(3) Square end trimmed timber and lumber is trimmed square allowing slight manufacturing tolerance of 1/64 inch for each nominal 2 inches of thickness or width.

5. Nomenclature of domestic hardwoods and softwoods shall be in accordance with ASTM D 1165.

1075.02 -- Material Characteristics

1. General Requirements:

a. All timber and lumber required to meet a specific stress grade shall be graded as provided in ASTM D 245 according to rules approved by the American Lumber Standards Committee for the species involved.

b. Unless otherwise specified in the contract documents, all timber and lumber shall be rough (unsurfaced) and full sawn at the time of manufacture. Tolerances allowed for "full sawn timber and lumber" shall be as specified in Subsection 1075.01, Paragraph 4.a. The dimensions of surfaced lumber shall be in accordance with the industry standards approved by the Board of Review of the American Lumber Standards Committee (ALSC) for surfaced lumber of the species furnished.

c. Each piece of timber and lumber shall be well manufactured and unless otherwise specified, all ends shall be cut square to a tolerance of 1/64 inch for each nominal 2 inches of width or thickness. Unless otherwise specified, each piece shall be furnished to the length specified ± 3.0 percent.

d. All timber and lumber to be used without preservation treatment shall contain not less than 85 percent heartwood when measured around the girth of any piece 5 inches or more in least dimension or on each wide face for lumber 4 inches or less in greatest dimension. Each measurement is taken at a point where the least amount of heartwood occurs.

e. For all timber and lumber that is to be pressure treated, there shall be no heartwood requirements; and the amount of sapwood shall not be limited.

f. All timber and lumber shall be square edged.

2. Treatment of Timber and Lumber:

a. The creosote and pentachlorophenol preservative treatment for timber and lumber shall be by the Empty-cell (Rueping) Process; and, where allowed, the ammoniacal copper arsenate (ACA), chromated copper arsenate (CCA), and ammoniacal copper zinc arsenate (ACZA) preservative treatment for timber and lumber shall be by the Full-cell (Bethel) Process. Treatment shall conform to the requirements as specified in Standard C1 of the American Wood-Preservers' Association Standards and AASHTO M 133. Preservatives shall meet the requirements of Section 1076.

b. Preservative Treatment. The preservative treatment and minimum retentions for timber and lumber shall conform to the requirements as specified in Standard C14 of the American Wood Preservers' Association Standards as amended herein. Timber and lumber to be treated with ammoniacal copper arsenate or ammoniacal copper zinc arsenate shall be dried to the fiber saturation point required to put the timber into satisfactory condition to accept the preservative and attain the required preservative retention and penetration. After treatment, with the exception of offset blocks and posts for guardrail terminal systems, the material shall be redried and have a moisture content of not more than 30 percent at the time of shipment to the job site.

c. In order to assure dimensional stability after treatment, the material should be redried to a moisture content of not more than 30 percent at the time of shipment. If properly redried to this moisture content, the material may be undersize from the "nominal or full sawn dimensions" by a maximum of 3/8 inch on each face. However, at the option of the producer or treater, material need not be redried after treatment, provided that the material is "full sawn" in accordance with Subsection 1075.01, Paragraph 4.a.

d. Timber to be given preservative treatment shall be cut and framed before treatment insofar as is practicable. No unnecessary cutting, framing or boring of treated timber and lumber will be allowed after treatment; and all places where the surface of treated timber and lumber is broken by cutting, boring, or any other cause shall be coated thoroughly with 3 applications of the same type of preservative with which the material was originally treated (RE: AWPA M4).

e. All Douglas Fir timber and lumber that is to be treated and whose least dimension is 3 inches or over shall be incised on all 4 sides in a suitable power driven machine. When indicated in the plans, timber and lumber whose dimension is 2 to 3 inches shall also be incised, but on its side faces only. The incisions shall be reasonably clear cut; and their spacing, pattern, and depth shall be such as to provide a uniform penetration of the preservative to the required depth without damage and with the least loss in strength of the material being treated.

1075.03 -- Fence Post and Brace Requirements

1. a. (1) All wood posts used in fencing, including those used for braces, shall be round.

(2) They shall be cut from sound and solid trees and shall contain no unsound knots.

(3) Sound knots will be allowed, provided the width of the knot does not exceed 1/3 the diameter of the piece at the point where it occurs or a maximum of 2 1/2 inches.

(4) Posts shall be free from decayed wood, rot, "red heart", ring shake, season checks more than 1/4 inch wide, and splits in the end.

(5) When measured over the outer 2 inches of a radial line from the pith, Douglas Fir posts shall not show less than 5 annual rings per inch and pine posts shall show not less than 4 annual rings per inch and not less than 30 percent of summer wood.

(6) Posts shall not show spiral grain exceeding 1/4 turn in 10 feet. Groups of knots or any combination of defects which impair the strength more than the maximum size knot will not be allowed.

(7) Round wood fence posts shall be free from bends in more than one plane and free from short or reverse bends. A straight line from the center of the tip to the center of the butt shall not deviate from the center of the post by more than two percent of the length of the post.

(8) All round wood posts shall be peeled for their full length (all bark and inner skin removed). They shall be free from the glazed surface left by dried sap. All knots or projections shall be shaved smooth and flush with the surrounding surface of the surrounding wood.

(9) Both ends of each post shall be sawed perpendicular to the vertical axis of the post to a tolerance of 1/4 inch in 4 inches. The Contractor may point the ends of driven posts before treatment.

b. Round wood fence posts that are to be pressure treated shall be of any of the following species:

Jack Pine	Red or Norway Pine
Lodgepole Pine	Southern Yellow Pine
Ponderosa Pine	Douglas Fir
Western Larch	

c. Untreated round fence posts when specified, shall be white or burr oak, black locust, osage orange, or red cedar.

d. (1) Round wood fence posts shall be of the dimensions shown in the plans.

(2) The size of a post will be specified by its top diameter in even inches.

(3) Posts will be accepted only when the top diameter equals, or exceeds by not more than 7/8 inch, the specified diameter; except that posts of specified diameter of 7 inches and larger may exceed the specified diameter by not more than 1 3/4 inches.

(4) This diameter, after peeling, shall be determined with a circumference-diameter tape or by dividing the circumference measurement in inches by 3.14.

(5) Posts will be furnished in the length specified plus or minus 2.0 percent.

e. The preservative treatment shall conform to Paragraph 2. of Subsection 1075.02 (Paragraph 2.c. excluded).

f. Acceptance of fence posts and braces shall be as prescribed in Paragraph 2. of Subsection 1075.07.

1075.04 -- Round Guardrail Posts and Offset Blocks

1. a. General. All round guardrail posts shall conform to the American National Standards Institute Specifications and Dimensions for Wood Poles ANSI 05.1., except as modified herein.

b. Round guardrail posts and offset blocks shall be cut from sound live timber, preferably during the winter season. They shall contain no unsound knots. Sound knots shall be allowed, provided they are not in clusters, and provided the diameter of the knot does not exceed 33 percent the diameter of the post at the point where it occurs. Any defect or combination of defects which will impair the strength of the post more than the maximum allowable knot will not be allowed. All posts must be free from injurious ring shakes, rot, twists, falling or wind shakes, bird pecks, damage caused by insects entering the body of the posts or any defect which will detract from the appearance of the post.

c. All round guardrail posts shall be dense. All wood offset blocks shall be Grade No. 2 or better as certified by the producer or treater.

d. Posts shall be free from short or reverse bends and shall be straight such that a line from the center of the butt to the center of the tip will not deviate more than 1 inch from the center of the post. The Contractor may furnish turned posts. The turned posts need not taper, but all others shall taper from butt to tip.

e. All bark shall be removed, and all knots shall be smoothly dressed close to the body of the posts.

f. The tops and butts of all posts shall be sawed perpendicular to the vertical axis of the post to a tolerance of 1/4 inch in 4 inches. Posts to be used in safety beam guard rail post installations shall also be notched, or the offset blocks shall be routed before treatment in accordance with the plans.

g. The preservative treatment shall conform to Paragraph 2. of Subsection 1075.02 (Paragraph 2.c. excluded). No treatment with creosote is allowed.

2. Species. Unless otherwise specified, round wood guardrail posts and offset blocks shall be either Douglas Fir of the Coast Region or Southern Yellow Pine, except that the use of offset blocks composed primarily of wood fibers and recycled plastic may be used in safety beam guardrail systems. These wood polymer composite offset blocks shall conform to the dimensions shown in the plans and be successfully crash tested according to NCHRP 230.

3. a. Dimensions. Round timber posts for safety beam guardrail shall conform to the dimensions shown in Table 1075.01. Offset blocks shall conform to the shape and dimensions shown in the contract documents.

Table 1075.01

	Length	Bottom Diameter Min.	Top Diameter
Treated, Unseasoned or Green (>30% moisture)	6 feet Nom.	8 inches	8 to 9 inches
Treated Dried (<30% moisture)	5 feet 10 inches	7 3/4 inches	7 3/4 inches

b. The diameter of the posts shall be determined by means of a circumference-diameter tape or by dividing the circumference measurement in inches by 3.14, and no actual or calipered diameter shall vary from the diameter as determined with the circumference-diameter tape by 1/2 inch.

c. Acceptance of round guardrail posts shall be as prescribed in Paragraph 1. of Subsection 1075.07.

1075.05 -- Sawn Wood Guardrail Posts and Offset Blocks for Safety Beam Guardrail and Guardrail Terminal Systems

1. Safety Beam Guardrail:

a. General. Sawn wood guardrail posts and offset blocks shall conform to the shape and dimensions specified in the contract documents and in accordance with the requirements of Subsection 1075.02, Paragraph 2.c. At the time of shipment, posts and blocks shall be of the length specified, ± 3.0 percent. Posts and blocks shall be double-end trimmed with the mounting bolt hole in each being drilled 1/16 inch oversize and within 1/2 inch of the specified location on either side of the post or block.

b. Species. Unless otherwise specified, sawn wood guard rail posts shall be either dense Douglas Fir (Coast Region) or dense Southern Yellow Pine. Wood offset shall be either Douglas Fir (Coast Region) or Southern Yellow Pine (either major or minor species).

c. Grade. Sawn wood guard rail posts shall be capable of a minimum working stress of 1600 psi on the extreme fibers when subjected to bending and be either of the following grades:

~~Douglas Fir: Select Structural (graded as beams and stringers)~~
Southern Yellow Pine: Dense Structural 65

d. Offset blocks. Wood offset blocks shall be Grade No. 2 or better, as certified by the producer or treater. Offset blocks composed primarily of wood fibers and recycled plastic may be used in safety beam guardrail systems. These wood polymer composite offset blocks shall conform to the dimensions shown in the plans and be successfully crash tested according to NCHRP 230.

e. The preservative treatment shall conform to Paragraph 2. of Subsection 1075.02 with the exception that creosote is excluded.

f. Acceptance of sawn wood guard rail posts shall be as prescribed in Paragraph 1. of Subsection 1075.07.

2. Guardrail Terminal Systems:

a. General. Sawn wood guardrail posts and offset blocks for guardrail terminal systems shall conform to the shape and dimensions specified in the contract documents or be as shown on the approved manufacturer's design plans. Posts and blocks shall be double end trimmed with the mounting bolt hole in each being drilled 1/16 inch oversize and within 1/2 inch of the specified location on either side of the post or block.

b. Species. Unless otherwise specified by design, sawn wood, guardrail posts shall be either Douglas Fir (Coast Region) or Southern Yellow Pine. Wood offset blocks shall be either Douglas Fir (Coast Region) or Southern Yellow Pine (either major or minor species).

c. Grade. Sawn wood guardrail posts and offset blocks shall be in accordance with the manufacturer's design requirements.

d. Composite Offsets Blocks. Unless otherwise specified by manufacturer's design, offset blocks composed primarily of wood fibers and recycled plastic may be used in guardrail terminal systems. These wood polymer composite offset blocks shall conform to the dimensions shown in the plans and be successfully crash tested according to NCHRP 230.

e. Preservative Treatment. The preservative treatment shall conform to Subsection 1075.02, Paragraph 2. (Paragraph 2.c. excluded). Use of creosote for treatment is not allowed.

f. Acceptance. Acceptance of sawn wood guardrail posts and offset blocks shall be as prescribed in Paragraph 2. of Subsection 1075.07.

1075.06 -- Sign Post Requirements

1. a. Sawn wood sign posts shall conform to the dimensions specified in the contract documents. Sawn wood sign posts shall be full length, double end trimmed, free of heart centers, surfaced 4 sides (S4S) to American Lumber Standard Sizes, and incised on all 4 sides.

b. Sawn wood sign posts shall be Douglas Fir of the Coast Region.

c. Sawn wood sign posts shall be capable of a minimum working stress on the extreme fibers when subjected to bending as shown in the plans and be of the grades shown in Table 1075.02.

Table 1075.02

Sawn Wood Grades			
Size	**Grade**	**Description**	**Des. Value (Min. F-b)**
4 inches x 4 inches	No. 1 & Btr.	Structural Light Framing	1725 psi
4 inches x 6 inches	No. 1 & Btr., No. 1	Structural Joists and Planks	1495 psi

2. The preservative treatment shall conform to Paragraph 2. of Subsection 1075.02 (Paragraph 2.c. excluded). Use of creosote for treatment is not allowed. Posts must be redried after treatment to a moisture content not to exceed 30 percent.

3. Acceptance of sawn wood sign posts shall be as prescribed in Paragraph 2. of Subsection 1075.07.

1075.07 -- Acceptance of Timber and Lumber

1. Acceptance of timber and lumber by a certified agency.

a. Material, with the exception of grade dimension for guardrail offset blocks, will be inspected for grade, dimension, and treatment by an agency certified by the American Lumber Standards Committee Board of Review (ALSC).

b. ALSC grade inspection certificates shall show the kind, quality, grade, and dimensions of the material furnished.

c. ALSC treatment inspection certificates shall show the following:

(1) The actual preservative retention determined by assay.

(2) Depth of preservative penetration.

(3) Analysis of the preservative used.

(4) Moisture content (when applicable) of material treated with chromated copper arsenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate before shipment.

d. (1) Both ends of each piece of material (with the exception of guardrail offset blocks) accepted as conforming to these *Specifications* shall be permanently branded or permanently stamped with indent printing using a marking hammer showing the identity of the inspector who performed the work. One end shall be branded or stamped after determining compliance of the material in the green condition (before treatment), and the other branded or stamped after determining its compliance after treatment. No piece shall be loaded for shipment which does not show both end marks in legible form.

(2) Additionally, the treating plant must provide a permanent mark (by branding) on any top face (hole end) on each post to identify the specie, grade, date, type of treatment, retention, and the treating plant identification logo.

e. The Contractor shall furnish the NDR Materials and Tests Division with 4 copies each of ALSC grade and treatment inspection certificates at no additional cost to the Department.

f. Unless otherwise specified, and in addition to these certificates, each piece of timber and lumber cut to "use size" at the mill and required to meet a specific stress grade shall be stamped at the mill to show the grade, mill and species.

g. Caution should be exercised in making final inspection of treated material before shipment to be sure that conditions subsequent to treatment have not caused excessive splitting, checking, warping, or any distortion which may cause the material to fail to meet these *Specifications*.

h. These inspections and certificates in no way relieve the Contractor from furnishing required specification material. The Department reserves the right to inspect and test each shipment when received and to reject material not meeting specifications.

2. Acceptance of timber and lumber on the basis of certificate(s) of compliance from producer and/or treater are as follows:

a. The producers' and/or treaters' certificate of compliance shall list all the material supplied and shall state that the material listed complies in kind, quality, grade, and dimension to the requirements of the specifications. No independent inspection agency performing work for the producer and/or treater shall relieve the producer and/or treater from furnishing required specification material.

b. Treatment inspection certificates shall show the following:

(1) The actual preservative retention determined by assay.

(2) Depth of preservative penetration.

(3) Analysis of the preservative used.

(4) Moisture content (when applicable) of material treated with chromated copper arsenate, ammoniacal copper zinc arsenate, or ammoniacal copper arsenate before shipment.

c. Should the production and treatment of the material occur at the same plant, a single certificate showing all of the above information will be acceptable.

d. All certificates must originate from the producer and/or treater and be dated and signed by an authorized company representative.

e. The Contractor shall furnish the NDR Materials and Tests Division with 4 copies each of grade and treatment inspection certificates at no additional cost to the Department.

f. Caution should be exercised in making final inspection of treated material before shipment to be sure that conditions subsequent to treatment have not caused excessive splitting, checking, warping, or any distortion which may cause the material to fail to meet these *Specifications*.

g. These inspections and certificates in no way relieve the Contractor from furnishing acceptable material. The Department reserves the right to inspect and test each shipment when received and to reject material not meeting specifications.

SECTION 1076 -- WOOD PRESERVATIVES

1076.01 -- Description

1. Creosote to be used as a wood preservative shall be a distillate derived entirely from tar produced by the carbonization of bituminous coal.

2. Pentachlorophenol solution in petroleum for use as a wood preservative shall consist of 5 percent pure pentachlorophenol in a suitable petroleum solvent.

3. Waterborne preservatives that are approved for specific applications defined in this Section are:

   a. ACA-Ammoniacal copper arsenate waterborne preservative.

   b. CCA-Chromated copper arsenate waterborne preservative.

   c. ACZA-Ammonical copper zinc arsenate waterborne preservative.

1076.02 -- Material Characteristics

Creosote, pentachlorophenol, ammoniacal copper arsenate, chromated copper arsenate, and ammoniacal copper zinc arsenate shall conform to the requirements of AASHTO M 133.

1076.03 -- Acceptance Requirements

1. Creosote shall be sampled and tested in accordance with AASHTO T 60.

2. Pentachorophenol shall be analyzed in accordance with ASTM D 1274.

3. Ammoniacal copper arsenate shall be analyzed in accordance with ASTM D 1326.

4. Chromated copper arsenate shall be analyzed in accordance with ASTM D 1628.

5. Ammoniacal copper zinc arsenate shall be analyzed in accordance with AWPA A2.