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# 1701 - BEARINGS AND PADS FOR STRUCTURES

## SECTION 1701

### BEARINGS AND PADS FOR STRUCTURES

#### 1701.1 DESCRIPTION

This specification covers the following types of pads and bearings for use on bridge seats:

- Plain Elastomeric Pads
- Steel Reinforced Elastomeric Bearings
- PTFE/Elastomeric Sliding Bearings
- Steel Bearings
- Pot Bearings
- Disc Bearings
- Spherical Bearings

#### 1701.2 REQUIREMENTS

**a. General.** Use only one type of pad throughout any one structure, unless otherwise noted in the Contract Documents.

Provide the type(s) of bearings shown in the Contract Documents.

Provide pads or bearings that comply with the Bearings section requirements of AASHTO's LRFD Bridge Design Specifications and LRFD Bridge Construction Specifications.

**b. Plain Elastomeric Pads.** Provide a virgin neoprene (Polychloroprene) pad. A Shore A Durometer hardness of  $60 \pm 5$  and an AASHTO low temperature grade 3 elastomer is required, unless shown otherwise in the Contract Documents. Leveling pads used in Continuous Prestressed Beam Bridges are exempt from the low temperature grade requirements.

**c. Steel Reinforced Elastomeric Bearings.** Provide a virgin neoprene (polychloroprene) elastomer. A Shore A Durometer hardness of  $60 \pm 5$  and an AASHTO low temperature grade 3 elastomer is required, unless shown otherwise in the Contract Documents. Additional testing associated with Design Method B is required.

Provide laminates for the bearings that comply with ASTM A 36, AASHTO M 270 (ASTM A 709) Grade 36, ASTM A 1011 SS Grade 36 or A 1008 SS Grade 40, unless otherwise specified in the Contract Documents.

**d. PTFE/Elastomeric Sliding Bearings.** Provide an elastomeric portion satisfying **subsection 1701.2(c)**. Provide a sliding surface for the PTFE that is chromium-nickel stainless steel sheet or plate that complies with ASTM A 240, UNS S31600 or UNS S30400. Polish the surface to an 8 micro-inch RMS (#8 mirror) finish.

Provide special bearing quality polytetrafluoroethylene (PTFE) unfilled sheets having a static loading coefficient of friction of not more than 0.03 at a bearing pressure of 3.0 ksi or greater and a temperature of 68°F.

**e. Steel Bearings.** Face the bearing surfaces of the bearings as required by **DIVISION 700**.

When specified on the Contract Documents, provide structural steel that is hot dip galvanized in accordance with ASTM A 123.

When specified on the Contract Documents, paint the surfaces of the bearings as required by **DIVISION 700**.

**f. Anchor Bolts.** Provide Type I or II anchor bolts that comply with **DIVISION 1600**. When specified on the Contract Documents, provide anchor bolts, nuts, and washers that have been hot dip galvanized in accordance with ASTM A 153.

#### 1701.3 TEST METHODS

As specified in the various AASHTO and ASTM standards cited in this specification.

## 1701 - BEARINGS AND PADS FOR STRUCTURES

### 1701.4 PREQUALIFICATION

None required.

### 1701.5 BASIS OF ACCEPTANCE

**a. Plain Elastomeric Pads.** Receipt and approval of a Type D certification as specified in **DIVISION 2600**.

**b. Bearings** (all types except Steel) Accepted on the basis of the following:

- Receipt and approval of a Type B certification as specified in **DIVISION 2600**
- Visual inspection for condition and compliance with the shop drawings by the Field Engineer at the project site.

**c. Steel Bearings.** Accepted on the basis of the following:

- Receipt and approval of a Type A certification as specified in **DIVISION 2600** for all steel components provided through this specification.
- Visual inspection for compliance with the shop drawings and fabrication requirements of **SECTION 703** at either the point of production, at the bridge fabricator's facility, or at the project site, as determined by the Field Engineer.

## 1702 - CALCIUM CHLORIDE

### SECTION 1702

#### CALCIUM CHLORIDE

##### 1702.1 DESCRIPTION

This specification covers calcium chloride to be added to bases or surfaces as a stabilizer or dust palliative.

##### 1702.2 REQUIREMENTS

a. Provide calcium chloride that complies with AASHTO M 144 with the exception that “Impurities Content” does not apply. Supply one of the types listed below:

- (1) Type S (Flake, pellet or granule)
  - (a) Grade 1 (77%  $\text{CaCl}_2$ )
  - (b) Grade 2 (90%  $\text{CaCl}_2$ )
- (2) Type L (Liquid)

b. Base the application rate used in the Contract Documents on Type S, Grade 2 calcium chloride. Increase the rate by 20% when using Grade 1. Calculate the application rate of Type L based on the concentration of the material supplied.

##### 1702.3 TEST METHODS

Sample and test according to the applicable provisions of AASHTO T 143.

##### 1702.4 PREQUALIFICATION

Not required.

##### 1702.5 BASIS OF ACCEPTANCE

a. Receipt and approval of a Type D certification as specified in **DIVISION 2600**. Include the concentration of  $\text{CaCl}_2$  if certifying a Type L material.

b. Satisfactory performance in the field.

## 1703 - ELECTRIC LIGHTING AND TRAFFIC SIGNAL EQUIPMENT

### SECTION 1703

#### ELECTRIC LIGHTING AND TRAFFIC SIGNAL EQUIPMENT

##### 1703.1 DESCRIPTION

This specification covers general materials, electrical conduit and miscellaneous hardware for highway lighting and traffic signal systems. Construct these systems in accordance with, and at locations indicated in the Contract Documents or designated by the Engineer.

##### 1703.2 REQUIREMENTS

**a. General Materials.** Whether the installation involves a single Contract or tied contracts, use a single manufacturer when purchasing all major items of electrical equipment to be used on the project(s). Make all attempts to maintain the same type and consistency of products to promote uniformity, singular responsibility and serviceability. Provide equipment that is new, the best standard product of a manufacturer regularly engaged in the production of this type of equipment, the manufacturer's latest approved design and of best quality and workmanship.

Provide a complete lighting/traffic signal system. Provide and install all equipment necessary for the complete and satisfactory operation of the lighting/traffic signal system whether specifically mentioned or not.

##### **b. Electrical Conduit.**

(1) **Metallic Conduit and Fittings.** Provide a rigid steel conduit suitable for use as a raceway for wires or cables of an electrical system. Comply with all requirements of American National Standards Institute (ANSI) C80.1. Protect the exterior surface with a metallic zinc coating and on the interior surface with zinc, enamel or other equivalent corrosion-resistant coating. Metallic conduit fittings are to be zinc coated and comply with ANSI C80.4.

(2) **Nonmetallic Conduit and Fittings.**

(a) **Polyvinyl Chloride (PVC) Conduit.** Provide a Schedule 40 or Schedule 80 rigid polyvinyl chloride conduit complying with the latest edition of the National Electrical Manufacturing Association (NEMA) Standard TC-2. Comply with NEMA Standard TC-3 on all PVC conduit fittings. Fabricate from polyvinyl chloride having the same chemical and physical properties as the conduit, which is made in accordance with the manufacturer's recommendations. Underwriters, Inc. (UL) labels are required on all conduit and fittings.

(b) **Polyethylene Conduit.** Provide a smooth wall, Schedule 40 or Schedule 80, high-density polyethylene duct complying with NEMA Standard TC-7.

(3) Supply conduits complying with the dimensional requirements shown in the Contract Documents.

**c. Miscellaneous Hardware.** Hot dip galvanize or electroplate with zinc or cadmium all miscellaneous hardware such as bolts, nuts, washers, studs, pins, terminals, springs and similar fastenings in accordance with the following requirements:

(1) **Hot Dipped Galvanized.** Comply with to requirements stated in ASTM A 153. Complying with the requirements stated under Class C or D for threaded fittings.

(2) **Electroplated Articles.** Provide sufficient coating to complying with ASTM B 633.

##### 1703.3 TEST METHODS

For hot dipped galvanized materials, determine acceptable coating thickness as stated in ASTM A 90, ASTM B 499 or methods stated in ASTM B 633.

For electroplated articles, measure thickness by any one of the methods specified in ASTM B 633 and, in addition, by eddy current techniques. The eddy current methods, ASTM B 244 may be utilized provided appropriate calibration procedures and standards have been applied. The ASTM B 659 provides a guide to these methods. The magnetic methods of ASTM B 499, referenced in ASTM B 633, and eddy current techniques are nondestructive and are preferred.

## 1703 - ELECTRIC LIGHTING AND TRAFFIC SIGNAL EQUIPMENT

### 1703.4 PREQUALIFICATION

**a. Traffic Signals.** Prequalification or preapproval by the Bureau of Traffic Engineering is required of all materials stated in the Contract Document's Bill of Materials before use on KDOT projects. Upon approval by the Bureau of Traffic Engineering, the material will be added to the prequalified list of materials maintained by the Bureau of Materials and Research. When a manufacturer or supplier is intending to supply traffic signal materials under these specifications, proceed as follows:

- (1) Submit an original catalog cut, shop drawing, drawing and/or data sheets on the material.
- (2) Send a signed certification letter from the manufacturer or fabricator certifying that the material complies with the applicable specifications. Submit this information to:

KDOT  
Bureau of Traffic Engineering  
Eisenhower State Office Building  
700 SW Harrison Street  
Topeka, Kansas 66603-3754

**b. Lighting.** Not Applicable.

### 1703.5 BASIS OF ACCEPTANCE

Acceptance of material provided under this specification will be based on the following:

**a. Traffic Signals.**

- (1) Prequalification for traffic signal materials as specified in **subsection 1703.4**.
- (2) Traffic Signal Materials List: Before the installation of traffic signals, submit for the approval of the Engineer a complete list of traffic signal materials proposed for installation. Submit the list as soon as practicable. Include items on the list for all quantities which are indicated in the Bill of Materials. Include the make, model and other descriptive data as may be required by the Engineer to identify the product. Sign the list certifying that the project-provided materials fulfill the requirements above. The Engineer will compare the items on the traffic signal materials list to the prequalified list. If all of the items match, the Engineer will sign the traffic signal materials list attesting that the materials are approved for use on the project. Forward a copy of the list to each of the following: Bureau Chief of Materials and Research, Bureau Chief of Traffic Engineering, and the maintaining agency's contact person indicated in the Contract Documents.

In the event the Contractor wishes to provide any item that is not on the prequalified list, provide the Engineer with the information for prequalification per **subsection 1703.4**. Forward this information to the Bureau of Traffic Engineering for review and approval, along with possible addition to the prequalified list.

- (3) Electrical conduit: Receipt and approval of a Type D certification as specified in **DIVISION 2600** and visual inspection for condition and compliance with dimensional or other requirements.

(4) Structural steel poles and mast arms:

- (a) Receipt and approval of a copy of the certified mill test reports for each heat or lot of material showing process of manufacture and compliance with chemical and physical requirements of the applicable specifications. Submit these reports to the Engineer of Tests.
- (b) Satisfactory results of tests performed at destination to determine the weight of the zinc coating.
- (c) Provide detailed shop drawings on all poles from the traffic signal pole manufacturer. Include drawings of the poles, mast arm and luminaire arm (on combination poles) dimensions, arm attachment details, handhole details, and anchor bolt details. Include the signal weight, projected areas and mounting arrangement the poles are designed to accommodate. Submit design calculations along with the shop drawings. Approved shop drawings will be included on the prequalified list.

For traffic signal poles that are not covered by the approved manufacturer's standard shop drawings, submit 3 copies of the detailed shop drawings, along with the design calculations to the Engineer for approval by the Bureau of Traffic Engineering.

- (d) Along with the traffic signal materials list, submit the necessary traffic signal pole ordering information. The Engineer will review the information for compliance with the plan dimensions for pole height, mast arm length/mounting height and luminaire arm length/mounting height.

## 1703 - ELECTRIC LIGHTING AND TRAFFIC SIGNAL EQUIPMENT

(e) Visual inspection at destination for condition, compliance with dimensions and requirements as indicated by the approved documents.

(5) Materials such as ferrous-and non-ferrous metals or other materials are governed by other sections of these specifications.

### **b. Lighting.**

(1) Electrical conduit: Receipt and approval of a Type D certification as specified in **DIVISION 2600** and visual inspection for condition and compliance with dimensional or other requirements.

(2) Structural steel poles and mast arms:

(a) Receipt and approval of a copy of the certified mill test reports for each heat or lot of material showing process of manufacture and compliance with chemical and physical requirements of the applicable specifications. Submit these reports to the Engineer of Tests.

(b) Satisfactory results of test performed at destination to determine the mass of the zinc coating.

(c) Visual inspection at destination for condition and compliance with dimensions or other requirements.

(3) Materials such as ferrous-and non-ferrous metals or other materials are governed by other sections of these specifications.

(4) Materials for electric lighting installations not covered elsewhere in these specifications are shown in the Contract Documents. Base acceptance of these materials on the following:

(a) Approval of shop drawings, catalog cuts, brand names or other requirements as shown in the Contract Documents. Submit 7 copies of all catalog cuts, shop drawings, etc. to the following address for approval:

KDOT  
Bureau of Traffic Engineering  
Eisenhower State Office Building  
700 SW Harrison Street  
Topeka, Kansas 66603-3754

(b) Visual inspection at destination for condition and compliance with requirements as indicated by the approved documents.

## 1704 – WARNING LIGHTS

### SECTION 1704

#### WARNING LIGHTS

##### 1704.1 DESCRIPTION

This specification covers warning lights for use on traffic control devices.

##### 1704.2 REQUIREMENTS

**a. General.** Provide warning lights of the type or types shown in the Contract Documents and complying with the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD), Part VI, Warning Lights and the Institute of Transportation Engineers (ITE) Purchase Specification for Flashing and Steady Burn Warning Lights.

Clearly mark the manufacturer's name, type and model number on the outside of each unit used on the project.

Provide lights that comply with the crashworthy criteria contained in the testing and acceptance guidelines of the National Cooperative Highway Research Program (NCHRP) Report 350.

**b. Batteries.** Use batteries that are recommended by the light manufacturer. Replace batteries when they no longer provide satisfactory performance as determined by the Engineer.

##### 1704.3 TEST METHODS

As specified in ITE Purchase Specification for Flashing and Steady Burn Warning Lights.  
Test lights as specified by NCHRP Report 350.

##### 1704.4 PREQUALIFICATION

Supply test data from an approved testing laboratory for each type and model of warning light showing compliance with the specification. Submit test results, along with the brand, model and type of warning light to the Engineer of Tests. Requalify any unit that has been modified or changed in such a way as to affect the performance of the unit. Submit a NCHRP Report 350 crashworthy certification to the Engineer of Tests.

The Bureau of Materials and Research will maintain a list of prequalified warning lights.

##### 1704.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1704.4.**

Receipt and approval of a Type C certification as specified in **DIVISION 2600.**

Satisfactory performance in the field.



# 1705 – EPOXY-RESIN-BASE BONDING SYSTEMS FOR CONCRETE

## SECTION 1705

### EPOXY-RESIN-BASE BONDING SYSTEMS FOR CONCRETE

#### 1705.1 DESCRIPTION

This specification covers two-component, epoxy-resin bonding systems for application to portland cement concrete, which are able to cure under humid conditions and bond to damp surfaces, and comply with the AASHTO M 235 (ASTM C 881).

a. Seven types of systems are covered by this specification.

(1) Type I - For use in non-load bearing applications for bonding hardened concrete to hardened concrete and other materials, and as a binder in epoxy mortars or epoxy concretes.

(2) Type II - For use in non-load bearing applications for bonding freshly mixed concrete to hardened concrete.

(3) Type III - For use in bonding skid-resistant materials to hardened concrete, and as a binder in epoxy mortars or epoxy concretes used on traffic bearing surfaces (or surfaces subject to thermal or mechanical movements).

(4) Type III Overlay- For use in multi-layer polymer concrete overlay, and as a binder in epoxy mortars or epoxy concretes used on traffic bearing surfaces (or surfaces subject to thermal or mechanical movements).

(5) Type IV - For use in load bearing applications for bonding hardened concrete to hardened concrete and other materials, and as a binder for epoxy mortars and concrete.

(6) Type V - For use in load bearing applications for bonding freshly mixed concrete to hardened concrete.

(7) Type VI - For bonding and sealing segmental pre-cast elements with internal tendons and span-by-span erection when temporary post tensioning is applied.

(8) Type VII - For use as a non-stress carrying sealer for segmental pre-cast elements when temporary post tensioning is not applied as in span-by-span erection.

b. Three grades of systems are covered by this specification.

(1) Grade 1 - Low viscosity (0-2.0 Pa)

(2) Grade 2 - Medium viscosity (2.0-10 Pa)

(3) Grade 3 - Non-sagging consistency.

c. Classes A, B, and C are defined for Types I through V, and Classes D, E, and F are defined for Types VI and VII, according to the range of temperatures for which they are suitable. The temperature in question is usually that of the surface of the hardened concrete to which the bonding system is to be applied. This temperature may be considerably different from that of the air. Where unusual curing rates are desired, it is possible to use a class of bonding agent at a temperature other than that for which it is normally intended. For example, a Class A system will cure rapidly at room temperature. Any deviation of this sort must be approved by the Engineer before application. Classes are defined as follows:

(1) Class A - For use below 40°F. The lowest allowable temperature is defined by the manufacturer of the product.

(2) Class B - For use between 40 and 60°F.

(3) Class C - For use above 60°F. The highest allowable temperature is defined by the manufacturer of the product.

(4) Class D - For use between 40 and 65°F.

(5) Class E - For use between 60 and 80°F.

(6) Class F - For use between 75 and 90°F.

#### 1705.2 REQUIREMENTS

Provide material that complies with AASHTO M 235 (ASTM C 881), is the type and grade specified in the Contract Documents, and is the class appropriate for the temperature at the time of use, as designated by the manufacturer.

## 1705 – EPOXY-RESIN-BASE BONDING SYSTEMS FOR CONCRETE

For Type III Overlay, Grade 1 or 2, 100 percent solids, thermosetting, moisture-insensitive epoxy, that complies with AASHTO M 235 (ASTM C 881), with the following exceptions in **TABLE 1705-1**:

<b>TABLE 1705-1: ADDITIONAL REQUIREMENTS FOR TYPE III OVERLAY EPOXY</b>		
<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Viscosity	7-25 poises	ASTM D2393, Brookfield RVT, Spindle No. 3 at 20 RPM
Gel Time	15-45 min.	ASTM C 881, para. 11.2.1 modified, 50 to 100 ml sample.
Compressive Strength*, 3 hr.	1000 psi min.	ASTM C 109, w/ plastic inserts
Compressive Strength*, 24 hr.	5000 psi min.	ASTM C 109, w/ plastic inserts
Tensile Strength, 7day	2000-5000 psi	ASTM D 638
Elongation, 7 days	30-70 percent	ASTM D 638
Adhesive Strength, 24 hr.	250 psi min.	ACI 503R, Appendix A

\*Mixed with aggregate.

### 1705.3 TEST METHODS

As specified in AASHTO M 235 (ASTM C 881).

### 1705.4 PREQUALIFICATION

a. All epoxy resin systems intended for use under this specification must be prequalified on the basis of Type, Grade and Class prior to use. Manufacturers desiring to supply material for KDOT jobs must submit a written request to the Bureau Chief of Materials and Research, with the following information for each type and brand name:

(1) Name, address and telephone number of the manufacturer. Include the name of the preferred contact person.

(2) Brand name of the material.

(3) Type, Grade and Class of the material.

(4) Information regarding recommended usage and application instructions.

(5) Material Safety Data Sheets.

(6) One copy of a certified test report prepared by a laboratory regularly inspected by the Cement and Concrete Reference Laboratory (CCRL) of the National Institute of Standards Technology or other approved reference laboratory, showing test results complying with AASHTO M 235 (ASTM C 881). Include evidence that the laboratory is inspected regularly.

(7) For Type III Overlay Epoxy, include a Fourier Transform Infrared Spectrophotometry (FTIR) spectrum in transmittance mode and a bulk sample of each component tested. All data will be maintained as confidential and used only for QA/QC purposes.

(8) For Self-contained Epoxy Systems, provide 6 samples for testing at MRC.

All liquid components will be “fingerprinted” using infrared spectroscopy for use in screening future verification samples to verify that materials submitted for use are of an identical formulation as originally approved.

b. The information and test reports will be reviewed by the Bureau Chief of Materials and Research. The manufacturer will be advised as to whether or not the product is prequalified.

For Type III Overlay Epoxy, prequalification is dependent upon a three-year satisfactory performance in the field. Proof or performance at non-KDOT projects in Kansas may be submitted to show satisfactory performance history in Kansas.

c. The Bureau of Materials and Research will maintain a list of prequalified epoxy resin systems. Products will remain prequalified as long as the formulation and manufacturing processes remain unchanged, and field experience indicates that the material functions appropriately. Changes in formulation or manufacturing processes will require new prequalification testing. Failure of the material to function appropriately in the field will be cause for removal of the product from prequalified status. Products removed from prequalified status will be considered for requalification if the manufacturer can provide evidence that the cause of failure has been positively identified,

## 1705 – EPOXY-RESIN-BASE BONDING SYSTEMS FOR CONCRETE

and necessary formulation changes and quality control measures have been implemented to eliminate that cause. Complete prequalification testing may be required for products that have been removed from prequalified status.

**d.** Verification samples will be taken and forwarded to the MRC for testing. Failure of such samples to comply with the specification requirements may be cause for removal of the product from prequalified status.

### 1705.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1705.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

Observation of performance at the project to verify that the epoxy is effective for the specified purpose.

For Type III Overlay, the Engineer will accept the epoxy on the basis of the certified laboratory report, and the Infrared Spectrum analysis of the field samples.

**1706 – ABUTMENT STRIP DRAIN**

**SECTION 1706**

**ABUTMENT STRIP DRAIN**

**1706.1 DESCRIPTION**

The abutment strip drain is a prefabricated geocomposite system used to provide drainage behind abutment backwalls, wing walls, retaining walls or under slopes.

**1706.2 REQUIREMENTS**

**a. General.** The system is preformed using a lightweight, high impact polymeric core with an attached geotextile (filter fabric). The composite polymer core is bonded to the geotextile at intervals not exceeding 1 1/8 inch in any direction. The preformed system permits the flow of water through the core. The geotextile fabric is thermal (heat) bonded or fungicide glue bonded to the polymeric core. The composite product sheets or rolls have a minimum width of 3 feet with a minimum area of 40 square feet. Store and handle the system in accordance with manufacturer's recommendations, except that in no case may geotextile be exposed to direct sunlight, ultraviolet rays, temperature greater than 140°F, mud, dirt, dust, and debris. Do not use any core section that becomes torn or punctured. All material delivered to the project must meet or exceed the physical requirements based on minimum average roll or sheet values in **TABLE 1706-1**.

<b>TABLE 1706-1: COMPOSITE SYSTEM PROPERTIES</b>		
<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Thickness (mils)	250 min., 500 max	ASTM D 1777
Peel Strength (lbs/ft)	5 minimum	ASTM D 1876
Transmissivity (gals/min/ft) at hydraulic gradient of 1.0 and minimum normal stress of ½ the crush strength of the core.	10 minimum	ASTM D 4716

**b. Core.** The core is a lightweight polymer plastic composition of either polystyrene, polyethylene, polypropylene, or PVC, with a convexity structure and complies with **TABLE 1706-2**.

<b>TABLE 1706-2: CORE PROPERTIES</b>		
<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Std. Crush Strength:		
Wall Drain (lbs/sq ft)	Min. 10,000	ASTM D 1621
Slope Drain (lbs/sq ft)	Min. 18,000	ASTM D 1621
Deflections (%)	Max. 20	ASTM D 1621
Thickness (mils)	Min. 230	ASTM D 1777

**c. Geotextile Filter Fabric.** Provide fabric that complies with AASHTO M 288 for subsurface drainage geotextiles with properties for Class 2 geotextile with elongation greater than or equal to 50%, and percent in-situ soil passing the No. 200 sieve of greater than 50%.

NOTE: Use backfill soils with a liquid limit less than 50.

**1706.3 TEST METHODS**

Test the composite and individual components according to the standards cited in **subsection 1706.2**.

## 1706 – ABUTMENT STRIP DRAIN

### 1706.4 PREQUALIFICATION

For prequalification, supply samples of the finished product from production to the KDOT Engineer of Tests for testing and evaluation. Submit separate samples of the core material and the filter fabric. All samples must be 10 feet long by nominal roll width. Submit a manufacturer's or independent laboratory test report addressing the properties in **subsection 1706.2**.

When it becomes available, test results for the product will be accepted from the AASHTO National Transportation Product Evaluation Program (NTPEP) without submitting samples. Forward an official copy of the test report to the Bureau Chief of Materials and Research for evaluation. Prequalification will be based on satisfactory compliance of NTPEP results with this specification.

If the KDOT test or NTPEP results comply with **subsection 1706.2**, the name of the product will be placed on a list of prequalified products maintained by the Bureau of Materials and Research. No geocomposite drainage system will be used on KDOT projects unless it has been prequalified.

Verification samples will be taken at the rate of 2 per source, per district, per year, and forwarded to the Materials and Research Center for evaluation. Failure of any verification sample to comply with this specification may be cause for removal of the manufacturer from the prequalified list.

### 1706.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1706.4** (note verification sample requirement).

Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

A visual inspection in the field for damage and to verify compliance with these specifications.

## 1707 – MANHOLE STEPS

### SECTION 1707

#### MANHOLE STEPS

##### 1707.1 DESCRIPTION

This specification covers the requirements for steps for use in precast or cast in place manholes. The steps may be either Type 1 or Type 2 unless otherwise shown in the Contract Documents.

##### 1707.2 REQUIREMENTS

**a. Type 1.** Provide a manhole step made of a No. 3 or larger deformed steel reinforcing bar encapsulated in a copolymer polypropylene plastic possessing good impact and load-bearing properties and corrosion resistance.

Use a steel bar that complies with ASTM A 615 and make it continuous throughout the entire length of the legs and tread. Use a copolymer polypropylene plastic coating that complies with ASTM D 4101, Group 2.

**b. Type 2.** All steps not complying with Type 1 are considered Type 2 and require prequalification. Provide steps that comply with ASTM C 478, Sections 13.4 and 13.6. Galvanize ferrous metal steps, or encapsulate them in a plastic, which possesses good impact, load bearing, and corrosion resistant properties.

##### 1707.3 TEST METHODS

Test in accordance with the ASTM methods shown for each step type.

##### 1707.4 PREQUALIFICATION

Submit a sample and a certified test report, listing the results of all applicable tests, from a qualified laboratory, for each model and size of Type 2 step to be prequalified to the Engineer of Tests. The Engineer of Tests will review the test results and inspect and/or test the sample, and will notify the manufacturer in writing of the status of each type of step submitted.

The Bureau of Materials and Research will maintain a list of prequalified Type 2 manhole steps.

##### 1707.5 BASIS OF ACCEPTANCE

**a. Type 1 manhole steps.** Receipt and approval of a Type D certification as specified in **DIVISION 2600** and visual inspection for conditions and dimensional requirements.

**b. Type 2 manhole steps.** Receipt and approval of a Type C certification as specified in **DIVISION 2600** and visual inspection for conditions and dimensional requirements.

# 1708 – BRIDGE BACKWALL PROTECTION SYSTEM

## SECTION 1708

### BRIDGE BACKWALL PROTECTION SYSTEM

#### 1708.1 DESCRIPTION

This specification covers waterproofing protection systems to be applied to the face of a concrete abutment against which a backfill will be placed. Requirements for the systems other than the coal-tar membrane are performance oriented, and not limited to any single methodology to accomplish the desired results.

#### 1708.2 REQUIREMENTS

**a. Coal-Tar Membrane.** A coal-tar membrane protective coat complying with the requirements below is an acceptable bridge backwall protective system without further prequalification as long as environmental regulations do not prohibit use of the material.

(1) Penetrating Primer. Use a cationic, highly penetrating, bituminous solution that is compatible with coal-tar emulsion and formulated to neutralize portland cement concrete.

(2) Fiber Glass Fabric. Use fiberglass fabric that complies with ASTM D 1668, Type II, and Coal Tar Pitch-Treated.

(3) Coal-Tar Emulsion.

(a) General. Coal-tar emulsion is compounded of heavy, closed ring hydrocarbons dispersed in water by means of a combination of irreversible colloidal clays. It contains no sulphite pitches, asphalt, bentonite, coal dust, soluble soaps or sulphonic acid.

(b) Physical Properties. The emulsion is homogeneous and shows no separation or coagulation of components that can not be readily overcome by moderate stirring.

The thixotropic properties are such that at normal working temperatures, the material may be temporarily reduced with agitation to a state of liquidity where, without the addition of adulterants, it may be easily spread or sprayed on the surface. After application by the above methods, it becomes set in place.

When spread to a thin film with a spatula, the emulsion shows a uniformly smooth, non-granular consistency, free from coarse particles which are either apparent or cause voids in the film as the material is drawn out to a smear.

(c) Comply with **TABLE 1708-1**.

<b>Property</b>	<b>Requirement</b>
Residue by evaporation,(minimum)	48%
Heat loss of residue by evaporation,(maximum)	15%
Ash content of residue by evaporation	30-40%
Setting time,(maximum)	4 hours
Resistance to kerosine and water	pass
Resistance to Impact after Accelerated Weathering	pass

**b. Other types of bridge backwall protection systems.** Make all systems of permanent non-biodegradable materials possessing the waterproofing protection qualities outlined below. All materials incorporated into a system must be environmentally acceptable, and not prohibited by any regulatory body. Handle, store and install bridge backwall protection systems in strict compliance with the manufacturer's recommendations. Specific requirements are as follows:

(1) The system provides an impermeable layer that adheres to the concrete surface. Such adherence may require the presence of water to activate the system. The activated system prevents lateral movement of water at the interface between the concrete and the impermeable layer.

(2) The system is self healing when punctured by sharp objects. It has the capability to flex and bridge over, or move into and seal any cracks which may develop in the concrete.

## 1708 – BRIDGE BACKWALL PROTECTION SYSTEM

(3) Acceptable bentonite based systems contain a minimum of 9 lb of evenly distributed bentonite per square yard of system surface area.

### 1708.3 TEST METHODS

Coal-Tar Emulsion.

- (1) Residue by Evaporation. ASTM D 2939, Section 8.
- (2) Heat Loss of Residue by Evaporation. Place the specimen from Residue by Evaporation in a cool muffle furnace and heat to 520°F for 30 minutes. Remove and place in a desiccator until cool. Weigh to determine the loss in mass.
- (3) Ash Content of Residue by Evaporation. ASTM D 2939, Section 10.
- (4) Setting Time. ASTM D 2939, Section 13, except the evaluation of setting time is made after four hours.
- (5) Resistance to Kerosine. ASTM D 2939, Section 25.
- (6) Resistance to Water. ASTM D2939, Section 15.
- (7) Resistance to Impact after Accelerated Weathering. ASTM D2939, Section 27.  
Use Test Method D 4798, Cycle B., Xenon Arc Exposure.

### 1708.4 PREQUALIFICATION

a. Bridge backwall protection systems other than coal-tar membrane that are intended for use under this specification must be prequalified. Submit a written request to the Bureau Chief of Materials and Research, with the following information for each type and brand name being offered:

- (1) Name, address and telephone number of the manufacturer. Include the name of the preferred contact person.
- (2) Brand name of the system.
- (3) Complete technical information on the system, including test reports addressing requirements cited above. Include small sales samples of the system. Larger samples will be requested if further testing is necessary.
- (4) Information regarding recommended usage and application instructions. Specifically identify any concrete surface or system curing requirements.
- (5) Material Safety Data Sheets.

b. The information will be reviewed by the Bureau Chief of Materials and Research, and the manufacturer will be advised as to whether or not the product is prequalified.

c. The Bureau of Materials and Research will maintain a list of prequalified bridge backwall protection systems. Products will remain prequalified as long as the formulation and manufacturing processes remain unchanged, and field experience indicates that the material functions appropriately. Changes in formulation or manufacturing processes will require a new prequalification review.

### 1708.5 BASIS OF ACCEPTANCE

#### a. Coal-Tar Membrane.

- (1) Receipt and approval of a Type D certification as specified in **DIVISION 2600** for each of the following components:
  - (a) Penetrating Primer
  - (b) Fiber Glass Fabric
  - (c) Coal-Tar Emulsion
- (2) Satisfactory application in the field.

#### b. Other types of bridge backwall protection systems.

- (1) Prequalification as specified in **subsection 1708.4**.
- (2) Receipt and approval of a Type C certification as specified in **DIVISION 2600**.
- (3) Visual inspection at destination for condition and compliance with dimensional and other requirements.



## 1709 – SUBSTRUCTURE WATERPROOFING

### SECTION 1709

#### SUBSTRUCTURE WATERPROOFING

##### 1709.1 DESCRIPTION

Material covered by this specification forms a waterproofing system to be applied to selected areas of a bridge substructure.

##### 1709.2 REQUIREMENTS

###### a. General.

(1) Provide a flexible coating which is moisture insensitive, and which seals the surface to which it is applied to prevent the penetration of water.

(2) When applied to a concrete substrate and given 500 hours of exposure in an accelerated weathering apparatus (ASTM G 153, Table X1.1, Cycle 1) the waterproofing membrane system must be continuous, free of deep cracks and give complete protection from moisture intrusion.

(3) Prepare surfaces and apply each component in accordance with the manufacturer's instructions. Provide a copy of the manufacturer's literature including mixing, thickness of application, and installation instructions to the Field Engineer prior to application of the system.

###### b. Epoxy Primer/Urethane Mastic System.

(1) Primer. The primer is a two-part penetrating epoxy polyamide specially formulated for use on concrete surfaces to improve adhesion before application of one or two-part polyurethane coatings, with a minimum solids content of 20 percent.

(2) Mastic. The mastic is a one or two-part modified urethane elastomer, formulated as a weather resistant membrane, with a minimum solids content of 80 percent.

**c. Epoxy System.** Epoxy systems comply with AASHTO M 235 (ASTM C 881) Type III, grade and class as required for work to be performed. Epoxy systems must be prequalified under **SECTION 1705**, "Epoxy-Resin-Base Bonding Systems for Concrete."

##### 1709.3 TEST METHODS

None specified.

##### 1709.4 PREQUALIFICATION

**a.** All substructure waterproofing systems intended for use under this specification must be prequalified. Submit a written request to the Bureau Chief of Materials and Research, with the following information for each type and brand name being offered:

(1) Name, address and telephone number of the manufacturer. Include the name of the preferred contact person.

(2) Brand name of the system.

(3) Complete technical information on the system, including test reports addressing requirements cited above. For epoxy systems, submit complete AASHTO M 235 (ASTM C 881) test reports if the material has not already been prequalified under **SECTION 1705**. Include small sales samples of the system. Larger samples will be requested if further testing is necessary.

(4) Information regarding recommended usage and application instructions. Specifically identify any concrete surface or system curing requirements.

(5) Material Safety Data Sheets.

**b.** The Bureau Chief of Materials and Research will review the information, and the manufacturer will be advised as to whether or not the product is prequalified.

## 1709 – SUBSTRUCTURE WATERPROOFING

c. The Bureau of Materials and Research will maintain a list of prequalified substructure waterproofing systems. Products will remain prequalified as long as the formulation and manufacturing processes remain unchanged, and field experience indicates that the material functions appropriately. Changes in formulation or manufacturing processes will require a new prequalification review.

### 1709.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1709.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

Visual inspection of performance in the field.

## 1710 – GEOTEXTILE FABRIC

### SECTION 1710

#### GEOTEXTILE FABRIC

##### 1710.1 DESCRIPTION

This specification covers the requirements for geotextile fabrics and securing pins for use in subsurface drainage, separation, and stabilization.

##### 1710.2 REQUIREMENTS

**a. Geotextiles.** Provide woven, non-woven, or composite geotextiles that comply with the general physical and the geotextile property requirements for subsurface drainage, separation, and stabilization in AASHTO M 288, with strength class and other properties as specified in the Contract Documents. Store and handle geotextiles according to ASTM D 4873. Do not use torn or punctured geotextiles.

When seams are required, use “Butterfly” seams that have a Federal Standard designation of Type SSD-1. Place the stitching approximately 1 inch from the fold. Make sure the two fabric edges are even and have been completely penetrated by the seam. Use polyester, polypropylene or Kevlar thread with durability equal to or greater than the material used in the fabric.

**b. Securing Pins.** When required, provide steel securing pins that are nominally ¼ inch in diameter, and 18 inches long, pointed at one end and fitted with a 1 ½ inch outside diameter steel washer at the other end.

##### 1710.3 TEST METHODS

Test in accordance with the procedures referenced in AASHTO M 288 for each type of geotextile fabric.

##### 1710.4 PREQUALIFICATION

Supply samples for prequalification to the AASHTO National Transportation Product Evaluation Program (NTPEP). Forward an official copy of the test report to the Bureau Chief of Materials and Research for evaluation. Prequalification will be based on satisfactory compliance of NTPEP results with AASHTO M 288. Products will be qualified and listed on the basis of strength class, use category and specific property requirements.

##### 1710.5 BASIS OF ACCEPTANCE

###### **a. Geotextiles**

Prequalification as specified in **subsection 1710.4.**

Receipt and approval of a Type C certification as specified in **DIVISION 2600.**

Visual inspection for damage during shipment, fit and other visual defects, and disposition when delivered to the project site.

###### **b. Securing Pins.**

Securing pins are accepted on the basis of a visual inspection and performance in the field.

## 1711 – GABIONS

### SECTION 1711

#### GABIONS

##### 1711.1 DESCRIPTION

This specification covers gabion fabricated in accordance with this specification and as shown in the Contract Documents. Gabions manufactured from both twisted and welded wire are described here. Provide the type that is specified in the Contract Documents. If neither is specified, either may be provided.

##### 1711.2 REQUIREMENTS

**a. General.** The following applies, regardless of the method of manufacture. Make the mesh openings with a maximum dimension less than 5 inches, and area less than 11 square inches, and a size less than the gabion orrevet mattress rock to be used with the mesh.

**b. Twisted Wire Mesh.** Provide gabions and permanent fasteners, lacing, stiffeners and other assembly components that comply with ASTM A 975 with the following specific designations.

- (1) Provide Style 1 unless polyvinyl chloride (PVC) coating is specified.
- (2) If PVC coating is specified, provide Style 3.

**c. Welded Wire Fabric.** Provide gabions and permanent fasteners, lacing, stiffeners and other assembly components that comply with ASTM A 974 with the following specific designations.

- (1) Provide Style 2 (zinc coating after welding) unless polyvinyl chloride (PVC) coating is specified.
- (2) If PVC coating is specified, provide Style 5 made from Style 2 components.

##### 1711.3 TEST METHODS

Test gabion materials according to the ASTM's cited in **subsection 1711.2**.

##### 1711.4 PREQUALIFICATION

**a.** All material provided under this specification must be prequalified.

**b.** Manufacturers interested in prequalifying material under this specification must provide 1 gabion that are galvanized and 1 gabion that is PVC coated to the Engineer of Tests for laboratory testing and evaluation. Include samples of all fasteners used to assemble the units and incorporate them into a structure. Include test reports for the same type of units being submitted, a copy of all technical data, and a complete set of installation recommendations and instructions.

**c.** The submittals will be evaluated for compliance with this specification, and the manufacturer will be notified of the results.

**d.** The Bureau of Materials and Research will maintain a list of qualified materials and a file of installation instructions. Products will remain on the prequalified list as long as the field performance is satisfactory.

##### 1711.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1711.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600** for each shipment. A shipment consists of all material arriving at the job site at substantially the same time.

Visual inspection at the job site for quality of workmanship and coatings, and for compliance to dimensions and dimensional tolerances.

## 1712 – NON- METALLIC DRUMS AND CONICAL PORTABLE DELINEATORS

### SECTION 1712

#### NON- METALLIC DRUMS AND CONICAL PORTABLE DELINEATORS

##### 1712.1 DESCRIPTION

This specification covers fully reflectorized non-metallic two-piece drums and two-piece conical delineators for channelizing traffic, lane closures and marking of specific projects.

##### 1712.2 REQUIREMENTS

Provide drums and conical delineators that comply with Part VI of the Manual on Uniform Traffic Control Devices, Section 6F-5 and the following general specifications:

**a. Configuration of Drums.** Drums are a two-piece, closed top, breakaway design capable of being securely fastened together to prevent accidental separation from air turbulence created by passing trucks, normal winds, etc., but capable of separating on impact from a vehicle. Provide a base that contains a self-draining storage compartment for ballast. The base must allow for storage of ballast so that the ballast does not become a projectile upon impact. The base must be low enough to allow a normal passenger vehicle to pass over it and not make contact with the vehicle undercarriage.

Provide drums designed for the attachment of two standard barricade lights that comply with the crashworthy criteria for category II devices contained in the testing and acceptance guidelines of the National Cooperative Highway Research Program (NCHRP) Report 350.

As an alternative, provide two-piece closed top drums with the same dimensions as above, but with a different method of ballasting and balancing. Provide a plastic drum with a bottom flange that protrudes a minimum of 2 inches from the lowest section around the entire circumference of the drum body. Balance the drums with a rubber base ring that also acts as ballast. Designs of this type that also require bags of material for ballast are not acceptable. Provide a plastic drum and rubber base capable of being secured together to prevent accidental separation from air turbulence created by passing vehicles, normal winds or lifting by the handle. Design the drums to allow the body to separate from the rubber base upon impact by vehicles. Provide a rubber base with a mass between 25 and 35 lbs. Install the drums so that the bottom of the rubber base has circumferential contact with the road surface. Construct the plastic drum and rubber base so no water can accumulate. Design the drums to be stacked with or without the rubber bases.

**b. Configuration of Conical Delineators.** Delineators are a two-piece, breakaway design capable of being securely fastened together to prevent accidental separation from air turbulence created by passing vehicles, normal winds, etc., but capable of separating on impact from a vehicle. The cone body must have a minimum weight of 2 lbs and have an integrally molded handle on the top. The cone body must be a minimum height of 42 inches when measured from the bottom flange to the top shoulder excluding the handle.

Provide black rubber bases that weigh approximately 10, 15 or 30 lbs each. As an alternate, provide a plastic sand fillable base weighing approximately 15 lbs. All bases must be low enough to allow a normal passenger vehicle to pass over it and not make contact with the vehicle undercarriage. Design the delineators to be stacked with or without the bases.

Provide delineators that comply with the crashworthy criteria for category I devices contained in the testing and acceptance guidelines of the National Cooperative Highway Research Program (NCHRP) Report 350.

**c. Reflective Stripes.** Provide drums and delineators reflectorized with Type III, High Performance Retroreflective Sheeting complying with **DIVISION 2200**. Alternate stripes, starting with orange at the top. Additional orange and white stripes may be non-reflectorized.

**d. Fabrication.** Provide drums and delineators manufactured from plastic polymer, plastic copolymer, rubber elastomer, or any other non-metallic material, that complies with this specification.

Pigment and mold drums and delineators of a highway orange color throughout and use ultra-violet inhibitors to prevent fading.

## 1712 – NON- METALLIC DRUMS AND CONICAL PORTABLE DELINEATORS

Satisfactory drums and delineators exhibit good workmanship and are free of objectionable marks or defects, which affect appearance or performance. Seams must be equal in strength to the rest of the item.

Provide drums and delineators capable of withstanding 5 cold weather impacts between 25°F and 40°F and 5 hot weather impacts between 80°F and 90°F.

### 1712.3 TEST METHODS

**a. Impact Resistance Test.** Test drums and delineators for impact resistance as prescribed by the AASHTO National Transportation Product Evaluation Program (NTPEP) test procedures for flexible delineator posts and plastic barrels.

**b. Crashworthy Test.** Test drums as prescribed by the NCHRP Report 350 for category II devices. Test delineators as prescribed by the NCHRP Report 350 for category I devices. Federal Highway Administration (FHWA) guidance indicates that category I devices may be accepted based on a self-certification by the manufacturer. This certification may be a one-page affidavit signed by the manufacturer, with documentation supporting the certification (crash tests and/or engineering analysis) kept on file by the certifying organization.

### 1712.4 PREQUALIFICATION

**a. Drums.** Submit 1 drum to the Engineer of Tests. Submit impact resistance data for tests that have been performed on the identical product by the AASHTO NTPEP test location that includes both hot and cold weather conditions. Submit NCHRP, Report 350 crashworthy test data. Forward an official copy of the test report and FHWA acceptance along with evidence that the product referenced is identical to that submitted for prequalification, to the Engineer of Tests for evaluation.

**b. Conical Delineators.** Submit 1 delineator to the Engineer of Tests. Submit impact resistance data for tests that have been performed on the identical product by the AASHTO NTPEP test location which includes both hot and cold weather conditions. Submit a NCHRP, Report 350 crashworthy certification, along with evidence that the product referenced is identical to that submitted for prequalification, to the Engineer of Tests for evaluation.

**c.** The sample drum or delineator will be tested for compliance with this specification, and the impact resistance data reviewed. The producer will be notified in writing of the results. The Bureau of Materials and Research will maintain a list of qualified products.

### 1712.5 BASIS OF ACCEPTANCE

**a.** Prequalification as specified in **subsection 1712.4**.

**b.** New drums or delineators will be accepted upon receipt and approval of a certification from the manufacturer, indicating the drums or delineators being supplied are the same model and design as previously approved. Provide a certification listing the manufacturer, model number and type of drum, and the grade and manufacturer of the reflective sheeting. Submit 2 copies of the certification to the Field Engineer in charge of the project.

**c.** Used drums or delineators to be used on a temporary basis will be accepted upon receipt and approval of a certification containing all of the information required in **subsection 1712.5a**. The certification may be prepared by the Contractor.

## **1713 – INERTIAL BARRIER SYSTEM AND REPLACEMENT MODULES**

### **SECTION 1713**

#### **INERTIAL BARRIER SYSTEM AND REPLACEMENT MODULES**

##### **1713.1 DESCRIPTION**

This specification covers inertial barrier systems and replacement modules.

##### **1713.2 REQUIREMENTS**

Provide an inertial barrier system and replacement modules as shown in the Contract Documents. Inertial barrier systems may be previously used.

##### **1713.3 TEST METHODS**

None specified.

##### **1713.4 PREQUALIFICATION**

All inertial barrier systems must be prequalified as a unit. Manufacturers wishing to supply inertial barrier systems to KDOT projects must send a complete evaluation package including the FHWA letter of acceptance and all design and testing information to the KDOT Bureau of Design, State Road Office. The information will be reviewed and the manufacturer will be notified of the results. Those systems that are satisfactory for use will be placed on a prequalified list maintained by the Bureau of Materials and Research.

##### **1713.5 BASIS OF ACCEPTANCE**

Inertial barriers and repair modules will be accepted as a complete system or module on the basis of a prequalified brand name, a Type C certification and visual inspection of the completed installation.

# 1714 – CEMENTITIOUS GROUT

## SECTION 1714

### CEMENTITIOUS GROUT

#### 1714.1 DESCRIPTION

This specification covers cementitious grouts used to bond anchor bolts and reinforcing steel to hardened concrete. This includes self-contained grouts, which are cementitious materials encapsulated in a water permeable layer.

#### 1714.2 REQUIREMENTS

- a. Provide material that complies with ASTM C 1107 or Corps of Engineers CRD-C 621.
- b. For self-contained grouts, provide material complying with **TABLE 1714-1**:

<b>TABLE 1714-1: SELF-CONTAINED GROUTS</b>		
<b>Property</b>	<b>Test Method</b>	<b>Requirement</b>
Soaking Time		1 to 3 min.
Initial Set Time, min.	ASTM C 1102	20 min.
Compressive Strength 28-day min.	ASTM C 39	4,000 psi
Shrinkage	ASTM C 1090	0.00%
Expansion	ASTM C 1090	1.5%
Pull Out Strength	ASTM E 488	9,000 lbf
Freeze-Thaw, min.	ASTM C 666, 300 cycles	95%

#### 1714.3 TEST METHODS

Test as specified in **subsection 1714.2**.

#### 1714.4 PREQUALIFICATION

a. Manufacturers interested in prequalifying material under **subsection 1714.2a**. must submit the following to the Bureau of Materials and Research:

- (1) A complete description, literature, and set of instructions and recommendations,
- (2) A copy of test results performed in accordance with ASTM C 1107 or CRD-C 621,
- (3) Certificate stating results comply with ASTM C 1107 or CRD-C 621, and
- (4) Material Safety Data Sheets (MSDS).

b. Manufacturers interested in prequalifying material under **subsection 1714.2b**. must submit the following to the Bureau of Materials and Research:

- (1) A complete description, literature, and set of instructions and recommendations,
- (2) A copy of test results performed as outlined in **subsection 1714.2b**.,
- (3) Certificate stating results comply with the values outlined in **subsection 1714.2b**., and
- (4) Material Safety Data Sheets (MSDS).

c. The Bureau of Materials and Research will maintain a list of qualified materials. Products will remain on the list as long as field performance is satisfactory.

#### 1714.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1714.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

Visual inspection by the Field Engineer.



## 1715 – CONCRETE MASONRY COATING

### SECTION 1715

#### CONCRETE MASONRY COATING

##### 1715.1 DESCRIPTION

This specification covers cement based polymer or acrylic polymer water seal for use in coating and sealing the exterior face of exterior prestressed concrete beams, joints between concrete overlays, bridge curb faces, masonry and other applications as stated in the Contract Documents.

##### 1715.2 REQUIREMENTS

Provide materials with the following properties:

- Coats and waterproofs concrete and masonry.
- Does not produce a vapor barrier (breathes).
- Is thermally compatible with portland cement mortar and concrete.
- Exhibits no chalking, checking, cracking, scaling, blistering or other deleterious effects after 5000 hours in a Xenon Arc Light Apparatus. (ASTM G 155).
- Color is to be gray to retain a natural concrete appearance, unless otherwise specified in the Contract Documents.

##### 1715.3 TEST METHODS

As specified in ASTM G 155 for the Xenon Arc Light Apparatus only.

##### 1715.4 PREQUALIFICATION

All concrete masonry coatings must be prequalified. Manufacturers interested in prequalifying material under this specification must submit the following to the Bureau of Materials and Research:

- A complete description, technical data, and set of instructions and recommendations.
- A copy of test results from an independent laboratory regularly inspected by a national reference organization (CCRL, AMRL, etc) confirming the various properties outlined above.
- Material Safety Data Sheets (MSDS).

The Bureau of Materials and Research will maintain a list of qualified materials. Products will remain on the list as long as field performance is satisfactory.

##### 1715.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1715.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

Visual inspection by the Field Engineer.

## 1716 – RAPID-SET CONCRETE PATCHING MATERIAL

### SECTION 1716

#### RAPID-SET CONCRETE PATCHING MATERIAL

##### 1716.1 DESCRIPTION

This specification covers requirements for rapid setting cementitious materials for concrete repairs.

##### 1716.2 REQUIREMENTS

- a. Provide material that complies with ASTM C 928.
- b. Freeze-thaw durability will be determined using ASTM C 666, Procedure B. At the end of 300 freeze-thaw cycles, acceptable products must exhibit expansion of less than 0.10%, and a calculated durability factor of 90.0% minimum.
- c. When allowed in the Contract Documents, extender aggregate may be combined with the neat rapid setting material according to the manufacturer's recommendations. The resulting combined material is subject to the foregoing requirements. Products will be tested neat as received, and also extended to the full amount allowed by the manufacturer, and will be classified as Rapid Hardening (R1), Very Rapid Hardening (R2), or Ultra Rapid Hardening (R3) based on the results. A product may be classified in one category when tested neat as received, and another when tested extended the maximum amount. All extender aggregate used on Contracts must be from a source that has a current Official Quality approval status for Mixed Aggregate per **SECTION 1102**.
- d. Provide material classified as Rapid Hardening, Very Rapid Hardening, or Ultra Rapid Hardening as specified in the Contract Documents. Any prequalified higher class of material may be substituted for a lower class specified at no additional cost. If no class is specified, any prequalified product may be supplied.
- e. Provide the same product as prequalified under the AASHTO National Transportation Product Evaluation Program (NTPEP), including water/cement ratio and proportion of extender (if applicable). If the product was prequalified using a manufacturer-provided extender (sand), then the extender may be substituted by using an approved local source at the same extender proportioning established during prequalification.

##### 1716.3 TEST METHODS

Test material in accordance with the applicable parts of ASTM C 928 and ASTM C 666, Procedure B.

##### 1716.4 PREQUALIFICATION

Supply samples for prequalification to the AASHTO National Transportation Product Evaluation Program (NTPEP). Forward an official copy of the test report to the Bureau Chief of Materials and Research for evaluation. Include information regarding the soluble chloride content of the material, and the mandatory statement from ASTM C 928 if it exceeds 1 lb/cu yd. Include the metallic iron content and the mandatory statement from ASTM C 928 if it exceeds 1% by mass. Prequalification will be based on satisfactory compliance of NTPEP results with this specification. Products will be classified as Rapid Hardening, Very Rapid Hardening, or Ultra Rapid Hardening in both the neat and extended mixes based on the NTPEP results.

If the NTPEP results comply with **subsection 1716.2**, the name of the product will be placed on a list of prequalified products maintained by the Bureau of Materials and Research. No rapid setting concrete patch material will be used on KDOT projects unless it has been prequalified. Manufacturers are required to re-qualify at intervals stipulated by NTPEP.

##### 1716.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1716.4**.

Receipt and acceptance of a Type C certification as specified in **DIVISION 2600**.

1717 – PRECAST PANEL BEDDING MATERIALS

SECTION 1717

PRECAST PANEL BEDDING MATERIALS

1717.1 DESCRIPTION

This specification covers material for bedding prestressed concrete panels used as a slab in bridge construction.

1717.2 REQUIREMENTS

a. Provide bedding material for precast units that complies with TABLE 1717-1 for expanded or extruded polystyrene.

TABLE 1717-1: BEDDING MATERIAL FOR PRECAST UNITS	
Property	Test Method
Compressive Strength, 60 psi, min.	ASTM D 1621
Water Absorption, 2% by vol. max.	ASTM D 2842
Oxygen Index, 24 min.	ASTM D 2863

b. Use a type of glue recommended by the bedding material manufacturer to secure the bedding material to the girder.

1717.3 TEST METHODS

ASTM tests as specified above.

1717.4 PREQUALIFICATION

Manufacturers desiring to provide material under this specification are to submit a 2 x 2 ft prequalification sample of each product which they wish to prequalify.

Provide complete instructions on the use of the material and a Material Safety Data Sheet (MSDS). State the type of glue which is acceptable for use with the material.

Provide a test report from an independent laboratory for the properties cited above.

Forward the prequalification samples and information to the Engineer of Tests. The Material will be tested as necessary to verify the information on the independent laboratory test report. Manufacturers will be notified of the test results.

If the prequalification samples comply with subsection 1716.2, the name of the product, along with the allowable type of glue to be used, will be placed on a list of prequalified products maintained by the Bureau of Materials and Research. No precast bedding material may be used on KDOT projects unless it has been prequalified.

1717.5 BASIS OF ACCEPTANCE

Prequalification as specified in subsection 1717.4.

Receipt of a Type C certification as specified in DIVISION 2600.

Observation of performance in the field.

**1718 – BOND-BREAKER FOR PORTLAND CEMENT  
CONCRETE PAVEMENT DOWEL BARS**

**SECTION 1718**

**BOND-BREAKER FOR PORTLAND CEMENT  
CONCRETE PAVEMENT DOWEL BARS**

**1718.1 DESCRIPTION**

Bond-breaker is applied to dowel bars to be placed in contraction joints in rigid pavement before placement of the concrete. The material serves to prevent the concrete from bonding to the dowel bars, thus preserving the joint as a working one.

**1718.2 REQUIREMENTS**

- a. Bond-breaker must have an average pull out resistance less than 3400 lbs.
- b. Bond-breaker must not have any detrimental effects on portland cement concrete or the epoxy coating on the dowel bars.
- c. Apply bond-breaker according to the manufacturer's instructions. Do not apply bond-breaker with a thickness value greater than 24 mils. The thickness value is the average of 3 measurements taken at  $\frac{1}{4}$ ,  $\frac{1}{2}$  and  $\frac{3}{4}$  bar length spaced 120 degrees apart. No measurements are permitted to exceed 24 mils.
- d. Dowels that have bond-breaker applied in the plant by the dowel supplier must be stored in such a way as to prevent dust, dirt or any other contaminant that would impair the bond-breaking action, from accumulating on the treated surface. Pre-coated dowels that have been stored in the field for any length of time will be inspected to verify that the coating is still active and will perform as required.

**1718.3 TEST METHODS**

Test pull out resistance using KDOT Test Method KTMR-16, Testing of Dowel Bars Placed in Concrete for Resistance to Removal (Pull Out).

**1718.4 PREQUALIFICATION**

a. All bond-breakers intended for use under this specification must be prequalified before use. Submit a written request to the Bureau Chief of Materials and Research with the following information for each type and brand name:

- (1) Name, address and telephone number of the manufacturer. Include the name of the preferred contact person.
- (2) Brand name of the material.
- (3) Information regarding recommended usage and application instructions.
- (4) Material Safety Data Sheets.

b. Submit three smooth 1 1/8 inch diameter (No. 9) epoxy coated dowel bars and sufficient bond-breaker material to coat the bars before sample preparation and testing. Send the samples to the Engineer of Tests. The bars will be coated, then cast in concrete and the bond tested. Submit one additional No. 9 bar for the noncoated comparison test. All sample bars should be a minimum of 24 inches in length.

c. The information and test reports will be reviewed by the Bureau Chief of Materials and Research. The manufacturer will be advised as to whether or not the product is prequalified.

d. The Bureau of Materials and Research will maintain a list of prequalified bond-breakers. Products will remain prequalified as long as the formulation and manufacturing processes remain unchanged, and field experience indicates that the material functions appropriately. Changes in formulation or manufacturing processes will require new prequalification testing. Failure of the material to function appropriately in the field will be cause for removal

**1718 – BOND-BREAKER FOR PORTLAND CEMENT  
CONCRETE PAVEMENT DOWEL BARS**

of the product from prequalified status. Products removed from prequalified status will be again considered for prequalification if the manufacturer can provide evidence that the cause of failure has been positively identified, and necessary formulation changes and quality control measures have been implemented to eliminate that cause. Complete prequalification testing will be required for products which have been removed from prequalified status.

**1718.5 BASIS OF ACCEPTANCE**

Prequalification as specified in **subsection 1718.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

## 1719 - RELEASE COMPOUND FOR ASPHALT MIXES

### SECTION 1719

#### RELEASE COMPOUND FOR ASPHALT MIXES

##### 1719.1 DESCRIPTION

This specification covers release compounds for asphalt mixes.

##### 1719.2 REQUIREMENTS

Provide a concentrated liquid release compound containing no petroleum solvents (diesel fuel, kerosene, etc.) that complies with the following:

- Deleterious Effects: The percentage of coating on the aggregate-binder mixture containing the release compound is equal to that of the mixture without the release agent.
- Release Capabilities: A hot aggregate-binder mixture slides freely in a shallow pan wetted with the release compound.
- Effect on Asphalt Penetration: No more than 7 units difference between a sample in water and one placed in the release compound.

##### 1719.3 TEST METHODS

Test the material in accordance with KTMR-19.

##### 1719.4 PREQUALIFICATION

a. Submit a 1-quart sample to the Engineer of Tests for prequalification.

Include the following information:

- Name, address and telephone number of the manufacturer and the preferred contact person.
- Name of product and manufacturer's dilution recommendation. and
- Material Safety Data Sheets.

b. The product will be tested and the manufacturer will be notified of the results. The Bureau of Materials and Research will maintain a list of prequalified release compounds.

##### 1719.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1719.4.**

Satisfactory performance in the field.

## 1720 - MODULAR EXPANSION DEVICES

### SECTION 1720

#### MODULAR EXPANSION DEVICES

##### 1720.1 DESCRIPTION

This specification covers providing a prefabricated modular expansion device on bridges in accordance with these specifications. The device includes the entire manufactured product (multiple sealing elements, steel edge beams and separation beams, joint armoring and attachments, support bars, support boxes and all parts) as well as all attached components. When shown in the Contract Documents, drains at the ends of the devices are subsidiary to the modular expansion devices.

##### 1720.2 REQUIREMENTS

a. Unless shown otherwise in the Contract Documents, provide one of the prequalified brands and models that will accommodate the total design movement shown in the Contract Documents. All modular expansion devices for any single structure must be provided by one supplier.

b. Shape the device to comply closely to the cross slope. Field cutting of the device will not be permitted.

c. Use steel for all major metal components.

d. Use neoprene (Polychloroprene) complying with ASTM D 2628 for the elastomeric sealing units/elements unless modified otherwise by the supplier on the shop drawings. Make the elements one-piece full length of the expansion device, including curbs, and as detailed in the Contract Documents.

e. After installation, there may be no appreciable change in the surface of the modular expansion device when the bridge expands and contracts.

f. Submit shop drawings as specified in **DIVISION 700**.

##### 1720.3 TEST METHODS

Compliance with approved shop drawings for the assembly. Use ASTM D 2628 for the neoprene.

##### 1720.4 PREQUALIFICATION

All modular expansion devices must be prequalified as a unit. Manufacturers wishing to supply modular expansion devices to KDOT projects must send a complete evaluation package including all design and testing information to the KDOT Bureau of Design, State Bridge Office. The information will be reviewed and the manufacturer will be notified of the results. Those systems that are satisfactory for use will be placed on a prequalified list maintained by the Bureau of Materials and Research.

##### 1720.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1720.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

Visual inspection for condition and dimensional requirements shown on the shop drawings.

## 1721 - FABRIC TROUGH

### SECTION 1721

#### FABRIC TROUGH

##### 1721.1 DESCRIPTION

This specification covers a material to be installed as a trough below the finger type expansion joints (or for other applications as shown in the Contract Documents) to carry drainage off the bridge, and prevent saltwater and debris from running down on other bridge members.

##### 1721.2 REQUIREMENTS

Provide fabric trough material composed of one or two ply tightly woven nylon fabric bonded to, laminated, or covered on both sides with a high density neoprene, ethylene-propylene-diene-monomer (EPDM), or buna-nitrile PVC, that complies with **TABLE 1721-1**.

<b>TABLE 1721-1: REQUIREMENTS FOR FABRIC TROUGH</b>		
<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Thickness (mm)	3 to 5	
Mass (g/sq m minimum)	3560	
Durometer Hardness (Shore A)	50A to 75A	ASTM D 2240
Low Temperature Brittleness (22 hrs. @ -29°C, then wrapped around a 75 mm diameter mandrel)	No Cracks	
Tensile Strength, kg/25 mm minimum, both directions	363	ASTM D 412
Elongation, %, maximum	30	ASTM D 412
Tear (Die C), kg/25 mm minimum	55	ASTM D 624
Ozone Resistance (100 hours of exposure of 20% elongated samples @ 38°C and 100 PPHM ozone.)	No Cracks	ASTM D 1149

Provide material that is resistant to abrasion, sunlight, oils, and saltwater.

##### 1721.3 TEST METHODS

Use the ASTM methods cited above.

##### 1721.4 PREQUALIFICATION

None required.

##### 1721.5 BASIS OF ACCEPTANCE

Receipt and approval of a Type B certification as specified in **DIVISION 2600**, and visual inspection for condition.



## 1722 - FIBROUS REINFORCEMENT FOR CONCRETE

### SECTION 1722

#### FIBROUS REINFORCEMENT FOR CONCRETE

##### 1722.1 DESCRIPTION

This specification covers fibers for use as reinforcement in concrete. Depending on the application, these fibers may serve as primary or secondary reinforcement.

##### 1722.2 REQUIREMENTS

a. Provide fibers that are 100% virgin polypropylene, fibrillated, rough textured, interconnected fibers containing no reprocessed olefin materials and specifically manufactured as concrete reinforcement.

b. Provide fibers that are graded with a maximum length of 2 inches and a minimum tensile strength of 32 ksi.

##### 1722.3 TEST METHODS

None Specified.

##### 1722.4 PREQUALIFICATION

a. Manufacturers wishing to provide fibrous reinforcement for concrete for KDOT projects must be prequalified.

b. Submit a small sample to the Bureau of Materials and Research for prequalification. Include the following information:

- (1) Name, address and telephone number of the manufacturer and the preferred contact person.
- (2) Name of product and manufacturer's recommended dosage rate or rates.
- (3) Technical data sheets and test reports substantiating the above requirements.
- (4) Material Safety Data Sheets.

c. The submittal will be reviewed and the manufacturer will be notified of the results. The Bureau of Materials and Research will maintain a list of prequalified fibrous reinforcement.

##### 1722.5 BASIS OF ACCEPTANCE

Prequalification as specified in **subsection 1722.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

# 1723 - NON-METALLIC OFFSET BLOCKS FOR GUARDRAIL

## SECTION 1723

### NON-METALLIC OFFSET BLOCKS FOR GUARDRAIL

#### 1723.1 DESCRIPTION

This specification governs non-metallic offset blocks for guardrail that are not covered under the wood post specification in **DIVISION 2300**. Substitution for the wood offset blocks is permitted for line and bullnose guardrail sections as shown on the Contract Documents. Substitution within the end terminal sections is only permitted when specified by the manufacturer of the end terminal.

#### 1723.2 REQUIREMENTS

##### a. General.

(1) Any manufacturer producing non-metallic offset blocks for guardrail under this specification must be currently prequalified. Procedures for prequalification are outlined in **subsection 1723.4**.

(2) Unless shown otherwise in the Contract Documents, manufacture all offset blocks provided under this specification that comply with the applicable subsections.

**b. Material Specifications.** Provide offset blocks of the same chemical composition and physical properties as those accepted under the NCHRP 350 crash test. Provide offset blocks that comply with **TABLE 1723-1**.

TABLE 1723-1, REQUIREMENTS FOR NON-METALLIC OFFSET BLOCKS		
Property	Test Method	Requirement
UV Protection	ASTM G 155	No visible change to the block.
Compressive Strength	See <b>subsection 1723.3</b>	To become prequalified $\geq 450$ psi. Verification Samples not to exceed $\pm 20\%$ of prequalification results.
Water Absorption	ASTM D 2842	% Absorption $\leq 20\%$
Solvent Resistance	KTMR-31	No evidence of softening, blistering, crinkling, dissolving, or change in color or appearance.
Defects and Voids	Visual	Not to exceed $\frac{1}{2}$ inch diameter.

**c. Dimensions.** Provide offset blocks that comply with the dimensions and details shown in the Contract Documents.

#### 1723.3 TEST METHODS

Test the ultraviolet (UV) protection of the block using ASTM G 155, "Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-metallic Materials." Utilize Cycle #1 for 500 hours following Table X3. Use a sample size of 1 inch by 4 inch by 4 inch.

Perform KTMR-31, "Solvent Resistance of Non-metallic Materials." Obtain a copy of this test by contacting KDOT's Bureau of Materials and Research.

Determine the strength of 1 complete block in this manner: Apply the compressive force along the entire length and in the direction that is perpendicular to both the guardrail and post. Support the post track so no force is applied to edges. Blocks are required to have a minimum compressive stress of 450 psi. Calculate the pressure by using the average longitudinal cross section area. Use a properly calibrated compression machine as defined in ASTM E 4.

Determine the water absorption of the block using ASTM D 2842, Procedure B, with the following exceptions:

- Use the actual width and thickness of the specimen instead of the specified 6 inch by 6 inch dimensions.

## 1723 - NON-METALLIC OFFSET BLOCKS FOR GUARDRAIL

- Under 9. Conditioning, delete 9.2 and 9.3. Add 9.2 Cool to room temperature and weigh to the nearest 0.1 g. Change 9.4 to 9.3.
- Under 10. 2 Procedure B, maintain a water bath temperature of 77 ± 2°F.
- When calculating the absorption, use this equation:  
$$\% \text{absorption} = [(W2i - W3i) - (W2f - W3f)] / (W2i - W3i) \times 100$$

### 1723.4 PREQUALIFICATION

To become prequalified, provide the Bureau of Materials and Research with a copy of the FHWA letter showing the product has been accepted under the National Cooperative Highway Research Program (NCHRP) Report 350. Blocks must be able to complying with **subsection 1723.3**. Submit 4 offset blocks to the Engineer of Tests.

The Bureau of Materials and Research will maintain a prequalified list of all complying manufacturers.

### 1723.5 BASIS OF ACCEPTANCE

The plant must be currently prequalified as specified in **subsection 1723.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

Visual inspection for voids as outlined in **subsection 1723.2.b**.

# 1724 - SILICONE RUBBER SURFACE CRACK SEALANT

## SECTION 1724

### SILICONE RUBBER SURFACE CRACK SEALANT

#### 1724.1 DESCRIPTION

This specification covers material for sealing surface cracks previous to epoxy resin crack repair.

#### 1724.2 REQUIREMENTS

a. Provide Type S, Grade NS, Class 50, NT or O, one-part, clear or gray, neutral-cure, silicone rubber sealant that easily extrudes in any weather and cures quickly at room temperature.

b. Provide sealant that complies with **TABLE 1724-1**.

<b>TABLE 1724-1: ONE PART SILICONE SEALANT</b>		
<b>Property</b>	<b>Test Method</b>	<b>Requirement</b>
Tack-Free Time	ASTM C 679	3 hrs
Working Time	ASTM C 639	20-30 minutes
Peel Strength	ASTM C 794	32 lb/in
Tensile Adhesion Strength	ASTM C 1135	45 psi at 25% extension

c. Clean all tools and other application or mixing equipment frequently using a solvent type that is approved by the crack sealant manufacturer.

#### 1724.3 TEST METHODS

Test the material in accordance with the ASTM standards stated in **subsection 1724.2**.

#### 1724.4 PREQUALIFICATION

a. All silicone rubber sealant intended for use under this specification must be prequalified on the basis of Type, Grade, Class and Use prior to prequalification. Manufacturers desiring to supply material for KDOT jobs must submit a written request to the Bureau Chief of Materials and Research, with the following information for each type and brand name:

(1) Name, address and telephone number of the manufacturer. Include the name of the preferred contact person.

(2) Brand name of the material.

(3) Type, Grade, Class and Use of the material.

(4) Information regarding recommended usage and application instructions.

(5) Material Safety Data Sheets.

(6) One copy of a certified test report prepared by a laboratory regularly inspected by the Cement and Concrete Reference Laboratory (CCRL) of the National Institute of Standards Technology or other approved reference laboratory, showing test results complying with ASTM C 920. Include evidence that the laboratory is inspected regularly.

b. The information and test reports will be reviewed by the Bureau Chief of Materials and Research. The manufacturer will be advised as to whether or not the product is prequalified.

c. The Bureau of Materials and Research will maintain a list of prequalified silicone rubber sealants. Products will remain prequalified as long as the formulation and manufacturing processes remain unchanged, and field experience indicates that the material functions appropriately. Failure of the material to function in the field will be cause for removal of the product from prequalified status. Products removed from prequalified status will be considered for requalification if the manufacturer can provide evidence that the cause of failure has been positively

## **1724 - SILICONE RUBBER SURFACE CRACK SEALANT**

identified, and necessary formulation changes and quality control measures have been implemented to eliminate that cause. Complete prequalification testing may be required for products that have been removed from prequalified status.

### **1724.5 BASIS OF ACCEPTANCE**

Receipt and approval of a Type D certification as specified in **DIVISION 2600**.

# 1725 - ADA-COMPLIANT RAMP PANELS

## SECTION 1725

### ADA-COMPLIANT RAMP PANELS

#### 1725.1 DESCRIPTION

This specification governs Americans with Disabilities Act (ADA) compliant ramp panels. The panels are required to comply with all dimensional requires as stipulated within the ADA guidelines.

#### 1725.2 REQUIREMENTS

##### a. General.

- (1) Any manufacturer producing ADA-compliant ramp panels under this specification must be currently prequalified. Procedures for prequalification are outlined in **subsection 1725.4**.
- (2) Unless shown otherwise in the Contract Documents, manufacture all ADA-compliant ramp panels provided under this specification to comply with the applicable subsections.
- (3) Dimensions. Provide a 2 X 2 foot panels that comply with the dimensions and details specified by the ADA guidelines. Larger panels may be used if approved by the Engineer.
- (4) Provide in the appropriate color stipulated in the Contract Documents. Warrant the color for 10 years.

##### b. Prestressed Concrete Panels.

- (1) Provide a non-rusting prestressed support system integrated into the lower portion of the panel. The system is required to impart pressure in excess of 200 psi in both horizontal directions on a fully cured panel.
- (2) Material Specifications. Provide ADA-compliant ramp panels that comply with **TABLE 1725-1**.

Property	Test Method	Requirement
UV Protection	ASTM G 155	No visible change to the panel.
Compressive Strength	ASTM C 39	≥ 8,000 psi
Slip Resistant	ASTM D 2047	≥ 0.80

##### c. Polymer Concrete Panels.

- (1) Provide a polymer concrete panel. For this specification, polymer concrete is defined as having a cementitious material blended with an epoxy material to create a high-strength, tough and durable panel. Fibers may be used.
- (2) Material Specifications. Provide a polymer concrete panel that complies with **TABLE 1725-2**.

Property	Test Method	Requirement
UV Protection	ASTM G 155 or ASTM C 1501	No visible change to the panel.
Compressive Strength	ASTM C 39 or ASTM C 170	≥ 8,000 psi
Slip Resistant	ASTM D 2047 or ASTM C 1028	≥ 0.80

#### 1725.3 TEST METHODS

Perform all test methods as specified in **subsection 1725.2** for the given product.

#### 1725.4 PREQUALIFICATION

To become prequalified, send a panel to the Engineer of Tests along with test results from a certified laboratory (CCRL, A2LA or NVLP). Panels must be able to comply with **subsection 1725.2**.

## **1725 - ADA-COMPLIANT RAMP PANELS**

The Bureau of Materials and Research will maintain a prequalified list of all complying manufacturers.

### **1725.5 BASIS OF ACCEPTANCE**

The manufacturer must be currently prequalified as specified in **subsection 1725.4**.

Receipt and approval of a Type C certification as specified in **DIVISION 2600**

Visual inspection for cracked or damaged panels.