

507.0841	Steel Pipe Hand Railing	Lump Sum
507.0846	Barrier Mounted Steel Bridge Rail: 1 Bar	Lump Sum
507.0848	Barrier Mounted Steel Bridge Rail: 2 Bar	Lump Sum
507.0951	Aluminum Bridge Railing, Pedestrians	Lump Sum
507.0961	Aluminum Bridge Railing, Pedestrian, with Pales	Lump Sum

SECTION 508 - MEMBRANE WATERPROOFING

508.01 Description This work shall consist of furnishing and applying an approved membrane waterproofing to concrete deck surfaces, or other concrete surfaces, with a barrier type membrane in accordance with this specification and in conformance with the plans. When high performance waterproofing membrane is specified, the Contractor shall furnish and install an approved high performance waterproofing membrane to the concrete deck with a pourable or heat welded membrane system applied in accordance with the plans, specifications, and the manufacturer's published recommendations.

508.02 Materials When high performance membrane is specified, the materials shall meet the requirements of the manufacturer and shall be one of the approved products on the Department's Prequalified List of Approved Materials for High Performance Waterproofing Membrane. All other membrane shall consist of an adhesive primer, preformed sheet waterproofing membrane, and a mastic with all components being as recommended by the manufacturer and approved by the Department as shown on the Prequalified List of Approved Barrier Membranes maintained by the Department.

508.04 General The Contractor shall store and install the membrane and all associated components in accordance with the manufacturer's published recommendations. Priming and membraning shall only be done when the air and concrete temperatures are above 6°C [40°F] and the surfaces that are to receive the primer and membrane have a moisture content at, or below, 6%. The moisture content will be checked with a "Sovereign Portable Electronic Moisture Master" meter, or an approved equal. Primer or membrane shall not be applied or installed until the concrete has been in place for a minimum of 10 days. Membrane waterproofing remaining on existing structures to be rehabilitated shall be completely removed to the primed surfaces. The entire deck shall be shot blasted to achieve an anchor profile which is clean of all foreign materials, such as oil or grease, and any sharp protrusions removed, and free of laitance. The Contractor shall have a copy of Technical Guideline No. 03732, published by the International Concrete Repair Institute. The final concrete surface profile shall range between a CSP 1 and a CSP 5 as defined by this Guideline. Areas where rapid setting patching

materials have been placed shall be cured for a minimum of 72 hours, or longer when recommended by the product manufacturer, prior to applying primer or installing membrane. All surfaces shall then be swept and cleaned by brooms and compressed air, as directed by the Resident.

The 25 mm [1 in] diameter drains in the deck shall be completely opened prior to paving over them. Any drainage slots in the metal roadway drains shall be opened both before and after placing the bituminous pavement.

Paving operations shall be done in a manner to permit water to drain to the low area of the deck without entrapment.

When a heat welded membrane system is used, it shall be machine applied when the surface area of the deck is greater than 750 m² [8,073 ft²].

A manufacturer's representative shall be present during the placement of the high performance membrane and the paving of the binder course over it.

508.05 Installation This subsection only applies when High Performance Membrane is not specified.

A membrane sheet with a minimum width of 225 mm [9 in] shall be applied with termination ends at concrete faces, the top edge being within 13 mm [½ in] of the top of the bituminous pavement overlay. The first full sheet of membrane at the termination ends shall be applied as close as possible to the face lines.

Termination edges at the ends of slabs shall be double covered with membrane by first applying a sheet with a minimum width of 225 mm [9 in], centered along the axis of the edge, applied to the primed surface. All edges shall be chamfered and all inside corners filled with a mortar fillet.

All slab construction joints shall be double covered with membrane by first applying a sheet with a minimum width of 300 mm [12 in], centered along the joint centerline, applied to the primed surface.

Membrane shall be installed in a shingled pattern so that water is permitted to drain to the low areas of the deck without accumulating against seams, and pressed or rolled into place to assure bond with the primed surface and to eliminate air bubbles.

The perimeter of all membrane placed in a given day's operation shall receive a seal of mastic over the edge of the membrane. Areas around drains or protrusions shall be liberally coated with mastic at the edges. When the membrane is completed, the perimeter shall receive an additional seal of mastic along the edge of the membrane.

No vehicles, other than the bituminous overlay equipment, will be permitted on the membrane prior to the bituminous overlay. Overlay equipment wheels and tires shall be clean and free from stones or other material that could penetrate the membrane. The bituminous overlay may be applied immediately after the membrane is installed.

Immediately prior to paving over the membrane, the entire surface of the membrane shall be rolled with a rubber tired roller and any air bubbles shall be eliminated by slitting the membrane and forcing out the air. These slits, and any other ruptures found, shall be repaired by applying a membrane sheet that is at least 150 mm [6 in] wider than the slit or rupture, in all directions.

Overlap of side seams and end laps, application procedures not addressed by this specification, and the laydown temperature of the bituminous overlay shall be in accordance with the membrane manufacturer's published recommendations.

When primer is required for the membrane system it shall be allowed to cure in accordance with the manufacturer's published recommendations.

508.06 Method of Measurement Membrane waterproofing will be measured for payment as one lump sum.

508.07 Basis of Payment Membrane waterproofing will be paid for at the contract lump sum price, which shall be payment in full for furnishing all materials, labor and equipment, including moisture meter, and all incidentals necessary to satisfactorily complete the work. Payment for repair of surfaces to which membrane is to be applied shall be paid for separately, except that any damage caused by the Contractor's operations shall be repaired at no cost to the Department.

Payment will be made under:

Pay Item

Pay Unit

508.13 Membrane Waterproofing

Lump Sum

SECTION 509 -STRUCTURAL PLATE PIPES, PIPE ARCHES, ARCHES, AND METAL BOX CULVERTS

509.01 Description This work shall consist of furnishing and installing structural plate pipes, pipe arches, arches, and metal box culverts in accordance with these specifications and in reasonably close conformity with the lines and grades shown in the Contract Documents.

509.02 Materials Material shall meet the requirements of the following Sections of Division 700 - Materials:

Asphalt Filler for Structural Plate Arches	702.09
Steel Structural Plate Pipe, Pipe Arches, Arches, Box Culverts and Fasteners	707.09
Aluminum Alloy Structural Plate Pipe, Pipe Arches, Arches, Box Culverts and Fasteners	707.14

509.03 Fabrication Structural plate pipes shall be circular with a vertical elongation of approximately 5% unless otherwise specified on the Plans.

Plates shall be formed to provide lap joints for bolted assembly. Joints shall be staggered so that no more than three plates come together at one point.

Bolt holes shall be made so that all plates having like dimension, curvature and the same number of bolts per meter [bolts/ft] of seam shall be interchangeable. Each plate shall be curved, before assembly, to the radius necessary to produce the final cross section called for.

End plates shall be neatly cut to the skew and slope shown on the Plans. Burnt edges shall be free of oxide and burrs, and shall be completely galvanized. Special plates and part plates shall be legibly marked to correspond to markings on an erection/assembly diagram, which shall be furnished by the Contractor. The Contractor shall prepare and submit Shop Drawings, erection/assembly diagrams, or other necessary Working Drawings in accordance with Section 105.7. These drawings will be reviewed and approved in accordance Section 105.7.