

1 1044-2 SUBDRAIN COARSE AGGREGATE

2 Subdrain coarse aggregate shall meet No. 78M in Table 1005-1.

3 1044-3 PIPE AND FITTINGS

4 Pipe and fittings may be, at the option of the Contractor, either concrete, corrugated steel,
5 bituminized fiber or corrugated plastic.

6 1044-4 CONCRETE PIPE AND FITTINGS

7 Non-perforated concrete pipe and pipe fittings shall meet AASHTO M 86 for standard
8 strength nonreinforced concrete pipe.

9 Perforated concrete pipe shall meet AASHTO M 175 for standard strength perforated
10 nonreinforced concrete underdrainage pipe.

11 Joint materials shall meet Section 1028.

12 1044-5 CORRUGATED STEEL PIPE AND FITTINGS

13 Non-perforated corrugated steel pipe and pipe fittings shall meet Subarticle 1032-3(A).

14 Perforated corrugated steel pipe shall meet AASHTO M 36.

15 Fabricate the corrugated steel pipe from steel sheets having a minimum thickness of 0.052".

16 1044-6 PVC PIPE

17 PVC pipe shall meet ASTM D1785.

18 1044-7 CORRUGATED PLASTIC PIPE AND FITTINGS

19 Corrugated plastic pipe and fittings shall meet AASHTO M 252 for heavy duty tubing, except
20 that the maximum stretch resistance shall be 10%.

21 1044-8 OUTLET PIPE

22 Outlets constructed of PVC Schedule 40 pipe shall meet ASTM D2665. HDPE pipe shall
23 meet AASHTO M 294, Type S.

24 SECTION 1046
25 GUARDRAIL MATERIALS**26 1046-1 GENERAL**

27 Use guardrail materials from sources meeting requirements of the Department's Brand
28 Registration Program for guardrail. A list of these sources is available from the Materials and
29 Test Unit's Central Laboratory. The Department will remove a manufacturer of guardrail
30 materials from this program if the monitoring efforts indicated that non-specification material
31 is being provided or test procedures are not being followed.

32 The following types of guardrail materials and all associated accessories may be accepted
33 under this program: rail elements, posts and offset blocks, terminal sections, anchor units,
34 transition sections and hardware.

35 1046-2 RAIL ELEMENTS

36 The rail element and terminal sections shall meet AASHTO M 180 for Class A, Type 2.

37 1046-3 POSTS AND OFFSET BLOCKS**38 (A) General**

39 (1) The Contractor may furnish any one of the following types of steel guardrail posts.
40 Only one type of post will be permitted at any one continuous installation.

Section 1046

1 Use structural steel posts throughout the project, unless otherwise directed or
2 detailed in the plans.

3 (a) Steel W6 x 8.5 or W6 x 9.0 posts

4 (b) Steel 4.5" x 6.0" C-shape posts

5 (2) The Contractor may at his option furnish either of the following types of treated
6 timber posts if specifically directed or detailed in the plans. Only one type of post
7 will be permitted at any one continuous installation.

8 (a) Timber 6" x 8" posts

9 (b) Timber 8" x 8" posts

10 (B) Structural Steel Posts

11 Fabricate steel posts for guardrail of the size and weight shown in the plans from
12 structural steel complying with Section 1072. Metal from which C-shape posts are
13 fabricated shall meet ASTM A1011 for any grade of steel except that mechanical
14 requirements that shall meet ASTM A36. Punch or drill the holes for connecting bolts.
15 Burning will not be permitted. After fabrication the posts shall be galvanized in
16 accordance with Section 1076.

17 (C) Treated Timber Posts

18 Timber guardrail posts shall be of treated southern pine meeting Articles 1082-2
19 and 1082-3.

20 Bore bolt holes to a driving fit for the bolts. A minus tolerance of 1% will be allowed in
21 the length of the post. Perform all framing and boring before the posts receive
22 preservative treatment.

23 (D) Offset Blocks

24 Provide 8" deep recycled plastic or composite offset blocks approved for use with the
25 guardrail shown in the *Roadway Standard Drawings* or plans. Only one type of offset
26 block will be permitted at any one continuous installation. Before beginning the
27 installation of recycled offset block, submit the FHWA acceptance letter for each type of
28 block to the Engineer for approval.

29 Treated timber offset blocks with steel beam guardrail will not be allowed unless required
30 by Specifications, directed by the Engineer or detailed in the plans. Steel offset blocks
31 with steel beam guardrail will not be allowed.

32 Recycled plastic or composite offset blocks shall be made from no less than 50%
33 recycled plastic or composite and shall meet the requirements in Table 1046-1.

Property	Requirement
Minimum Specific Gravity	0.950
Min. Compressive Strength in Lateral Direction	1,600 psi
Maximum Water Absorption	10% by weight
Maximum Termite and Ant Infestation	10%
Testing	Pass NCHRP Report 350, Test Level 3 by Crash Testing
Approval	Approved for use by the FHWA

1 1046-4 HARDWARE

2 Provide all hardware as indicated in the plans that is galvanized in accordance with
3 ASTM A153.

4 1046-5 ANCHORS AND ANCHOR ASSEMBLIES

5 Each shipment of guardrail terminal end sections, anchors and anchor assemblies shall be
6 shipped from the manufacture with a current parts list and installation guide. Units not having
7 the above documents will be rejected.

8 Articles 1046-1, 1046-2 and 1046-3 are applicable to rail elements, terminal sections, posts,
9 offset blocks and hardware.

10 Reinforcing steel shall meet Article 1070-2. Steel plates shall meet ASTM A36. Anchor rods
11 shall meet ASTM A663 for Grade 65.

12 Anchor cable shall be 3/4" wire rope having a minimum breaking strength of 21.4 tons and
13 galvanized. Use commercial quality galvanized steel cable thimbles. Use commercial quality
14 drop forged galvanized steel cable clips. The fitting and stud for the anchor cable shall be
15 suitable for cold swaging and be galvanized. After being swaged on the cable, the fitting and
16 stud assembly, including swaged joint and cable, shall have a minimum breaking strength
17 of 21.4 tons.

18 Perform welding in accordance with Article 1072-18.

19 Welded components shall be galvanized after welding in accordance with ASTM A123. All
20 other metal parts shall be galvanized in accordance with ASTM A153, except where
21 otherwise specified in Articles 1046-1, 1046-2 and 1046-3.

22 1046-6 REPAIR OF GALVANIZING

23 Perform repair of galvanizing in accordance with Article 1076-7.

24 1046-7 CABLE GUIDERAIL

25 Posts, hardware and miscellaneous components shall meet the applicable requirements of this
26 Section, the plans and the manufacture's requirements.

27 Furnish cable guiderail manufactured in accordance with AASHTO M 30, Type 1, Class A.

28 For concrete anchors, furnish Class A concrete if cast in place or use concrete meeting
29 Section 1077, if using precast concrete anchors.

30 Cable guiderail is not covered under the Brand Certification Program for guardrail materials.
31 Sample cable guiderail according to the *Minimum Sampling Guide*.

32 1046-8 ACCEPTANCE

33 Acceptance of guiderail materials and its accessories will be based on, but not limited to,
34 visual inspections, classification requirements and check samples taken from material
35 delivered to the project and conformance to the annual Brand Registration. Guiderail
36 materials not meeting the above requirements will be rejected, unless written approval is
37 obtained from the State.

38 SECTION 1050
39 FENCE MATERIALS**40 1050-1 GENERAL**

41 All fence material and accessories shall be melted and manufactured in the USA.