

1 **1080-12 PAINT FOR VERTICAL MARKERS**

2 For vertical markers, use a waterborne acrylic or alkyd type material meeting Table 1080-15.
 3 Apply sufficient paint to completely cover the color of the underlying substrate along with
 4 any surface imperfections.

TABLE 1080-15		
PROPERTIES OF PAINT FOR VERTICAL MARKERS		
Property	Requirement	Test Method
Color	# 27040 Black or # 13538	Federal Color Std. 595
Adhesion to Substrate	3A Min.	ASTM D3359

5 **1080-13 ABRASIVE MATERIALS FOR BLAST CLEANING STEEL**

6 Select the gradation of the abrasive to impart the anchor profile specified.

7 **(A) Expendable Abrasive**

8 Use blasting abrasives with a suitable steel or mineral abrasive containing no more than
 9 100 ppm of any corrosive compound such as sulfate or chloride or 100 ppm of any
 10 EPA characteristic waste compound such as lead, chromium or arsenic.

11 **(B) Recyclable Steel Grit**

12 Use abrasives that when sampled at any time during the blasting process, contain no more
 13 than 100 ppm of any corrosive compound such as sulfate or chloride or 1,000 ppm of any
 14 EPA characteristic waste compound such as lead, chromium or arsenic. Maintain the size
 15 and shape of the abrasive to impart the specified profile.

16 **1080-14 FIELD PERFORMANCE AND SERVICE**

17 Do not use paint products inspected by the Engineer and found to exhibit poor performance in
 18 similar North Carolina environments. Poor performance is defined as any coating failing to
 19 meet ASTM D610, Grade 5, or having greater than 3% rusting or disbonding before attaining
 20 5 years of service.

21 **SECTION 1081**
 22 **EPOXY AND ADHESIVES**

23 **1081-1 EPOXY RESIN SYSTEMS**

24 **(A) Classification**

25 The types of epoxies and their uses are as shown below:

26 **Type 1** - A low-modulus, non-sag gel adhesive used to bond or repair damp, vertical or
 27 overhead surfaces. Typical applications include walls, concrete foundations, concrete
 28 pipe, conduit and ceilings.

29 **Type 2** - A low-modulus, general-purpose adhesive used in epoxy mortar repairs and
 30 broadcast sand sealing operations. Bridge Maintenance uses it as both a primer coat and
 31 thickness-building second coat in 2-stage sand broadcast operations to seal and skid-
 32 proof bridge decks. As a repair material, it may be used to patch spalled, cracked or
 33 broken concrete where vibration, shock or expansion and contraction is expected.
 34 Feather-edged patching is not recommended with this material; instead, the adjacent
 35 concrete perimeter should be sawed at least 1/4" to 1/2" deep and any remaining concrete
 36 chipped away to provide a vertical interface between the epoxy mortar and concrete.

37 **Type 3** - A high-modulus general-purpose adhesive used to bond plastic concrete or
 38 hardened concrete to hardened concrete or other structural materials. It may be used to
 39 produce a high-strength epoxy mortar grout bed for equipment or to patch interior spalls,
 40 cracks or broken concrete. It is not recommended for exterior patching because its rate of

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1 thermal expansion and contraction differs too greatly from concrete. It may be used for
2 anchoring bolts where a flowable adhesive is required.

3 **Type 3A** - A gel-like version of Type 3, used specifically for embedding dowel bars,
4 threaded rods, rebars and other fixtures in hardened concrete. The manufacturer shall
5 submit test results showing that the bonding system will obtain 125% of the specified
6 yield strength of the anchor fixture in concrete with a minimum compressive strength of
7 3,000 psi. Plans may call for field testing of adhesively anchored fixtures.

8 **Type 4A** - A gray protective coating for concrete, wood, steel and other structural
9 materials. It is typically used as a topcoat in waterproofing concrete exposed to splash
10 zones and tidal water.

11 **Type 4B** - A red primer coating used with Type 4A.

12 **Type 5** - A high modulus, low viscosity adhesive suitable for pressure injection into
13 cracks in concrete. For some non-structural crack repairs, Type 5 epoxy may be poured
14 on the surface to penetrate cracks by gravity. This may be beneficial before
15 waterproofing and skid proofing.

16 **Type 6A** - An adhesive for bonding raised traffic markers to concrete or asphalt surfaces.
17 Part A shall be pigmented white, Part B black so when the components are combined
18 a uniform gray color results.

19 **Type 6B** - A normal-setting self-leveling adhesive for bonding traffic markers in recessed
20 areas on concrete and asphalt. Type 6A color requirements apply.

21 **Type 6C** - A rapid-setting adhesive for bonding traffic markers to concrete and asphalt
22 surfaces. Type 6A color requirements apply.

23 (B) Requirements

24 Epoxies shall conform to the requirements shown in Table 1081-1 using the test methods
25 described in Article 1081-3.

26 For epoxy resin systems used for embedding dowel bars, threaded rods, rebar and other
27 fixtures in hardened concrete, the manufacturer shall submit test results showing that the
28 bonding system will obtain 125% of the specified yield strength of the anchor fixture in
29 concrete with a compressive strength of at least 3,000 psi. Plans may call for field-testing
30 of adhesively anchored fixtures.

31 (C) Properties of Epoxy Resin Systems

32 (1) All integral fillers, pigments and thixotropic agents shall be fine enough to not
33 separate, settle or cause skinning during storage of the epoxy components. Do not
34 use abrasive fillers such as alumina and silica flour. Do not use solvents. When
35 mineral fillers are to be added during mixing, they shall be inert, readily dispersible
36 and except for sand, have fineness such that 99% of the material will pass
37 a No. 325 sieve.

38 (2) The coefficient of expansion of cured epoxy is 6 times greater than that of concrete.
39 Therefore, to reduce spalling and peeling during temperature changes, avoid thick
40 layers of pure epoxy. A 4:1 by weight sand-epoxy mortar has approximately the
41 same coefficient of expansion as concrete.

42 (3) The shelf life of parts A and B shall be at least one year from the date of
43 manufacture.

44 (4) Types 1 through 5 epoxy resin systems are moisture insensitive and can be applied
45 on clean, dry or damp surfaces free of standing water.

Table 1081-1
Properties of Mixed Epoxy Resin Systems

Property	Type 1	Type 2	Type 3	Type 3A	Type 4A	Type 4B	Type 5	Type 6A	Type 6B	Type 6C
Viscosity-Poises at 77°F ± 2°F	Gel	10-30	25-75	Gel	40-150	40-150	1-6	1,500-3,000	400-800	1,500-3,000
Spindle No.	-	3	4	--	4	4	2	T-D	6	T-D
Speed (RPM)	-	20	20	--	10	10	50	5	10	5
Pot Life (Minutes)	20-50	30-60	20-50	5-50	40-80	40-80	20-60	8-13	8-13	7-10
Minimum Tensile Strength at 7 days (psi)	1,500	2,000	4,000	4,000	1,500	1,500	4,000	-	-	-
Tensile Elongation at 7 days (%)	30 min.	30 min.	2-5	2-5	5-15	5-15	2-5	-	-	-
Min. Compressive Strength of 2" mortar cubes at 24 hours	3,000 (Neat)	4,000-	6,000-	6,000 (Neat)	3,000	3,000	6,000	-	-	-
Min. Compressive Strength of 2" mortar cubes at 7 days	5,000 (Neat)	-	-	-	-	5,000	-	-	-	-
Maximum Water Absorption (%)	1.5	1.0	1.0	1.5	1.0	1.0	1.0	-	-	-
Min. Bond Strength Slant Shear Test at 14 days (psi)	1,500	1,500	2,000	2,000	1,500	1,500	1,500	-	-	□

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1 (D) Test Methods for Epoxies

2 (1) Viscosity

3 Determine the viscosity of the mixture in accordance with AASHTO T 237 using
4 Brookfield viscometer model RVT. Use the spindle number and speed shown in
5 Table 1081-1.

6 (2) Pot Life

7 Determine the pot life of the mixture in accordance with AASHTO T 237 except use
8 a mass of 60 ± 0.4 g.

9 (3) Compressive Strength of Epoxy Mortar

10 Determine the compressive strength of epoxy mortar in accordance with
11 ASTM C109 except as follows:

12 Use mortar consisting of one part epoxy and 3 parts standard graded Ottawa sand
13 except for Types 1 and 3A, which shall be tested neat. Mix epoxy
14 components A and B at the recommended proportions for 2 minutes, add the sand,
15 and mix for 3 minutes. Pour the mortar into the cube molds in 2 layers, and tamp
16 each layer 50 times with a spatula and 25 times with a hammer handle. Make
17 6 specimens, and cure all in air at $77^{\circ}\text{F} \pm 2^{\circ}\text{F}$ for 24 hours. Test 3 specimens for
18 compressive strength at the end of this curing period. Immerse the remaining
19 3 specimens in water at $+ 77^{\circ}\text{F}$ for 6 days, after which immediately test them for
20 compressive strength in the wet condition.

21 (4) Tensile Strength and Tensile Elongation

22 Determine the tensile strength and tensile elongation of the mixture in accordance
23 with ASTM D638.

24 (5) Absorption

25 Determine the water absorption of the mixture in accordance with ASTM D570.

26 (6) Bond Strength

27 Determine the bond strength of the moist-cured mixture at 14 days by the slant shear
28 test in accordance with ASTM C882.

29 (E) Prequalification

30 All epoxy resin systems shall be on the NCDOT Approved Products List before use.
31 Manufacturers choosing to supply material for Department jobs must submit an Epoxy
32 Submittal Form to the Materials and Tests Physical Testing Laboratory with the
33 following information for each type and brand name:

34 (1) Contact information, including name, address and telephone number of the
35 manufacturer,

36 (2) Brand/Trade name of the material,

37 (3) Type of the material in accordance with Article 1081-1,

38 (4) Technical data sheet stating at a minimum product description, yield, technical
39 information, mixing directions, finishing directions, curing, clean-up and
40 precautions/limitations,

41 (5) Material Safety Data Sheets,

1 (6) Certified test data showing the product meets AASHTO M 237, including evidence
2 that the testing laboratory is regularly inspected by the Cement and Concrete
3 Reference Laboratory (CCRL) of the National Institute of Standards Technology or
4 other approved reference laboratory, and

5 (7) A sample of the product for testing (4 injection tubes or 1/2 gallon of each
6 component is required for testing).

7 Products will remain on the NCDOT Approved Products List as long as the formulation
8 and manufacturing process remain unchanged, and the product performs as intended in
9 the field. The manufacturer is required to submit an annual letter to the Materials and
10 Tests Physical Testing Laboratory certifying the formulation and manufacturing process
11 have not changed.

12 (F) Acceptance

13 When materials on the NCDOT Approved Products List are furnished to a project, submit
14 to the Engineer a Type 1 material certification in accordance with Article 106-3 for each
15 lot or batch delivered.

16 When materials are furnished to the Bridge Maintenance Unit, the terms of acceptance
17 will be listed in the bid solicitation. The Engineer reserves the right to reject any epoxy
18 that does not perform adequately in the field.

19 (G) Supply

20 Supply epoxy resin in 2 components, labeled as “Component A - Contains Epoxy Resin”
21 and “Component B - Contains Curing Agent”, for combining immediately before use in
22 accordance with the manufacturer’s instructions. Mark each container with the
23 manufacturer’s name, NCDOT type, lot or batch number, quantity, date of manufacture,
24 shelf life or expiration date, color, mixing instructions, usable temperature range and
25 hazards or safety precautions.

26 Furnish the 2 components in separate non-reactive containers. Provide containers of such
27 size that the proportions of the final mix can be obtained by combining a single container
28 of one component with one or more whole containers of the other component.

29 (H) Notes on Use of Epoxies

30 (1) Safety

31 Epoxies can irritate the eyes, skin and respiratory tract. Therefore, wear chemical
32 splash goggles, chemically-resistant gloves and protective clothing and boots when
33 handling epoxies. Respiratory protection is usually not needed if epoxies are mixed
34 and applied in well-ventilated areas, but avoid prolonged breathing of vapors.
35 Follow all MSDS instructions for proper use of these materials.

36 (2) Mixing

37 Stir parts A and B individually until each component is homogeneous. Use
38 a separate stirrer for each component.

39 Combine parts A and B, either by weight or volume, as specified in the
40 manufacturer’s instructions. Stir the mixture vigorously, periodically scraping the
41 sides and bottom of the container. Small quantities of epoxy usually require 2 to
42 3 minutes to mix homogeneously; 5-gallon quantities can take up to 10 minutes of
43 mixing.

44 Temperature affects the viscosity and pot life of epoxies. Most laboratory tests are
45 conducted at 77°F. Higher temperatures render epoxies thinner and faster setting;
46 lower temperatures induce higher viscosities and longer pot lives.

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1 Add sand or other fillers to liquid epoxies only after parts A and B have been
2 thoroughly mixed. Stir in the sand or filler until all particles are completely coated.

3 (3) Storage and Substrate Temperature

4 Store epoxies at temperatures between 50°F and 90°F. Epoxy components exposed
5 to the extremes of this range or outside this range should be conditioned to 77°F
6 before mixing and blending. If heat is necessary, always use indirect methods such
7 as hot water, a heated room or a microwave oven to condition components.

8 When applying epoxy to a cold substrate, preheat the components approximately 1°F
9 above 77°F for every 2°F of substrate temperature below 77°F.

10 Seal previously opened containers to be airtight. Unsealed containers can absorb
11 moisture from the atmosphere, which can alter the chemical reaction of the mixture.

12 1081-2 POLYESTER RESIN EPOXY ADHESIVE

13 (A) General

14 Polyester resin is used specifically for embedding dowel bars, threaded rods, rebars and
15 other fixtures in hardened concrete.

16 Have the manufacturer submit test results showing that the bonding system will obtain
17 125% of the specified yield strength of the anchor fixture in concrete with a minimum
18 compressive strength of 3,000 psi. Field testing may be required for adhesively anchored
19 fixtures.

20 (B) Materials

21 Package components of the adhesive in containers of such size that one whole container
22 of each component is used in mixing one batch of adhesive. Use containers of such
23 design that all of the contents may be readily removed, and are well sealed to prevent
24 leakage. Furnish adhesive material that requires hand mixing in 2 separate containers
25 designated as Component A and Component B. A self-contained cartridge or capsule
26 will consist of 2 components which will be automatically mixed as they are dispensed, as
27 in the case of a cartridge, or drilled into, as in the case of a capsule.

28 Clearly label each container with the manufacturer's name; date of manufacture; batch
29 number; batch expiration date; all directions for use and such warning of precautions
30 concerning the contents as may be required by Federal or State laws and regulations.

31 (C) Mixing of Adhesive

32 Mix adhesive in conformance with the manufacturer's instructions.

33 1081-3 HOT BITUMEN

34 Mix the adhesive asphaltic material with the filler homogeneously.

35 (A) Physical Requirements

36 Supply materials meeting Tables 1081-2 or 1081-3 and 1081-4.

Property	Min.	Max.	Test Method
Softening point, °F.	200	-	ASTM D36
Penetration, 100 g, 5 sec., 77°F	10	18	ASTM D5
Flow, inch, as modified in Subarticle 1081-4(B)	-	0.2	ASTM D5329
Viscosity, 400°F, poises or ASTM D4402 as modified in Subarticle 1081-4(B)	30	75	ASTM D2669
Flash Point, C.O.C., °F.	550	-	ASTM D92

TABLE 1081-17			
ASPHALT PROPERTIES OF ASPHALTIC MATERIAL WITHOUT FILLER			
Property	Min.	Max.	Test Method
Penetration, 100 g, 5 sec., 77°F	25	-	ASTM D5
Viscosity, 275°F poises	12	100	ASTM D2171
Viscosity Ratio, 275°F	-	2.2	See Subarticle 1081-3(B)

TABLE 1081-18			
FILLER PROPERTIES			
Property	Min.	Max.	Test Method
Filler Content, % by Weight	65%	75%	See Subarticle 1081-3(B)
Filler Fineness, % Passing No. 325	75%	-	ASTM C430 as modified in Subarticle 1081-3(B)
Filler Fineness, % Passing No. 200	95%	-	
Filler Fineness, % Passing No. 100	100%	-	

1 **(B) Test Methods**

2 (1) Flow

3 Determine flow according to Section 6 of ASTM D5329 with the exception that the
4 oven temperature shall be 158°F ± 2°F and sample preparation done according to
5 Section 7.1 of ASTM D5.

6 (2) Viscosity

7 Viscosity is to be determined according to ASTM D2669 or ASTM D4402 using
8 a spindle speed of 10 rpm. Heat the adhesive to approximately 410°F and allowed to
9 cool. Determine viscosity at 400°F ± 1°F.

10 (3) Asphalt Properties

11 Properties of the base asphalt are to be determined on the material obtained from the
12 following extraction and Abson recovery methods. Extract the asphalt by heating the
13 adhesive just to the point where it will easily flow and then transfer 125 to 150 g into
14 400 ml of trichloroethylene with a temperature of 125°F to 150°F. Thoroughly stir
15 this mixture to dissolve the asphalt. Decant the trichloroethylene-asphalt mixture
16 decanted and the asphalt recovered using the Abson recovery method, ASTM D1856
17 as modified by the following. The extraction methods of ASTM D2172 do not apply
18 and there will be no filtration of the solvent asphalt mixture. The extraction solution
19 of trichloroethylene and asphalt shall be centrifuged for at least 30 minutes at
20 770 times gravity in a batch centrifuge. Decant this solution in the distillation flask,
21 taking care not to include any filler sediment. Apply heat and bubble carbon dioxide
22 solution slowly to bring the solution temperature to 300°F. At this point the carbon
23 dioxide flow is increased to 800 ml to 900 ml per minute. The solution temperature
24 is maintained at 320°F to 335°F with this carbon dioxide flow for at least 20 minutes
25 and until the trichloroethylene vapors have been completely removed from the
26 distillation flask. Repeat the above extraction-recovery method as necessary to
27 obtain the desired quantity of asphalt. Use the asphalt recovered to determine
28 penetration, 275°F viscosity, and 275°F viscosity ratio.

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(4) Viscosity Ratio

Determine the 275°F viscosity ratio by comparing the 275°F viscosity on the base asphalt before and after the thin-film oven test. Perform the thin-film oven test in accordance with ASTM D1754. Determine the specific gravity by pycnometer as in ASTM D70 for use in the thin-film oven test. Calculate the 275°F viscosity ratio by dividing the viscosity after the thin-film oven test by the original 275°F viscosity.

(5) Filler Material

Separate the filler material from the asphalt to determine Filler Content and Filler Fineness. Determine the portion by weight of the adhesive insoluble in 1,1,1 trichloroethane by weighing 10.00 ± 0.01 grams of solid adhesive into a centrifuge flask with approximately 100 ml volume such as that specified in ASTM D1796. Add 50 ml of 1,1,1-trichloroethane to the adhesive, which should be broken up in small pieces to speed up the dissolution solids. Place the sample flask in a balanced centrifuge and spin using a minimum relative centrifugal force of 150 in accordance with ASTM D1796 for 10 minutes. Remove the sample flask and decant the solid, taking care not to lose any solids. Repeat the application of solvent and centrifuging until the solvent becomes clear and the filler is visually free of asphalt. Dry the filler at $160^{\circ}\text{F} \pm 5^{\circ}\text{F}$ to remove solvent and weigh the resulting filler. Filtration of the decanted solvent may be performed to verify there is no loss of filler. Percent filler content is calculated as follows:

$$\text{Filter Content, \% by Weight} = \frac{\text{Filler Weight, grams} \times 100}{\text{Original Adhesive Weight, grams}}$$

Determine Filler Fineness according to ASTM C430 using number 325, 200 and 100 sieves. This method is to be modified by using a water soluble non-ionic wetting agent, such as Triton X-100, to aid the wetting action. Concentration of the surfactant solution shall be approximately 1% by weight. Thoroughly wet the one-gram dry sample in the surfactant solution and allowed to soak for 30 minutes. Transfer the filler completely into the sieve cup and apply water spray for 2 minutes. Surfactant solution may be added as needed and physical means used to disperse any clumped particles. Dry the sample and handle as described in ASTM C430.

(C) Prequalification

Bituminous adhesives are required to be pre-qualified by the Department's Transportation-Traffic Engineering Branch. Interested parties shall submit a sample to a qualified independent testing laboratory for testing in accordance with Subarticle 1081-3(A) at no cost to the Department. Submit a Type 2 materials certification in accordance with Article 106-3 with the results and the name of the testing laboratory along with a qualification sample(s) of the same lot to the Department for evaluation. For more information on the pre-qualification process, contact the Work Zone Traffic Control Unit.

(D) Packaging and Labeling

Pack the adhesive in self-releasing cardboard containers which will stack properly. Containers shall have a net weight of 50 lb to 60 lb and contain 2 to 4 subcompartments. Ensure the label shows the manufacturer, quantity and batch number. Print "Bituminous Adhesive for Pavement Markers" or similar wording on the label.

(E) Certification

A certification from the manufacturer showing the physical properties of the bituminous adhesive and conformance with the Specifications shall be required before use.

(F) Application

Apply the adhesive according to the manufacturer's requirements and the following requirements.

Apply the adhesive when the road surface, ambient air and pavement marker temperatures are in the range of 50°F to 160°F on dry pavement.

The composition of the adhesive shall be such that its properties will not deteriorate when heated to and applied at temperatures up to 425°F using either air or oil-jacketed melters.

Melt and heat the bituminous adhesive in either thermostatically controlled double boiler type units using heat transfer oil or thermostatically controlled electric heating pots. Do not use direct flame units.

Heat the adhesive to between 375°F and 425°F and applied directly to the pavement surface from the melter/applicator by either pumping or pouring. Maintain the application temperature between 375°F and 425°F as lower temperatures may result in decreased adhesion while higher temperatures may damage the adhesive.

Use sufficient adhesive to insure total contact with the entire bottom of the pavement marker. Apply pavement markers to the adhesive immediately (within 5 seconds) to assure bonding. Place the pavement marker in position by applying downward pressure until the marker is firmly seated with the required adhesive thickness and squeeze-out. Remove excessive adhesive squeeze-out from the pavement and immediately remove adhesive on the exposed surfaces of pavement markers. Soft rags with mineral spirits conforming to Federal Specifications TT-T-291 or kerosene may be used if necessary, to remove adhesive from exposed faces of pavement markers. No other solvent may be used.

Do not waste or spill any excess adhesive on Department right of way. Remove and properly dispose of any adhesive spilled or dumped at such location. The Contractor, at no cost to the Department, shall correct any damage incurred to the Department, highway or appurtenances as a result of misplaced adhesive.

The adhesive may be reheated and reused. However, the pot life at application temperatures shall not exceed the manufacturer's recommendations.

Clean out of equipment and tanks may be performed using petroleum solvents such as diesel fuel or similar materials. All solvents shall be removed from the equipment tanks and lines before the next use of the melter.

(G) Anchor Bolt Adhesives

Before application, test the adhesive for a tensile strength of 125% of the specified required yield load (42 kips) of the anchor bolt. Furnish certification that, for the particular bolt grade, diameter and embedment depth required, the anchor system will not fail by adhesive failure and that there is no movement of the anchor bolt. For certification and anchorage, use 3,000 psi as the minimum Portland cement concrete compressive strength used in this test.

Use adhesives that meet Section 1081.

List the properties of the adhesive on the container and include density, minimum and maximum temperature application, setting time, shelf life, pot life, shear strength and compressive strength.

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1 Package components of the adhesive in containers of such size that one whole container
2 of each component is used in mixing one batch of adhesive. Design the containers to
3 allow for all of the contents to be readily removed and be well sealed to prevent leakage.
4 Furnish adhesive material that requires hand mixing in 2 separate containers marked as
5 Component A and Component B. A self contained cartridge or capsule consists of
6 2 components that will automatically be mixed as they are dispensed.

7 Clearly label each container with the manufacturer's name, date of manufacture, batch
8 number, batch expiration date, all directions for use and such warning of precautions
9 concerning the contents as required by Federal or State laws and regulations.

SECTION 1082 STRUCTURAL TIMBER AND LUMBER

1082-1 GENERAL

13 Use Southern Pine timber and lumber graded in accordance with the current grading rules of
14 the Southern Pine Inspection Bureau unless otherwise specified or approved by the Engineer.
15 Use stress rated grades equal to or higher than the grades specified. For temporary crossings,
16 the use of stress rated lumber having stress ratings below those specified may be used if
17 approved by the Engineer.

18 Have all timber and lumber, including any preservative treatment, inspected and/or tested at
19 no cost to the Department by an approved commercial inspection company before it is
20 delivered to the project. Provide industry standard commercial inspection reports for each
21 shipment of untreated timber or lumber before its use on the project. Provide industry
22 standard commercial inspection reports and treatment test reports for each shipment of treated
23 timber or lumber before its use on the project. Perform all timber and lumber treatment
24 inspections in accordance with Standard M2 (Part A) of the AWPA Specifications. In
25 addition, brand, hammer mark, ink stamp or tag each piece of timber or lumber with the
26 approved commercial inspection company's unique mark to indicate it has been inspected.

1082-2 UNTREATED TIMBER AND LUMBER

28 Lumber that is 2" to 4" thick and 2" to 4" wide shall conform to Structural Light Framing,
29 Grade No. 1 Dense MC19. Lumber that is 2" to 4" thick and 6" wide or wider shall conform
30 to Structural Joists and Planks, Grade No. 1 Dense MC19. Lumber that is 5" and thicker
31 along the least dimension shall conform to Structural Lumber, Grade Dense Structural 72.
32 Rough lumber will be acceptable except where surfacing is called for by the contract. Rough
33 lumber may vary $\pm 1/4$ " from the dimensions shown on the contract or bill of material.

1082-3 TREATED TIMBER AND LUMBER

(A) General

36 Grade marked lumber will not be required. Brand or ink stamp each piece of treated
37 lumber in accordance with the AWPA Standard M6.

(B) Bridges, Fender Systems and Piles

39 Lumber for bridges that is 2" to 4" thick and 2" to 4" wide shall conform to Structural
40 Light Framing, Grade No. 1 Dense. Lumber for bridges that is 2" to 4" thick and 6" wide
41 and wider shall conform to Structural Joists and Planks, Grade No. 1 Dense. Lumber for
42 bridges that is 5" and thicker along the least dimension shall conform to Structural
43 Lumber, Grade Dense Structural 65. Lumber for fender systems shall conform to
44 Structural Lumber, Grade Dense Structural 65.

45 Timber for piles shall meet ASTM D25 except that the timber shall be Southern Pine, and
46 have at least a 2" sap ring or a 3" sap ring where called for by the contract or where the
47 preservative is creosote and the retention is greater than 18 lb/cf.