

Section 910

Earthwork

Section 911—Clearing and Grubbing

Description

911.01 Work. 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 the treatment of damaged trees.

Construction

911.02 Clearing Limits. Clear to the dimensions SHOWN ON THE DRAWINGS or 300 mm beyond the fill and backslope catch points, whichever is greater.

911.03 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 DRAWINGS.
- (b) Live brush, herbaceous plants, and trees between the trailway and the clearing limits that are less than 300 mm in height and less than 10 mm in diameter at ground line.

Except as provided above, cut all limbs and branches more than 10 mm 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 DRAWINGS.

Fall and limb designated trees.

911.04 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 DRAWINGS. Remove and dispose of trees with major roots exposed by construction that are rendered unstable.

911.05 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.

911.06 Disposal of Clearing Slash, Logs, Stumps, Brush, and Roots.

Limb all felled trees to a 100-mm diameter top, including designated trees outside the clearing limits.

Do not place clearing slash, logs, stumps, brush, or roots in concentrated piles. Scatter all logs, limbs, lopped tops, brush, and grubbed stumps and roots below the trailway and outside the clearing limits, with the following exceptions:

- (a) Where the sideslope above the trail is less than 10 percent, material may be scattered above the trail.
- (b) Logs may be left on the uphill side of the trail if they are placed so that they will not move into the clearing limits.

Do not place clearing and grubbing debris in water courses, snow ponds, lakes, meadows, or in locations where it could impede the flows to, through, or from drainage structures.

Measurement

911.07 Method. Measure the quantities in accordance with Section 906.

Payment

911.08 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
911(01) Clearing and Grubbing	km
911(02) Clearing and Grubbing	m
911(03) Clearing and Grubbing	LS
911(04) Clearing	km
911(05) Clearing	m
911(06) Clearing	LS
911(07) Grubbing	km

911(08) Grubbing..... m

911(09) Grubbing..... LS

911(10) Individual Removal and Disposal EA

911(11) Individual Removal and Disposal LS

Section 912—Excavation and Embankment

Description

912.01 Work. Work consists of the excavation and placement of excavated material, regardless of its nature, from within the railway 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 shallow stream fords and gully crossings, talus and rubble rock sections, and climbing turns.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

964—Geosynthetics

Construction

912.03 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 railway limits and uniformly spread outside the clearing limits, not more than 100 mm in depth (unless otherwise SHOWN ON THE DRAWINGS). 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 100 mm. This includes any material removed in the grubbing operation and deposited in the same area.

Place rocks over 100 mm in greatest dimension not used in construction beyond the hinge point on the downslope side. Place rocks so that the tops are at least 150 mm lower than the trailbed surface. Ensure that no blockage of drainage or creation of a windrow effect occurs.

912.04 Trailway Excavation and Embankment. Minor deviations of \pm 300 mm in vertical alignment and 1 m in horizontal alignment with smooth transitions of at least 10 m on each side of the deviation are acceptable unless otherwise SHOWN ON THE DRAWINGS.

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 912.03.

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.

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

912.06 Talus or Rubble Rock Sections. Through talus or rubble rock slide areas, fill all voids with suitable material to the depth SHOWN ON THE DRAWINGS. Use cap rocks that weigh a minimum of 60 kg and have a length of at least twice their width. At least 50 percent of all handplaced outer rocks should weigh a minimum of 60 kg. Construct tread by building out rather than by removing material from the inner bank.

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

912.08 Geosynthetics. Where SHOWN ON THE DRAWINGS, place geosynthetics flat and parallel to centerline of the trail before placing embankment. Overlap geosynthetics a minimum of 600 mm. Install anchors or fasteners as recommended by the geosynthetic manufacturer.

Measurement

912.09 Method. Measure the quantities in accordance with Section 906.

Payment

912.10 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
912(01) Excavation	m
912(02) Excavation	km
912(03) Excavation	LS
912(04) Trail Turnout	m
912(05) Trail Turnout	EA
912(06) Rolling Dip	EA
912(07) Shallow Stream Ford and Gully Crossing Structure	EA
912(08) Shallow Stream Ford and Gully Crossing Structure	LS
912(09) Ditch	m
912(10) Borrow	m ³
912(11) Borrow	LS
912(12) Grade Dip	EA
912(13) Geosynthetics, Type _____	m ²
912(14) Trail Passing Section	m
912(15) Talus or Rubble Rock Section	m

Section 913—Turnpike

Description

913.01 Work. Work consists of constructing turnpike sections, including excavation, embankment, retainers, geosynthetics, backfill, and drainage features.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

964—Geosynthetics

Construction

913.03 Excavation and Embankment. Perform excavation and embankment in accordance with Section 912.

913.04 Retainers. Place log, sawn timber, or rock retainers in a continuous row along each shoulder of the turnpike section as SHOWN ON THE DRAWINGS. Bed the parallel retainers so they are stable and at approximately the same top elevation. When retainers are constructed of logs or sawn timber use lengths greater than or equal to 3 m.

913.05 Geosynthetics. Where SHOWN ON THE DRAWINGS, place geosynthetics flat and parallel to centerline of the trail before placing embankment. Overlap geosynthetics a minimum of 600 mm. Install anchors or fasteners as recommended by the geosynthetic manufacturer.

913.06 Backfill. Backfill and compact with suitable material.

913.07 Drainage. Construct side ditches, cross-drainage, and culverts at locations SHOWN ON THE DRAWINGS 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 DRAWINGS.

Measurement

913.08 Method. Measure the quantities in accordance with Section 906.

Payment

913.09 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
913(01) Turnpike—Retainer, Type _____	m
913(02) Side Ditch	m
913(03) Geosynthetics, Type _____	m ²
913(04) Leadoff Ditches	m
913(05) Borrow	m ³
913(06) Borrow	LS

Section 914—Switchbacks

Description

914.01 Work. Work consists of construction of switchbacks, including excavation, associated barriers, ditches, retaining walls, and approach sections.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

Construction

914.03 Excavation and Embankment. Perform excavation and embankment in accordance with Section 912.

914.04 Retaining Walls. When SHOWN ON THE DRAWINGS, construct retaining walls in accordance with Section 934 or Section 935.

914.05 Barriers. When SHOWN ON THE DRAWINGS, construct barriers at each switchback in accordance with Section 953.

914.06 Ditches. When SHOWN ON THE DRAWINGS, construct ditches in accordance with Section 912.07.

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

Measurement

914.08 Method. Measure the quantities in accordance with Section 906.

Payment

914.09 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

PAY ITEM

PAY UNIT

914(01) Switchbacks, Type _____ Ea

914(03) Ditch m

914(05) Barriers, Type _____ m

914(06) Retaining Walls, Type _____ m²

Section 915—Existing Trail Restoration

Description

915.01 Work. 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.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

Construction

915.03 Clearing and Grubbing. Clear and grub in accordance with the requirements of Section 911 and as SHOWN ON THE DRAWINGS.

915.04 Excavation and Embankment. Excavate and place all excavated material in accordance with the requirements of Section 912 and as SHOWN ON THE DRAWINGS.

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

915.06 Slough and Berm Removal and Excess Material. Use suitable slough and berm material within the trailway to restore the trailbed as SHOWN ON THE DRAWINGS. Place all unsuitable and excess material beyond the downslope edge of the trailbed and uniformly spread to a depth not exceeding 100 mm 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 1.5 m from the outslope edge of finished tread unless otherwise DESIGNATED ON THE GROUND or SHOWN ON THE DRAWINGS.

915.07 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 915.06. Compact and shape as SHOWN ON THE DRAWINGS.

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

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

Restore rock spillways in accordance with Section 923 and as SHOWN ON THE DRAWINGS.

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

915.10 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 DRAWINGS and at locations STAKED ON THE GROUND.

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

915.11 Switchbacks. Restore switchbacks in accordance with Section 914 and as SHOWN ON THE DRAWINGS.

915.12 Waterbars. Restore waterbars in accordance with Section 922 and as SHOWN ON THE DRAWINGS. Reestablish drainage by removing accumulated material and replacing loose or missing rocks, unsuitable logs, and deteriorated rubber belting.

915.13 Turnpikes. Restore turnpikes in accordance with Section 913 and as SHOWN ON THE DRAWINGS by replacing missing, rotten, or loose retainer logs and stakes, or missing or loose retainer rocks. Backfill with suitable material.

915.14 Trail Structures. Restore all trail structures at locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND.

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

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

Measurement

915.16 Method. Measure the quantities in accordance with Section 906.

Payment

915.17 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
915(01) Trail Restoration.....	m
915(02) Trail Restoration.....	LS
915(03) Check Dams	EA
915(04) Borrow	m ³

Section 916—Removal of Structures and Obstructions

Description

916.01 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

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

Remove existing structures down to the natural stream bottom, and remove parts outside the water course to at least 300 mm 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. Matchmark steel and/or wood members and prepare drawings showing the structural location of each member.

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

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

916.05 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 Government-administered lands and placing in approved waste disposal sites.

Measurement

916.06 Method. Measure the quantities in accordance with Section 906.

Payment

916.07 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for the PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
916(01) Removal of Structures and Obstructions	LS
916(02) Removal of _____	EA
916(03) Removal of _____	m

Section 920

Drainage

Section 921—Culverts

Description

921.01 Work. 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.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

963—Drainage Pipe

964—Geosynthetics

Construction

921.03 Excavation and Embankment. Perform excavation and embankment in accordance with Section 912.

921.04 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.

921.05 Pipe Culverts. Install pipe culverts at the locations SHOWN ON THE DRAWINGS 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 75 mm to a minimum depth of 150 mm 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 75 mm 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.

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

Firmly embed selected sidewall rocks below the natural ground or streambed as SHOWN ON THE DRAWINGS. 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.

921.07 Treated Timber Box Culverts. Install box culverts at the locations SHOWN IN THE DRAWINGS 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 75 mm in size.

921.08 Backfilling Culverts. Backfill and compact around culverts with suitable material that is free of rocks over 75 mm. Provide for the cover height as SHOWN ON THE DRAWINGS.

921.09 Headwalls. Install headwalls at the locations SHOWN ON THE DRAWINGS 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 100 mm horizontally from vertical joints in adjoining courses.

Measurement

921.10 Method. Measure the quantities in accordance with Section 906.

Payment

921.11 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
921(01)____mm Corrugated, Type ____ Pipe - ____mm Thickness	m
921(02)____mm Non-Corrugated, Type ____ Pipe - ____mm Thickness	m
921(03)____mm End Section, Type ____	EA
921(04) Rock Culverts	EA
921(05) Rock Culverts	m
921(06) Treated Timber Box Culverts	EA

Section 922—Waterbars

Description

922.01 Work. This work consists of installing waterbars, including excavation and backfill; selecting log and rock materials; and furnishing treated timber, belting, and other materials.

Materials

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

961— Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

Use rubber belting that is single-ply, nonreinforced material 10 mm to 12 mm thick.

Construction

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

922.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 912. Around waterbars, backfill and compact suitable material that is free of rocks larger than 75 mm 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.

922.05 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.

922.06 Log or Treated Waterbar. Embed peeled native logs or treated timbers into the trailbed to form a waterbar across the trail. Use anchor methods as SHOWN ON THE DRAWINGS at log or timber ends outside the trail tread. Predrill 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.

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

Measurement

922.08 Method. Measure the quantities in accordance with Section 906.

Payment

922.09 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
922(01) Native Log Waterbar	EA
922(02) Rock Waterbar	EA
922(03) Treated Timber Waterbar	EA
922(04) Rubber Belting Waterbar	EA

Section 923—Rock Spillways

Description

923.01 Work. This work consists of constructing rock spillways, including selecting, excavating, and placing rock material.

Materials

923.02 Requirements. Use materials meeting the requirements of Section 961.

Construction

923.03 General. Construct rock spillways at locations SHOWN ON THE DRAWINGS 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.

923.04 Excavation. Excavate for the spillway in accordance with Section 912. Construct a horizontal bench into undisturbed material and compact it as a foundation for the toe of the rock spillway.

923.05 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

923.06 Method. Measure the quantities in accordance with Section 906.

Payment

923.07 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
923(01) Rock Spillway	EA
923(02) Rock Spillway	m ²

Section 924—Underdrain

Description

924.01 Work. This work consists of constructing underdrains and associated drainage ditches, including excavation and backfill and obtaining and installing filter rock, geosynthetics, and drain pipe with necessary fittings.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

963—Drainage Pipe

964—Geosynthetics

Construction

924.03 General. Construct underdrains at locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND.

924.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 912.

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

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

Measurement

924.07 Method. Measure the quantities in accordance with Section 906.

Payment

924.08 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

PAY ITEM

PAY UNIT

924(01) Rock Underdrain m

924(02) Rock Underdrain, Type ____ Drain Pipe m
 ____ mm diameter

924(03) Geosynthetic, Type ____ m²

Section 930

Structures

Section 931—Log Stringer Bridge

Description

931.01 Work. This work consists of constructing log stringer bridges, including mud sills, bulkheads, rails, curbs, decking, excavation, backfill, and approach fills as SHOWN ON THE DRAWINGS.

Materials

931.02 Requirements. The location of trees for native timber materials will be SHOWN ON THE DRAWINGS and DESIGNATED ON THE GROUND. Use materials meeting the requirements of Section 962.

Construction

931.03 General. Construct log stringer bridges at locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND. Predrill holes for fasteners when necessary to prevent splitting and drive spikes flush. Use washers with lag screws and bolts.

931.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 912.

931.05 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 150 mm.

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.

931.06 Stringers. Fasten each log stringer to each mud sill with drift pins that penetrate a minimum of 100 mm into the mud sill.

When plank decking is used, hew the top surfaces of log stringers up to 50 mm deep, as necessary, to provide bearing surfaces for deck planks.

931.07 Decking. Spike decking evenly at right angles to each stringer, unless otherwise SHOWN ON THE DRAWINGS.

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 40 and 60 mm 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.

931.08 Curbs. Construct curbs with logs or sawn timber as SHOWN ON THE DRAWINGS. Use lengths greater than or equal to 3 m and splice with a 150-mm half-lap joint at a spacer location. Match diameters of logs at lap joints and trim excess to provide a smooth transition between logs.

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

Finish curbs smooth and free from splinters and sharp projections.

931.09 Handrails. Construct rails with logs or sawn timber as SHOWN ON THE DRAWINGS and use lengths greater than or equal to 3 m.

When rails are constructed of logs, splice them with a 150-mm half-lap joint at a post location. Notch surfaces of posts and rails 15 mm at connections. Match diameters of rails at lap joints and trim excess to provide a smooth transition between rails. Counterbore lag screws in rails so that heads are flush with the surface. Counterbore lag screws in all round members to provide full bearing for washers.

When rails 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 to each post with two 16d nails and fasten each top cap to the top rail with 16d nails spaced a maximum of 400 mm on center. Finish handrails and posts smooth and free from splinters and sharp projections.

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

Measurement

931.11 Method. Measure the quantities in accordance with Section 906.

Payment

931.12 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

PAY ITEM

PAY UNIT

931(01) Log Stringer Bridge, Type_____ EA

931(02) Log Stringer Bridge, Type_____ LS

931(03) Log Stringer Bridge, Type_____ m

931(04) Approach Fills m

Section 932—Puncheon

Description

932.01 Work. Work consists of constructing puncheon, including excavation.

Materials

932.02 Requirements. Use materials meeting the requirements of Section 962. The location of trees for native timber materials will be SHOWN ON THE DRAWINGS and DESIGNATED ON THE GROUND.

Construction

932.03 General. Construct puncheon at locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND. Predrill holes for fasteners when necessary to prevent splitting and drive spikes flush.

932.04 Excavation and Embankment. Perform excavation and embankment in accordance with the requirements of Section 912 and as SHOWN ON THE DRAWINGS.

932.05 Mud Sills. Bury mud sills to a depth that provides a finished walking surface that is less than or equal to 1 m 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.

932.06 Log Stringers. Use logs greater than or equal to 3 m in length. Use logs greater than or equal to 200 mm in diameter before the top is flattened. Fasten each stringer to each mud sill with drift pins that penetrate a minimum of 100 mm into the mud sill unless otherwise SHOWN ON THE DRAWINGS.

When plank decking is used, hew the top surfaces of log stringers up to 50 mm deep, as necessary, to provide bearing surfaces for deck planks.

932.07 Sawn Timber Stringers. Use sawn timber greater than or equal to 3 m in length. Fasten each stringer to each mud sill with drift pins that penetrate a minimum of 100 mm into the mud sill unless otherwise SHOWN ON THE DRAWINGS.

932.08 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 6 percent and where no change in grade exceeds 6 percent unless otherwise SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND. Construct the finished walking surface of the puncheon flush with the trail grade at each end of the structure.

932.09 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 a 50-mm-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 DRAWINGS.

932.10 Curbs. Construct curbs with logs or sawn timber as SHOWN ON THE DRAWINGS. Use lengths greater than or equal to 3 m and splice with a 150-mm half-lap joint at a spacer location. Match diameters of logs at lap joints and trim excess to provide a smooth transition between logs.

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

Finish curbs smooth and free from splinters and sharp projections.

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

Measurement

932.12 Method. Measure the set quantities in accordance with Section 906.

Payment

932.13 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
932(01) Puncheon _____, Type _____	m
932(02) Puncheon _____, Type _____	LS

Section 933—Trail Stairways

Description

933.01 Work. This work consists of excavation and placing embankment and constructing rock, log and treated timber riser, crib-ladder, and pinned stairways and handrails.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

Construction

933.03 General. Construct stairways at locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND.

933.04 Excavation and Embankment. Excavate and place embankment in accordance with Section 912. Use and compact suitable material for backfill.

933.05 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.

933.06 Log or Treated Timber Riser Stairways. Use single logs or timbers for the entire riser.

933.07 Rock Riser Stairway. 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.

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

Drill two 16-mm 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.

933.09 Crib Ladder Stairway. Construct by laying two carriages parallel to each other, firmly supported for their entire length. Backfill behind the riser with suitable compacted material.

933.10 Plank Stairway. Construct plank stairways 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.

Measurement

933.11 Method. When the quantity is measured by the meter, measure along the centerline of the stairway from the front of the bottom riser to the back of the top riser. Otherwise, measure in accordance with Section 906.

Payment

933.12 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
933(01) Stairway, Type _____	m
933(02) Stairway, Type _____	EA
933(03) Stairway, Type _____	LS

Section 934—Log Retaining Walls

Description

934.01 Work. Work consists of constructing log or split timber retaining walls. Work includes excavation, notching, predrilling, pinning, borrow, backfilling, and trailbed and slope finishing.

Materials

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

962—Material for Timber Structures

964—Geosynthetics

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

Construction

934.03 Excavation. Excavate in accordance with Section 912 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.

934.04 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 prenotch.

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 15 mm of space between filler and face logs.

934.05 Backfill. Place filler logs before backfilling and compaction. Backfill and compact with suitable material.

Measurement

934.06 Method. Measure the quantities in accordance with Section 906.

Payment

934.07 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
934(01) Retaining Wall	m ²
934(02) Retaining Wall	EA
934(03) Retaining Wall	LS
934(04) Geosynthetics, Type _____	m ²
934(05) Borrow	m ³
934(06) Borrow	LS

Section 935—Rock Retaining Walls

Description

935.01 Work. Work consists of constructing rock retaining walls, including excavating, placing borrow, backfilling, and trailbed and slope finishing.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

964—Geosynthetics

Construction

935.03 Excavation. Excavate in accordance with Section 912 to provide a full bench foundation.

935.04 Wall Construction. Construct rock retaining walls at locations SHOWN ON THE DRAWINGS and DESIGNATED ON THE GROUND. Stagger vertical joints a minimum of 100 mm 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.

Measurement

935.05 Method. Measure the quantities in accordance with Section 906.

Payment

935.06 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for the PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
935(01) Rock Retaining Wall	m ²
935(02) Rock Retaining Wall	EA
935(03) Rock Retaining Wall	LS
935(04) Borrow	m ³
935(05) Geosynthetics, Type _____	m ²

Section 936—Wire Baskets

Description

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

Materials

936.02 Requirements. Use materials meeting the requirements of the following subsections:

961—Rock, Grid Pavement Units, and Aggregate

964—Geosynthetics

965—Wire Baskets

Construction

936.03 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.

936.04 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 936.03, 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.

936.05 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 300 mm 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 300 mm 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 936.04. Make all exposed basket surfaces smooth and neat, with no sharp rock edges projecting through the wire mesh.

936.06 Geotextile Installation. Place the geotextile as SHOWN ON THE DRAWINGS. 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 the CO before placing geotextile.

Loosely lay the geotextile without wrinkles or creases. Sew or overlap adjacent strips a minimum of 300 mm at joints.

Insert securing pins through both strips of overlapped geotextile at maximum intervals of 900 mm, but no closer than 50 mm to each edge, to prevent the geotextile from being displaced.

936.07 Basket Mattresses. Construct wire baskets for mattresses less than 300 mm thick according to Subsections 936.03 through 936.05. Note that alternate fasteners for basket assembly may be used for structure erection. Anchor the mattress in place as SHOWN ON THE DRAWINGS. Place geotextile against the vertical edges of the mattress and backfill against the geotextile, using structural backfill material or other approved material.

Measurement

936.08 Method. The method of measurement, as described in Section 906, will be SHOWN IN THE SCHEDULE OF ITEMS. Base area computations on surface measurements. Do not include overlap quantities.

Payment

936.09 Basis. Pay for the accepted quantities at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
936(01) Baskets, galvanized or aluminized coated	m ²
936(02) Baskets, epoxy or polyvinylchloride coated	m ²
936(03) Baskets, galvanized or aluminized coated	m ³
936(04) Baskets, epoxy or polyvinylchloride coated	m ³
936(05) Geotextiles, Type _____	m ²

Section 940

Surfacing

Section 941—Aggregate Surfacing and Base Course

Description

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

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

964—Geosynthetics

Produce aggregate by pit run, screening, or crushing. Obtain materials from sources SHOWN ON THE DRAWINGS or other sources approved by the CO in writing.

941.03 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.

941.04 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

941.05 Preparation of Subgrade. Prepare and finish trailbed as required under Section 912. Obtain written approval of the CO before placing aggregate.

941.06 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 DRAWINGS. The maximum thickness of any one layer shall be 75 mm. Obtain compaction by one of the following methods as SHOWN IN THE SCHEDULE OF ITEMS:

- (a) by hand, using nonmechanized 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.

941.07 Acceptance, Testing, Sampling, and Tolerances. Do not vary the total compacted thickness of the aggregate by more or less than 15 mm from the specified thickness or place it consistently below or above the specified depth.

Do not vary the aggregate width by more than ± 80 mm from the specified width or place it consistently narrower or wider than the specified width.

941.08 Timber, Log, or Rock Retainers. Bed retainers along their entire length and as SHOWN ON THE DRAWINGS.

Measurement

941.09 Method. Measure the quantities in accordance with Section 906.

Payment

941.10 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price of each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
941(01) Aggregate Surfacing, Grading _____ Compaction Method _____	m
941(02) Aggregate Surfacing, Grading _____ Compaction Method _____	m ³
941(03) Aggregate Surfacing, Grading _____ Compaction Method _____	kg
941(04) Aggregate Surfacing, Grading _____ Compaction Method _____	LS
941(05) Base Course, Grading _____ Compaction Method _____	m
941(06) Base Course, Grading _____ Compaction Method _____	m ³
941(07) Base Course, Grading _____ Compaction Method _____	kg
941(08) Base Course, Grading _____ Compaction Method _____	LS
941(09) Watering	LS
941(10) Retainers, Type _____	m
941(11) Geosynthetics Type _____	m ²

Section 942—Hot Bituminous Plant Mix Trail Surfacing

Description

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

Materials

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

962—Material for Timber Structures

964—Geosynthetics

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

942.03 Weather Limitations. Do not place the bituminous 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 bituminous mixture is to be placed is less than 13 °C. Do not place when it is raining or snowing.

942.04 Mixing. Do not allow the temperature of the mix to exceed 160 °C when discharging from the mixer.

942.05 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.

942.06 Placement and Compaction. Place and compact plant mix to meet the lines, grades, and thicknesses SHOWN ON THE DRAWINGS. 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 DRAWINGS. 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 bituminous plant mix to the required widths and thicknesses.

Start compaction when the mix is above 110 °C. 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.

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

942.08 Retainers. Bed retainers along their entire length and as SHOWN ON THE DRAWINGS.

Measurement

942.09 Method. Measure the quantities in accordance with Section 906.

Payment

942.10 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for the PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
942(01) Hot Bituminous Plant Mix Trail Surfacing	m ²
942(02) Hot Bituminous Plant Mix Trail Surfacing	kg
942(03) Retainers	m
942(04) Geosynthetics	m ²

Section 943—Cold Bituminous Mix Trail Surfacing

Description

943.01 Work. 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

943.02 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 20 mm and no more than 10 percent by weight passing the .075 mm sieve.

Construction

943.03 Weather Limitations. Place cold asphalt concrete on an unfrozen, reasonably dry surface. Place when the air temperature in the shade is above 10 °C, the temperature of the road surface is above 4 °C, and it is not raining or snowing or predicted to rain or snow within 24 hours after placement.

943.04 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.

943.05 Mixing. If liquid asphalt is used, use aggregate that contains no more than 3 percent moisture and is at a temperature between 15 and 105 °C during mixing. If emulsified asphalt is used, use aggregate that is at a temperature between 10 and 80 °C during mixing.

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

943.06 Placement and Compaction. Place and compact the mix to meet the lines, grades, and cross-section SHOWN ON THE DRAWINGS. 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 DRAWINGS. 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.

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

Measurement

943.08 Method. Measure the quantities in accordance with Section 906.

Payment

943.09 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
943(01) Cold Mix Trail Surfacing	m ²
943(02) Cold Mix Trail Surfacing	kg
943(03) Geosynthetics	m ²
943(04) Retainers	m

Section 944—Grid Pavement Units

Description

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

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

964—Geosynthetics

Construction

944.03 Excavation and Embankment. Perform excavation and embankment in accordance with Section 912 and as SHOWN ON THE DRAWINGS.

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.

944.04 Laying Grid Block. Place and bed blocks so they interlock, are stable, and form a smooth and uniform tread surface. 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 150 mm in greatest dimension. Bury beginning and ending blocks at a 30° angle to the tread.

Dispose of unused block material by removing from Government-administered lands to an appropriate site or by burying it at a location DESIGNATED ON THE GROUND.

944.05 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.

Measurement

944.06 Method. Measure the quantities in accordance with Section 906.

Payment

944.07 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
944(01) Grid Pavement Units, Type_____ m ²
944(02) Grid Pavement Units, Type_____ m

Section 950

Incidental Construction

Section 951—Mobilization

Description

951.01 Work. 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

951.02 Basis. Pay for the accepted work at the contract unit price for the PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make progress payments for mobilization as follows:

- (a) Reimburse for bond premiums before issuing the Notice to Proceed if evidence of payment is received.
- (b) When 5 percent or more of the original contract amount is earned from other PAY ITEMS, pay mobilization at the rate of 50 percent, or up to 5 percent of the original contract amount, whichever is less.
- (c) When 10 percent or more of the original contract amount is earned from other PAY ITEMS, pay mobilization at the rate of 100 percent, or up to 10 percent of the original contract amount, whichever is less.
- (d) Pay any unpaid amount for mobilization upon final acceptance of all work items.

Make payment under:

PAY ITEM

PAY UNIT

951(01) Mobilization LS

Section 952—Sign, Post, and Cairn Installation

Description

952.01 Work. This work consists of furnishing and installing signs and posts and constructing rock cairns.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

Construction

952.03 General. Erect signs, posts, and cairns at the locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND.

952.04 Sign Installation. Tighten hardware snug, but do not damage the sign panel surface.

952.05 Post Installation. Dig post hole width not more than three times the width of the post and to the depth SHOWN ON THE DRAWINGS. If necessary because of obstacles, the post hole may be moved within the tolerances SHOWN ON THE DRAWINGS, or stabilize the post with concrete or rock mounds built in accordance with rock cairn specifications.

Compact suitable material between the post and the post hole in 100-mm layers to produce a solid and plumb installation.

952.06 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

952.07 Method. Measure the quantities in accordance with Section 906.

Rock cairns built to support signposts will be considered incidental to the PAY ITEM for signposts, and separate payment will not be made.

Payment

952.08 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
952(01) Install Sign Panel, Government-Furnished	EA
952(02) Furnish and Install Sign Panel	EA
952(03) Treated Posts, Length ____ m - Dia. ____ mm	EA
952(04) Native Posts Length ____ m	EA
952(05) Steel Posts, Type ____ Length ____ m, ____ Gauge	EA
952(06) Steel Tubing Posts, Type ____ Length ____ m, ____ Gauge	EA
952(07) Plastic Posts, Type ____ Length ____ m	EA
952(08) Composite Posts, Type ____ Length ____ m	EA
952(09) Rock Cairns	EA

Section 953—Barriers

Description

953.01 Work. Work consists of constructing barriers, including subgrade widening, debris disposal, and excavation.

Materials

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

961—Rock, Grid Pavement Units, and Aggregate

962—Material for Timber Structures

Construction

953.03 General. Construct barriers at locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND.

Use logs in which the true centerline deviates no more than 50 mm from the line between the centers of the ends of the log.

Measurement

953.04 Method. Measure the quantities in accordance with Section 906 and include spaces between individual units in each barrier section as SHOWN ON THE DRAWINGS.

Payment

953.05 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

PAY ITEM

PAY UNIT

953(01) Barrier, Type _____ m

Section 954—Obliteration of Abandoned Trailways

Description

954.01 Work. This work consists of obliteration of trailways, construction of drainage structures, and reestablishment of natural drainage patterns and vegetation.

Construction

954.02 General. Obliterate trailways in locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND.

954.03 Trail Closure. Block trailway entrances to traffic by placing rocks, logs, tree branches, and duff across the trailway. Place rocks, logs, branches, and duff to conceal the abandoned trailway and discourage future use. Use rocks and other materials that are available in the areas to be obliterated.

954.04 Drainage Structures. Leave existing water bars on the abandoned trail segments in place unless designated for removal. Construct additional drainage structures in locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND.

954.05 Check Dams and Ditches. Construct check dams and ditches in locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND.

954.06 Scarify. Scarify the trail to promote the establishment of vegetation at locations SHOWN ON THE DRAWINGS or DESIGNATED ON THE GROUND. Scarification is defined as breaking up the compacted soil to a depth and maximum clod size as SHOWN ON THE DRAWINGS.

954.07 Contour Restoration. Backfill trail sections where SHOWN ON THE DRAWINGS. On sidehill sections, pull fill material from the lower side of the trail, or the upper cut area, and place fill material in the original cut area to restore a natural-appearing contour and a natural drainage pattern.

954.08 Trench Backfill. Backfill trenched trail sections with compact suitable material until flush with the adjacent ground surface. Obtain backfill material from designated borrow sources.

Measurement

954.09 Method. Measure the quantities in accordance with Section 906.

Payment

954.10 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
954(01) Obliteration	LS
954(02) Obliteration	m
954(03) Closure	LS
954(04) Closure	m
954(05) Drainage Structures, Removal	EA
954(06) Scarify	m
954(07) Trench Backfill	m
954(08) Contour Restoration	m

Section 955—Seeding and Mulching

Description

955.01 Work. This work consists of preparing seedbeds and furnishing and placing required seed, fertilizer, mulch, net, and blanket material.

Materials

955.02 Seed. Do not use seed that is wet, moldy, or has been damaged in transit or storage.

Furnish seed, separately or in mixture, in standard containers with (1) seed name, (2) lot number, (3) net weight, (4) percentages of purity and germination, and (5) percentage of maximum weed seed content clearly marked for each kind of seed. Certify that seed meets the type as SHOWN ON THE DRAWINGS. Furnish the CO 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, and (4) results of tests as to name, percentage of purity and of germination, and percentage of weed content for each kind of seed furnished, and, in case of mixture, the proportions of each kind of seed.

955.03 Fertilizer. Use standard commercial-grade fertilizer and provide the minimum percentage of available nutrients as SHOWN ON THE DRAWINGS.

Furnish fertilizer in new, clean, and sealed containers with the name, weight, and guaranteed analysis of contents clearly marked. Fertilizer failing to meet the specified analysis may be used providing sufficient materials are applied to supply the specified nutrients without additional cost to the Government.

955.04 Mulch. Use commercially produced mulch as SHOWN ON THE DRAWINGS.

955.05 Erosion Control Blanket. Use erosion control materials of the type and in the locations SHOWN ON THE DRAWINGS.

(a) **Burlap.** Use burlap of standard weave with a weight of 145, ± 20 g/m².

(b) **Excelsior Blanket.** Use excelsior blanket consisting of a machine-produced mat or curled wood excelsior of 80-percent, 200-mm 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

25 by 50 mm plus or minus 25 percent. Provide blanket with average weight of 270 g/m² plus or minus 10 percent at time of manufacture.

Construction

955.06 Seeding Seasons. Seed during the seeding dates as SHOWN ON THE DRAWINGS. Do not apply seeding materials during windy weather or when the ground is excessively wet or frozen.

955.07 Soil Preparation. Shape and finish cutslopes, fillslopes, embankments, or other areas to be seeded as required by other applicable sections or as SHOWN ON THE DRAWINGS. Prepare soil as specified in other sections.

955.08 Mulch. Spread mulch immediately after seeding, or after seeding and fertilizing, to a loose depth of 30 to 80 mm at locations SHOWN ON THE DRAWINGS.

955.09 Erosion Control Blankets. Install erosion control blankets in accordance with manufacturer's recommendations at locations SHOWN ON THE DRAWINGS.

Measurement

955.10 Method. Measure the quantities in accordance with Section 906.

Payment

955.11 Basis. Pay for the accepted quantities in accordance with Section 906 at the contract unit bid price for each PAY ITEM SHOWN IN THE SCHEDULE OF ITEMS.

Make payment under:

<u>PAY ITEM</u>	<u>PAY UNIT</u>
955(01) Seeding	m ²
955(02) Seeding	LS
955(03) Fertilizer	LS
955(04) Mulch	LS
955(05) Erosion Control Blanket, Type _____	m ²
955(06) Seeding, Mulch, and Fertilizer	LS

Section 960

Materials

Section 961—Rock, Grid Pavement Units, and Aggregate

961.01 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 DRAWINGS.

961.02 Wire Basket Rock. Ensure that rock conforms to the requirements of Section 961.01 and the following specifications.

(a) Unit weight of a filled basket: 1,600 kg/m³ min.

(b) Gradation:

- (1) Baskets 0.3 m or greater in the vertical dimension:
 - Maximum dimension of rock 200 mm
 - Minimum dimension of rock 100 mm
- (2) Baskets less than 0.3 m in the vertical dimension:
 - Maximum dimension of rock 150 mm
 - Minimum dimension of rock 75 mm

961.03 Concrete Grid Pavement Units. Use concrete grid pavement units with a minimum compressive strength of 31 MPa that meet the National Concrete Masonry Association (NCMA) Designation: A-15-82: Specifications for Grid Pavers.

961.04 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.

961.05 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 961-1 and of the grading SHOWN IN THE SCHEDULE OF ITEMS.

961.06 Crushed Aggregate for Base or Surface Course. Use crushed aggregate meeting the requirements of tables 961-1 and 961-2 and SHOWN IN THE SCHEDULE OF ITEMS.

At least 50 percent, by weight, of the aggregate retained on the 4.75 mm sieve is to have one fractured face. Naturally fractured faces may be included in the 50-percent requirement.

The CO may approve other gradations if they are similar to those specified. Grade aggregate from coarse to fine within the gradation band.

Table 961-1.—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
25 mm				
19 mm	100	100		
12.5 mm	50-90	70-100		
9.5 mm			100	100
4.75 mm	30-65	45-75	60-85	70-90
2.36 mm	25-55	30-60	35-70	45-70
.600 mm		15-40		20-40
.075 mm	6-12	6-20	5-20	5-20

Table 961-2.—Crushed Aggregate Quality Requirements

Description	AASHTO Test Method	Requirement
Percent Wear	T 96	40 Max.
Durability Index, Coarse and Fine	T 211	35 Min.
Liquid Limit	T 89	35 Max.
Plasticity Index	T 91	2-11

Section 962—Material for Timber Structures

962.01 Timber. Select timber from designated sites on Government-administered land. Select the species and sizes of materials as SHOWN ON THE DRAWINGS. Select timber that is 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 DRAWINGS. Scatter the debris from the processing of timber away from the trail and so it will not block the trail or plug water courses.

962.02 Structural Lumber. Use structural lumber meeting the requirements of AASHTO M 168.

962.03 Hardware. Use drift pins and dowels meeting the requirements of the American Society for Testing and Material (ASTM) A307 and galvanized hardware meeting the requirements of AASHTO M 232.

Use nails of standard form or as SHOWN ON THE DRAWINGS.

962.04 Preservative. Use wood preservative treatment methods meeting the requirements of AASHTO M 133 as SHOWN ON THE DRAWINGS. Completely and accurately fabricate all treated timber before treatment. Provide treated timber that is clean and free of dripping treatment liquids.

Submit a certified copy of the lot certification, by a qualified independent inspection and testing agency, to the CO for each charge of preservative, stating penetration in millimeters and retention in kilograms per cubic meter (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.

Except for pine, incise before treatment all surfaces greater than 50 mm in width and all Douglas fir and western larch surfaces. Field treat, as SHOWN ON THE DRAWINGS, any area hewn, notched, cut, or drilled after the initial preservative treatment.

Section 963—Drainage Pipe

963.01 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.

963.02 Corrugated Steel Pipe and Pipe Arches

(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 unperforated 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.

963.03 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

963.04 Corrugated Aluminum Alloy Culvert Pipe, Pipe Arches, and Underdrains. Use pipe meeting the requirements of AASHTO M 196.

963.05 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.

963.06 Polyvinylchloride (PVC) Pipe. Use PVC drain and perforated pipe meeting the requirements of AASHTO M 278.

963.07 Plain or Corrugated Polyethylene (PE) Pipe. Use corrugated PE pipe and connections 300 mm through 900 mm in diameter meeting the requirements of AASHTO M 294

963.08 Acrylonitrile-butadiene-styrene (ABS) and PVC Composite Pipe.

Use ABS and PVC pipe and connections meeting the requirements of AASHTO M 264.

Section 964—Geosynthetics

Materials

964.01 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 D4632-91 0.355 kN min.
 - (2) Seam Strength,
ASTM D 4632 0.310 kN min.
 - (3) Puncture Strength,
ASTM D4833-88 0.110 kN min.
 - (4) Mullen Burst,
ASTM D 3786-87... 900 kPa min.
 - (5) Trap Tear Strength,
ASTM D4533-91 0.110 kN min.
- (b) Use geotextile meeting the following critical physical properties, unless otherwise SHOWN ON THE DRAWINGS.
 - (1) Material Structure Nonwoven (all purposes)
or Slit Film (for reinforcement or separation)
 - (2) Polymer Composition Polypropylene
 - (3) Apparent Opening,
ASTM D 4751-87 0.297 mm max.
 - (4) Permittivity, ASTM
D4491-92 4060 liters/minute/m² min.
 - (5) Ultraviolet Degradation 70 at 150 hours

964.02 Geonet. Use geonet meeting the following critical physical properties unless otherwise SHOWN ON THE DRAWINGS.

- (a) Polymer Composition of Core
(Net or Mesh) Medium PE or HDPE
- (b) Permeability 0.001 cm/second min.
- (c) Geotextile Must meet all Section
964.01 requirements
- (d) Compressive Strength
of Core, ASTM D1621 500 kPa, min.
- (e) Transmissivity with Gradient
at 0.1, Pressure at 10 kPa 0.0009 m²/second min.

964.03 Geogrids. Use geogrids made from polypropylene or coated polyester that meet the following critical physical properties.

- (a) Polymer Type HDPE, Polypropylene,
or Polyester with Acrylic or
PVC coating
- (b) Mass per Unit Area,
ASTM D5261-92 175 g/m² min.
- (c) Maximum Aperture Size
 - (1) Machine Direction (MD) 100 mm
 - (2) Cross-Direction (XD) 75 mm
- (d) Wide-Width Strip Tensile Strength
at 5 percent Strain, ASTM D4595-86:
 - (1) Machine Direction (MD) 8 kN/m min.
 - (2) Cross-Direction (XD) 6 kN/m max.

964.04 Geocells. Use geocells meeting the following physical properties.

- (a) Composition PE or HDPE
- (b) Geocell Weight expanded: 1.70 kg/m² min.
- (c) Minimum Cell Seam Peel Strength,
U.S. Army Corps of Engineers
Technical Report G-86-19,
Appendix A 800 N min.
- (d) Expanded Dimensional Properties ... AS SHOWN ON
DRAWINGS

964.05 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 964.01 requirements
- (c) Core Thickness, ASTM D5199 10 mm min.
- (d) Core Compressive Strength at
Yield, ASTM D1621 650 kPa max.

964.06 Fasteners. Use anchors or fasteners of the design recommended by the manufacturer, and install per manufacturer's specifications.

964.07 Certification. Furnish a certificate or affidavit signed by an official from the company manufacturing the geosynthetic, verifying that the geosynthetic meets specifications.

964.08 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 965—Wire Baskets

Materials

965.01 Baskets. Twist or weld the mesh from galvanized steel wire, Class 3, soft temper, conforming to ASTM A641M, or aluminized steel wire, soft temper, conforming to ASTM A 809. Use wire with a minimum tensile strength of 400 megapascals when tested in accordance with ASTM A 370. The zinc or aluminum coating may be applied after the mesh fabrication.

Fabricate baskets from either twisted wire mesh or welded wire mesh. Make the mesh openings with a maximum dimension of less than 120 mm and an area of less than 7,000 mm². Furnish 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.

(a) Wire Baskets 0.3 M or Greater in the Vertical Dimension. Fabricate the mesh for galvanized or aluminized coated basket from wire with a diameter of 3.0 mm or greater in nominal size, and fabricate the mesh for epoxy or PVC-coated baskets from wire with a diameter of 2.7 mm or greater in nominal size.

- (1) Twisted Wire Mesh.** Form the mesh in a uniform hexagonal pattern with nonraveling double twists. Tie the perimeter edges of the mesh for each panel to a selvage wire with a diameter of 3.9 mm or greater, or a selvage wire with a diameter of 3.4 mm or greater for epoxy- or PVC-coated baskets, so that the selvage is at least the same strength as the body of the mesh. Furnish selvage wire from the same kind and type of material used for the wire mesh.
- (2) Welded Wire Mesh.** For mesh from galvanized or aluminized wire with a diameter of 3 mm or greater in nominal size, weld each connection to obtain a minimum average weld shear strength of 2,600 N, with no value less than 2,000 N. For mesh for epoxy- or PVC-coated baskets from wire with a diameter of 2.7 mm in nominal size, weld each connection to obtain a minimum average weld shear strength of 2,100 N, with no value less than 1,600 N.

(b) Wire Baskets Less Than 0.3 Meter in the Vertical Dimension. Fabricate the mesh from wire with a diameter of 2.2 mm or greater in nominal size.

- (1) **Twisted Wire Mesh.** Form the mesh in a uniform hexagonal pattern with nonraveling double twists. Tie the perimeter edges of the mesh for each panel to a selvedge wire with a diameter of 2.7 mm or greater so that the selvedge is at least the same strength as the body of the mesh. Furnish selvedge wire from the same kind and type of material used for the wire mesh.
- (2) **Welded Wire Mesh.** Weld each connection to obtain a minimum average weld shear strength of 1,300 N, with no value less than 1,000 N.

(c) Epoxy-or-PVC-Coated Baskets. Use either the fusion bonding or extrusion coating process to coat the galvanized or aluminized mesh.

Make the coating at least 0.18 mm in thickness for epoxy, and 0.38 mm in 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 0.19 g.
- Salt crock, ASTM G 8, maximum disbondment diameter 45 mm, and at 90 days, 1.5 volts, and 3 percent solution.
- Chemical resistance, ASTM G 20, with 45 days at 21 °C, 3 molar CaCl₂, 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 PVC coating meet:

- Specific gravity, ASTM D 792 1.20 to 1.40
- Tensile strength, ASTM D 638 15.7 MPa, min.
- Modulus of elasticity, ASTM D 638 13.7 MPa, min.
at 100 strain
- Hardness-shore "A," ASTM D 2240 75 min.
- Brittleness temperature, ASTM D 746 -9 °C max.
- Abrasion resistance, ASTM D 1242 12 percent maximum
method B, at 200 cycles,
weight loss CSI-A
abrader tape, 80 grit
- Salt spray (ASTM B 117) and No visual effect
Ultraviolet Light exposure (c) D < 6 percent
(ASTM D 1499 and G 23 using (d) D < 25 percent
apparatus type E and 63 °C) for (e) D < 25 percent
3,000 hours (h) D < 10 percent

- Mandrel bend, 360° bend at -18 °C. No breaks or cracks in coating around a mandrel 10 times the wire diameter.

965.02 Fasteners. For lacing wire, use wire with a diameter of 2.2 mm in nominal size that is of the same type, strength, and coating as the basket mesh.

For welded wire mesh panels, form the spiral binders with wire that has at least the same thickness and coating as the basket mesh.

Furnish alternate fasteners that are acceptable to the basket manufacturer and that remain closed when subjected to a 2,600-N tensile force when confining the maximum number of wires to be confined. Submit installation procedures and fastener test results.

965.03 Internal Connecting Wire. Use lacing wire as described in Subsection 965.02 to reinforce side panels. Alternate stiffeners that are acceptable to the basket manufacturer may also be used.