DESCRIPTION

This work shall consist of fabricating, furnishing, installing, adjusting the bridge hangers, complete with anchorage components, anchor pipes, wedges, bearing plates, pins, ring nuts, high density polyethylene (PE) sheathing, sealing and damping rings, boots, bolts, clamping bands, temporary corrosion protection, erection devices and all incidental materials and labor necessary to construct the hangers in accordance with the contract documents, the Post Tensioning Institute (PTI) “Recommendations for Stay Cable Design, Testing and Installation, 5th Edition” (PTI Recommendations) and as directed by the Engineer.

Testing of hanger materials and systems shall be in accordance with the PTI Recommendations. No fabrication of permanent hangers can begin until the tests have been successfully completed and the Engineer authorizes fabrication and with acceptance by the Department.

The Contractor shall perform a fatigue test of two fully assembled hangers for acceptance of the anchorage system. After completion of fatigue testing, one of the specimens will be subject to the leak test and the other to the static strength test. Upon successful completion and acceptance of test results by the DCES, fabrication of the hangers shall be permitted.

The fabricator shall provide a quality control plan to the DCES for approval. This plan shall contain information concerning the fabricator’s internal quality control / quality assurance process. The plan shall be approved by the DCES prior to the commencement of fabrication.

The main tension element of the hangers shall generally consist of 0.60-inch diameter strands; each strand shall be coated with a corrosion inhibiting coating and encased in a directly extruded sheath. The individual strands shall be bundled within a thick walled co-extruded High Density Polyethylene (HDPE) pipe. The individual strands shall be anchored with a wedge type system. Specific details of the hanger system are provided in this Special Provision and are detailed on the Plans.

Notice of Beginning of Work

The provisions of §106-01 Sources of Supply shall apply.

The Contractor shall give the DCES ample notice of the beginning of work at the fabrication area, so that a Department Representative may be on hand for inspection. No material shall be manufactured or work performed before the DCES has been so notified.

Inspection

The hangers shall be inspected in the fabrication shop. The Contractor shall require the strand supplier to furnish to the DCES for approval, complete mill test reports and certificates for the
strand from each heat, including stress-strain curves and modulus of elasticity of the strand. Final approval of the material will not be given until the above data is approved.

The provisions of Section 304 Facilities for Inspection of the Steel Construction Manual (SCM) shall apply. The DCES or his representative shall have free entry while work on this contract is being performed to those parts of manufacturer's work that concern the manufacture of the material ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All tests and inspections shall be made at the place of the manufacturer, unless otherwise specified.

MATERIALS

Strand for Hangers

All materials for the hangers shall be subject to the provisions of §106-11 Buy America.

Strand for the hangers shall be 0.60 inches (15-mm diameter), Grade 270, fy = 0.90 f’s, Weldless Grade, low-relaxation seven-wire strand conforming to the requirements of AASHTO M203 (ASTM A416) Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete. Strand shall be coated with an approved corrosion inhibiting grease and encased in a directly extruded high density polyethylene (HDPE) sheath not less than 0.04 inch thick using an anchorage system specifically designed for this greased and sheathed strand system. The extruded HDPE sheath may have either a tight or a loose fitting sheath. The outer cable sheath, which confines the individual strands, shall be HDPE pipe.

If the hanger and anchor heads and/or the individual hanger strands proposed by the Contractor have different dimensions and/or support details other than those shown on the plans, the Contractor shall be responsible for the re-design of the hanger anchorage areas and connection details at the arch ribs and the tie girders and shall ensure their compatibility with the remainder of the structure, subject to approval by the DCES.

The design criteria, test criteria and individual strand acceptance criteria shall be as stated in the Plans and these Special Provisions.

Should the Contractor choose an alternate strand type, he shall include with his bid a detailed description of the corrosion protection system and shall demonstrate compliance with the requirements of the PTI Recommendations and these specifications. Any additional costs to the Department to monitor such a program will be at the expense of the Contractor. Selection and approval of an alternate shall not be grounds for a delay to the project.

The strand shall be furnished by the supplier in coils on wooden reels and shall have padded contact areas, wherever possible. Each coil shall be protected by a manufacturer approved method to ensure
a strand having no adhering foreign matter or damage to the corrosion protective coating, including that from ultraviolet exposure. The ends of the strand shall be sealed to prevent intrusion of moisture into the annular space between the seven wires. No welds or joints shall be present in the finished strand.

Upon delivery, the strand shall be properly stored in a weatherproof enclosure. Each coil shall be marked with the order number, coil number and heat number. The starting end of each coil shall also be marked. When uncoiled, the strand shall lay straight with a maximum deviation not exceeding a 4 inch offset from a theoretical centerline in any 6 feet of length. Sharp kinks or short radius bends shall be cause for rejection.

Sheathed strand shall have relaxation losses of not more than 4% when initially loaded to 70% of specified minimum breaking strength, or not more than 5.6% when loaded to 80% of specified minimum breaking strength of the strand after 1000 hours when tested under conditions of ASTM M203 (ASTM A416M) Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.

Strand represented by test samples that do not meet the requirements of this specification shall be rejected. At the manufacturer's option, such strand shall be replaced or, alternatively, may be stripped of coating, recleaned, recoated and resubmitted for acceptance testing in accordance with the requirements of this specification.

Strands shall be cut using abrasive saws. Flame cutting strand is not permitted.

**Hanger Cable Sheathing**

Hanger cable sheathing shall consist of co-extended heavy duty polyethylene (HDPE) pipe conforming to the requirements of ASTM F 714, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter, and the following:

**Material Specifications**

PE pipe sheathing shall meet the specific cell category requirements for PE 3406 and PE 3408 materials as defined by Table X1 of ASTM Designation: D 3350. The resultant acceptable range of primary properties for these PE materials is as follows (from Table 1 of ASTM Designation: D 3350):
**PROPERTY** | **ASTM TEST METHOD** | **VALUE**
--- | --- | ---
Density, kilogram/cubic meter | D 1505 | 941 - 955
Melt Index | D 1238 | max. of 1.0
Flexural Modulus, MPa | D 790 | 550 - 1100
Tensile Strength at Yield, MPa | D 638M | 21 - 28
Environmental Stress Crack Resistance, F20, hrs., min. (Cond. C) | D 1693 | 192
Elongation @ Rupture | D 638 | 500% - 700%
Hardness | D 2240 | 64 - 65
Hydrostatic Design Basis, MPa | D 2837 | 8.6 - 11.0

*There are no AASHTO equivalents for these ASTM designations:

D638  *Standard Test Method for Tensile Properties of Plastics (Withdrawn, use last version D638M-96)*

D790  *Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials*

D1238  *Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer*

D1505  *Standard Test Method for Density of Plastics by the Density-Gradient Technique*

D1693  *Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics*

D2837  *Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products*

The material shall have a Plastic Pipe Institute (PPI) recommended hydrostatic design basis.

The inner layer shall meet the requirements of a Class C material – it shall be weather resistant and contain not less than two percent carbon black.

The polyethylene material shall not react with cementitious grout and shall be free of water soluble chloride. The contractor shall furnish to the DCES a certified test report covering the quality of the polyethylene sheathing performed by an approved independent laboratory.

Samples for quality testing shall consist of one 6-foot length of sheathing per size per 3000 feet. In addition, the contractor shall submit three samples to qualify the fusion welding procedure, both butt and lap joints, to develop the full yield strength of the pipe cross-section. Each sample shall consist of a 6-foot length of sheathing per size per thickness.
The color of the external sheath shall be light Ivory color (Color Code RAL-1015) and will require the approval of the Engineer. The supplier of the co-extruded pipe shall submit for the approval of the DCES, evidence as to the UV resistance and color stability of the pipe. The co-extruded pipe shall be capable of being joined by fusion welding in accordance with the requirements of the PTI Recommendations and this special provision.

The sheathing shall not include helically wound ribs.

Wall Thickness

The wall thickness shall be sufficient to withstand handling and construction loadings.

The maximum Standard Dimension Ratio, SDR, (SDR = ratio of outside diameter to minimum wall thickness) shall be 18.

Pipe Length

The required pipe length for each cable shall be obtained by continuous extrusion or by fusion welding of standard length sections of pipe.

Fusion Welds

The required pipe length for each hanger shall be obtained by continuous extrusion or by fusion welding of standard length sections of pipe. All fusion welds, both butt and socket type, shall conform to ASTM D2657, *Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings*, and shall be capable of developing the full yield strength of the pipe cross section. The Contractor shall perform proposed welds on a test section of polyethylene pipe for the cable cross section used on the project and perform the necessary test to assure that the weld develops the yield strength of the pipe and that the joint is hydrostatically sealed. No welding on the pipe shall be performed when the prestressing strands are in the pipe.

Anchors

The anchors for the strand hanger system shown on the plans are schematic. Material specifications, not specified herein or in the contract documents, shall be supplied by the manufacturer for review and approval by the DCES.

The guide pipes as shown on the Plans are schematic. The supplier of the hanger system shall submit to the DCES for review calculations and detail drawings for the sizes and materials of the guide pipes and neoprene dampers based on the proposed cable system according to the designed cable forces as shown on the plans. The guide pipes shall be sufficiently reinforced to avoid excessive deformation during construction.

Neoprene Boot and Neoprene Dampers
Neoprene boots and neoprene dampers shall be manufactured from 100% virgin chloroprene (neoprene) of the thickness, shapes and hardness shown on the plans. The sole polymer shall be 100% virgin chloroprene which shall be not less than 60% by volume of the total compound. Neoprene shall meet the following requirements (ASTM Designation: C 864 as amended herein):

<table>
<thead>
<tr>
<th>Property</th>
<th>Physical Requirements</th>
<th>Test Procedure As Per ASTM Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 Duro.</td>
<td>60 Duro.</td>
</tr>
<tr>
<td>Hardness, Durometer A</td>
<td>50 ±5</td>
<td>60 ±5</td>
</tr>
<tr>
<td>Tensile Strength, psi, min.</td>
<td>2,500</td>
<td>2,500</td>
</tr>
<tr>
<td>Ultimate Elongation, percent, min.</td>
<td>400</td>
<td>350</td>
</tr>
<tr>
<td>Accelerated Test to Determine Long-Term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oven-Aged - 70 hours at 100°C</td>
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<td></td>
</tr>
<tr>
<td>Change in Durometer Hardness, Maximum Points</td>
<td>+15</td>
<td>+15</td>
</tr>
<tr>
<td>Change in Tensile Strength, Maximum Percent</td>
<td>-15</td>
<td>-15</td>
</tr>
<tr>
<td>Change in Elongation at Break, Maximum Percent</td>
<td>-40</td>
<td>-40</td>
</tr>
<tr>
<td>1 ppm Ozone in Air by Volume - 20 percent Strain</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>- 100 ±2°F, 100 hours Mounting, ASTM D 518</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Procedure A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compression Set – 22hrs at 212°F, % Max.</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>
* There are no AASHTO equivalents for these ASTM designations:

D395  *Standard Test Methods for Rubber Property – Compression Set*

D142  *Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension*

D573  *Standard Test Method for Rubber – Deterioration in an Air Oven*

D1149 *Standard Test Method for Rubber Deterioration – Surface Ozone Cracking in a Chamber*

D2240 *Standard Test Method for Rubber Property – Durometer Hardness*

**Washers and Shims**

Material for split washers, and shims used in the cable anchorage shall be high-strength low-alloy structural steel conforming to the following requirements:

- Split washers and shims .................. ASTM Designation: A709, Grade 50
- Cap screws ................................ASTM Designation A307
- High-strength bolts .....................ASTM Designation: A325

*Where:*

- AASHTO 270M:  *Standard Specification for Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges*
- ASTM A307:  *Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength*
- AASHTO M 164:  *Standard Specification for High Strength Bolts for Structural Steel Joints*

**Stainless Steel Bands**

Bands for securing the neoprene boots in place around the polyethylene pipe and the neoprene sleeve and for securing the cable tape wrapping shall be 1 inch wide by 0.03” thick stainless steel strapping material ASTM A 240, *Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications, Type 316 with stainless crimp type seal of a type approved by the DCES.*

**Hanger Anchor Assembly**

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Anchorage components shall meet the requirements as specified by the Contractor furnishing the anchorages at the time of acceptance testing of the hanger cable. The lower hanger anchor assembly shall consist of an externally threaded steel socket, anchor head, tension ring, ring nut, protective cap and filler. The upper anchorage assembly shall include a threaded connection that results in an open socket termination that accepts a pin as presented in the Contract Documents. The lower anchorage assembly must allow for complete components (except the load bearing nut) to pass through the guide pipe. The lower and upper cable anchorage assemblies shall pass, without failure of any component, the hanger testing outlined in these Special Specifications. The contractor or specialty subcontractor shall furnish all material and testing specifications to the DCES for review and approval. Each component of the assembly, including wedges, will have an AASHTO or ASTM material and test specification.

The threaded portion of the anchorage shall be sufficient length for the installation of the cable and for future force adjustment of 2.5 % (±) of the guaranteed ultimate tensile strength (GUTS). The assembly shall have a capacity equal to the guaranteed ultimate strength of the hanger cable. Calculations shall be submitted to the DCES showing the service stresses in all load bearing components of the assembly.

Shop drawings shall be submitted to the DCES for approval showing all dimensions, materials and operations for fabrication of the anchor assembly, as per the SCM. Detailed procedures for installing all assembly components, insertion of the strands, installation of wedges, stressing and grouting the assembly shall be developed and submitted to the DCES for approval. Complete shop drawings with supporting calculations shall be submitted showing all equipment (jack, stressing chair, etc.) and procedures required for hanger force adjustments and for complete detensioning. No approval will be given to any portion of the hanger anchor assembly or procedures until all required submittals are made and found acceptable.

The anchorage assemblies and components shall be protected at all times against corrosion, particularly the wedge and wedge holes. Corrosion protection measures shall be shown on the shop drawings. The lower anchorage assembly shall include a removable cap that covers the ends of the strands and is injected with a corrosion protective material that does not induce hydrogen embrittlement. Corrosion protective material must be approved by the DCES.

All other components such as bearing plates, keeper plates, steel flanges, socket bearing flanges, wedges, protective caps, rubber gaskets, O-rings, etc. shown on the plans, but not specified herein, are only shown schematically. They shall be of suitable type and sufficient strength suitable for the intended use. The supplier of the hanger cable system shall submit to the DCES for review and approval material specifications, calculations and detail drawings for the sizes, types and materials for such components.

CONSTRUCTION DETAILS

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Working Drawings

All working drawings shall be in accordance with the provisions of section 2 of the SCM.

A. Shop Drawings

The contractor shall prepare and submit shop drawings in accordance with Section 202. Shop Drawings in the SCM.

The Contractor shall submit copies of the detailed shop drawings to the DCES for approval. Shop drawings shall be submitted sufficiently in advance of the start of the work to allow time for review by the DCES and corrections to be made by the Contractor without delaying the work. Upon completion of the work, reproducible, full-size tracings of the original drawings shall be delivered to the DCES. The size of the original drawings shall be 22 inches (559 mm) x 34 inches (864 mm), including margins, unless otherwise permitted. The shop drawings submitted for approval may be of a reduced size.

The title block of all sheets of the shop drawings shall contain at a minimum the following: state project number, federal project number, bridge name, bridge (design) number, prime contractor's name and fabricator’s name.

Shop drawings shall give full detailed dimensions and sizes of component parts of the structure and details of all miscellaneous parts, such as pins, nuts, bolts, etc.

Shop drawings shall specifically identify each piece that is to be made of steel which is to be other than AASHTO M 270 (M270M), Standard Specification for Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plates for Bridge, ASTM Grade 36 (245) steel.

B. Erection Drawings

The contractor shall prepare and submit erection drawings in accordance with Section 204. Erection Drawings in the SCM.

The Contractor shall submit drawings illustrating fully their proposed method of hanger erection and installation. It is intended that the hangers are prefabricated and installed as one system. Erection drawings shall show details of all lifting and handling devices, and attachments to the hangers: the sequence of erection, location and capacities of lifting equipment as well as location of lifting points on the hangers, and weights of the hangers. The plan and drawings shall be complete in detail for all anticipated phases and conditions during hanger installation. Design calculations, sealed by a Professional Engineer registered in the State of New York, shall be submitted by the Contractor to the DCES for approval which will demonstrate compliance with the PTI Recommendations and these specifications.
Erection of Hangers

A. Subcontractor Qualifications

Hanger installation, stressing, and adjustments shall be supervised by the hanger supplier. The supervisor shall be on site full time during all such operations. The supervisor shall have previous experience with strand-by-strand installation of hangers / stay cables of similar or larger size on at least two other projects within the previous five years.

The Contractor shall submit qualification for all subcontractors and supervisors and a quality procedures manual to the DCES for review.

The hanger cable supplier shall own and furnish all equipment necessary to install and adjust hanger cables and to verify hanger forces.

B. Fabrication

Hangers shall be fabricated in a manner consistent with the design and testing requirements for the hanger cable system as indicated in these Special Provisions. Appropriate measures shall be taken to ensure that all strands are installed parallel to each other.

Strands may be fabricated into fixed length cables or fabricated in-situ.

Flame cutting of the strands is not permitted.

Pretensioning for in-situ fabrication shall be limited to 10 percent of the final installation force. The Contractor shall develop procedures to assure that the pretensioning is uniform (± 2½%) for all strands in a given cable.

C. Handling

The Contractor shall develop procedures to assure that hanger cable components will not be damaged during handling.

Hangers shall be protected from corrosives, heat, abrasion and other harmful effects throughout the fabrication and installation.

Spreader bars and slings or other appropriate devices shall be used to handle all cables. The minimum bending radius for all such cables during handling shall be 25 times the diameter of the cable sheath. Slings or similar devices shall be positioned on the cable to carry both the anchor and adjacent cable in a tangent position, preventing bending of the cable at the anchor. Slings and spreader devices shall be padded to prevent damage to the cable sheath.

All damage to hangers or components thereof shall be evaluated by the Department and remedied prior to installation of the cable. Damaged strand shall be replaced.
non-load carrying components shall be repaired to the Engineer's satisfaction prior to the installation of the hangers. Repair procedures shall be submitted for review and approval prior to the commencement of work.

D. Installation

Hangers shall be installed in accordance with approved working drawings and an engineered cable installation procedure to be prepared by the Contractor which shall prescribe cable force and elongation for the installation of each hanger cable. The engineered procedure shall be developed by a Professional Engineer registered in the State of New York experienced in bridge design and construction utilizing cable systems for bridge superstructures.

Changes to the construction and erection sequence or procedure from those assumed in the development of the hanger cable procedure shall be incorporated in revisions to the hanger cable installation program. Revisions shall be in accordance with Section 202.8 Revisions.

Jacks and gauges for hanger cable installation shall be calibrated using a load cell or calibrated static load machine within one month prior to the beginning of the cable installation, and every six months thereafter, for the duration of cable installation. The 6-month recalibration may be performed using a master gauge, provided that the master gauge is calibrated with the field gauges at the time of initial jack calibration.

The cable installation procedure shall prescribe both force and cable elongation and deck elevations, for each jacking operation, and shall establish the priority of force or elongation for control of the jacking operation. This procedure shall stipulate the permissible variance between force and elongation and deck elevation for each cable to be installed.

Permanent records shall be established for each cable installation and shall be provided to the Engineer in electronic format and hard copy. Such records shall include survey records: date, time and ambient temperatures; cable forces; cable elongation measurements; shim pack or locknut setting; deck loading conditions, and all other special notations necessary and sufficient to establish the conditions under which the cable was installed.

E. Erection

The results of all design computations and computer analyses prepared by the Contractor to determine the erection stresses, reactions, geometry, cable adjustments, etc., at each intermediate stage of erection, shall be submitted to the DCES for review as part of the erection procedure.

Values shown on the hanger cable data sheets are based on design loads and geometry. Before erection, the Contractor shall furnish to the DCES dead load computations based on
weights and geometry from approved shop drawings to verify final dead load assumptions and cable forces/lengths.

Details, including cable lengths, must be developed by the Contractor to provide proper final dead load geometry and cable tensions. For prefabricated cables, the Contractor's details shall show the proposed fabricated lengths and final lengths of cables, including the initial and final geometry of the fixed (arch rib) and adjustable (tie girder) hanger anchorages, with shim/anchor nut position clearly defined, to ensure there is adequate capacity to adjust the hanger.

Hanger cables shall be erected and stressed in pairs (i.e. the cables Cxx) at the appropriate times to suit the Contractor's erection scheme. The upper (arch rib) end shall be the "dead" end of the cable and the lower (tension tie) end shall be the "stressing" end. Tolerances in the free length of each cable shall be compensated by jacking and shimming or adjusting anchor nut at the lower anchorage only. Shims, if used, shall be A709, grade 50, metalized, and as detailed on the shop drawings. The difference in forces between the two cables shall not exceed 5% at any time during the stressing operation. The Contractor shall notify the DCES if at any time the imbalance exceeds 5%.

Based on the Contractor's construction equipment and procedures, the Contractor shall compute and prepare a table of anticipated cable tensions in each cable at corresponding stages of erection, including, but not limited to the stages of, after tension tie girder and arch rib erection, and after full dead load, including wearing surfaces and parapets. The table of anticipated cable tensions and computations shall be submitted to the DCES for review.

Split shims and washers shall have a positive means of locking or clamping the two halves together.

Promptly after erection of each hanger cable, the tension in the hanger cable shall be checked to ascertain that it is within the range of anticipated tension for the corresponding stage of superstructure erection. Measured tension in any cable shall be within five percent of the value calculated for that stage of erection. Maximum cable tension during construction shall not exceed 56% of the cable guaranteed ultimate tensile strength.

If the hanger cable force exceeds the design force as shown in the plans, the Contractor shall investigate adequacy of all cable components and anchorage areas. Cost for all and any additional material required shall be borne by Contractor.

Verification of cable force shall be based on a full-head lift-off test. The Contractor shall perform a full-head lift-off test at 20 hanger locations chosen by the DCES at intermediate and final states of erection, which the DCES will designate depending on the approved sequence and method of erection. If testing of the first 10 hangers shows
hanger stresses that are within 5% of the theoretical design stresses, the remaining 10 hanger locations will not be tested.

No reseating of the wedges on a portion of the strand where wedges have been previously seated will be permitted, unless the supplier has demonstrated that reseating will not deteriorate strength or fatigue performance of the strand. In addition, no wedge seating shall be permitted in the live length of the strand (between the stressing end and dead end wedges). Any small cable length adjustments or cable detensioning shall be made using a multi-strand jack and the anchor nut.

Wedges shall be secured to avoid unseating during construction stages and shall be power seated after all final adjustments have been made. Care shall be exercised during cable erection to prevent damage to the polyethylene sheathing and to prevent damage to the steel components of the cable. All damage to the polyethylene pipe sheathing must be repaired to the satisfaction of the Engineer. Severely damaged sheathing shall be replaced as directed by the Engineer at the Contractor's expense.

F. Painting

All ferrous metal surfaces, other than stainless steel and hot dipped galvanized surfaces of the hanger cable system, shall be painted with and approved zinc primer and top coats. Finish coat color shall be the color of the arch span. Bearing plates, guide pipes, and tower deviation pipes shall be galvanized in accordance with ASTM M 111M (ASTM A123M), Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products, six kilograms per square meter.

G. Silicone Sealant

Prior to clamping the stainless steel bands, the Contractor shall seal the interface of the neoprene boot and the hanger cable using an approved silicone sealant suitable for permanent bonding to the neoprene boots and the PVF tape.

METHOD OF MEASUREMENT

This work will be measured as the lump sum quantity for hangers, complete in place and accepted, for which price shall be full compensation for furnishing all the material and doing all the work herein prescribed in a workmanlike and acceptable manner including all labor, tools, materials, equipment, supplies, falsework, painting and incidentals necessary to complete the work.
BASIS OF PAYMENT

The unit price bid shall include the cost of furnishing all labor, materials, and equipment, fabricating, transporting, erecting, tensioning, painting and wrapping, necessary to satisfactorily complete the work.

Upon application by the Contractor, partial payment according to §109-04 Partial Payment will be made amounting to 40% of the raw material costs after successful completion of the fatigue testing.