to the following Sections and Subsections:

Rock, Grid Pavement Units, and Aggregate	111
Material for Timber Structures	115

Furnish the following compliance certificates to Natural Resources Manager upon delivery of the materials to the jobsite:

(a) Verification of compliance with grading rules and species of timber and lumber. Provide certification by an agency accepted as competent by the American Lumber Standards Committee (ALSC).

(b) Lot certification of each charge for preservative, penetration in inches, and retention in pounds per cubic foot (assay method) by a qualified independent inspection and testing agency. In addition, have the producer of the treated products provide written certification that Best Management Practices (BMP's) in accordance with "Best Management Practices for Treated Wood in Western Aquatic Environments," published by the Western Wood Preservers Institute (WWPI) and Canadian Institute of Treated Wood, were followed, including a description and appropriate documentation of the applicable BMP's used.

(c) Such other certifications as SHOWN ON THE PLANS or called for in the SPECIAL PROJECT SPECIFICATIONS.

Provide shop drawings in accordance with section 103 for all timber bridges 30 days in advance of fabrication when SHOWN ON THE PLANS or in the SPECIAL PROJECT SPECIFICATIONS. Show all dimensions and fabrication details for all cut, framed, or bored timbers.

Construction

162.00.03 General. Construct sawn timber trail bridges at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Furnish structural lumber and timber of the required stress grade as SHOWN ON THE PLANS.

Clear stacks of weeds, rubbish, or other objectionable material from the ground under and in the vicinity of all stored material. Place the bottom layer of material at least 8 inches above the ground level. Provide sufficient support to prevent sagging.

Open-stack untreated material to shed water. Stack material in layers on spacers (stickers) that extend across the full width of the stack to allow for free air circulation. Align all stickers vertically and space them at regular intervals.

Close-stack treated material to shed water.

Protect material from the weather. If covered, used sheet material such as water-resistant paper or opaque polyethylene film. Do not cover with impervious membranes, such as polyethylene film, during dry weather. Slit individual wrappings full length or puncture on the lower side to permit drainage of water.

Use slings or other devices to protect corners of heavy construction timbers and banded packages of heavy construction timber

162.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

162.00.05 Hardware. Furnish and install hardware as SHOWN ON THE PLANS

162.00.06 Workmanship. Cut and form all lumber and construction timbers so all joints will have even bearing over the entire contact surface. Do not use shims in making joints. Construct all joints to be closed. Drive nails and spikes to set the heads flush with the wood surface. Use the same end, face, and edge of the timber member for all layout dimensions. Bore all holes from mating faces.

162.00.06 Mud Sills. Construct mud sills at each end of the span in the location staked on the ground. Construct mud sills to be level, bedded evenly, and buried to the depth necessary for the bottom of the log stringers to clear the ground surface by a minimum of 6 inches.

162.00.07 Stringers. Stringers shall be size matched at bearings and shall be positioned so that knots near the edge will be in the top portion of the stringers. Bridging between stringers shall be neatly and accurately framed and securely fastened.

162.00.08 Curbs. Construct curbs with logs or sawn timber as SHOWN ON THE PLANS. Use lengths greater than or equal to 10 feet and splice with a 24-inch half-lap joint at a curb block location. Match diameters of logs at lap joints and trim excess to provide a smooth transition between logs.

Finish curbs smooth and free from splinters and sharp projections.

162.00.01 Rail Systems. Construct rail systems with logs or sawn timber as SHOWN ON THE PLANS and use lengths greater than or equal to 10 feet.

When rail systems are constructed of logs, splice them with a 6-inch half-lap joint at a post location. Notch surfaces of posts and rails 5/8 inch at connections. Match

diameters of rails at lap joints and trim excess to provide a smooth transition between rails. Use timber bolts for fastening rails to posts as SHOWN ON THE PLANS.

When rail systems are constructed of sawn timber, splice them with a diagonal butt joint at a post location. Use S4S sawn timber, for all rails, posts, and top caps. Fasten each rail and top rail to each post with wood screws as SHOWN ON THE PLANS. Finish handrails and posts smooth and free from splinters and sharp projections.

162.00.10 Approach Fills. Construct the approach fills with compacted suitable material.

Measurement

162.00.11 Measure the Section 162 items listed in the bid schedule according to section 106.

Payment

162.00.12 The accepted quantities will be paid at the contract price per unit of measurement for the Section 162 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

162.10 – Sawn Timber Stringer Trail Bridge

Description

162.10.01 This work consists of construction of a sawn timber stringer trail bridge, including excavation, embankment, backfill, curbs and/or railing system.

Construction

162.10.02 Construct a sawn timber stringer trail bridge as required under construction section 162.00 and as SHOWN ON THE PLANS.

162.20 – Longitudinal Nail-Laminated Trail Bridge

Description

162.20.01 This work consists of construction of a longitudinal nail-laminated trail bridge, including excavation, embankment, backfill, curbs and/or railing system.

Construction

162.20.02 Construct a longitudinal nail-laminated trail bridge as required under construction section 162.00 and as SHOWN ON THE PLANS.

Section 163 - Glulam Trail Bridge

Description

163.00.01 Work. This work consists of furnishing, fabricating, constructing glulam trail bridges, including all required lumber, hardware, sills, backwalls, rail systems, curbs, decking, excavation, backfill, and approach fills as SHOWN ON THE PLANS. Construction of glulam trail bridges may be covered by one or more of the following subsections:

163.10. Glulam Stringer Trail Bridge
163.20. Longitudinal Glulam Deck Panel Trail Bridge

Materials

163.00.02 Materials. Conform to the following Sections and Subsections:

Rock, Grid Pavement Units, and Aggregate	111
Material for Timber Structures	115

Furnish the following compliance certificates to Natural Resources Manager upon delivery of the materials to the jobsite:

(a) Verification of compliance with grading rules and species of timber and lumber. Provide certification by an agency accepted as competent by the American Lumber Standards Committee (ALSC).

(b) Lot certification of each charge for preservative, penetration in inches, and retention in pounds per cubic foot (assay method) by a qualified independent inspection and testing agency. In addition, have the producer of the treated products provide written certification that Best Management Practices (BMP's) in accordance with "Best Management Practices for Treated Wood in Western Aquatic Environments," published by the Western Wood Preservers Institute (WWPI) and Canadian Institute of Treated Wood, were followed, including a description and appropriate documentation of the applicable BMP's used.

(c) Certification from a qualified inspection and testing agency indicating that all glued laminated members are in accordance with the requirements of American National Standard, "Standard for Wood Products - Structural Glued Laminated Timber" (ANSI A110.1) modified as SHOWN ON THE PLANS.

(d) Such other certifications as SHOWN ON THE PLANS or called for in the SPECIAL PROJECT SPECIFICATIONS.

Provide shop drawings in accordance with section 103 for all timber bridges 30 days in advance of fabrication when SHOWN ON THE PLANS or in the SPECIAL PROJECT SPECIFICATIONS. Show all dimensions and fabrication details for all cut, framed, or bored timbers.

Construction

163.00.03 General. Construct glulam trail bridges at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Furnish glulams and lumber of the required stress grade.

Clear stacks of weeds, rubbish, or other objectionable material from the ground under and in the vicinity of all stored material. Place the bottom layer of material at least 8 inches above the ground level. Provide sufficient support to prevent sagging.

Store and protect glued laminated timber in accordance with the recommendations for Loading and Handling, Job Site Storage, and Erection in "Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage, and Erection," published by the American Institute of Timber Construction, AITC 111.

Open-stack untreated material to shed water. Stack material in layers on spacers (stickers) that extend across the full width of the stack to allow for free air circulation. Align all stickers vertically and space them at regular intervals.

Close-stack treated material to shed water.

Protect material from the weather. If covered, used sheet material such as water-resistant paper or opaque polyethylene film. Do not cover with impervious membranes, such as polyethylene film, during dry weather. Slit individual wrappings full length or puncture on the lower side to permit drainage of water.

Use slings or other devices to protect corners of heavy construction timbers and banded packages of heavy construction timber.

163.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

163.00.05 Hardware. Furnish and install hardware as SHOWN ON THE PLANS.

163.00.06 Workmanship. Cut and form all lumber and construction timbers so all joints will have even bearing over the entire contact surface. Do not use shims in making joints. Construct all joints to be closed. Drive nails and spikes to set the heads flush with the wood surface. Use the same end, face, and edge of the timber member for all layout dimensions. Bore all holes from mating faces.

163.00.07 Mud Sills. Construct mud sills at each end of the span in the location staked on the ground. Construct mud sills to be level, bedded evenly, and buried to the depth necessary for the bottom of the log stringers to clear the ground surface by a minimum of 6 inches.

163.00.08 Glulam Stringers. Do not drag or skid stringers. Stringers shall be size matched at bearings and shall be positioned so that the camber is up. Bridging between stringers shall be neatly and accurately framed and securely fastened.

163.00.01 Glued Laminated Panel Decks. Do not drag or skid panels. When lifted, support panels in the weak-moment plane at a sufficient number of points to avoid overstressing, and protect the edges from damage.

When dowels are SHOWN ON THE PLANS between deck panels, use a template or drilling jig to ensure that dowel holes are accurately spaced and drilled parallel to one another and to the horizontal surfaces of the panel. Drill holes to a depth 1/4 inch greater than one-half the dowel length, and a diameter that is 3/32 greater than the dowel, unless otherwise SHOWN ON THE PLANS. Use a temporary dowel as a check for snug fit prior to production drilling. Use dowels of the size SHOWN ON THE PLANS, with the tips slightly tapered or rounded. Use an approved lubricant to facilitate the connection process.

Start the tips of all dowels partially and equally into the holes of the two panels being joined. Draw the panels together keeping the edges parallel, until the panels abut tightly. Securely fasten each panel to each stringer as SHOWN ON THE PLANS.

Assemble and match-mark panels prior to delivery to the construction site when SHOWN ON THE PLANS or called for in the SPECIAL PROJECT SPECIFICATIONS. Follow erection procedures given in FPL-263, USDA Forest Service, Forest Products Laboratory (FPL), Madison, Wisconsin.

163.00.010 Curbs. Construct curbs with sawn timber as SHOWN ON THE PLANS. Use lengths greater than or equal to 10 feet and splice with a 24-inches half-lap joint at a curb block location. Match diameters of logs at lap joints and trim excess to provide a smooth transition between logs.

Finish curbs smooth and free from splinters and sharp projections.

163.00.11 Rail Systems. Construct rail systems with sawn timber as SHOWN ON THE PLANS and use lengths greater than or equal to 10 feet.

When rail systems are constructed of sawn timber, splice them with a diagonal butt joint at a post location. Use S4S sawn timber, for all rails, posts, and top caps. Fasten each rail and top rail to each post with wood screws as SHOWN ON THE PLANS. Finish handrails and posts smooth and free from splinters and sharp projections.

163.00.12 Approach Fills. Construct the approach fills with compacted suitable material.

Measurement

163.00.13 Measure the Section 163 items listed in the bid schedule according to section 106.

Payment

163.00.14 The accepted quantities will be paid at the contract price per unit of measurement for the Section 163 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

163.10 – Glulam Stringer Trail Bridge

Description

163.10.01 This work consists of construction of a glulam stringer trail bridge, including excavation, embankment, backfill, curbs and/or railing system.

Construction

163.10.02 Construct a glulam stringer trail bridge as required under construction section 163.00 and as SHOWN ON THE PLANS.

163.20 – Longitudinal Glulam Deck Panel Trail Bridge

Description

163.20.01 This work consists of construction of a longitudinal glulam deck panel trail bridge, including excavation, embankment, backfill, curbs and/or railing system.

Construction

163.20.02 Construct a longitudinal glulam deck panel trail bridge as required under construction section 163.00 and as SHOWN ON THE PLANS.

Section 164 - Prefabricated Steel Trail Bridges

164.00.01 This work consists of designing, furnishing, fabricating, and constructing prefabricated steel trail bridges, including all required materials, hardware, sills, backwalls, rail systems, curbs, decking, excavation, backfill, and approach fills as SHOWN ON THE PLANS. Work includes all other incidental work necessary to complete the bridge installation. These specifications are for a fully engineered clear span bridge and shall be regarded as minimum standards for design and construction.

Design

164.00.02 Engineering Requirements. Structural design of the bridge structure(s) shall be performed by or under the direct supervision of a licensed professional engineer and done in accordance with recognized engineering practices and principles. The engineer shall be licensed to practice in the State in which the bridge is fabricated. The design shall be in accordance with AASHTO LRFD Bridge Design Specifications, Current Edition and as recommended in AASHTO's LRFD Guide Specifications for Design of Pedestrian Bridges, Current Edition. The design shall meet the following requirements unless otherwise SHOWN ON THE PLANS:

1. Pedestrian Load – Main supporting members shall be designed for a pedestrian live load of 10 psf.

2. Vehicle Load – When the clear deck width between railings is greater than 7 ft. and less than 10 ft. the bridge shall be designed for an occasional single maintenance vehicle of 10,000 lbs. (H5 Design Vehicle). When clear deck width is greater than 10 feet, the bridge shall be designed for an occasional single maintenance vehicle of 20,000 lbs. (H10 Design Vehicle). The vehicle load shall not be placed in combination with the pedestrian live load or snow load. A vehicle impact allowance is not required.

3. Other Loads– Other loads such as snow, equestrian, wind and fatigue loads and load combinations shall be designed for as specified in AASHTO LRFD and as SHOWN ON THE PLANS. When a snow load greater than the 10 psf pedestrian load is SHOWN ON THE PLANS the bridge shall be analyzed and designed for the controlling load.

4. Deflection – Pedestrian live load deflection shall not exceed L/360 for steel or as SHOWN ON THE PLANS.

5. Vibration – The fundamental frequency of the pedestrian bridge without live load shall be greater than 3.0 hertz in the vertical direction and 1.3 hertz in the lateral direction for steel bridges. The minimum fundamental frequency for loads other than pedestrian loads, such as equestrian and mule trains shall be determined by the design engineer.

6. Camber - The bridge shall have a vertical camber dimension at midspan equal to 100% of the full dead load deflection plus 1% of the full length of the bridge or as SHOWN ON THE PLANS.

164.00.03 General Features of Design. The following are the required minimum design features unless otherwise SHOWN ON THE PLANS.

1. Span -The required bridge span shall be as SHOWN ON THE PLANS.

2. Deck Width -The required bridge width between railing elements as SHOWN ON THE PLANS.

3. Truss Type - Bridge(s) shall be designed as a through (or box) "Pratt" truss with one (1) diagonal per panel and square end vertical members.

4. Through truss bridges will be designed utilizing underhung floor beams.

5. The top of the top chord shall not be less than 42 inches above the deck (measured from the high point of the riding surface) unless otherwise SHOWN ON THE PLANS.

6. Safety Rails - Horizontal safety rails shall be placed on the structure so as to prevent a 4-inch sphere from passing through the truss or as SHOWN ON THE PLANS. The safety rail system shall be designed for 50 pounds per linear foot transversely and vertically, acting simultaneously on each rail.

164.00.04 Design Drawings and Calculations. Provide design drawings and calculations for the prefabricated bridge including wind, seismic and bearing

forces. The Contractor is responsible for preparing all shop drawings necessary for erection of the bridge. All design drawings and calculations shall have the signature and seal of a registered professional engineer.

The Contractor shall submit all design drawings and calculations in accordance with section 103 at least 30 days in advance of the start of fabrication to allow time for review by Appointed Authority of the Howard County Department of Recreation & Parks and correction of any changes. Include plan, elevation, and section views of the pedestrian bridge superstructure, dimensions of all components, connection details, and general and specific notes regarding design and construction.

The Contractor and County shall be provided with detailed installation instructions.

Materials

164.00.05 Materials. Conform to the following Sections:

Steel Structures	FP-03, Section 555
Rock, Grid Pavement Units, and Aggregate	111
Material for Timber Structures	115

Furnish materials that meet the following requirements:

1. Unpainted Steel - Bridges which are not to be painted shall be fabricated from high strength, low alloy, atmospheric corrosion resistant ASTM A847 cold-formed welded square and rectangular tubing and/or ASTM A588, or ASTM A242, ASTM A606 plate and structural steel shapes (F_y = 50,000 psi). The minimum corrosion index of atmospheric corrosion resistant steel, as determined in accordance with ASTM G101, shall be 5.8.

2. Minimum Metal Thickness – The minimum nominal metal thickness of closed structural tubular metal members shall 0.25 inches.

3. 3/8-inch weep holes are required at all low points for bottom and top chords, verticals, and diagonals for closed structural tubular metal members.

4. Hardware – All fasteners and hardware shall be in compliance with FP-03, Section 717 and as SHOWN ON THE PLANS.

5. Wood Decking - Wood decking shall be West Coast Regional Douglas Fir or Southern Pine as SHOWN ON THE PLANS. Treated wood shall meet the requirements as SHOWN ON THE PLANS.

164.00.06 Welding

1. Welding Process - Welding and weld qualification tests shall conform to the provisions of the ANSI/AWS D1.5 Structural Welding Code.

2. Welders - Welders shall be properly accredited experienced operators, each of whom shall submit certification of satisfactorily passing AWS standard qualification tests for all positions, satisfactory evidence of experience and skill in welding structural steel with the kind of welding to be used in the work, and who has demonstrated the ability to make uniform, sound welds of the type required.

164.00.07 Submittals

1. Welder certifications showing compliance with Section 164.00.06(2)

2. Welding procedures in compliance with Section 164.00.06(1)

3. Steel Certification - All certified mill test reports shall be furnished upon request. Mill test reports shall show the chemical analysis and physical test results for each heat of steel used in the work. All steel shall be produced in the United States of America and be AISC certified.

4. Bolt Certification - All certified mill test reports shall be furnished upon request. Mill test reports shall show the chemical analysis and physical test results for each heat of steel used in the work. All bolts shall be produced in the United States of America.

5. Wood Certifications - Furnish the following compliance certificates to Natural Resources Managerupon delivery of the wood materials to the jobsite:

(a) Verification of compliance with grading rules and species of timber and lumber. Provide certification by an agency accepted as competent by the American Lumber Standards Committee (ALSC).

(b) Lot certification of each charge for preservative, penetration in inches, and retention in pounds per cubic foot (assay method) by a qualified independent inspection and testing agency. In addition, have the producer of the treated products provide written certification that Best Management Practices (BMP's) in accordance with "Best Management Practices for Treated Wood in Western Aquatic Environments," published by the Western Wood Preservers Institute (WWPI) and Canadian Institute of Treated Wood, were followed, including a description and appropriate documentation of the applicable BMP's used.

(c) Such other certifications as SHOWN ON THE PLANS or called for in the SPECIAL PROJECT SPECIFICATIONS.

Provide shop drawings in accordance with section 103 for all bridges 30 days in advance of fabrication when SHOWN ON THE PLANS or in the SPECIAL PROJECT SPECIFICATIONS. Show all dimensions and fabrication details for all cut, framed, or bored timbers.

Construction

164.00.08 General Construct a prefabricated steel trail bridge as required under construction section 164.00. and as SHOWN ON THE PLANS.

164.00.01 Excavation and Embankment. Perform all excavation and embankment work in accordance with Section 111.

164.00.10 Installation. All construction and installation shall be performed in conformance with manufacturer's recommendations and the approved shop drawings. Unprotected steel chains shall not be used as a sling for installation.

164.00.11 Performance. Provide 14-day notice prior to delivery and/or installation of prefabricated bridge.

If the prefabricated superstructure is not installed immediately upon delivery to the project site, provide appropriate equipment and labor to unload and stack, support, and store all material at the delivery point designated by the County. Support and stack all components to prevent damage. Furnish and install blocking such that all components are supported at least 8 inches above the ground.

Measurement

164.00.12 Measure the section 164 items listed in the bid schedule according to section 106.

Payment

164.00.13 The accepted quantities will be paid at the contract price per unit of measurement for the Section 164 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

Section 165 – Trail Bridge Substructures

Description

165.00.01 This work consists of furnishing, fabricating, constructing trail bridge substructures, including all required geosynthetics, gabion baskets, concrete, lumber, hardware, excavation, and backfill as SHOWN ON THE PLANS. Construction of trail bridge substructure may be covered by one or more of the following subsections:

165.10. Timber Sill on Geocell Pad
165.20. Timber Sill on Gabion Baskets
165.30. Timber Sill on Timber Cribbing
165.40. Concrete Leveling Pad on Bedrock

Materials

165.00.02 Materials. Conform to the following Sections:

Concrete	FP-03, Section 552
Reinforcing Steel	FP-03, Section 554
Rock, Grid Pavement Units, and Aggregate	111
Geosynthetic Materials	114
Material for Timber Structures	115
Wire Basket Materials (Gabion Baskets)	116

Furnish the following compliance certificates to the Appointed Authority of Howard County Department of Recreation & Parks upon delivery of the materials to the jobsite:

(a) Verification of compliance with grading rules and species of timber and lumber. Provide certification by an agency accepted as competent by the American Lumber Standards Committee (ALSC).

(b) Lot certification of each charge for preservative, penetration in inches, and retention in pounds per cubic foot (assay method) by a qualified independent inspection and testing agency. In addition, have the producer of the treated products provide written certification that Best Management Practices (BMP's) in accordance with "Best Management Practices for Treated Wood in Western Aquatic Environments," published by the Western Wood Preservers Institute (WWPI) and Canadian Institute of Treated Wood, were followed, including a description and appropriate documentation of the applicable BMP's used.

(c) Such other certifications as SHOWN ON THE PLANS or called for in the SPECIAL PROJECT SPECIFICATIONS.

Provide shop drawings in accordance with section 103 for all timber bridge substructures 30 days in advance of fabrication when SHOWN ON THE PLANS or in the SPECIAL PROJECT SPECIFICATIONS. Show all dimensions and fabrication details for all cut, framed, or bored timbers.

Construction

165.00.03 General. Construct trail bridge substructure at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Furnish structural lumber and timber of the required stress grade as SHOWN ON THE PLANS.

Clear stacks of weeds, rubbish, or other objectionable material from the ground under and in the vicinity of all stored material. Place the bottom layer of material at least 8 inches above the ground level. Provide sufficient support to prevent sagging.

Open-stack untreated material to shed water. Stack material in layers on spacers (stickers) that extend across the full width of the stack to allow for free air circulation. Align all stickers vertically and space them at regular intervals.

Close-stack treated material to shed water.

Protect material from the weather. If covered, used sheet material such as water-resistant paper or opaque polyethylene film. Do not cover with impervious membranes, such as polyethylene film, during dry weather. Slit individual wrappings full length or puncture on the lower side to permit drainage of water.

Use slings or other devices to protect corners of heavy construction timbers and banded packages of heavy construction timber

165.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

165.00.05 Hardware. Furnish and install hardware as SHOWN ON THE PLANS.

165.00.06 Workmanship. Cut and form all lumber and construction timbers so all joints will have even bearing over the entire contact surface. Do not use shims in making joints. Construct all joints to be closed. Drive nails and spikes to set the heads flush with the wood surface. Use the same end, face, and edge of the timber member for all layout dimensions. Bore all holes from mating faces.

Measurement

165.00.07 Measure the Section 165 items listed in the bid schedule according to section 106.

Payment

165.00.08 The accepted quantities will be paid at the contract price per unit of measurement for the Section 165 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

165.10 – Timber Sill on Geocell Pad

Description

165.10.01 This work consists of construction of a timber sill on geocell pad including excavation, embankment, backfill, curbs and/or railing system.

Construction

165.10.02 Construct a timber sill on geocell pad as required under construction section 165.00 and as SHOWN ON THE PLANS.

165.20 – Timber Sill on Gabion Baskets

Description

165.20.01 This work consists of construction of a timber sill on gabion baskets including excavation, embankment, backfilling.

Construction

165.20.02 Construct a timber sill on gabion baskets as required under construction section 165.00 and as SHOWN ON THE PLANS.

165.30 – Timber Sill on Timber Cribbing

Description

165.30.01 This work consists of construction of a timber sill on timber cribbing including excavation, embankment, and backfilling.

Construction

165.30.02 Construct a timber sill on timber cribbing as required under construction section 165.00 and as SHOWN ON THE PLANS.

165.40 – Concrete Leveling Pad on Bedrock

Description

165.40.01 This work consists of construction of a concrete leveling pad on bedrock including rock excavation, embankment and backfilling.

Construction

165.40.02 Construct a concrete leveling pad on bedrock as required under construction section 165.00 and as SHOWN ON THE PLANS.

Section 166 - Trail Bridge Maintenance

Description

166.01 This work consists of maintenance of trail bridges, including replacing or reconstructing rail systems, curbs, decking, sills, stringers and approach fills as SHOWN ON THE PLANS.

Materials

166.02 Materials. Conform to the following Sections:

Rock, Grid Pavement Units, and Aggregate	111
Material for Timber Structures	115

Furnish the following compliance certificates to the Appointed Authority of Howard County Department of Recreation & Parks upon delivery of the materials to the jobsite:

(a) Verification of compliance with grading rules and species of timber and lumber. Provide certification by an agency accepted as competent by the American Lumber Standards Committee (ALSC).

(b) Lot certification of each charge for preservative, penetration in inches, and retention in pounds per cubic foot (assay method) by a qualified independent inspection and testing agency. In addition, have the producer of the treated products provide written certification that Best Management Practices (BMP's) in accordance with "Best Management Practices for Treated Wood in Western Aquatic Environments," published by the Western Wood Preservers Institute (WWPI) and Canadian Institute of Treated Wood, were followed, including a description and appropriate documentation of the applicable BMP's used.

(c) Certification from a qualified inspection and testing agency indicating that all glued laminated members are in accordance with the requirements of American National Standard, "Standard for Wood Products - Structural Glued Laminated Timber" (ANSI A110.1) modified as SHOWN ON THE PLANS.

(d) Such other certifications as SHOWN ON THE PLANS or called for in the SPECIAL PROJECT SPECIFICATIONS.

Maintenance

166.03 General. Maintenance of trail bridges at locations SHOWN ON THE PLANS.

Furnish structural lumber and timber of the required stress grade as SHOWN ON THE PLANS.

Clear stacks of weeds, rubbish, or other objectionable material from the ground under and in the vicinity of all stored material. Place the bottom layer of material at least 8 inches above the ground level. Provide sufficient support to prevent sagging.

Open-stack untreated material to shed water. Stack material in layers on spacers (stickers) that extend across the full width of the stack to allow for free air circulation. Align all stickers vertically and space them at regular intervals.

Close-stack treated material to shed water.

Protect material from the weather. If covered, used sheet material such as water-resistant paper or opaque polyethylene film. Do not cover with impervious membranes, such as polyethylene film, during dry weather. Slit individual wrappings full length or puncture on the lower side to permit drainage of water.

Use slings or other devices to protect corners of heavy construction timbers and banded packages of heavy construction timber

166.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 111.

163.05 Hardware. Furnish and install hardware as SHOWN ON THE PLANS.

166.06 Workmanship. Cut and form all lumber and construction timbers so all joints will have even bearing over the entire contact surface. Do not use shims in making joints. Construct all joints to be closed. Drive nails and spikes to set the heads flush with the wood surface. Use the same end, face, and edge of the timber member for all layout dimensions. Bore all holes from mating faces.

166.07 Stringers. Stringers shall be size matched at bearings and shall be positioned so that the camber is up and if possible, so that knots near the edge will be in the top portion of the stringers. Bridging between stringers shall be neatly and accurately framed and securely fastened.

Measurement

166.08 Measure the Section 166 items listed in the bid schedule according to section 106.

Payment

166.01 The accepted quantities will be paid at the contract price per unit of measurement for the Section 166 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

170. Specialty Specifications

Section 171 – Reserved for Specialty Structures Special Project Specifications

180. Incidentals

Section 181 – Seeding, Fertilizing and Mulching

Description

181.01 This work consists of preparing seedbeds and furnishing and placing required seed, fertilizer, and mulch.

Materials

181.02 Seed. Conform to the Maryland Standards and Specifications for Soil Erosion & Sediment Control, B-4-5 Standards and Specification for Permanent Stabilization. Do not use wet, moldy, or otherwise contaminated or damaged seed. Furnish each seed type in separate sealed container. Clearly label each container with the following:

(a) Name and type of seed

(b) Lot number

(c) Net mass

(d) Percent of purity, germination, and hard seed

(e) Percent of maximum weed seed content

(f) Seed Origin

(g) Noxious weeds present

(h) Other crop seed

(i) Inert matter

(j) Name and address of seed distributor

(k) Mixture percent of each component

Inoculate legume seed with approved cultures according to the manufacturer's instructions.

Certify that seed meets the type as SHOWN ON THE PLANS. Furnish the Appointed Authority of Howard County Department of Recreation & Parks with duplicate copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within 6 months of the date of delivery.

Include in the certificate:

(1) Name and address of the laboratory

(2) Date of test

(3) Lot number for each kind of seed

(4) Percent of purity and germination for each kind of seed

(5) Percent of weed seed content for each kind of seed

(6) Mixture percent of each component

181.03 Fertilizer. Furnish standard commercial grade dry formulated fertilizer conforming to the standards of the Association of Official Analytical Chemists International, applicable Howard County, Maryland and Federal regulations, and required minimum percentages of available nutrients. Supply fertilizer in new, clean, sealed, and properly labeled containers with name, mass, and guaranteed

analysis of contents clearly marked. Use fertilizer with the minimum percentage of available nutrients as SHOWN ON THE PLANS.

181.04 Mulch. Use commercially produced mulch as SHOWN ON THE PLANS.

(a) Straw. Furnish certified weed free straw from oats, wheat, rye, or other grain crops that is free from mold or other objectionable material. Furnish straw in an air-dry condition suitable for placing with mulch blower equipment.

(b) Wood fiber. Furnish processed wood fiber from wood chips conforming to the following:

(1) Colored with a green dye noninjurious to plant growth

(2) Readily dispersible in water

(3) Nontoxic to seed or other plant material

(4) Free of growth or germination inhibiting substances

(5) Free of weed seed

(6) Air dried to an equilibrium moisture content of 12±3 percent

(7) Packaged in new labeled containers

(8) Packaged in a condition appropriate for mixing in a homogeneous slurry suitable for application with power spray equipment

(c) Grass straw cellulose fiber. Furnish processed grass straw fiber conforming to the following:

(1) Colored with a green dye noninjurious to plant growth

(2) Readily dispersible in water

(3) Nontoxic to seed or other plant material

(4) Free of growth or germination inhibiting substances

(5) Free of weed seed

(6) Air dried to a moisture content of 10±0.2 percent

(7) Air dried to a uniform mass of ±5 percent

(8) Packaged in new containers labeled with the manufacturer's name and air-dry mass

(1) Packaged in a condition appropriate for mixing in a homogeneous slurry suitable for application with power spray equipment

Construction

181.05 Seeding Seasons. Seed during the seeding dates as SHOWN ON THE PLANS. Do not apply seeding materials during windy weather or when the ground is excessively wet or frozen.

181.06 Soil Preparation. Shape and finish cut slopes, fill slopes, embankments, or other areas to be seeded as required by other applicable sections or as SHOWN ON THE PLANS. Prepare soil as specified in other sections.

181.07 Mulch. Spread mulch immediately after seeding, or after seeding and fertilizing, to a loose depth of 1 1/2 inches to 3 inches at locations SHOWN ON THE PLANS.

Measurement

181.08 Measure the section 181 items listed in the bid schedule according to subsection 106.

Payment

181.01 The accepted quantities will be paid at the contract price per unit of measurement for the Section 181 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

Section 182 – Erosion Control Blankets

Description

182.01 This work consists of furnishing and installing erosion control blankets.

Material

182.02 Erosion Control Blanket. Use erosion control materials of the type and in the locations SHOWN ON THE PLANS.

(a) Burlap. Use burlap of standard weave with a weight of 4, ±1/2 oz/SY.

(b) Excelsior Blanket. Use excelsior blanket consisting of a machine-produced mat or curled wood excelsior of 80-percent, 8 inches or longer fiber length with consistent thickness and the fiber evenly distributed over the entire area of the blanket. Use blanket with mesh dimensions of 1 inch by 2 inches ±25 percent. Provide blanket with average weight of 8 oz/SY ±10 percent at time of manufacture.

Construction

182.03 General. Install erosion control blankets in accordance with manufacturer's recommendations at locations SHOWN ON THE PLANS.

Make the soil surface stable, firm, and free of rocks and other obstructions. Install erosion control blankets to the following minimum guidelines.

(a) Slope Installations. At the top of slope, anchor the erosion control blankets by one of the following methods:

(1) Staples. Install the erosion control blankets 3 feet over the shoulder of the slope onto flat final grade. Secure with a single row

of staples on 1 foot centers.

(2) Anchor trench. Construct a 6 inch by 6-inch trench. Extend the upslope terminal end of the erosion control blankets 10 feet past the trench. Use staples on 1 foot centers to fasten the erosion control blankets into the trench. Backfill the trench and compact the soil. Secure the terminal end with a single row of staples on 1 foot centers and cover the end with soil. Apply turf establishment.

(3) Check slot. Install two rows of staples 4 inch apart on 4 inch centers across the top edge of the erosion control blankets. Drive all staple heads flush with soil surface.

Securely fasten all erosion control blankets to the soil by installing staples at a minimum rate of 1.5 per square yard.

(b) Channel Installations. At the beginning of the channel, construct a full width anchor trench according to paragraph (a)(2) above. Construct additional anchor trenches or check slots at intervals along the channel reach and at the channel end according to paragraph (a)(2) or (a)(3) and the manufacturer's installation guidelines.

Securely fasten all erosion control blankets to the soil by installing staples at a minimum rate of 2.0 per square yard. Significantly higher anchor rates may be necessary in sandy, loose, or wet soils and in severe applications.

Repair all damaged areas immediately by restoring soil to finished grade, re-applying turf establishment, and replacing the erosion control blankets.

Measurement

182.04 Measure the section 182 items listed in the bid schedule according to subsection 106.

Payment

182.05 The accepted quantities will be paid at the contract price per unit of measurement for the Section 182 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

Section 183 – Removal of Structures and Obstructions

Description

183.01 Work. Work consists of removal and disposal of existing structures, including turnpikes, walkways, bridges, culverts, signs and posts, and other material within the trailway, above or below ground. Work also includes salvaging DESIGNATED materials and backfilling the resulting trenches, holes, and pits.

Construction

183.02 Removal of Culverts and Bridges. Remove existing culverts within embankment areas at locations SHOWN ON THE PLANS.

Remove existing structures down to the natural stream bottom, and remove parts outside the water course to at least 1inch below natural ground surface or finish ground surface, whichever is lower. Where portions of an existing structure lie wholly, or in part, within the limits of a new structure, remove parts to accommodate the installation of the proposed structure.

Avoid damage to bridges being dismantled for salvage. Match mark steel and/or wood members and prepare drawings showing the structural location of each member.

183.03 Removal of Signs and Posts. Remove signs, posts, and associated hardware at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Backfill post hole, compact, and contour area to match existing ground.

183.04 Removal of Other Obstructions. Remove other obstructions at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

183.05 Disposal. Dispose of native log and rock material by scattering below the trailway and outside clearing limits. Do not place debris in water courses, snow ponds, lakes, meadows, or locations where it could impede the flow to, through, or from the drainage structures. Dispose of metal, treated timber, and other manufactured products by removing from Howard County Department of Recreation & Parks-managed lands and placing in approved waste disposal sites.

Measurement

183.06 Measure the section 183 items listed in the bid schedule according to subsection 106.

Payment

183.07 The accepted quantities will be paid at the contract price per unit of measurement for the Section 183 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 106.04.

Section 184 – Reserved for Incidentals Special Project Specifications

190. Materials

Section 190 - Materials

190.01 General. Materials specification not found in this section will be covered by the most current version of *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects*, U.S. Department of Transportation, Federal Highway Administration.

Section 191 - Rock, Grid Pavement Units, Aggregate and Asphalt

191.01 Rock. Use sound, durable rock free of rifts, seams, laminations, and minerals that could deteriorate as a result of weathering. Dress rock to remove thin or weak portions before use.

Furnish rock of the size, shape, weight, and face area necessary to produce the general characteristics and appearance SHOWN ON THE PLANS.

191.02 Gabion and Revet Mattress Rock. Ensure that rock conforms to the requirements of Section 111.01 and the following specifications.

(a) Coarse durability index, AASHTO T 210 52 min.

(b) Unit weight of a filled basket 100 pounds per cubic foot min.

(c) Gradation:

(1) Baskets 12 inches or greater in the vertical dimension:

Maximum dimension of rock .....…. 8 inch

Minimum dimension of rock ..... 4 inch

(d) (2) Baskets less than 12 inches in the vertical dimension:

Maximum dimension of rock ..... 6 inch

Minimum dimension of rock ..... 3 inch

191.03 Grid Pavement Units. Use concrete grid pavement units with a minimum compressive strength of 4415 lbs/in^2 that meet the National Concrete Masonry Association (NCMA) Designation: A-15-82: Specifications for Grid Pavers.

191.04 Pit-Run Aggregate. Use pit-run aggregates consisting of native materials that can be placed on the trail without crushing or screening. No gradation, other than a maximum size, will be required. Provide pit-run aggregate with a maximum size as SHOWN IN THE SCHEDULE OF ITEMS.

191.05 Screened Aggregate. Use screened material consisting of gravel, talus, rock, sand, shale, or other suitable material that is reasonably hard, durable, and free of organic material, mica, clay lumps, or other deleterious material. Use screened aggregate meeting the gradation requirements shown in table 161-1 and of the grading SHOWN IN THE SCHEDULE OF ITEMS.

191.06 Crushed Aggregate for Base or Surface Course. Use crushed aggregate meeting the requirements of tables 111-1 and 111-2 and SHOWN IN THE SCHEDULE OF ITEMS.

At least 50 percent, by weight, of the aggregate retained on the No.4 sieve is to have one fractured face. Naturally fractured faces may be included in the 50-percent requirement.

The Appointed Authority of Howard County Department of Recreation & Parks may approve other gradations if they are similar to those specified Grade aggregate from coarse to fine within the gradation band.

Table 111-1-Crushed and screened aggregate grading requirements for base or surface courses.

	Percent Passing (AASHTO T 11 and T 27)			
Sieve	Grading A	Grading B	Grading C	Grading D
1"				
¾"	100	100		
½"	50-10	70-100		
3/8"			100	100
No.4	30-65	45-75	60-85	70-10
No.8	25-55	30-60	35-70	45-70
No.30		15-40		20-40
No.200	6-12	6-20	5-20	5-20

Table 111-2.-Crushed Aggregate Quality Requirements

Description	AASHTO Test Method	Requirement
Percent Wear	T 16	40 Max.
Durability Index, Coarse and Fine	T 211	35 Min.
Liquid Limit	T 81	35 Max.
Plasticity Index	T 11	2-11

191.07 – Asphalt. Asphalt material for trail construction shall conform to requirements of the U.S. Department of Transportation, Federal Highway Administration, Standard Specifications for Construction or Roads and Bridges on Federal Highway Projects, most current edition, Section 702 – Asphalt Material.

191.08 – Cement. Cement material for trail construction shall conform to requirements of the U.S. Department of Transportation, Federal Highway Administration, Standard Specifications for Construction or Roads and Bridges on Federal Highway Projects, most current edition, Section 701 – Cement.

Section 192 – Pipe Material

192.01 General. Use pipe, coupling bands, and special sections such as elbows, tees, and wyes made of the same material and of the same thickness as the conduit to which they are joined, unless otherwise specified.

192.02 Corrugated Steel Pipe, Pipe Arches and Underdrains

(a) Riveted Pipe and Pipe Arches. Use pipes meeting the requirements of AASHTO M 36.

(b) Welded Pipe and Pipe Arches. Use corrugated metal pipe and pipe arches fabricated by resistance spot welding meeting the applicable requirements of AASHTO M 36.

(c) Helical Pipe. Use un-perforated helically corrugated pipe with continuous lock or welded seams meeting the applicable requirements of AASHTO M 36.

(d) Coupling Bands. Use coupling bands meeting the requirements of AASHTO M 36.

(e) Special Sections. Use special sections such as elbows, tees, and wyes meeting the same thickness as the conduit to which they are joined and meeting the applicable requirements of AASHTO M 36.

(f) Flared-End Sections. Use flared-end sections for inlet and outlet ends of pipe and pipe arch culverts meeting the applicable requirements of AASHTO M 36.

(g) Corrugated Steel Pipe for Underdrains. Use perforated galvanized pipe meeting the requirements of AASHTO M 36. Use polymer-precoated perforated underdrains meeting the requirements of AASHTO M 245

192.03 Corrugated Aluminum Alloy Culvert Pipe, Pipe Arches, and Underdrains. Use pipe meeting the requirements of AASHTO M 116.

192.04 Aluminum-Coated (Aluminized Type 2). Use pipe and coupling bands meeting the requirements of AASHTO M 36 except that they must be made from material meeting the requirements of AASHTO M 274.

192.05 Concrete Pipe and Pipe Arches

(a) Non-Reinforced Concrete Pipe. Conform to AASHTO M 86M for the diameters and strength classes specified.

(b) Reinforced Concrete Pipe. Conform to AASHTO M 170M for the diameters and strength classes specified. For precast reinforced concrete end sections, conform to cited specifications to the extent they apply.

(c) Perforated Concrete Pipe. Conform to AASHTO M 175M type 1 or 2 and AASHTO M 86M for the diameters and strength classes specified.

(d) Reinforced Arch-Shaped Concrete Pipe. Conform to AASHTO M 206M for the diameters and strength classes specified.

(e) Reinforced Elliptically-Shaped Concrete Pipe. Conform to AASHTO M 207M for the diameters, placement design (horizontal or vertical), and strength classes specified.

192.06 Precast Reinforced Concrete Box Sections. Conform to AASHTO M 251M or M 273M, as applicable, for dimensions and loading conditions specified.

192.07 Plastic Pipe. Furnish perforated and non-perforated plastic pipe conforming to the following for the sizes and types specified. For watertight joints, conform to ASTM D 3212.

(a) Smooth wall polyethylene pipe. Furnish 12 to 42-inch diameter pipe conforming to ASTM F 714 and minimum cell class, ASTM D 3350, 335434C.

(b) Corrugated polyethylene pipe. Furnish 12 to 42-inch diameter pipe conforming to AASHTO M 214M. For sanitary sewer applications, furnish AASHTO M 214M type S pipe with watertight joints.

(c) Profile wall (ribbed) polyethylene pipe. Furnish 18 to 48-inch diameter pipe conforming to ASTM F 814 and minimum cell class, ASTM D 3350, 334433C or 335434C.

(d) Corrugated polyethylene drainage tubing. Furnish 3 to 10-inch diameter tubing conforming to AASHTO M 252M.

(e) Smooth wall polyvinyl chloride pipe. Furnish 4 to 15-inch diameter pipe conforming to AASHTO M 278 and minimum cell class, ASTM D 1784, 12454B or 12364C. For sanitary sewer applications, conform to ASTM D 3034.

(f) Profile wall (ribbed) polyvinyl chloride pipe. Furnish 4 to 48-inch diameter pipe conforming to AASHTO M 304M and minimum cell class, ASTM D 1784, 12454C or 12364C. For sanitary sewer applications, conform to ASTM F 714 or F 141.

(g) Acrylonitrile-butadiene-styrene (ABS) pipe. Conform to AASHTO M 264. For perforations, conform to AASHTO M 278.

Section 193 - Fence Material

193.01 Barbed Wire. Furnish galvanized wire conforming to AASHTO M 280 or aluminum coated wire conforming to AASHTO M 305 type I.

193.02 Woven Wire. Furnish galvanized fabric conforming to AASHTO M 271 or aluminum coated fabric conforming to ASTM A 584.

193.04 Fence Posts.

(a) Wood. Conform to AASHTO M 168 and as SHOWN ON THE PLANS.

Peel all bark, except for red cedar posts and bracing which do not require peeling. Trim all knots flush with the surface and season the wood.

For dimension lumber for fences or gates, use timber that is sound, straight, and reasonably free from knots, splits, and shakes. Provide S4S finish.

(b) Concrete. Conform to FP-03, Section 601.

(c) Steel. For line fence posts, conform to AASHTO M 281.

193.05 Fence Gates. Furnish wood gates conforming to conforming to AASHTO M 168 and as SHOWN ON THE PLANS. For dimension lumber for gates, use timber that is sound, straight, and reasonably free from knots, splits, and shakes. Provide S4S finish.

193.06 Metal Beam Rail. Conform to AASHTO-AGC-ARTBA *A Guide to Standardized Highway Barrier Hardware*.

(a) Galvanized steel rail. Furnish W-beam or the beam rail elements fabricated from corrugated sheet steel conforming to AASHTO M 180 for the designated shape, class, type, and mass of coating specified.

(b) Corrosion resistant steel rail. Furnish W-beam or the beam rail elements and associated weathering steel hardware conforming to the following:

(1) Shapes and plates	ASTM A 242
(2) Rail elements	AASHTO M 180
(3) Fasteners	AASHTO M 180

193.07 Guardrail Posts. Conform to AASHTO-AGC-ARTBA "A Guide to Standardized Highway Barrier Hardware."

Do not use a wood guardrail post that has a thorough check, shake, or end slit in the same plane as, or a plane parallel to the bolt hole and extending from the top of the post to within 3 inches or the bolt hole.

For steel-backed timber rail posts, furnish 10 by 12-inch posts conforming to Subsection 710.08.

193.08 Guardrail Hardware. Conform to the AASHTO-AGC-ARTBA *A Guide to Standardized Highway Barrier Hardware*.

For angles, channels, wide flanges, and plates not contained in the above standard, conform to ASTM A 36M. For structural tubing for short steel posts, conform to ASTM A 500 or ASTM A 513 grade 1008. Galvanize soil plates and structural tubing according to AASHTO M 111. Do not punch, drill, cut, or weld the metal after galvanizing.

193.01 Temporary Plastic Fence. Furnish plastic noncorrosive fence fabricated from polyethylene (HDPE) and UV stabilized for outdoor weathering. Conform to the following:

(a) Height	48-inch min.
(b) Mesh openings	3 to 3.5 inches
(c) Color	International orange
(d) Mass	0.168 lbs./ft. min.

Section 194 - Geosynthetics

194.01 Geotextiles

(a) Use geotextiles, alone or in combination with other geosynthetics that meet the following Class B requirements for subsurface drainage as specified in AASHTO M288.

(1) Grab Strength at 50 percent elongation
ASTM D4632-11 .....…….. 355 N min.
(2) Seam Strength,
ASTM D 4632 .....…….. 310 N min.
(3) Puncture Strength,
ASTM D4833-88 .....…….. 110 N min.
(4) Mullen Burst,
ASTM D 3786-87 ..... 100 kPa min.
(5) Trap Tear Strength,
ASTM D4533-11 .....…….. 110 N min.

(b) Use geotextile meeting the following critical physical properties, unless otherwise SHOWN ON THE PLANS.

(1) Material Structure .....…….. Nonwoven (all purposes) or Slit Film (for reinforcement or separation)
(2) Polymer Composition .....……. Polypropylene
(3) Apparent Opening,
ASTM D 4751-87 .....……. .30 mm max.
(4) Permittivity, ASTM
D4411-12 .....…….. 4060 liters/minute/m^2 min.
(5) Ultraviolet Degradation .....…….. 70 at150 hours

194.02 Geonet. Use geonet meeting the following critical physical proper-ties unless otherwise SHOWN ON THE PLANS.

(a) Polymer Composition of Core
(Net or Mesh).....…….. Medium PE or HDPE
(b) Permeability……..... 0.001cm/second min.
(c) Geotextile .....……..……..…. Must meet all Section 114.01 requirements
(d) Compressive Strength
of Core, ASTM D1621.....……. 500 kPa min.
(e) Transmissivity with Gradient
at 0.1, Pressure at 10 kPa.....……..... 0.0001 m^2/second min.

194.03 Geogrids. Use geogrids made from polypropylene or coated polyester that meets the following critical physical properties.

(a) Polymer Type .....……	HDPE, Polypropylene, or Polyester with Acrylic or PVC coating
(b) Mass per Unit Area, ASTM D5261-12...	175 g/m^2 min.
(c) Maximum Aperture Size	
(1) Direction (MD) ....……	100 mm
(2) Cross-Direction (XD) .....……	75 mm
(d) Wide-Width Strip Tensile Strength at 5 percent Strain, ASTM D4515-86	
(1) Machine Direction (MD) ....……	8 kN/m min.
(2) Cross-Direction (XD) .....……	6 kN/m max.

194.04 Geocells. Use geocells meeting the following physical properties.

(a) Composition .....…….	PE or HDPE
(b) Geocell Weight expanded: .....…..	1.70 kg/m^2 min.
(c) Minimum Cell Seam Peel Strength, U.S. Army Corps of Engineers Technical Report G:-86-11, Appendix A .....……	800 N min.
(d) Expanded Dimensional Properties…...	AS SHOWN ON PLANS

194.05 Sheet Drains. Use sheet drains meeting the following critical physical properties.

(a) Core Polymer Composition ....……	Polystyrene, HDPE, or polypropylene attached
(b) Geotextile .....……	Nonwoven on one side if core solid; on both sides if core perforated. Must meet all Section 114.01 requirements
(c) Core Thickness, ASTM D5111 .……	10 mm min.
(d) Core Compressive Strength at Yield, ASTM D1621 .....……	650 kPa max.

194.06 Fasteners. Use anchors or fasteners of the design recommended by the manufacturer, and install per manufacturer's specifications.

194.07 Certification. Furnish a certificate or affidavit signed by an official from the company manufacturing the geosynthetic, verifying that the geosynthetic meets specifications.

194.08 Delivery, Storage, and Handling. During shipment and storage, wrap all geosynthetics to protect them from sunlight. When storing geosynthetics, protect them from mud, soil, dust, and debris. If materials are not installed immediately after delivery to site, do not store them in direct sunlight.

Section 195 - Material for Timber Structures

195.01 Untreated Structural Timber and Lumber. Conform to AASHTO M 168. Furnish an inspection certification from an agency accredited by the American Lumber Standards Committee for the species and grade. Mark all pieces with the inspection service, grade designation, species, and inspector identity.

Season and dry all structural timber and lumber before fabrication. Do not use material that is twisted, curved, or otherwise distorted.

Do not use boxed-heart pieces of Douglas fir or redwood in outside stringers, floor beams, caps, posts, sills, or rail posts. Boxed-heart pieces are defined as timber so sawed that at any point in the length of a sawed piece the pith lies entirely inside the four faces.

Select native log stringers from designated sites on Howard County Department of Recreation & Parks-managed land. Select the species and sizes of materials as SHOWN ON THE PLANS. Select native log stringers that are straight, sound, and free of defects. Obtain CO approval of logs and trees before felling or moving them to the site. Fell trees to prevent damage to standing timber and to minimize breakage of trees to be used. Buck logs from felled trees in such a way to minimize waste and to obtain the required length and diameter.

Peel logs, square the ends, and trim the knots and limbs flush unless otherwise SHOWN ON THE PLANS. Scatter the debris from the processing of timber away from the trail and so it will not block the trail or plug water courses.

Field treat the following untreated timber surfaces in accordance with AWPA standard M4.

(a) All ends and tops, and all contact surfaces of posts, sills, and caps.

(b) All ends, joints, and contact surfaces of bracing and truss members.

(c) All surfaces of timber bumpers and the back faces of bulkheads.

(d) All other timber that will be in contact with earth.

(e) All ends of log stringers.

195.02 Holes for Bolts, Dowels, Rods & Lag Screws. Bore all holes before preservative treating the wood.

Bore holes for round drift bolts and dowels 1/16 inch smaller in diameter than that of the bolt or dowel to be used. Ensure that the diameter of holes for square drift bolts or dowels is equal to the side dimension of the bolt or dowel.

Bore holes for machine bolts 1/16 inch larger than the diameter, except when galvanized bolts are specified. In this case, drill all holes 1/8 inch greater than the bolt size.

Bore holes for lag screws 1/16 inch larger for the shank portion of the lag screw and drill the remainder of the hole approximately 75 percent of the shank diameter to a depth of 1 inch less than the length of the screw.

195.03 Hardware. Use nails of standard form (ASTM F 1667), wood screws (ANSI/ASME B 18.6.1), hex headed bolts and nuts (ASTM A307), lag screws (ASTM A307 and ANSI/ASME B18.2.1), carriage bolts (ASTM A307), and drift pins and dowels (ASTM A307) as SHOWN ON THE PLANS.

Fabricate washers from gray iron or malleable iron castings unless structural washers are specified. Use malleable iron washers with a diameter approximately four times the bolt diameter under all bolt heads or nuts in contact with wood, unless otherwise SHOWN ON THE PLANS.

Galvanize all hardware according to AASHTO M 232 or cadmium plate all hardware according to ASTM B 766 class 12, type III, unless otherwise SHOWN ON THE PLANS, except for the glued laminated deck panel dowels. Ensure that all fasteners, including nails, spikes, bolts, washers, and timber connectors, other than malleable iron, are galvanized.

Final tighten all nuts to provide proper bearing and snug tight condition. Snug tight is defined as sufficient tightness to bring faces of members into firm contact with each other. Cut off excess bolt lengths of more than 1 inch. After final tightening, check or burr all bolts effectively with a pointing tool to prevent loosening of the nuts.

195.04 Treated Structural Timber and Lumber. Furnish wood according to Subsection 115.01. Incise all wood and make all dimensional cuts and holes in the wood before pressure treatment. Use wood preservative treatment methods meeting the requirements of AASHTO M 133 as SHOWN ON THE PLANS. Treat dimensional lumber, sawn timber and glued laminated timber members according to AWPA Standards as SHOWN ON THE PLANS.

All treated stringers, decking, running planks, and handrails shall be treated after fabrication in accordance with AWPA U1, *Use Category System,* using Pentachlorophenol or Copper Naphthenate (CuN) in Light Oil, (Type C Solvent) for Use Category UC3B.

All treated substructures (sills, backing planks, cribs, timber walls, etc.) shall be treated after fabrication in accordance with AWPA U1 *Use Category System,* using Pentachlorophenol or Copper Naphthenate (CuN) in Heavy Oil (Type A Solvent) for Use Category UC4B.

Treat timber members shall comply with the requirements of the current edition of WWPI's *Best Management Practices for the Use of Treated Wood in Aquatic Environments.*

Except for pine, incise before treatment all surfaces greater than 2 inches in width and all Douglas fir and western larch surfaces. Field treat all cuts, abrasions, drilled

holes, and recesses that occur after initial preservative treatment in accordance with the requirements specified in AWPA standard M4, *Standard for the Care of Pressure-Treated Wood Products*. Plug all unused holes with preservative-treated plugs. Perform all field-applied preservation treatment with necessary precautions so as to prevent soil and/or water contamination.

All treated timber members must have an approved American Lumber Standards Committee quality mark, individually or sealed pallets, assuring that treatment conforms to the appropriate AWPA standards.

Submit a certified copy of the lot certification, by a qualified independent inspection and testing agency, to Appointed Authority of Howard County Department of Recreation & Parks for each charge of preservative, stating penetration in inches and retention in pounds per cubic foot (assay method). In addition, provide a written certification from the producer of the treated products that "Best Management Practices for Treated Wood in Western Aquatic Environments," published by the Western Wood Preservers Institute and Canadian Institute of Treated Wood, were utilized. Include a description and appropriate documentation of the Best Management Practices used.

Handle treated timber according to the Consumer Information Sheet published by AWPA. Do not cut, frame, or bore treated timber after treatment unless approved by the CO. Handle treated timbers carefully and do not drop, damage outer fibers, or penetrate the surface with tools. Do not use cant dogs, hooks or pike poles. In coastal waters, do not cut or bore timber below the highwater mark.

195.05 Structural Glued Laminated Timber. Furnish structural glued laminated timber according to American National Standard, "Standard Specifications for Structural Glued Laminated Timber of Softwood Species" (ANSI 117). Fabricate according to the combination and grade as indicated in the contract. Fabricate structural glued laminated members according to American National Standard, "Standard for Wood Products - Structural Glued Laminated Timber" (ANSI A110.1).

Manufacture members as industrial appearance grade for wet use conditions, using a phenol-resorcinol resin type of adhesive throughout. Use only single- or multiple-piece laminations with bonded edge joints.

Section 196 - Gabion and Revet Mattress Material.

196.01 Basket Mesh. Twist or weld the mesh from galvanized steel wire conforming to ASTM A 641, class 3 or aluminized steel wire conforming to ASTM A 801. Use wire with a minimum tensile strength of 60,000 pounds per square inch when tested according to AASHTO T 244. The galvanized or aluminized coating may be applied after mesh fabrication. Make the mesh openings with a maximum dimension less than 4½ inches, an area less than 10 square inches, and a size less than the gabion or revet mattress rock to be used with the mesh.

(a) Gabion baskets (1 foot or greater in the vertical dimension). Fabricate the mesh for galvanized or aluminized coated baskets from nominal-sized 0.12-inch or greater diameter wire and fabricate the mesh for polyvinyl chloride coated baskets from nominal-sized 0.11-inch or greater diameter wire.

(1) Twisted wire mesh. Form the mesh in a uniform hexagonal pattern with non-raveling double twists. For galvanized or aluminized coated baskets, tie the perimeter edges of the mesh for each panel to a 0.15-inch or greater diameter selvedge wire. For polyvinyl chloride coated baskets, tie the perimeter edges of the mesh for each panel to a 0.13-inch or greater diameter selvedge wire. Make the selvedge at least the same strength as the body of the mesh. Furnish selvedge wire from the same type of material used for the wire mesh.

(2) Welded wire mesh. For galvanized or aluminized coated baskets, weld each connection to obtain minimum average weld shear strength of 585 pounds with no value less than 450 pounds. For polyvinyl chloride coated baskets, weld each connection to obtain minimum average weld shear strength of 472 pounds with no value less than 360 pounds.

Fabricate gabion baskets in the dimensions required with a dimension tolerance of ±5 percent. Where the length of the basket exceeds 1.5 times its width, equally divide the basket into cells less than or equal to the basket width using diaphragms of the same type and size mesh as the basket panels. Prefabricate each basket with the necessary panels and diaphragms secured so they rotate into place.

(b) Revet mattresses (less than 1 foot in the vertical dimension). Fabricate the mesh from nominal-sized 0.086-inch or greater diameter wire.

(1) Twisted wire mesh. Form the mesh in a uniform hexagonal pattern with non-raveling double twists. Tie the perimeter edges of the mesh for each panel to a 0.11-inch or greater diameter selvedge wire. Make the selvedge at least the same strength as the body of the mesh. Furnish selvedge wire from the same type of material used for the wire mesh.

(2) Welded wire mesh. Weld each connection to obtain minimum average weld shear strength of 212 pounds with no value less than 225 pounds.

Fabricate revet baskets in the dimensions required with a dimension tolerance of ±5 percent in length and width and ±10 percent in height. Where the length of the basket exceeds 0.5 times its width, equally divide the basket into cells less than or equal to 0.5 times the

basket width using diaphragms of the same type and size mesh as the mattress panels. Prefabricate each basket with the necessary panels and diaphragms secured so they rotate into place.

(c) Epoxy or Polyvinyl chloride coated baskets. Use either a fusion bonded or extruded coating to coat the galvanized or aluminized mesh.

Make the coating at least 0.0625 inches in thickness for epoxy and 0.125-inch thickness for PVC. Make the color black or gray and conform to the following:

(1) For epoxy coating meet:

- Abrasion resistance, ASTM D 1242, maximum weight loss 0.11 g.
- Salt crock, ASTM G 8, maximum disbondment diameter 1.75 inch, and at 10 days, 1.5 volts, and 3 percent solution.
- Chemical resistance, ASTM G 20, with 45 days at 70°F, 3 molar CaCl, 3 molar NaOH, saturate $Ca(OH)^2$, and no coating loss.
- Weatherometer, ASTM G 23, with a surface chalk and 2,000 hours.

(2) For polyvinyl coating meet:

▪ Specific gravity, ASTM D 712	1.20 to 1.40
▪ Tensile strength, ASTM D 638 per square inch	2,300 pounds min.
▪ Modulus of elasticity, ASTM D 638 per square inch	2,000 pounds min. at 100 strain
▪ Hardness — shore "A", ASTM D 2240	75 min.
▪ Brittleness temperature, ASTM D 746	16 ºF max.
▪ Abrasion resistance, ASTM D 1242, method B at 200 cycles, CSI-A abrader tape, 80 grit	12% max. mass loss
▪ Salt spray (ASTM B 117) and ultraviolet light exposure (ASTM D 1411 and G 23 using apparatus type E and 145 ºF) for 3000 hours	No visual effect *(c)* $\Delta < 6\%$ *(d)* $\Delta < 25\%$ *(e)* $\Delta < 25\%$ *(h)* $\Delta < 10\%$
▪ Mandrel bend, 360º bend at 0 ºF around a mandrel 10 times the wire diameter	No breaks or cracks in coating

196.02 Permanent fasteners.

(1) Lacing wire. Furnish nominal-sized 0.086-inch diameter wire of the

same type, strength, and coating as the basket mesh.

(2) Spiral binders. Form with wire having at least the same diameter, type, strength, and coating as the basket mesh.

(3) Alternate fasteners. Furnish fasteners according to the basket manufacturer's specification that remain closed when subjected to a 585-pound tensile force while confining the maximum number of wires to be confined in the gabion structure or revet mattress. Submit installation procedures and fastener test results.

196.03 Internal connecting wire. Furnish lacing wire as described in (b)(1) above or alternate stiffeners according to the basket manufacturer's specification.

STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND TRAIL BRIDGES ON HOWARD COUNTY DEPARTMENT OF RECREATION & PARKS PROJECTS

U.S. Customary Units

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http://www.fs.fed.us/t-d/

Pay Item	Description	Pay Unit
10701	Mobilization	LS
11101	Excavation	L.F.
11102	Excavation	mi
11103	Excavation	LS
11104	Borrow	C.Y.
11105	Borrow	LS
11106	Existing Trail Restoration	L.F.
11107	Existing Trail Restoration	LS
11108	Slide Maintenance	L.F.
11101	Slide Maintenance	LS
11110	Slough and Berm Maintenance	L.F.
11111	Slough and Berm Maintenance	LS
11115	Obliteration of Abandoned Trail	LS
11116	Obliteration of Abandoned Trail	L.F.
11117	Closure	LS
11118	Closure	L.F.
11111	Drainage Structures, Removal	EA
11120	Scarify	L.F.
11121	Trench Backfill	L.F.
11122	Contour Restoration	L.F.
11123	Retainers	L.F.
11201	Clearing and Grubbing	mi
11202	Clearing and Grubbing	L.F.
11203	Clearing and Grubbing	LS
11204	Clearing	mi
11205	Clearing	L.F.
11206	Clearing	LS
11207	Grubbing	mi
11208	Grubbing	L.F.
11201	Grubbing	LS

11210	Brush Cutting.....…….....	mi
11211	Brush Cutting .....…….	L.F.
11212	Brush Cutting .....……	LS
11213	Logging Out .....…… ….	mi
11214	Logging Out ____ Diameter.....…….	EA
11215	Logging Out .....……..	L.F.
11216	Logging Out .....……..	LS
11217	Hazard Tree Removal .....……..	EA
11218	Loose Rock Removal .....……..	L.F.
11211	Loose Rock Removal ……	LS
11220	Rock and Root Removal.....……..	L.F.
11221	Rock and Root Removal ……	LS

11301	Aggregate Surfacing, Grading_____.....…….	L.F.
	Compaction Method_____	
11302	Aggregate Surfacing, Grading_____.....…...	C.Y.
	Compaction Method_____	
11303	Aggregate Surfacing, Grading_____.....…….	Ton
	Compaction Method_____	
11304	Aggregate Surfacing, Grading_____.....……..	LS
	Compaction Method_____	
11305	Base Course, Grading_____.....……..	L.F.
	Compaction Method_____	
11306	Base Course, Grading_____.....……..……..	C.Y.
	Compaction Method_____	
11307	Base Course, Grading_____.....……..……..	Ton
	Compaction Method_____	
11308	Base Course, Grading_____.....…….	LS
	Compaction Method_____	
11301	Watering.....…….	LS
11310	Hot Asphalt Plant Mix Trail Surfacing .....……	S.Y.
11311	Hot Asphalt Plant Mix Trail Surfacing .....……...	Ton
11312	Cold Asphalt Mix Trail Surfacing .....…...	S.Y.
11313	Cold Asphalt Mix Trail Surfacing .....…...	Ton

11314	Hardened Surfacing, Type_____ .....……...	S.F.
11315	Hardened Surfacing, Type_____ .....……...	L.F.
11316	Grid Pavement Units, Type_____ .....……...	S.F.
11317	Grid Pavement Units, Type_____ .....……...	L.F.
11318	Riprap Surfacing, Type_____ .....……...	S.F.
11311	Riprap Surfacing, Type_____ .....……...	L.F.
11320	Surface Maintenance, Type_____ .....……...	S.F.
11321	Surface Maintenance, Type_____.....……...	L.F.
11401	Climbing Turn .....…….	L.F.
11402	Climbing Turn.....…….	EA
11403	Climbing Turn Maintenance.....…….	LS
11501	Rubble Rock Section.....…….	L.F.
11502	Rubble Rock Section Maintenance .....…….	L.F.
11601	Trail Turnout .....…….	L.F.
11602	Trail Turnout .....…….	EA
11603	Trail Passing Section.....……..	L.F.
11604	Trail Passing Section.....……..	EA
11605	Trail Turn Maintenance.....……..	LS
11606	Trail Passing Section Maintenance ….....……...	LS
11701	Ford, Type _____.....…….	EA
11702	Ford, Type _____.....…….	LS
11702	Ford Maintenance…….....…….	LS
11801	Rock Foundation, Type _____…….	S.Y.
11802	Rock Foundation, Type _____…….	L.F.
11803	Rock Foundation, Type _____…….	Ton
11804	Rock Foundation, Type _____…….	LS
11805	Geosynthetics, Type _____.....…….	S.Y.
11806	Geosynthetics, Type _____.....…….	LS
11807	Gabion Basket Foundation, Type _____..	L.F.

11808	Gabion Basket Foundation, Type _____..	LS
11801	Gabion Baskets, galvanized or aluminized coated ...	S.F.
11810	Gabion Baskets, galvanized or aluminized coated ...	C.F.
11811	Gabion Baskets, epoxy or polyvinylchloride coated ..	S.F.
11812	Gabion Baskets, epoxy or polyvinylchloride coated ..	C.F.
11813	Crib Foundation, Type_____……..	L.F.
11814	Crib Foundation, Type_____……..	LS
11815	Geosynthetic Foundation, Type_____.....……..	L.F.
11816	Geosynthetic Foundation, Type_____.....……..	LS
11817	Corduroy Foundation, Type_____.....……..	L.F.
11818	Corduroy Foundation, Type_____.....……..	LS
11811	Foundation Maintenance.....…….	L.F.
11820	Foundation Maintenance.....…….	LS
12101	_____inches Corrugated, Type _____	
	Pipe -_____inches Thickness……...……..	L.F.
12102	_____inches Non-Corrugated, Type _____	
	Pipe -_____inches Thickness ……	L.F.
12103	_____inches End Section, Type _____ ……..….	EA
12104	Culvert Headwall ……..……	EA
12105	Rock Culvert ……..….....	L.F.
12106	Rock Culvert ……..……	EA
12107	Treated Timber Box Culvert ……	L.F.
12108	Treated Timber Box Culverts ……	EA
12101	Open-Top Drain ……	L.F.
12110	Open-Top Drain ……	EA
12111	Bottomless Arch Culvert ……	L.F.
12112	Bottomless Arch Culvert ……	EA
12113	Log Culvert ……	L.F.
12114	Log Culvert ……	EA
12115	Culvert Maintenance ……..……	LS
12201	Rock Waterbar ……..……..	EA
12202	Log Waterbar …….	EA

12203	Treated Timber Waterbar ……..	EA
12204	Belted Waterbars ……..……..	EA
12203	Waterbar Maintenance…….……..…..	EA
12301	Rock Spillway	EA
12302	Rock Spillway .....….....	S.Y.
12303	Rock Spillway Maintenance.....….....	EA
12304	Rock Spillway Maintenance.....….....	S.Y.
12401	Rock Underdrain . ……..…….	L.F.
12402	Rock Underdrain, Type_____,	
	Drain Pipe _____inch diameter …….	L.F.
12403	Sheet Underdrain .....…..	L.F.
12404	Sheet Underdrain .....…….…..…..	LS
12405	Sheet Drain with Outlet Pipe .....…..	L.F.
12406	Sheet Drain with Outlet Pipe ……..….…...	LS
12407	Underdrain Maintenance .....……..	L.F.
12408	Underdrain Maintenance .....……..……..	LS
12501	Side Ditch .....…….	L.F.
12502	Side Ditch .....……	LS
12503	Leadoff Ditch .....……	L.F.
12504	Ditch Maintenance …….....….....	L.F.
12601	Berm …….....…….	L.F.
12602	Berm …….....……	LS
12603	Berm Maintenance …….....….....	L.F.
12701	Drain Dip .....……..	EA
12706	Drain Dip Maintenance .....….	EA
12801	Check Dam, Type _____.....……..	EA
12801	Check Dam Mainteance .....……..	EA

13101	Switchback, Type _____.....	EA
13102	Switchback Maintenance	EA
13201	Turnpike, Type _____.....	L.F.
13202	Turnpike, Type _____.....	LS
13203	Turnpike Maintenance	L.F.
13204	Turnpike Maintenance	LS
13301	Side Barrier, Type_____	L.F.
13302	Side Barrier, Type _____	LS
13303	Side Barrier Maintenance, Type _____...	L.F.
13304	Side Barrier Maintenance, Type _____....	LS
13401	Puncheon, Type_____.....	L.F.
13402	Puncheon, Type_____.....	LS
13403	Puncheon Maintenance, Type _____.....	L.F.
13404	Puncheon Maintenance, Type_____.....	LS
13501	Retaining Wall, Type _____.....	L.F.
13502	Retaining Wall, Type_____.....	EA
13503	Retaining Wall, Type_____.....	LS
13504	Gabion Baskets, galvanized or aluminized coated ..	S.F.
13505	Gabion Baskets, epoxy or polyvinylchloride coated .	S.F.
13506	Gabion Baskets, galvanized or aluminized coated ...	C.F.
13507	Gabion Baskets, epoxy or polyvinylchloride coated .	C.F.
13508	Retaining Wall Maintenance, Type_____ ...	L.F.
13501	Retaining Wall Maintenance, Type_____ ...	LS
13601	Stairway, Type_____.....	L.F.
13602	Stairway, Type_____.....	EA
13603	Stairway, Type_____.....	LS
13604	Stairway Maintenance …….....	L.F.
13604	Stairway Maintenance …….....	LS

13701	Railing System, Type_____.....	L.F.
13702	Railing System, Type_____.....	LS
13703	Railing System Maintenance …….....……	L.F.
13704	Railing System Maintenance …….....……	LS
13801	Boardwalk, Type_____.....	L.F.
13802	Boardwalk, Type_____.....……	LS
13803	Boardwalk Maintenance…….....……	L.F.
13804	Boardwalk Maintenance…….....……	LS
14101	Fence, Type_____.....	L.F.
14102	Fence, Type_____.....……	LS
14103	Remove and Reset Fence……..	L.F.
14104	Remove and Reset Fence……..	LS
14103	Fence Maintenance…….....…….……	L.F.
14104	Fence Maintenance…….....…….……	LS
14201	Gate, Type_____.....	EA
14202	Gate Maintenance…….....……	EA
14301	Cattle Guard, Type_____.....	EA
14302	Cattle Guard Maintenance…….....……	EA
14401	Stile, Type_____.....	EA
14402	Stile Maintenance…….....……	EA
14501	Bollard, Type_____.....	EA
14502	Bollard Maintenance…….....……	EA
15101	Install Sign Panel, Type_____ Howard County Department of Recreation & Parks-Furnished .....……..	EA
15102	Furnish and Install Sign Panel, Type_____…..	EA

15103	Treated Posts,	
	Length_____- Dia._____ ….....…….	EA
15104	Native Posts	
	Length_____ .....…….	EA
15105	Steel Posts, Type_____	
	Length_____, _____Gauge ….....…....	EA
15106	Steel Tubing Posts, Type_____	
	Length_____, _____Gauge .....……	EA
15107	Plastic Posts, Type_____	
	Length_____…….....…….	EA
15108	Composite Posts, Type_____	
	Length_____.....…….	EA
15101	Sign Repair.....…….	EA
15110	Sign Replacement .....…….	EA
15111	Post Replacement.....…….	EA
15201	Route Marker, Type_____.....	EA
15202	Route Marker Maintenance…….....……	EA
15301	Reassurance Marker, Type_____.....	EA
15302	Reassurance Marker Maintenance…….....……	EA
15401	Mileage Marker, Type_____.....	EA
15402	Mileage Marker Maintenance…….....……	EA
15501	Cairn, Type_____.....	EA
15502	Cairn Maintenance…….....……	EA

16101	Single Log Stringer Trail Bridge, Length _____..	EA
16102	Single Log Stringer Trail Bridge, Length _____..	LS
16103	Single Log Stringer Trail Bridge, Length _____..	L.F.
16104	Multiple Log Stringer Trail Bridge, Length _____..	EA
16105	Multiple Log Stringer Trail Bridge, Length _____..	LS
16106	Multiple Log Stringer Trail Bridge, Length _____..	L.F.
16201	Sawn Timber Stringer Trail Bridge, Length _____..	EA
16202	Sawn Timber Stringer Trail Bridge, Length _____..	LS
16203	Sawn Timber Stringer Trail Bridge, Length _____..	L.F.
16204	Longitudinal Nail-Laminated Timber Trail Bridge, Length _____.....	EA
16205	Longitudinal Nail-Laminated Timber Trail Bridge, Length _____.....	LS
16206	Longitudinal Nail-Laminated Timber Trail Bridge, Length _____.....	L.F.
16301	Glulam Stringer Trail Bridge, Length _____…..	EA
16302	Glulam Stringer Trail Bridge, Length _____…..	LS
16303	Glulam Stringer Trail Bridge, Length _____…..	L.F.
16304	Longitudinal Glulam Deck Panel Trail Bridge, Length _____.....	EA
16305	Longitudinal Glulam Deck Panel Trail Bridge, Length _____.....	LS
16306	Longitudinal Glulam Deck Panel Trail Bridge, Length _____.....	L.F.
16401	Prefabricated Trail Bridge, Type_____, Length_____.....….	EA
16402	Prefabricated Trail Bridge, Type_____, Length_____.....….	LS
16403	Prefabricated Trail Bridge, Type_____, Length_____.....….	L.F.

16501	Trail Bridge Substructure, Type_____ ..	EA
16502	Trail Bridge Substructure, Type_____ ..	LS
16503	Trail Bridge Substructure, Type_____ ..	L.F.
16601	Trail Bridge Deck Replacement …….	S.Y.
16602	Trail Bridge Deck Replacement …….	L.F
16603	Trail Bridge Deck Replacement ……...…….	LS
16604	Trail Bridge Railing Replacement ……..…….	L.F.
16605	Trail Bridge Railing Replacement ……...…….	LS
16606	Trail Bridge Maintenance, Type_____….	L.F.
16607	Trail Bridge Maintenance, Type_____….	LS
18101	Seeding .....…….	acre
18102	Seeding .....…….	LS
18103	Fertilizer.....…….	LBS
18104	Fertilizer.....…….	LS
18105	Mulch .....…….	Tons
18106	Mulch .....…….	LS
18107	Seeding, Mulch, and Fertilizer .....…..	LS
18201	Erosion Control Blanket, Type.....…….…..	acre
18202	Erosion Control, Type_____.....…..……..	LS
18301	Removal of Structures and Obstructions .....…	LS
18302	Removal of _____ ….……	EA
18303	Removal of _____ ……	L.F.
18304	Individual Removal and Disposal .....…..	EA
18305	Individual Removal and Disposal .....…..	LS

[i]For complete history and latest updates related to the FTDS, see the Federal Geographic Data Committee (FGDC) link; http://www.fgdc.gov/standards/projects/FGDC-standards-projects/trail-data-standard/trail-data-standards

[ii] The USDA Forest Service Standard Trail Specifications were revised and developed with extensive involvement and expertise from Jonathan Kempff, P.E. (Professional Engineer), Forest Service National Trail Technical Team; and James Scott Groenier, P.E., and Deb Mucci, Draftsperson, both with Forest Service Technology and Development Program. This project was sponsored and funded in large part by the Federal Highway Administration, Recreational Trails Program. http://www.fs.fed.us/recreation/programs/trail-management/trailplans/