SECTION 606 -- GUARDRAIL

Description

1.1 This work shall consist of furnishing and installing guardrail, anchorages, terminal units and concrete barriers of the type specified at the locations shown on the plans or as ordered.

1.1.1 Resetting of existing guardrail shall be included in this work.

1.1.2 Temporary guardrail and temporary concrete barrier shall consist of furnishing, maintaining and removing rail as specified.

Materials

2.1 Wood Posts and Rails.

2.1.1 Wood posts shall be of seasoned stock, sound and reasonable straight. The ends shall be cut square or as indicated. Posts with hollow knots, open or plugged holes, or season checks exceeding 1/4 inch in width will be rejected.

2.1.1.1 Round posts shall be one of the following species: ash, beech, birch (except gray), elm, hickory, locust, maple, oak, cedar, red pine, pitch pine, tamarack, southern yellow pine, or Douglas fir. The use of other species will be permitted only upon written approval. All bark shall be removed, knots shall be closely trimmed, and surface shall be shaved smooth.

2.1.1.2 Dimensioned posts and blocks shall be made of timber with a stress grade of 1,200 psi or more for extreme fiber in bending in accordance with AASHTO M 168. All cuts and holes shall be made before preservative treatment.

2.1.2 Wood rails shall be spruce, southern yellow pine, red pine or Douglas fir unless otherwise permitted. The rails shall be well seasoned, straight and sound, free from loose knots and other defects, and shall be surfaced on all sides.

2.2 Preservative Treatment.

2.2.1 All wood posts and rails shall be treated with preservative materials conforming to the requirements of AASHTO M 133,

2.2.2 The type of treatment shall be one of the following:

Treatment	Minimum net retention, Pounds per cubic foot
Type A Pentachlorophenol	0.60 (dry salts)
Water-Borne Preservative	0.40

2.3 Steel posts. Steel posts shall conform to ASTM A 36 and shall be galvanized after fabrication to meet the requirements of AASHTO M 111.

2.4 Rails and Fittings for Beam Guardrail.

2.4.1 Steel rail elements, terminal sections, bolts, nuts, and other fittings shall conform to AASHTO M 180, Class A (except that paragraph 11, Marking, shall not apply). Steel shall be galvanized after fabrication with Type II coating. Rail elements and terminal sections shall be treated with a solution of sodium dichromate or other approved chemical solutions so as to prevent or reduce storage stain. Corrosion resistant steel shall conform to AASHTO M 180, Type IV.

2.4.2 Steel rail elements shall be shop punched to allow for 6 foot - 3 inch post spacing or as required. Where the rail is on a curve having a radius of 150 feet or less, the rail shall be shop curved. The plates at the splice shall make contact throughout the area of the splice. Guardrail parts furnished under this specification shall be interchangeable with similar parts, regardless of the source of manufacture.

2.4.3 The post bolt and connection shall withstand a 5,000 pound pull in either direction.

2.5 Anchor blocks. Anchor blocks shall be as shown on the plans.

2.6 Permanent Concrete Anchors and Barriers.

2.6.1 Concrete shall be Class AA conforming to 520.1.2. The cement shall be Type III Portland cement as specified in AASHTO M 85. Slump shall be closely controlled between 2 and 3 inches.

2.6.2 Reinforcing steel shall conform To 544.

2.6.3 Structural material including end connectors shall conform with the applicable portions of these specifications.

2.6.3.1 Galvanizing shall conform to AASHTO M 111.

2.6.4 Mortar for patching, when permitted, shall be composed of the exact ingredients of the concrete with the coarse aggregate omitted.

2.8 Handrail.

2.8.1 Steel pipe for rails and posts shall conform to ASTM A 53, Schedule 40, Standard Weight of the diameter shown on the details. Pipe shall be galvanized after fabrication in accordance with the requirements of AASHTO M111.

2.8.2 Grout for anchoring the pipe posts shall be Item 529.1 High strength, Impact Resistant, Non-shrinking grout.

Construction Requirements

3.1 Posts.

3.1.1 Wood posts shall be set plumb at the required locations by either excavating or driving. Round posts shall be set with butt ends down and without cutting the tops after treatment. The bottom of the holes shall be thoroughly tamped to grade. The face of the post nearest the road shall present a vertical line from the top to bottom.

3.1.1.1 Use of round wood posts shall be limited to installations utilizing wood rail elements.

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3.1.2 Steel posts shall be driven to grade at the spacing required.

3.1.3 Post and anchor holes shall be backfilled with acceptable material placed in layers and thoroughly compacted with a power tamper.

3.1.4 The wood offset blocks shall be "toe nailed" to the rectangular wood posts to prevent them from turning.

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3.2 Beam Rail.

3.2.1 Beam guardrail shall be erected to provide a smooth continuous rail conforming to the line and grade of the highway. Corrugated rail elements shall be lapped so that the exposed end of each element is away from approaching traffic. Tube-type beam elements shall be bolted and joined as shown on the plans. Expansion joint bolts shall be tightened, but only to a degree which will not prevent the rail elements from sliding past each other longitudinally. All other bolts shall be drawn tight.

3.2.2 All metal work shall be fabricated in the shop. No punching, cutting, or welding shall be done in the field. Holes may be drilled or cutting done for special details only.

3.2.3 Galvanized beam rail shall be stored to prevent wet storage stain. Storage shall be off the ground and individual rail elements shall be separated with spacers to provide

free access of air. The beam rail shall be inclined in a manner which will provide continuous drainage.

3.2.4 All damage to galvanized surfaces, and threaded portions of all fittings and fasteners and cut ends of bolts after assembly, shall be repaired by thoroughly wire brushing the damaged area and painting it with 2 coats of zinc-rich primer 708-NH 1.60.

3.2.5 At each location where an electric transmission, distribution, or secondary line crosses any of the types of metal guardrail covered by these specifications, the guardrail shall be grounded as required by the electric utility company.

3.2.5.1 At locations where electric lines run parallel and in close proximity to metal fences, grounding systems may be required by the electric utility company.

3.3 Terminal sections. Terminal sections shall be installed at each end of every installation of corrugated beam guardrail unless otherwise specified.

3.4 Wood Rail. Wood rail shall be constructed as shown on the plans, but shall not be used on any City street. Wood rail may be used in other City owned areas, subject to the Engineers approval. Wood surfaces cut or injured shall be brush treated with 2 applications using material of the same specification as that used in the preservative treatment.

3.5 Resetting. The existing guardrail including anchorages shall be dismantled in a careful and workmanlike manner and suitably stored. Unless otherwise ordered, hardware and fittings shall be packed in substantial wooden boxes or kegs. New treated posts shall be substituted for all existing untreated posts. Material damaged due to the Contractor's negligence shall be replaced with new materials.

3.6 Temporary beam guardrail. Temporary beam guardrail shall be installed meeting the requirements of Item 606.140 except that posts may be of steel or wood.

3.7 Concrete Barriers.

3.7.1 General.

3.7.1.1 Concrete barriers shall be supplied to the configuration shown on the plans. Minor deviations in the shape may be submitted to the Engineer for approval.

3.7.1.2 Sections of barrier shall be uniform in color
and in good condition, free from cracked or spalled surfaces.

3.7.1.3 The layout of the concrete barriers will be as shown on the plans or as directed by the Engineer. Permanent barriers shall be placed at the elevation ordered on granular

material which has been compacted to 100% density in accordance with the applicable tests as specified in 304.3.5.

3.7.1.4 Shop drawings and working drawings shall be submitted in accordance with 105.02.

3.7.1.5 Form work shall be approved steel or wood, externally braced in like new condition without any projections or depressions which would detract from the required finish. Proper care and precautions shall be exercised in removing forms to ensure no damage results to the finished surface of the barrier.

3.7.1.6 Reinforcing steel shall be placed in accordance with 544.

3.7.2 Permanent Cast-in-Place Barriers. Formatted: Font: Bold

3.7.2.1 Forms and subgrade shall be thoroughly moistened in conformance to 520.3. Care shall be taken that form construction has been completed, embedment of required materials placed and removal of all foreign materials completed before the concrete is placed.

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3.7.2.2 Concrete shall be placed in its final position. Excessive movement of concrete by use of vibrators will not be permitted.

3.7.2.3 Concrete shall not be dropped a distance of more than 5 feet unless contained within a tremie, elephant trunk or other approved system.

3.7.2.4 Concrete shall be consolidated as provided in 520.3.5.4 by means of high frequency internal vibrators with 15 minutes after it is deposited in the forms. Vibrators shall not be attached to, or held against the forms or the reinforcing steel. Care shall be taken to avoid the displacement of reinforcement.

3.7.2.5 In the event of an emergency where placement continuity is affected, the Engineer will decide if a construction joint will be allowed and will direct the Contractor as to the location and manner in which the joint is to be constructed.

3.7.2.6 Concrete shall be cured in compliance with 520.3.10.1. Forms shall not be removed for a period of 3 days or as directed.

3.7.2 Precast Barriers.

3.7.2.1 Fabrication of precast units shall be performed by an approved commercial precasting plant. The provisions of 105.11 and 106.05 shall apply.

3.7.2.2 Fabrication inspection of the precast barrier will be performed by the Department. A concrete mix design shall be prepared by the manufacturer and approved by the Engineer prior to fabrication. The Contractor shall notify the Engineer at least 72 hours before casting barriers so that the necessary arrangements may be made for the Engineer to be present for inspection of the casting. The casting date shall be shown on the bottom of each piece.

3.7.2.3 The length of individual precast sections shall not exceed 20 feet unless otherwise permitted. The length of individual sections of any one run shall be approximately the same. Precasting tolerance will allow no variations of more than 1/4 inch in any plan dimension.

3.7.2.4 Unless shown on the plans, the Contractor's proposed method for joining and anchoring the sections shall be submitted for approval. Steel shapes exposed to weathering shall be galvanized.

3.7.2.5 Compaction of the concrete into a dense uniform mass shall be accomplished by internal vibration to provide a smooth surface relatively free of voids. External vibration may be used when permitted.

3.7.2.6 Care shall be taken to insure that inserts including reinforcing steel remain in their proper locations. Ends of the individual sections shall be smooth and perpendicular to the top surfaces.

3.7.2.7 Curing. Concrete shall be water cured in compliance with 520. Water cured barrier shall not be shipped until the barrier has cured a minimum of 7 days. Steam curing of the barriers shall be as follows:

3.7.2.7.1 The Contractor shall furnish sufficient canvas and framework or other type of housing to completely enclose the concrete barrier sections so that the curing temperatures can be controlled.

3.7.2.7.2 Live steam shall be introduced into the enclosure through a series of steam jets which shall be evenly spaced within the enclosure and in no case shall the steam jet impinge directly on the concrete formwork.

3.7.2.7.3 The initial set of the concrete shall take place before steam is applied.

3.7.2.7.4 The steam shall be maintained at 100 percent relative humidity to prevent loss of moisture and to provide excess moisture for proper hydration of the cement.

3.7.2.7.5 During the application of the steam, the ambient air temperature shall increase at a rate not to exceed 40 degrees F per hour until a temperature of 160 degrees F is reached. Curing at 160 degrees F shall continue until concrete test cylinders, prepared at

the time of placing, and cured under the same temperature and moisture conditions have attained 80 percent of the expected compressive strength.

3.7.2.7.6 Necessary equipment for testing the cylinders shall be available at the fabricator's plant unless permitted otherwise.

3.7.2.7.7 When discontinuing steam, the ambient air temperature shall not decrease at a rate exceeding 40 degrees F per hour until the temperature has reached 20 degrees F above the temperature of the air to which the concrete will be exposed.

3.7.2.7.8 The concrete shall not be exposed to temperatures below freezing for 6 days after casting.

3.7.2.7.9 The precast barrier shall not be moved until 24 hours after casting. The precast sections must be in the position and location for curing prior to removing forms The lifting hooks shall not be used to move the barrier until curing is complete. Handling shall at all times be performed in a manner to prevent damage to the concrete.

3.7.3 Portable concrete barrier for traffic control. Portable concrete barriers for traffic control shall include relocating the barriers on the project as well as transporting the barriers to and from the project.

3.8 Handrail.

3.8.1 Fabricate handrails to the dimensions and details shown on the plans.

3.8.1.1 Top railing shall be continuous throughout entire length of railing, except as noted in 3.8.4.

3.8.1.2 Interconnect handrail members by butt-welding or welding with internal fittings. Welding shall conform to ANSI/ AWS D 1.1 Chapter 10, Tubular Structures. At tee and cross connections notch ends of intersecting members to fit contour of pipe to which end is joined and
weld all around,

3.8.1.3 Form simple and compound curves by bending pipe in jigs to produce uniform curvature; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking or otherwise deforming exposed surfaces of pipe.

3.8.2 The Contractor shall install the pipe and hardware for handrail as shown or ordered.

3.8.2.1 Anchor posts in preset sleeves or drilled holes. Sleeves or holes shall be not less than 12 inches deep with an inside diameter not less than 1/2 inch greater

than the outside diameter of the post. Sleeves shall have a steel plate closure welded to the bottom and a friction fit, removable cover designed to keep the sleeve clean and hold the 112 inch below the finished surface ~f concrete or mortar rubble masonry.

3.8.2.2 Set handrail accurately in location, alignment and elevation with edges and surfaces level, plumb and true. Fill annular space between posts and sleeve or holes with grout.

3.8.3 Damage to galvanized surfaces during erection shall be repaired by cleaning the damaged area as specified in 550.3.17.2, pretreating as specified in 550.3.17.7.1 and painting with 2 coats of zinc-rich primer, 708-NH 1.60. The second coat shall not be applied until the first coat has been approved.

3.8.4 Provide slip joint expansion joints, at intervals not to exceed 40 feet, located within 6 inches of posts. Slip joint shall be formed with an internal sleeve extending 2 inches beyond the joint on either side with the sleeve securely fastened to one side.

3.8.5 Handrail shall be installed in a timely manner to ensure pedestrian safety.

Method of Measurement

4.1 The accepted quantities of guardrail, new, temporary or reset, will be measured by the unit, or by the linear foot to the nearest 0.1 of a foot, as follows:

4.1.1 Corrugated beam guardrail indicated as "standard section" will be measured by the linear foot as shown on the plans. Terminal units and bridge approach units will each be measured by the unit.

4.1.2 Wood guardrail, pipe guardrail and double faced beam guardrail will be measured from end to end of rail by the linear foot. Measurement includes to end of terminal sections unless otherwise shown on the plans.

4.1.3 Handrail will be measured from end to end of rail by the linear foot, to the nearest 0.1 foot.

4.2 Anchorages shown on the plans as integral parts of terminal units paid for by the unit will not be measured separately; other anchorages as specified, both new and reset, will be measured by the number of units installed.

4.3 Measurement of the temporary beam guardrail and temporary terminal units of the type specified will be in accordance with 4.1.

4.4 The accepted quantities of concrete barrier, permanent or portable for traffic control, will be measured by the linear foot as follows:

4.4.1 Permanent concrete barrier will be measured by the foot to the nearest 0.1 of a foot from end to end along the top of the barrier section, as shown on the plans.

4.4.2 Portable concrete barrier for traffic control will be measured by the linear foot for barrier ordered and delivered to the project. Relocating portable concrete barriers on the project will not be measured.

Basis of Payment

5.1 The accepted quantities will be paid for at the contract unit price for terminal units and bridge approach units when separately specified, per linear foot for guardrail, and per each for anchorages other than anchorages included with terminal units for all types specified, complete and in place.

5.2 New material required for resetting guardrail, other than that damaged due to the Contractor's negligence, will be paid for as provided in 109.04.

5.3 The accepted quantity of permanent concrete barrier of the type specified and portable concrete barriers for traffic control will be paid for at the contract unit price per linear foot.

5.3.1 Mortar for patching joints between units on permanent concrete barriers will be subsidiary when required.

5.3.2 Miscellaneous steel for connecting individual units or end units will be subsidiary.

5.4 The accepted quantity of handrail will be paid for at the contract unit price per linear foot complete in place.

5.4.1 Grout will be subsidiary to handrail.

KEY TO ITEM NUMBERS FOR GUARD RAIL ITEMS

Item Number		Unit
606.00C	Beams for Guardrail	Linear Foot
606.01A	Posts for Guardrail	Each
606.1A,B	Steel Beam GR (Galvanized)	Linear Foot *
606.21A,B	Double-faced Steel Beam GR (Galvanized)	Linear Foot
606.411	Concrete Barrier, Single-Faced, Precast	Linear Foot

606.412	Concrete Median Barrier, Double-Faced, Precast	Linear Foot
606.41291	Modified Concrete Median Barrier, Precast	Linear Foot
606.41292	Modified Concrete Median Barrier, Cast-in-Place	Linear Foot
606.417	Portable Concrete Barrier (for Traffic Control)	Linear Foot

* Linear foot except that terminal units are by the unit.

A	Type of Post	
0	Open	
1	Light weight steel (S3x5.7)	
2	Medium weight steel(W6x8.5)	
3	Round wood 7-1/2 inches minimum at shoulder grade	
4	6 inch x 8 inch wood	
5	Round wood 6 inch +/- 1/2 inch at shoulder grade	
6	Aluminum, size per plans	
7	Heavy weight steel (W6x15.5)	
8	Open	
9	Aluminum or steel -- Contractor's choice, size per plans	
B	Post Spacing or Type of Unit (Spacing of terminal units is standardized on the plans)	
0	"Standard Section" with 6 foot - 3 inch spacing	
1	Open	
2	Open	
3	6 foot - 3 inch	
4	Variable: 25 feet to 6 feet - 3 inches or 3-1/2 feet to 1-1/2 inches	
5	Open	
6	Terminal Unit F (1) (with 6 foot - 3 inch spacing)	Unit
7	Terminal Unit G (with 6 foot - 3 inch spacing)	Unit
8	Bridge Approach Unit (with 4 foot- 2 inch spacing)	Unit
C	Rail Material	
0	Steel (Galvanized)	
1	Open	
2	Open	
3	Open	
4	Open	
5	Steel Rubbing Rail (Galvanized)	
6	Steel Top Hand Rail (Galvanized)	
7	Steel Top Pipe Rail (Galvanized)	
8	Open	
Note 1	Length of Terminal Unit F, indicated in Col. "C" when Col. "B" = 6 or 7	

0	or Blank = 100 feet (Standard)
1	Modified - (length shown on plans)
2	Open

606.5A, B, C Wood Guardrail

A	Type of Wood Rail
1	Single 6 inch x 8 inch
2	Double 6 inch x 8 inch
5	Double 4 inch x 6 inch

B	Type of Posts
0	5 feet-8 inch x 8 inch round wood
1	6 feet-6 inch x 8 inch round wood
2	5 feet-9 inch x W6x8.5 steel
3	5 feet-9 inch x W6x15.5 steel
4	1 feet-5 inch x W6x15.5 steel
5	2 feet-5-1/4 inch x W6x15.5 steel

C	Post Spacing
7	7 feet-6 inch
8	8 feet-0 inch

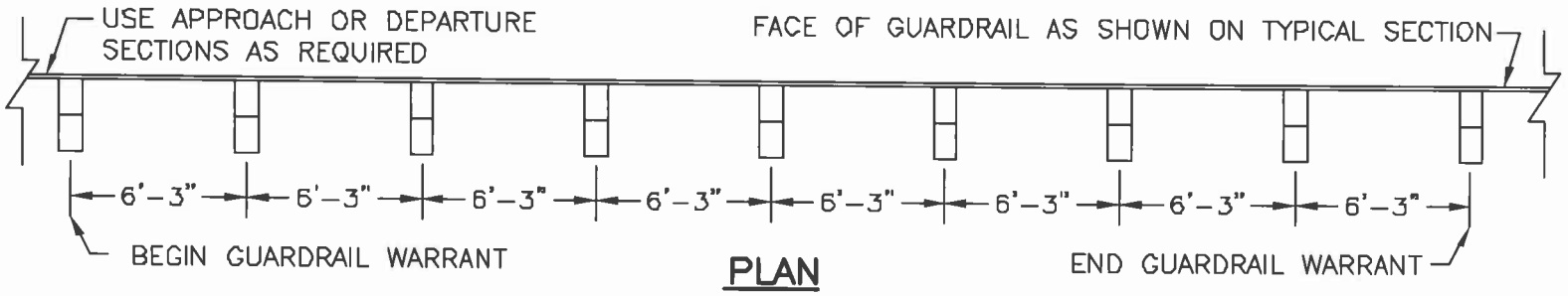
606.6A, B, C Handrail — Linear Foot

A	Type
1	Step
2	Ramp
3	Safety Rail

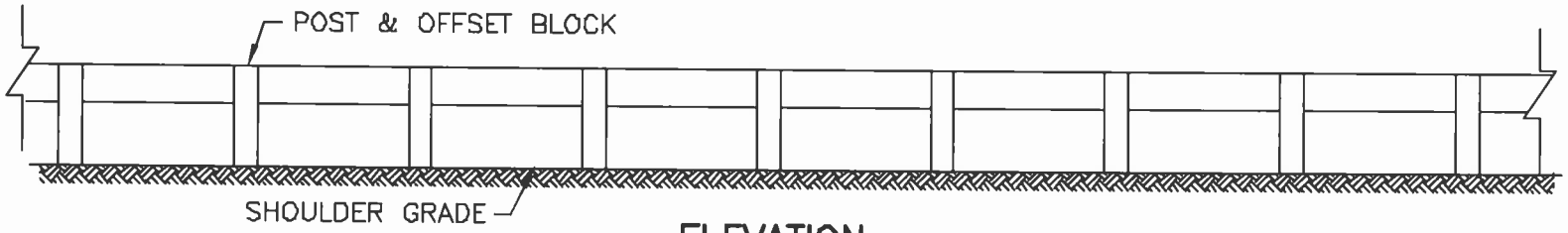
B	Guard Required
0	No Guard
1	With Guard

C	Material
1	Steel

606.82	Anchorages for Beam Guardrail	Each
606.83	Anchorages for Strong Beam Guardrail	Each
606.91	Resetting or Setting Guardrail	Linear Foot
606.92	Resetting Anchorages	Each
606.93	Temporary Beam Guardrail	Linear Foot



PLAN



ELEVATION

ITEM No. 606.127, STEEL POST BEAM GUARD RAIL (TERMINAL UNIT TYPE 'G')

ITEM No. 606.147, WOOD POST BEAM GUARD RAIL (TERMINAL UNIT TYPE 'G')

USE ON DIVIDED HIGHWAYS ONLY WITH DIRECTION OF TRAFFIC AS INDICATED. (DO NOT USE WITHIN WARRANT LIMITS)

STANDARD SECTION

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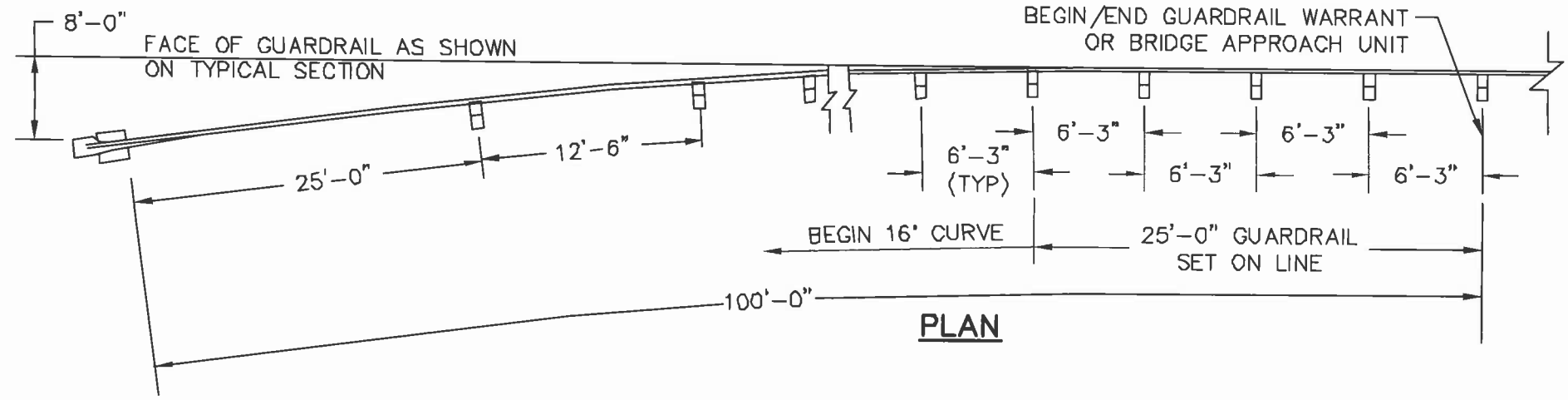
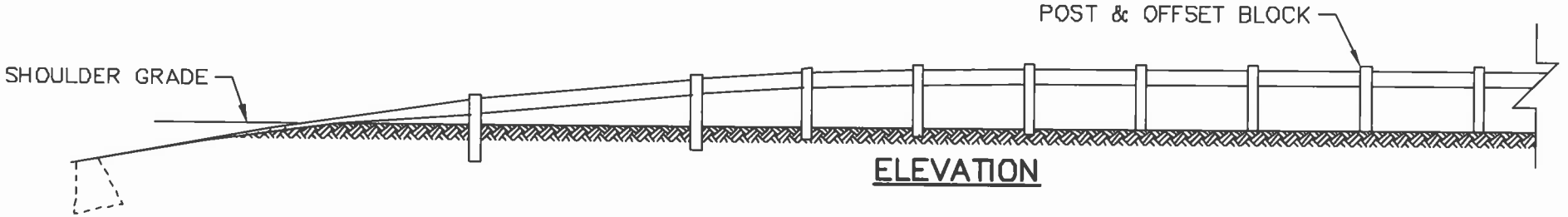
FIGURE 606-1





ITEM No. 606.126, STEEL POST
ITEM No. 606.146, WOOD POST

USE AT BEGINNING OR END OF SECTION FOR WARRANTED GUARDRAIL WHEN TERMINATING IN A FILL SECTION OR AN EXCAVATION SECTION WITH A 4:1 BACKSLOPE.

DO NOT USE WITHIN WARRANTED LIMTS.

TERMINAL UNIT TYPE 'F'

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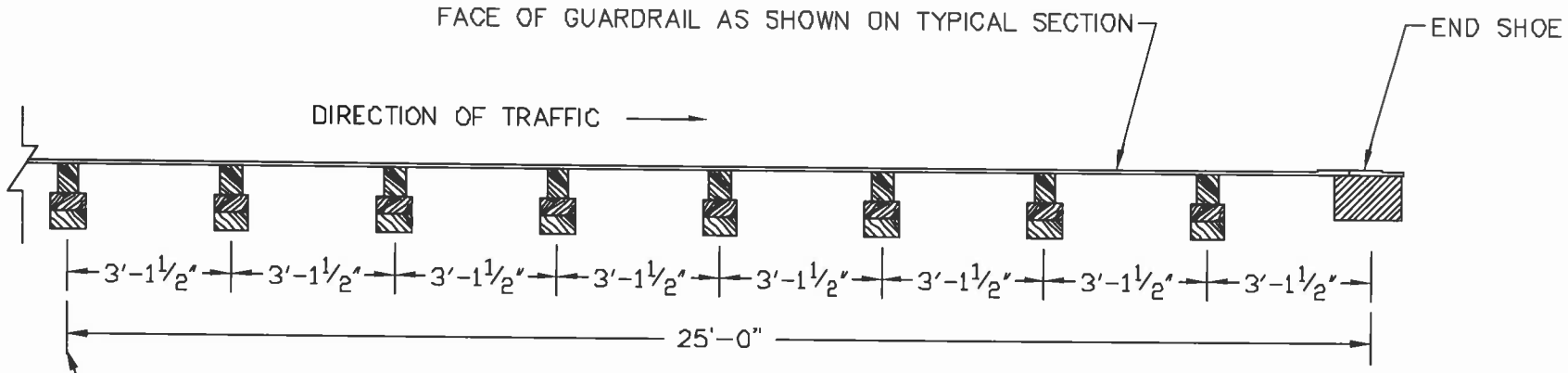
FIGURE 606-2



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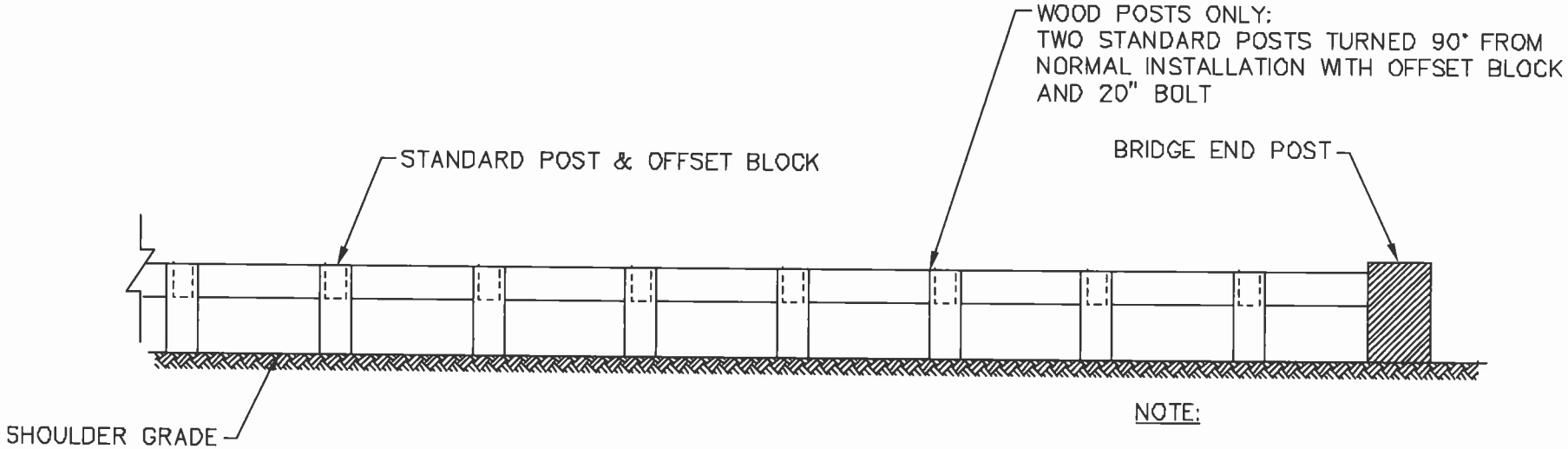

ELEVATION

ITEM No. 606.127, STEEL POST BEAM GUARD RAIL (BRIDGE APPROACH UNIT)

ITEM No. 606.147, WOOD POST BEAM GUARD RAIL (BRIDGE APPROACH UNIT)

USE AT BRIDGE END POST OR AS DESIGNATED.

NOTE:

USE THIS SECTION ON DEPARTURE TRAFFIC ENDS.
ON APPROACHING TRAFFIC ENDS ADD A SPACER UNDER SHOE AS DETAILED ON PLAN.

BRIDGE APPROACH UNIT

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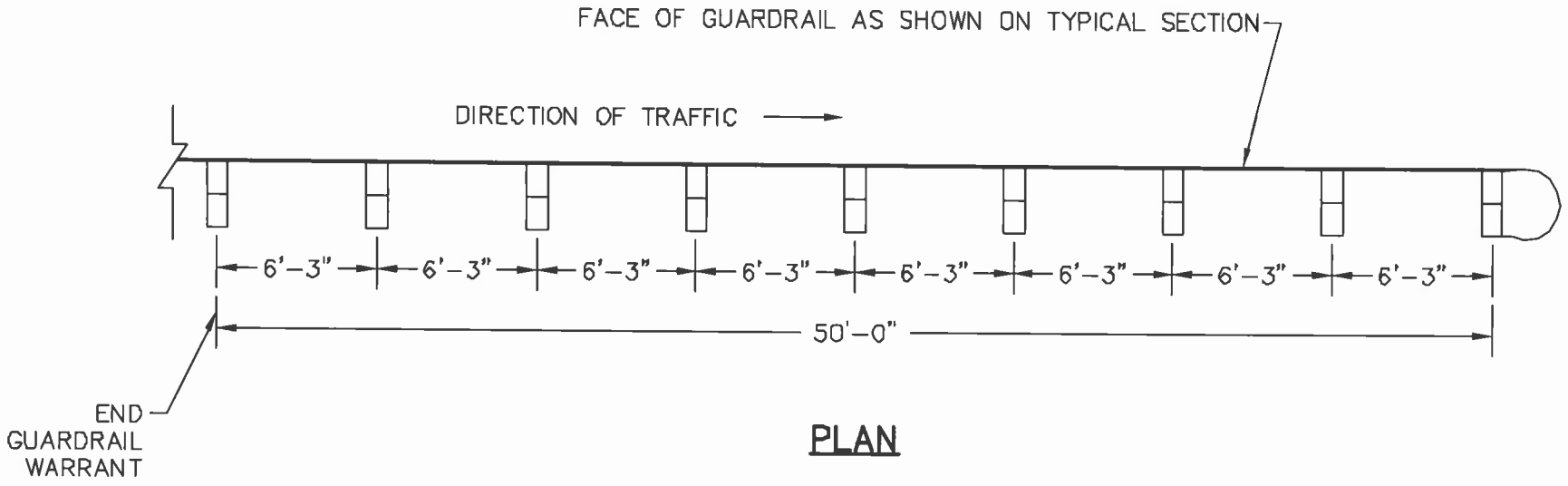
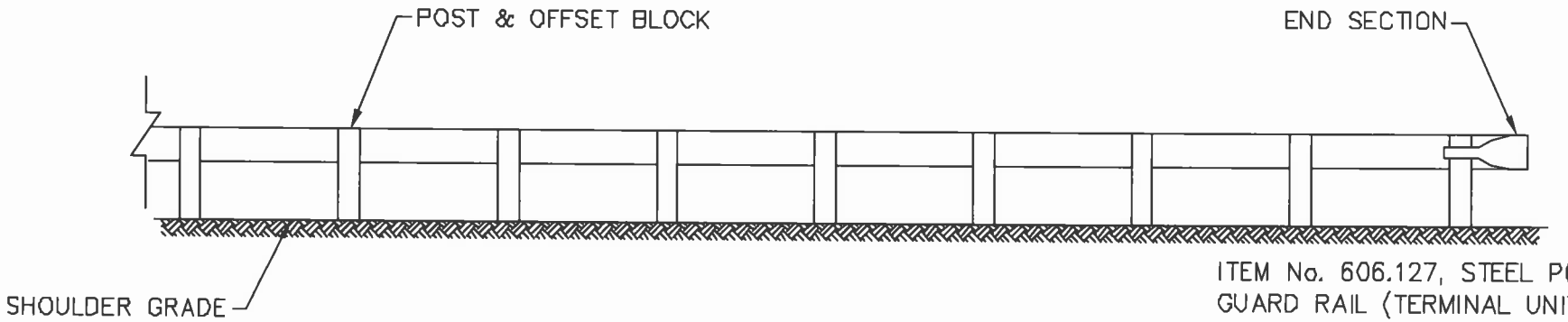
FIGURE 606-3



PLAN



ELEVATION

ITEM No. 606.127, STEEL POST BEAM GUARD RAIL (TERMINAL UNIT TYPE 'G')

ITEM No. 606.147, WOOD POST BEAM GUARD RAIL (TERMINAL UNIT TYPE 'G')

USE ON DIVIDED HIGHWAYS ONLY WITH DIRECTION OF TRAFFIC AS INDICATED. (DO NOT USE WITHIN WARRANT LIMITS)

TERMINAL UNIT TYPE 'G'

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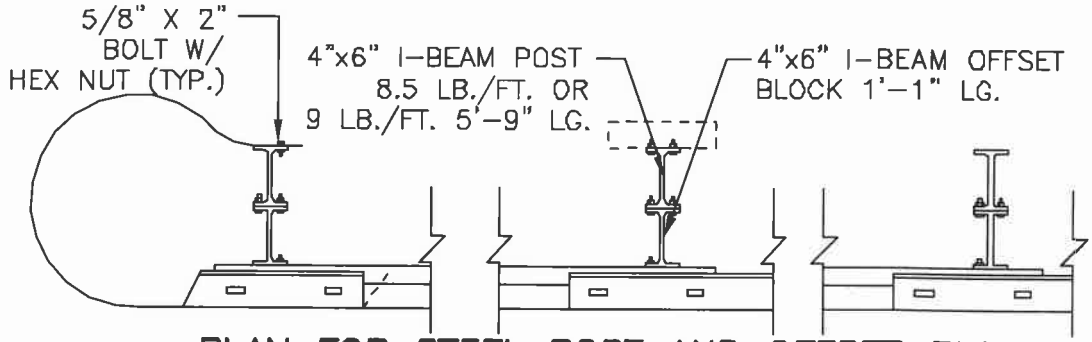
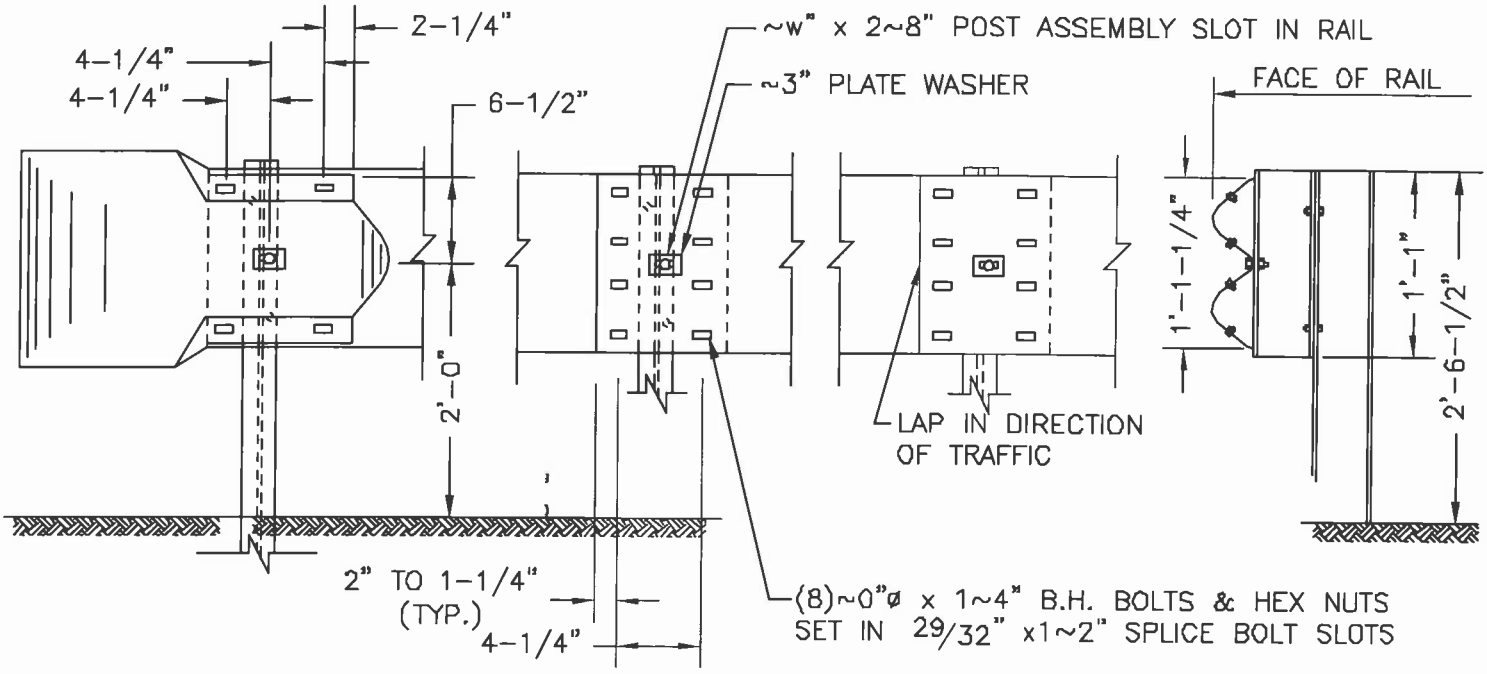
NOT TO SCALE

FIGURE 606-4



PLAN FOR STEEL POST AND OFFSET BLOCK



GENERAL NOTES

1.) STEEL POSTS, OFFSET BLOCKS, ANCHORS, PLATES & ALL FITTINGS TO BE GALVANIZED.

2.) ALL DIMENSIONS SUBJECT TO MANUFACTURER'S TOLERANCES.

3.) RAIL PANELS AND END SECTIONS TO BE 12 GAUGE STEEL.

4.) BACK-UP PLATE TO BE PLACED BEHIND RAIL ELEMENTS AT INTERMEDIATE STEEL POSTS. (NON-SPLICE POSTS)

5.) ALL PARTS SHALL CONFORM TO CURRENT STANDARD SPECIFICATIONS.

6.) WHEN GUARDRAIL IS CONSTRUCTED AT UP TO FOUR FEET FROM THE EDGE OF PAVEMENT, THE GUARDRAIL HEIGHT WILL BE SET FROM THE GRADE AT THE EDGE OF PAVEMENT. WHEN GUARDRAIL IS CONSTRUCTED MORE THAN FOUR FEET FROM THE EDGE OF PAVEMENT, THE GUARDRAIL WILL BE SET FROM THE GRADE AT THE FACE OF RAIL.

GUARDRAIL DETAILS

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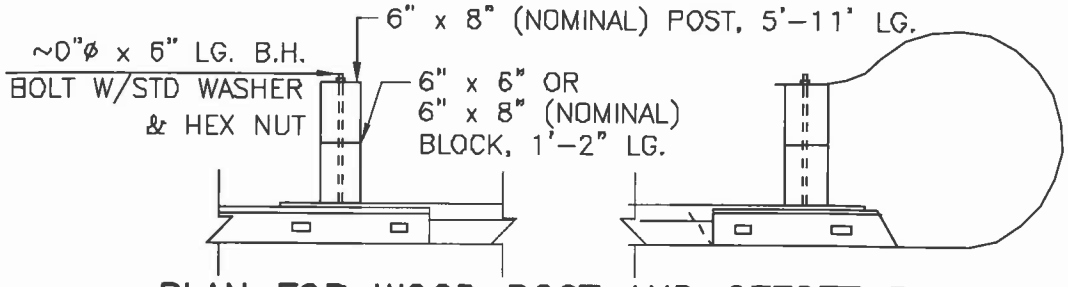
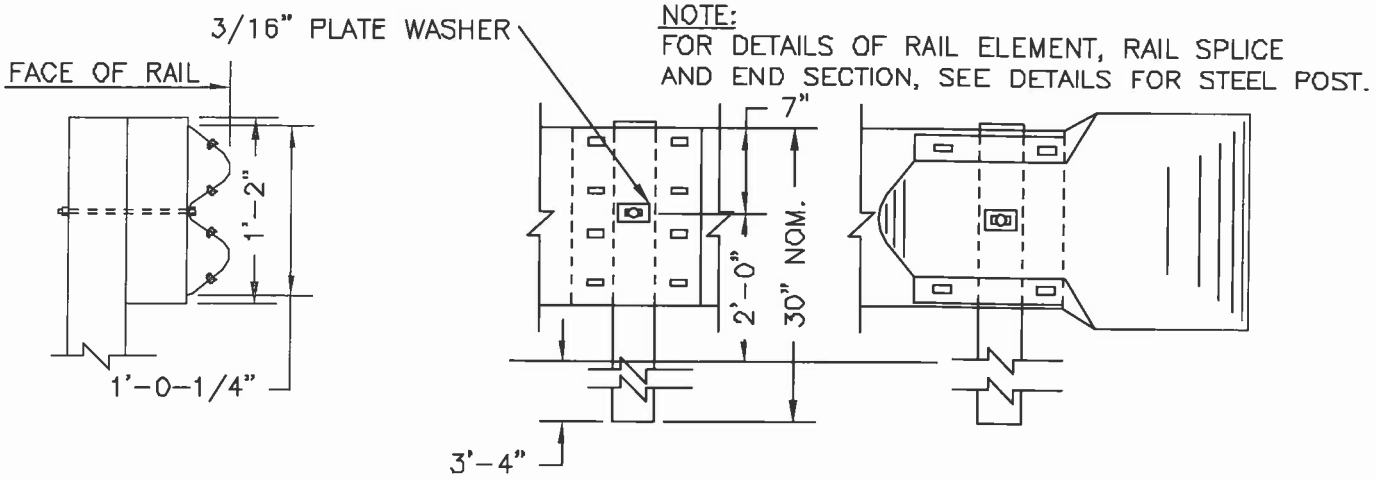
NOT TO SCALE

FIG. 606-5a



PLAN FOR WOOD POST AND OFFSET BLOCK



NOTE:
FOR DETAILS OF RAIL ELEMENT, RAIL SPLICE AND END SECTION, SEE DETAILS FOR STEEL POST.

GENERAL NOTES

1.) STEEL POSTS, OFFSET BLOCKS, ANCHORS, PLATES & ALL FITTINGS TO BE GALVANIZED.

2.) ALL DIMENSIONS SUBJECT TO MANUFACTURER'S TOLERANCES.

3.) RAIL PANELS AND END SECTIONS TO BE 12 GAUGE STEEL.

4.) BACK-UP PLATE TO BE PLACED BEHIND RAIL ELEMENTS AT INTERMEDIATE STEEL POSTS. (NON-SPLICE POSTS)

5.) ALL PARTS SHALL CONFORM TO CURRENT STANDARD SPECIFICATIONS.

6.) WHEN GUARDRAIL IS CONSTRUCTED AT UP TO FOUR FEET FROM THE EDGE OF PAVEMENT, THE GUARDRAIL HEIGHT WILL BE SET FROM THE GRADE AT THE EDGE OF PAVEMENT. WHEN GUARDRAIL IS CONSTRUCTED MORE THAN FOUR FEET FROM THE EDGE OF PAVEMENT, THE GUARDRAIL WILL BE SET FROM THE GRADE AT THE FACE OF RAIL.

GUARDRAIL DETAILS

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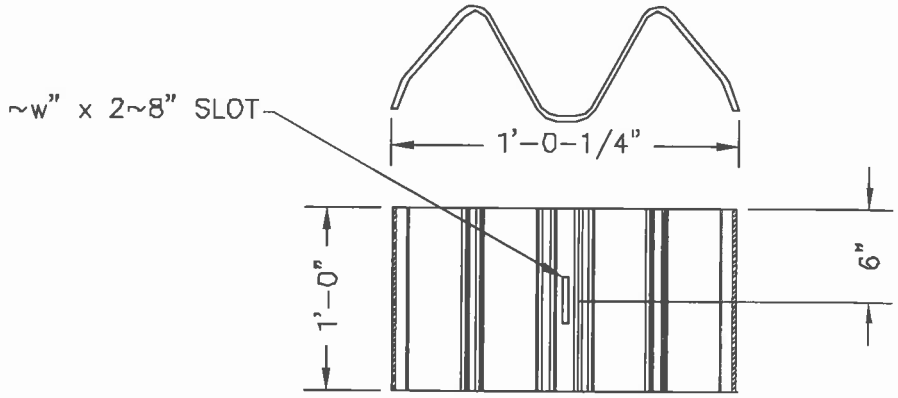
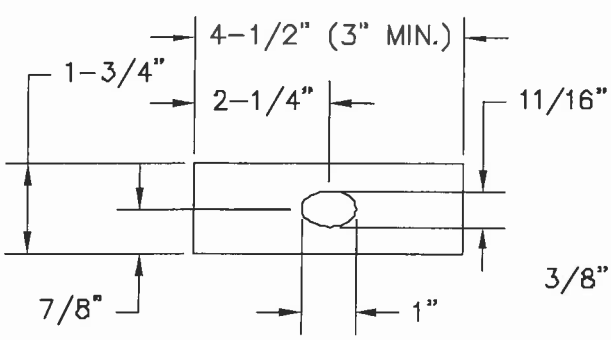
NOT TO SCALE

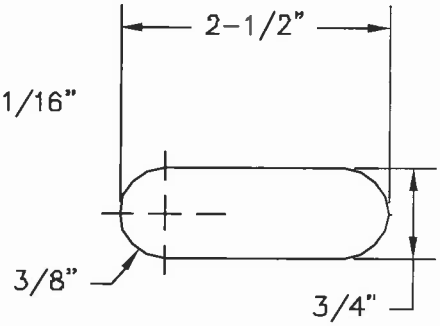
FIG. 606-5b



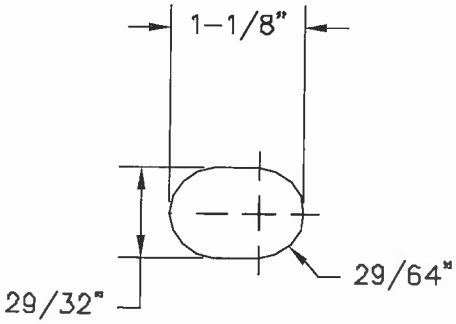
W-BEAM BACK-UP PLATE (STEEL POST ONLY)



~3" PLATE WASHER



POST ASSEMBLY SLOT



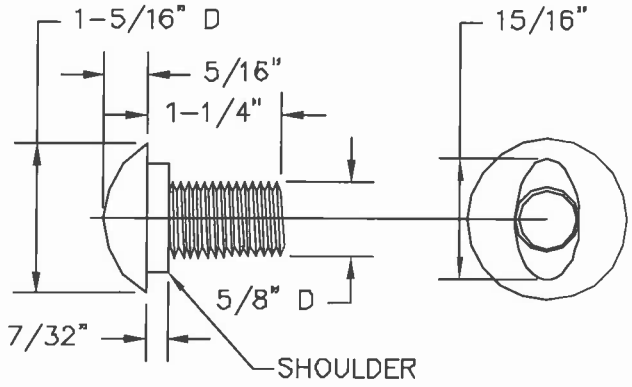
SPLICE BOLT SLOT

GUARDRAIL BOLT SLOT AND PLATE WASHER

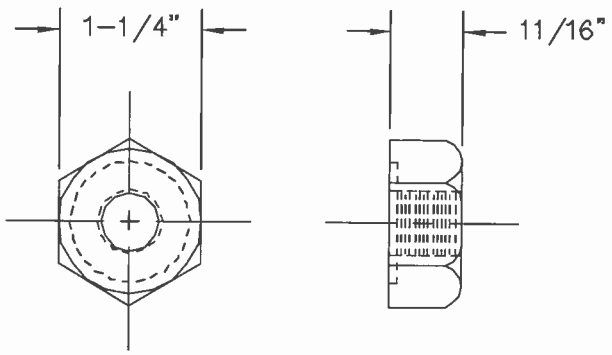
S:\DWG\DETAILS\606-6 GRHARD.DWG

NOT TO SCALE

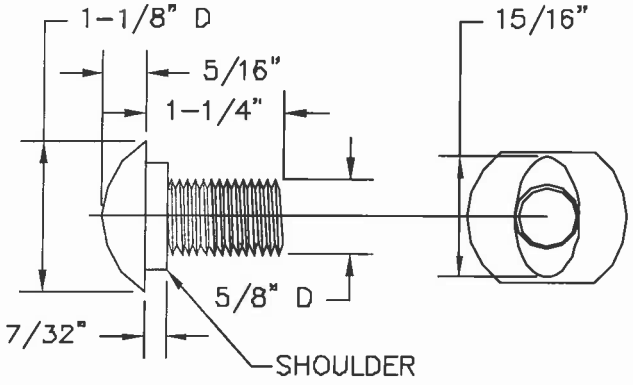
FIG. 606-6



ALTERNATE No. 1



NUT (9 REQ'D PER RAIL)



ALTERNATE No. 2

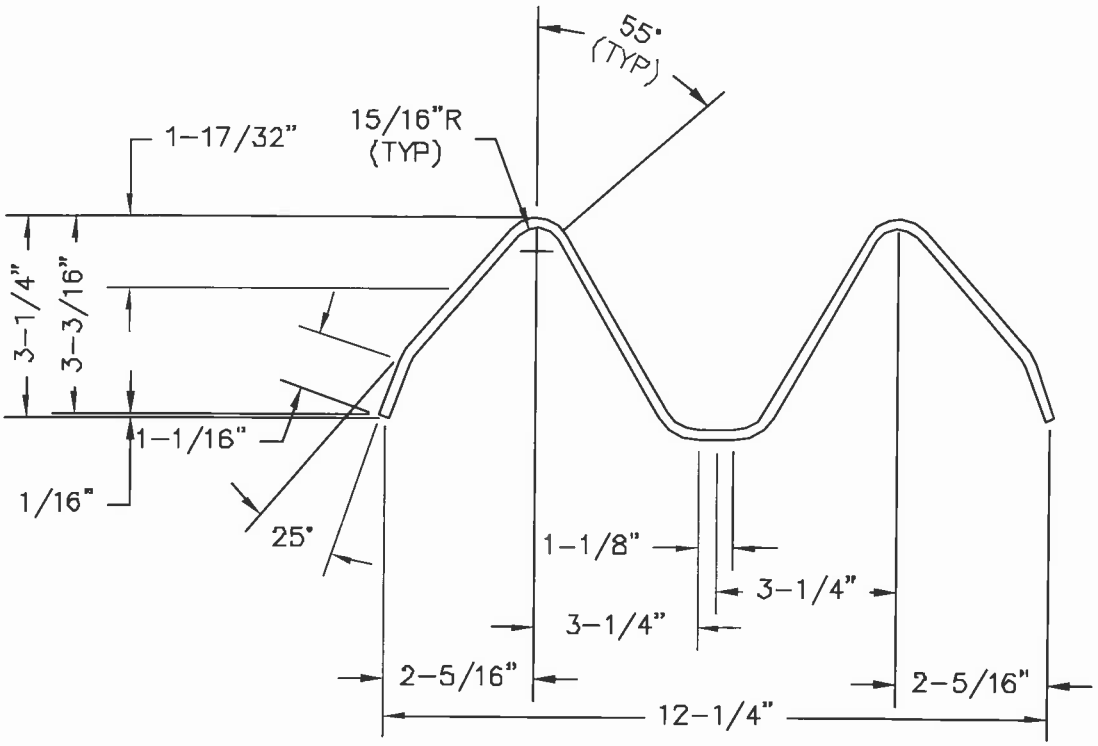
POST BOLT SAME EXCEPT LENGTH.
1 REQUIRED PER POST
STD. LENGTHS: 2", 5", 8", 10~8", & 16"

GUARDRAIL HARDWARE DETAILS

S:\DWG\DETAILS\606-7 GRHARD.DWG

NOT TO SCALE

FIG. 606-7

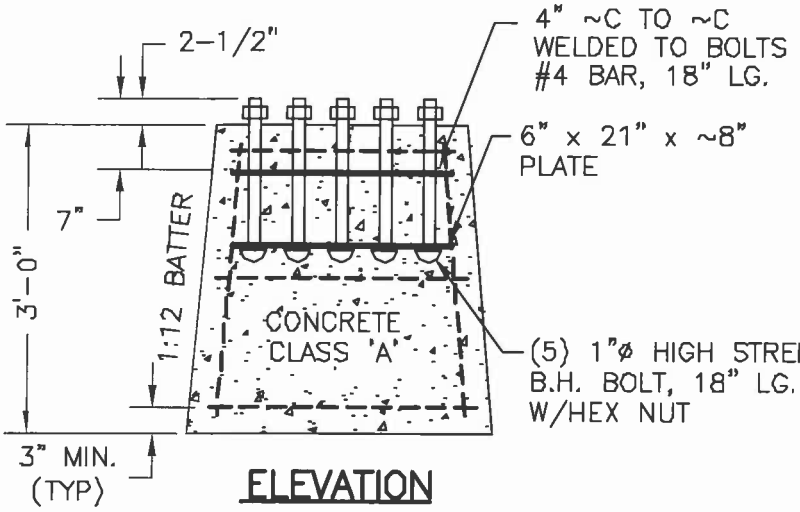


SECTION THROUGH RAIL ELEMENT

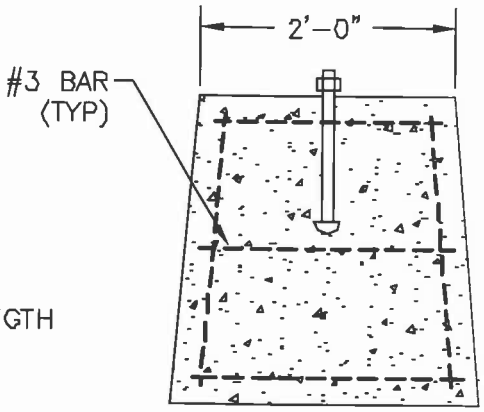
S:\DWG\DETAILS\606-8 CRrail.DWG

NOT TO SCALE

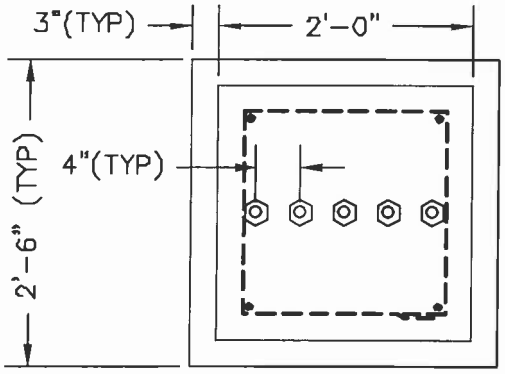
FIG 606-8



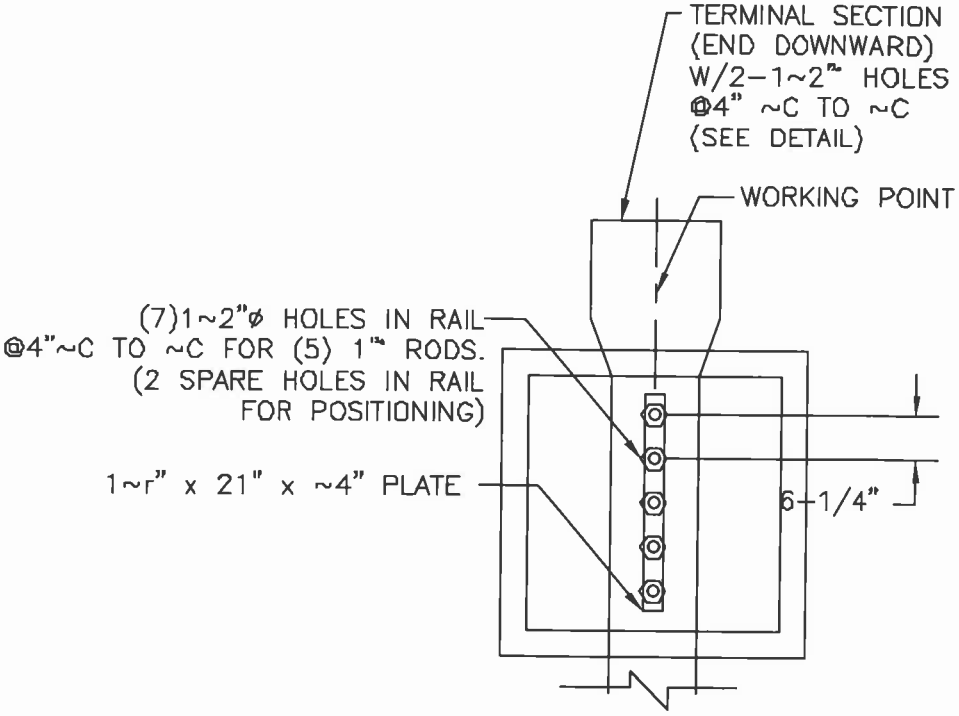
ELEVATION



ELEVATION



PLAN



PLAN

ANCHOR DETAIL FOR TERMINAL UNIT TYPE 'F'

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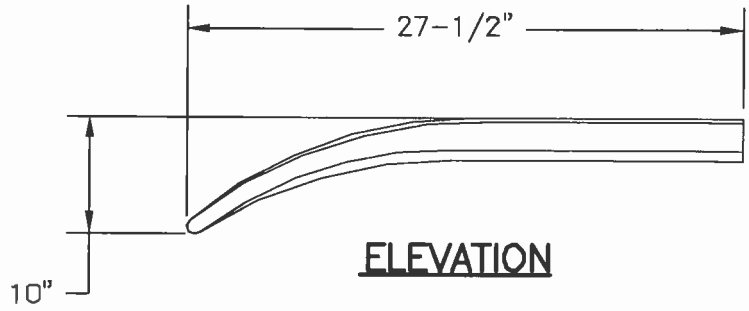
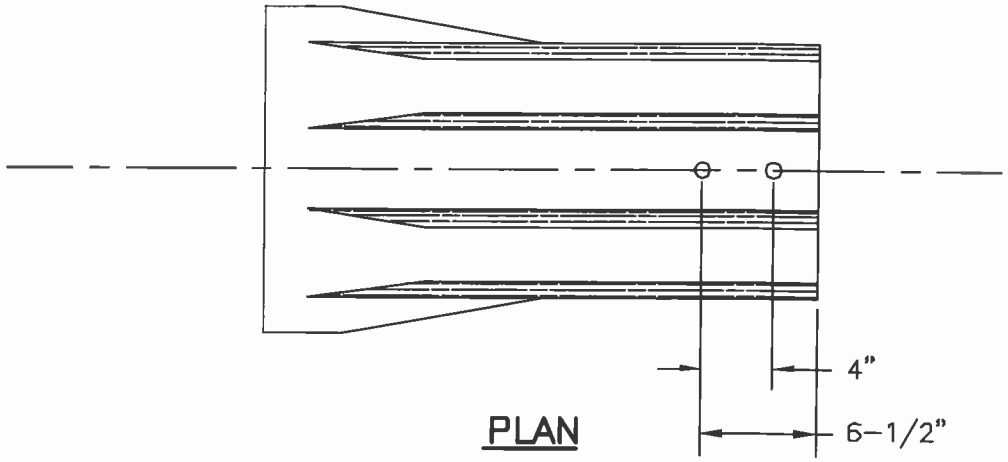
NOT TO SCALE

FIG 606-9



ELEVATION



PLAN

END SECTION (FOR USE W/ANCHOR BLOCK ONLY)

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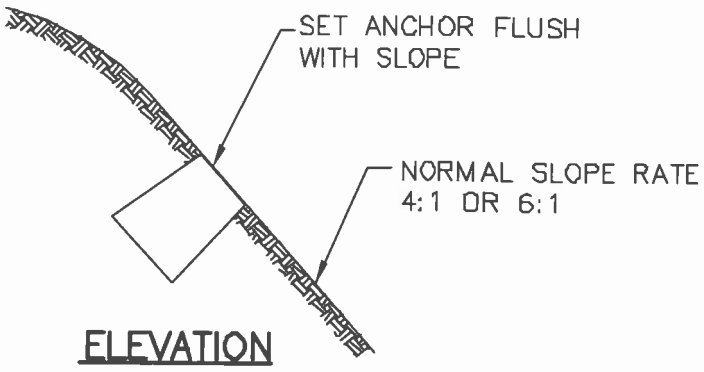
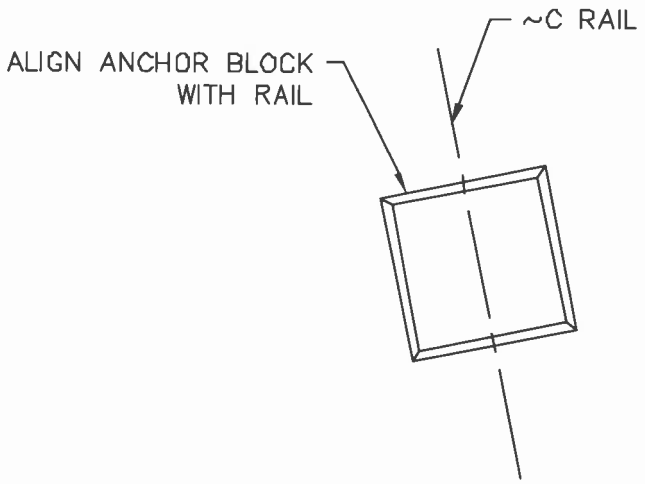
NOT TO SCALE

FIG. 606-10



ELEVATION



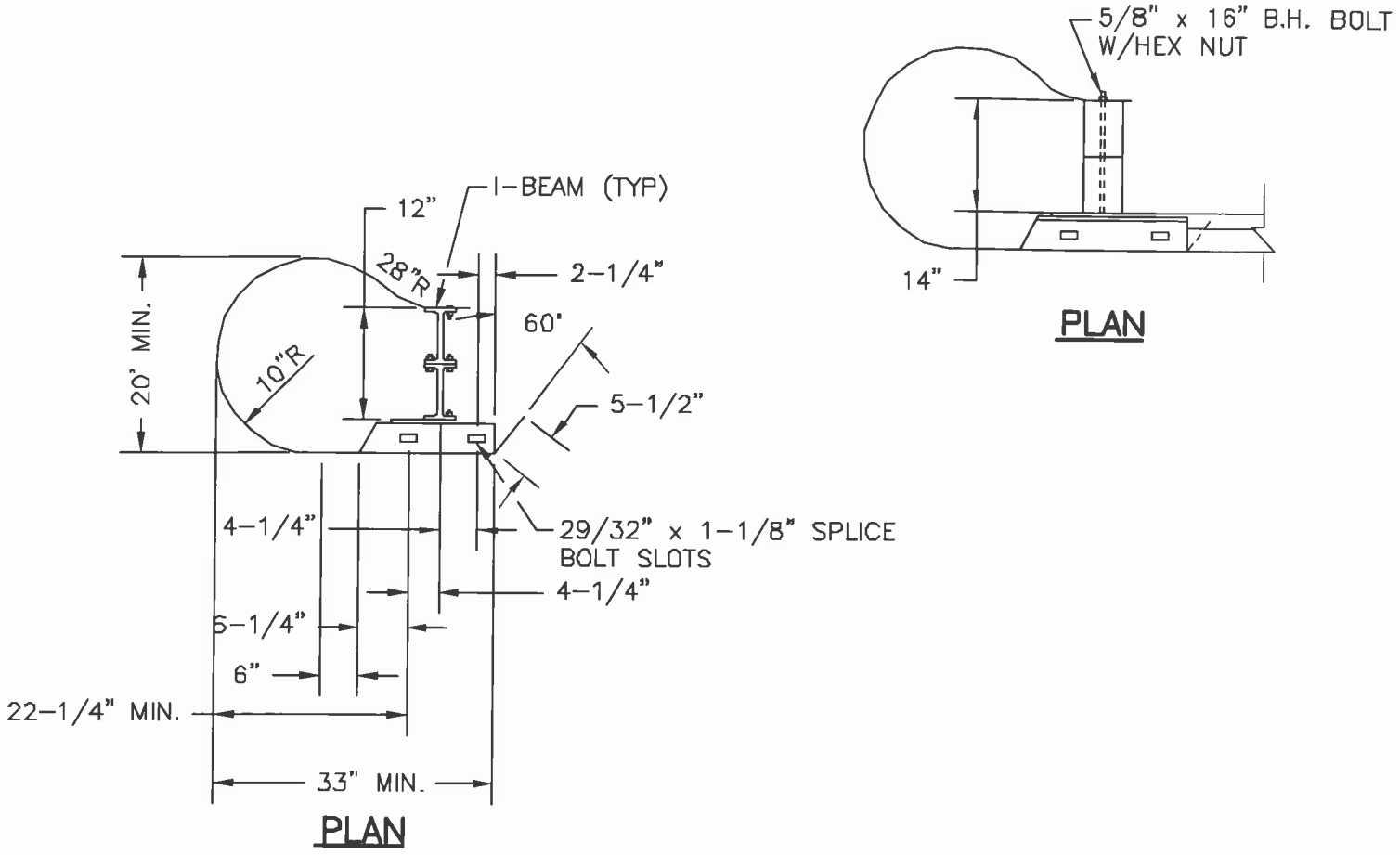
PLAN

ANCHOR SETTING UNIT 'F'

S:\DWG\DETAILS\606-11 GR-ANCHR.DWG

NOT TO SCALE

FIG 606-11



GUARDRAIL END SECTION DETAILS

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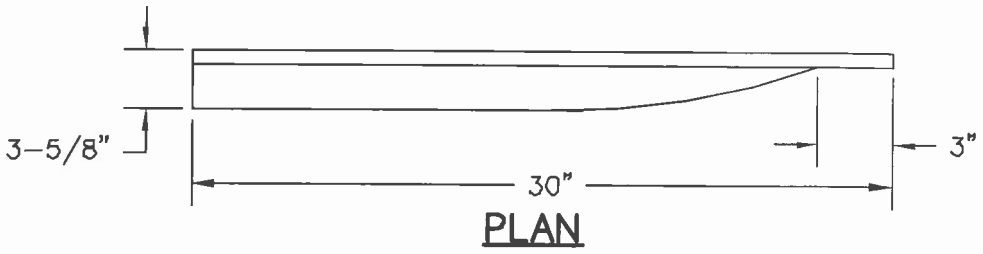
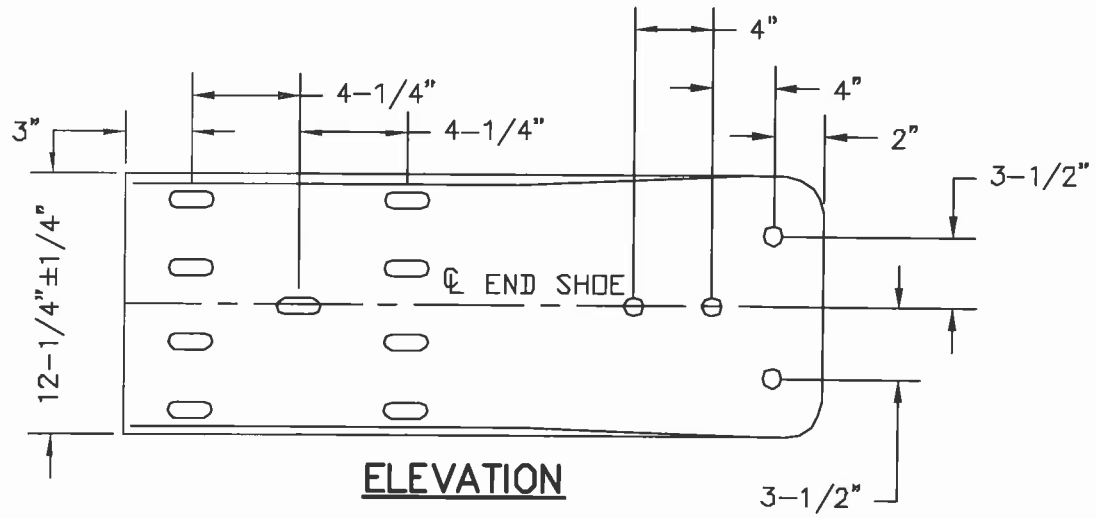
NOT TO SCALE

FIG 606-12



PLAN



ELEVATION

END SHOE FOR CONNECTION TO BRIDGE END POST

S:\DWG\DETAILS\606-12 GrBrShoe.DWG

NOT TO SCALE

FIG 606-13

SECTION 607 -- FENCES

Description

1.1 This work shall consist of the constructing, removing and resetting railings, fences, and gates as shown on the plans or as ordered. This work shall include furnishing and installing the required electrical grounds.

Materials

2.1 Woven Wire Fence.

2.1.1 Wire shall conform to ASTM A 116, Design No. 1047- 12-11. Minimum coating shall meet Class 1.

2.1.2 Steel posts and angle braces shall conform to ASTM A 499 and A 702. Posts shall be galvanized and shall be in accordance with AASHTO M 111. Fittings, hardware and other appurtenances not specifically covered by the plans and specifications shall be standard commercial grade, manufactured in accordance with current standard practice.

2.1.3 Tie wires and wire clips shall be of equivalent size and coating as specified in 2.1.1.

2.1.4 Gates. Gate posts shall conform to 2.1.2. Wire shall conform to 2.1.1. The frame, center brace, diagonal tension rod, and hardware shall conform to the standards shown on the plans.

2.2 Chain Link Fence.

2.2.1 Chain link fence shall conform to AASHTO M 181.

2.2.2 Unless otherwise stipulated, fencing material shall be 9 gauge 2 inch mesh, Type II or Type IV fabric. The specific diameter for Type IV fabric is the metallic coated diameter and the PVC coating shall not be used when determining wire size. All vinyl-coated fabric used on the project shall be the same shade of green.

2.2.2.1 Fabric up to and including 60 inches high shall be knuckled at the top and bottom salvages. Fabric over 60 inches high shall be twisted and barbed on the bottom salvage and knuckled on the top salvage.

2.2.3 Metallic coated steel posts, rails, or gate frames shall conform to AASHTO M 181 Grade 1 or Grade 2. Miscellaneous fittings and hardware shall conform to AASHTO M 181 Section 29.

2.2.4 Tension bars shall not be less than 0.25 by 0.75 inches.

2.2.5 Wire ties and clips for fastening fabric to posts and top rail shall be of the same material and the same or larger gauge as the fabric.

2.3 Barbed wire. Barbed wire, unless otherwise specified, shall be fabricated from 2 ply 12-1/2 gauge, class 3 zinc- coated steel wire, with 14 gauge 4-point barbs spaced not more than 5 inches apart, and shall meet the requirements of ASTM A 121.

2.4 Additional materials required for resetting railings or fencing or both shall conform in quality and type to the materials in the existing fence.

2.5 Concrete shall conform to 520.

2.6 Protective coating for contact surfaces of aluminum and concrete shall be either zinc-chromate primer, 708-NH 1.50, or an approved bituminous paint meeting FSS TT-C-494.

Construction Requirements

3.1 General.

3.1.1 The Contractor shall perform such clearing and grubbing as may be necessary to construct the fence to the required grade and alignment.

3.1.2 At locations where breaks in a run of fencing are required, or at intersections with existing fences, appropriate adjustment in post spacing shall be made.

3.1.3 The fence shall be permanently connected to the existing fence.

3.1.4 Posts, braces, or anchors shall be embedded in concrete and temporary guys or braces may be required to hold the posts in proper position until such time as the concrete has set sufficiently to hold the posts. Unless otherwise permitted, no materials shall be installed on posts or strain placed on guys and bracing set in concrete until 3 days have elapsed from the time of placing of the concrete.

3.1.4.1 The portions of aluminum posts which will be in contact with concrete shall be coated both inside and outside with protective coating to 1 inch above the top of the concrete. The paint shall be allowed to dry for at least 24 hours before the concrete is placed.

3.1.4.2 In wet areas when it is impractical to place concrete, steel drive anchor assemblies may be required.

3.1.5 All posts shall be set plumb and firm and to the required grade, spacing, and alignment. Cutting of the posts will be allowed only with the approval of the Engineer.

3.1.6 When it is necessary to drill into rock to set a steel post, the post may be shortened, provided a minimum length of 12 inches of post is grouted in the rock.

3.1.7 At each location where an electric transmission, distribution, or secondarily line crosses any of the types of metal fences covered by these specifications, the fence shall be grounded as required by the electric utility company.

3.1.7.1 At locations where electric lines run parallel and in close proximity to metal fences, grounding systems may be required by the electric utility company.

3.1.8 Where it is impractical to conform the fence to the general contour of the ground, as at ditches, the opening beneath the fence shall be closed as ordered.

3.1.9 All surplus material and other debris shall be removed.

3.2 Woven Wire Fence.

3.2.1 The wire shall be stretched so that not more than 1/2 of the hump is removed from the horizontal wire. The top and bottom wire and alternate parallel interior wires shall be fastened at every post in such a manner that each interior wire shall have a fastening at every other post.

3.2.1.1 Runs of woven wire fence 600 feet or less in length shall be erected with not more than one splice between post assemblies. Except as otherwise provided, splicing the wire will be permitted at posts only. Each horizontal strand of wire shall be wrapped completely around posts at post assemblies and shall be securely fastened by winding the end of the wire about the same strand where it leads up to the post. Other devices designed specifically to splice fencing wire may be used when approved. Post assemblies shall be constructed at all corners, ends, gates, at extreme sags or humps in grade, and at ends of 600 foot lengths of fencing.

3.3 Chain Link Fence.

3.3.1 The fence shall be erected so that the bottom is between 1 and 2 inches above the ground.

3.3.1.1 The top rail shall pass through the post tops to form a continuous brace from end to end of each section of
fence, and shall be securely fastened to the posts at post assemblies by suitable clamps.

3.3.1.2 Post assemblies as shown on the plans shall be installed at ends, at corners or changes in line where the angle of deflection is 30 degrees or more, at abrupt changes in vertical grades where pull posts are required, and at gates. Moreover, at least one post assembly shall be installed for every 500 feet of run.

3.3.1.3 Braces shall be spaced approximately midway between the top and the ground, and extend to the first line post. Braces shall be securely fastened to posts by suitable clamps.

3.3.1.4 Truss rods shall be installed as shown on the plans.

3.3.2 Unless otherwise shown on the plans, when barbed wire is required, arms shall be installed outward.

3.3.3 Fabric shall be fastened to the post with suitable fabric bands, stretcher bar bands, and hook bolts and to the top rail with tie wires as shown on the plans. The fabric shall be free from sags and bends.

3.3.4 All holes within 2 feet of the fence shall be filled with suitable approved material and compacted properly.

3.4 Temporary fence. Fences holding livestock shall be promptly replaced by temporary fencing, with no extra compensation, during the time between the removal of the old fence and the erection of the new fence. Fencing meeting the specifications for the project may be used in its permanent location after having been used as temporary fence, provided the fencing has not been damaged.

3.5 Gates. Gates shall be firmly and securely erected in accordance with the recommendations of the manufacturer and as directed.

3.6 Resetting. The existing railing or fencing shall be carefully removed, transported and reset at the required location. The reset railing or fencing shall be at least equivalent in strength and appearance to the original railing or fencing. Additional materials such as fittings or hardware shall be furnished and installed as necessary.

3.7 Barbed wire. The installation of barbed wire along the right-of-way is not allowed (see RSA 236:15).

Method of Measurement

4.1 All fence, new or reset, will be measured by the linear foot, to the nearest 0.1 of a foot. Measurement will be along the top of the fence for each continuous run.

4.1.1 Woven wire fence and chain link fence will be measured from center to center of end posts or gate posts as the case may be.

4.1.2 Railing reset will be measured from end to end of rail.

4.2 Post assemblies of the kind specified will be measured by the number of units. A unit shall consist of the post and all its required hardware and anchorages.

4.3 Gates will be measured as complete units of the size and type specified.

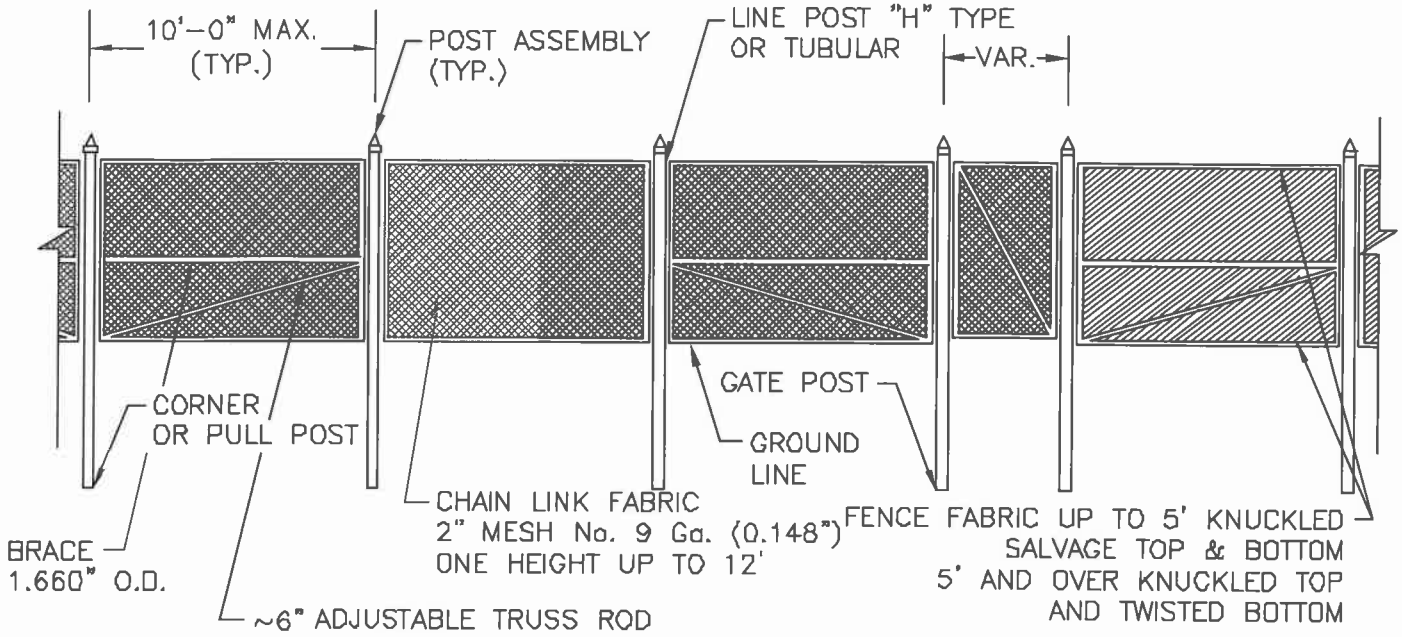
Basis of Payment

5.1 The accepted quantities of fencing of the type specified and of the height required will be paid for at the contract unit price per linear foot, complete in place. This unit price shall include the cost of furnishing all labor, tools and equipment to satisfactorily complete the work and shall include excavation, concrete or steel drive anchor assemblies, posts, hardware, fencing and any repair of material damaged by the Contractor's operation. Gates and post assemblies, complete in place, shall be paid for as units. Clearing necessary to provide space for erecting the fencing will be paid for as provided under Item 201.6.

5.2 The accepted quantity of railing or fencing reset will be paid for at the contract unit price per linear foot complete in place, except that the cost of furnishing additional materials, including new post concrete embediment, required through no fault of the Contractor will be paid for as Extra Work. Removing old concrete embediment from the posts will be subsidiary to the resetting item.

Pay Items and Units:

607.1	Woven Wire Fence	L.F.
607.20___	___Ft. Woven Wire Gates	Each
607.41	Post Assemblies for Woven Wire Fence	Each
607.6_2	Chain Link Fence with Aluminum Coated Steel Fabric, Ft. High	L.F.
607.6_5	Chain Link Fence with Vinyl-Coated Steel Fabric, _Ft. High	L.F.
607.6_9	Post Assemblies for Chain Link Fence, _Ft. High	Each
607.7___	___Ft. Chain Link Gates, _Ft. High	Each
607.8___	___Ft. Opening Chain Link Double Gates, _Ft. High	Each
607.9	Resetting Railing and Fencing	L.F.



NOTE:

ALL END POSTS SHALL HAVE ONE BRACE; ALL CORNER AND INTERMEDIATE BRACE OR PULL POSTS SHALL HAVE TWO BRACES, WITH A MAXIMUM SPACING BETWEEN POST ASSEMBLIES OF 500 FEET.

FOR ALL POSTS SEE FOOTING DETAIL.

FOR FENCE ERECTION ON THE RIGHT-OF-WAY LINE, SEE WOVEN WIRE FENCE DETAIL.

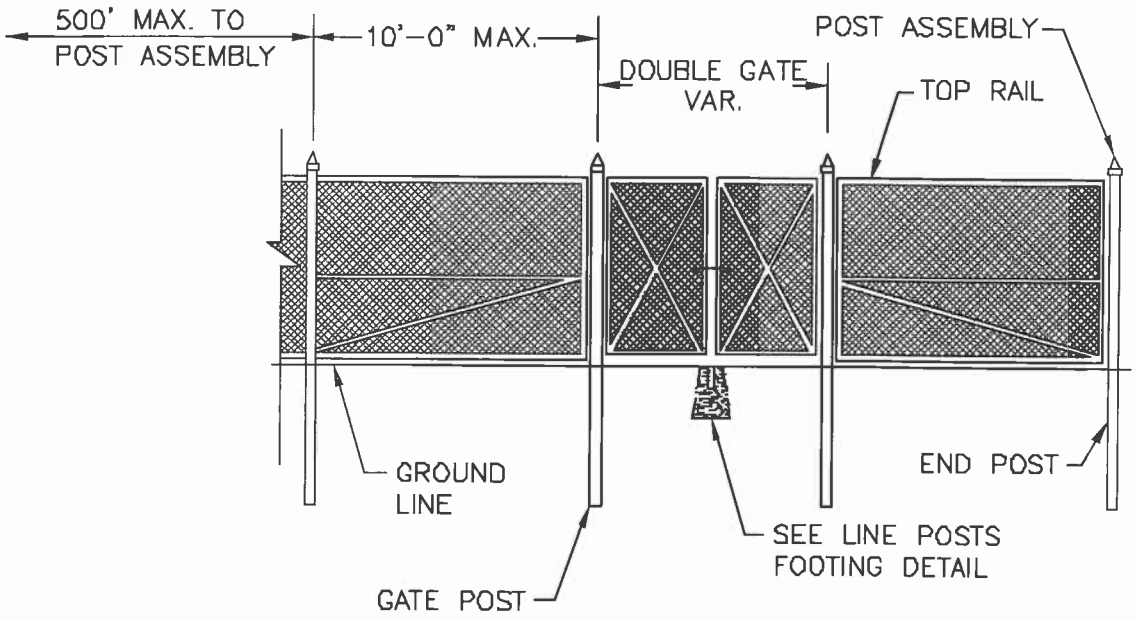
DESIGN IS FOR STEEL OR ALUMINUM FENCING.

CHAIN LINK FENCE

S:\DWG\DETAILS\607-1 CHAIN1.DWG

NOT TO SCALE

FIG. 607-1



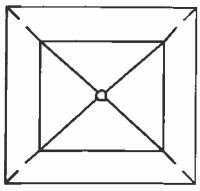
TOP RAILS		
FENCE HEIGHT	TUBULAR HEIGHT	LBS/FT
STEEL		
ALL	1.660" O.D.	2.27
ALUMINUM		
UP TO 12'	1.660" O.D.	0.786

CHAIN LINK FENCE-POST ASSEMBLIES

S:\DWG\DETAILS\607-2 CHAIN2.DWG

NOT TO SCALE

FIG. 607-2

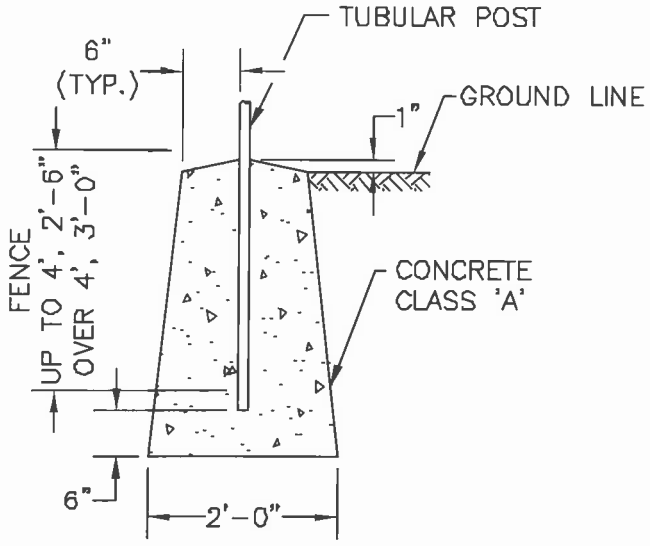


TOP VIEW

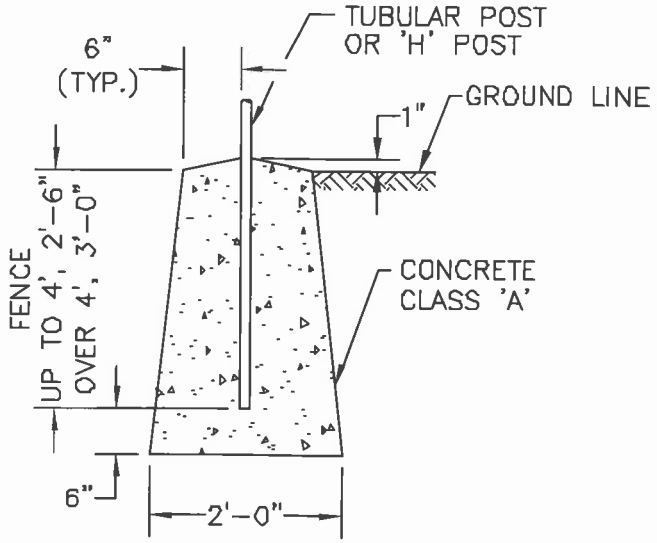
NOTE:

WHERE GROUND CONDITIONS PERMIT, FORMS FOR FOOTING WILL NOT BE REQUIRED.

ALUMINUM POSTS IN CONCRETE SHALL HAVE A PROTECTIVE COATING.
SEE AMENDMENT TO SECTION 607 OF THE STANDARD SPECIFICATIONS.

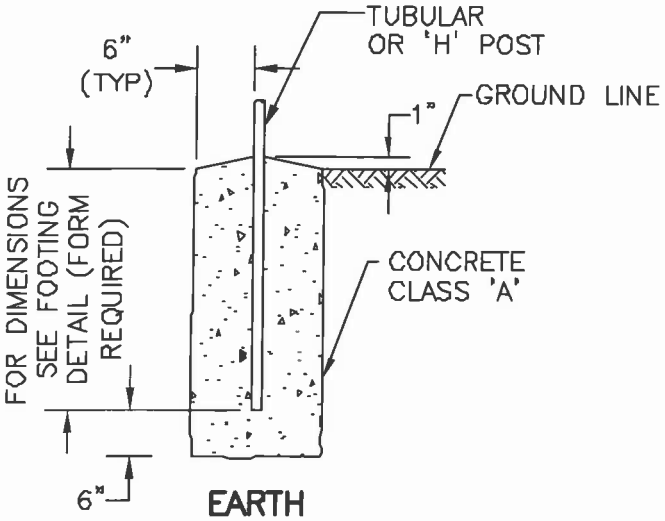


END, CORNER, GATE OR PULL POST

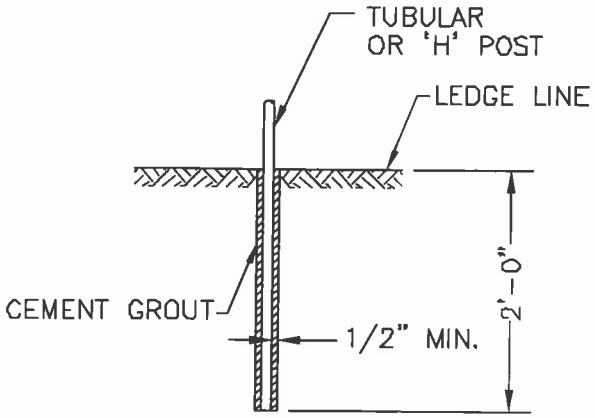


LINE POST

FOOTING DETAIL (WITH FORM)



EARTH



LEDGE

FOOTING DETAIL (WITHOUT FORM)

FOOTING DETAIL FOR CHAIN LINK FENCE

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NOT TO SCALE
FIG. 607-3

END, CORNER, AND PULL POST				
FENCE HEIGHT	TUBULAR			
	ROUND	lb/sf	SQUARE	lb/sf
STEEL				
< 6'	2~6"O.D.	3.65	2" x 2"	3.60
≥ 6'	2~r"O.D.	5.79	2~8"x2~8"	5.70
ALUMINUM				
< 12'	2~r"O.D.	2.00	3" x 3"	1.76

STEEL SWING GATE AND POST TABLE						
TYPE	GATE OPENING		GATE POST (TUBULAR)			
	SINGLE	DOUBLE	ROUND	lb/ft	SQUARE	lb/ft
A	<6'	<12'	2~r"O.D.	5.79	2~8"x2~8"	5.70
B	>6'≤13'	≥12'<26'	4" O.D.	9.11	3" x 3"	7.55
C	>13'≤18	≥26'<36'	6~0"O.D.	18.97	–	–
D	>18'	>36'	8~0"O.D.	28.55	–	–
GATE FRAME		<6"	1.66" O.D.	2.27	1~8"x1~8"	1.90
		≥6'	1.90"O.D.	2.72	2" x 2"	2.72

LINE POSTS				
FENCE HEIGHT	TUBULAR		"H" TYPE	
	ROUND	lb/sf	H	lb/sf
STEEL				
< 6'	1.90"O.D.	2.72	1~r"x1~0"	2.70
≥ 6'	2~6"O.D.	3.65	2~4"x1.95"	4.10
ALUMINUM				
< 12'	2~6"O.D.	1.264	2~4"x1.95"	1.23

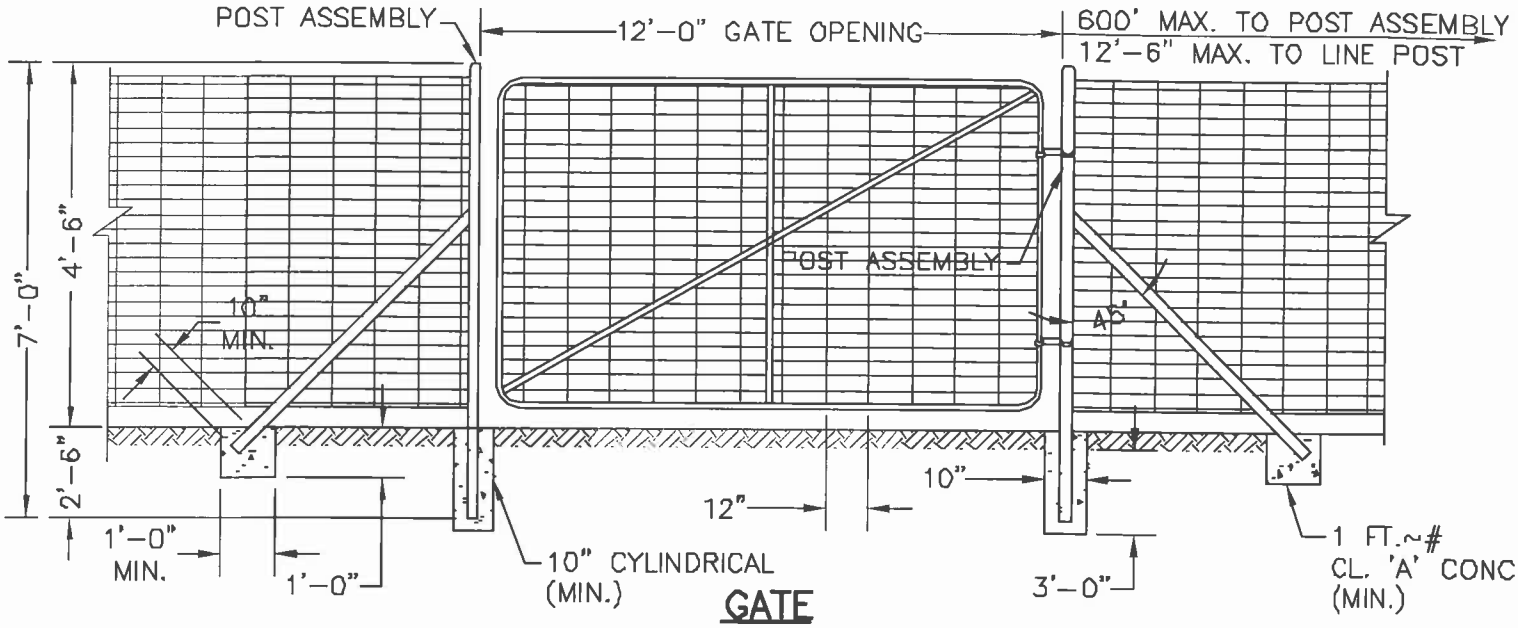
ALUMINUM SWING GATE AND POST TABLE						
TYPE	GATE OPENING		GATE POST (TUBULAR)			
	SINGLE	DOUBLE	ROUND	lb/ft	SQUARE	lb/ft
A	<6'	<12'	2~r"O.D.	2.004	3" x 3"	1.76
B	≥6'<12'	≥12'<24'	4" O.D.	3.151	–	–
C	≥12'<18	≥24'<36'	6~0"O.D.	6.564	–	–
D	≥18'<32	≥36'<44'	8~0"O.D.	9.878	–	–
GATE FRAME (ALL)		<6'	1.90" O.D.	0.940	2" x 2"	1.12

CHAIN LINK FENCE – POST AND BRAKE DIMENSIONS

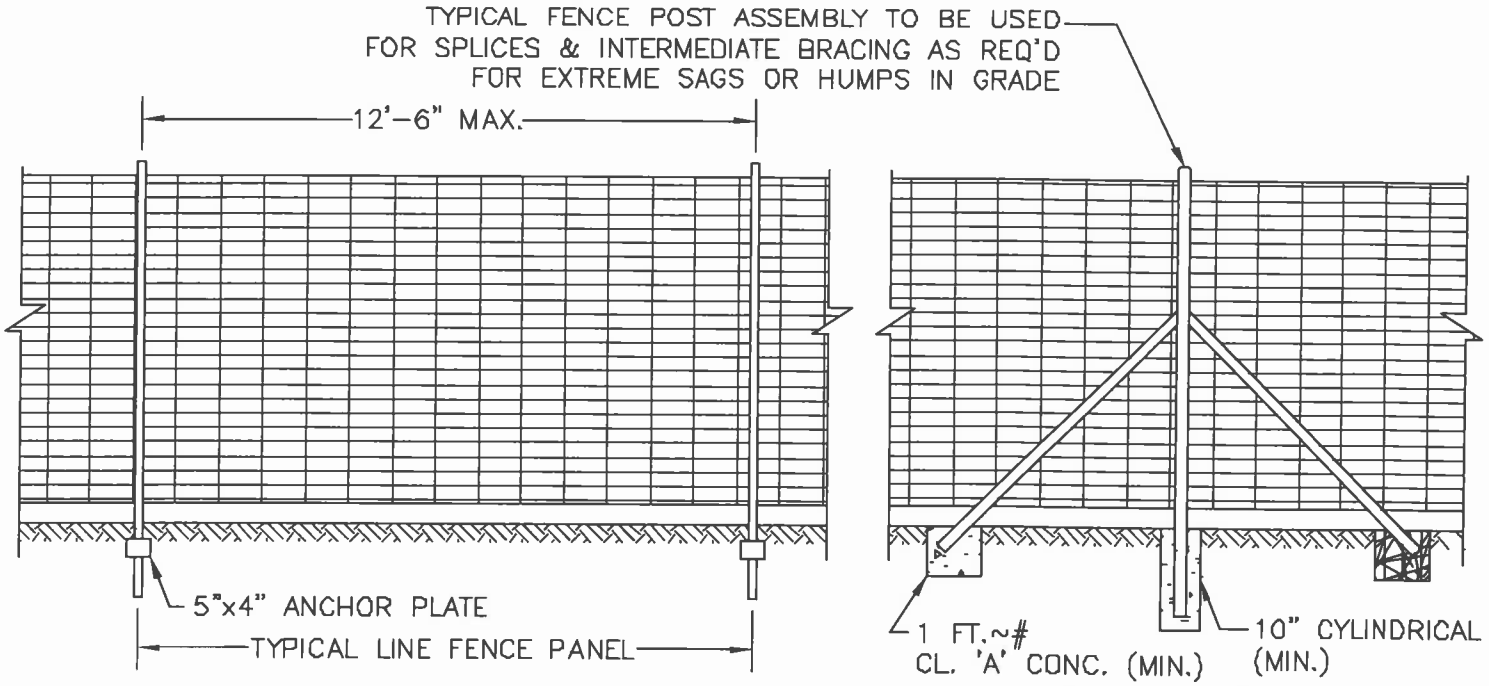
S:\DWG\DETAILS\607-4 CHAIN4.DWG

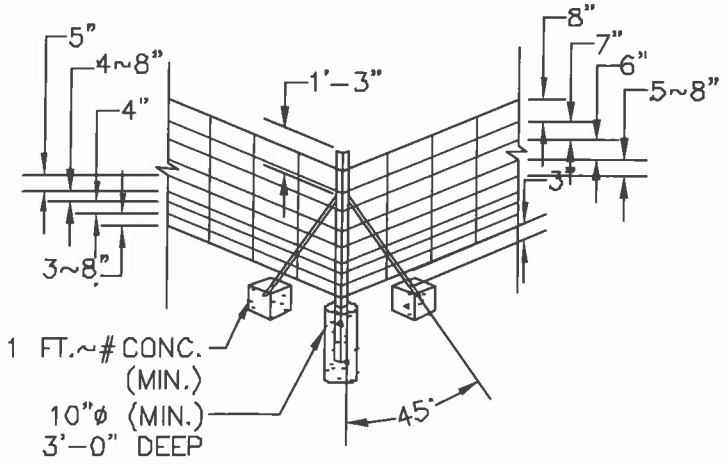
NOT TO SCALE

FIG. 607-4



GATE





ALL END POSTS SHALL HAVE ONE BRACE; ALL CORNER AND INTERMEDIATE BRACE OR PULL POSTS SHALL HAVE TWO BRACES, WITH A MAXIMUM SPACING BETWEEN POST ASSEMBLIES OF 600 FT. INTERMEDIATE OR LINE POSTS SHALL BE STANDARD STUDDED TEE POSTS. MIN. WEIGHT 1.33 lb/lf.

END POSTS, CORNER POSTS, OR PULL POSTS SHALL BE ANGLE POSTS WITH A MIN. SECTION OF 2-1/2"x2-1/2"x1/4" BRACES SHALL BE ANGLE POST WITH A MIN. SECTION OF 2"x2"x3/16".

WHERE GROUND CONDITIONS PERMIT, FORMS FOR FOOTINGS WILL NOT BE REQUIRED.

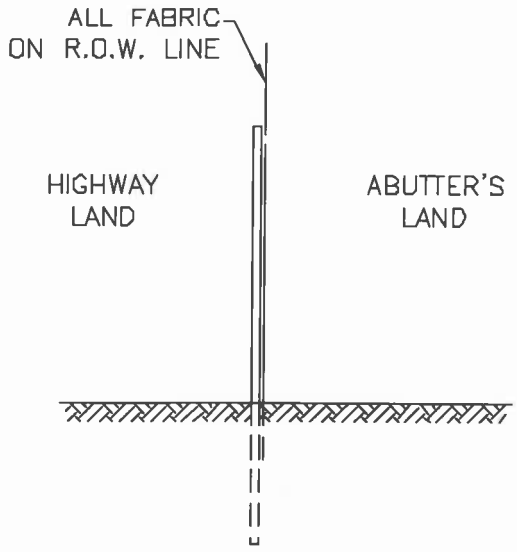
CONCRETE SHALL BE CL. 'A'.

DETAIL OF CORNER BRACE POST ASSEMBLY

WOVEN WIRE FENCE

S:\CMG\DETAILS\607-5 WWFENCE.DWG

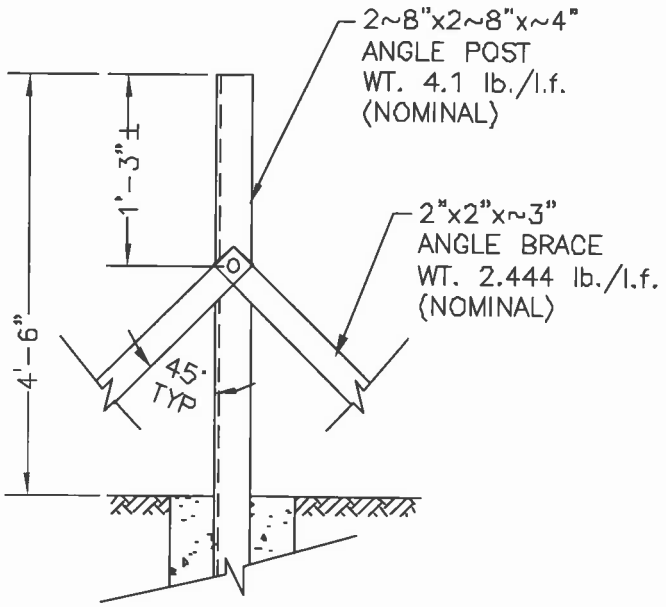
NOT TO SCALE
FIG. 607-5



SECTION VIEW ON R.O.W. LINE

2~8" x 2~8" ANGLE POST

WT. 4.1 lb./l.f. (NOMINAL)



ELEVATION

TYPICAL FENCE POST ASSEMBLY

BRACING DETAILS

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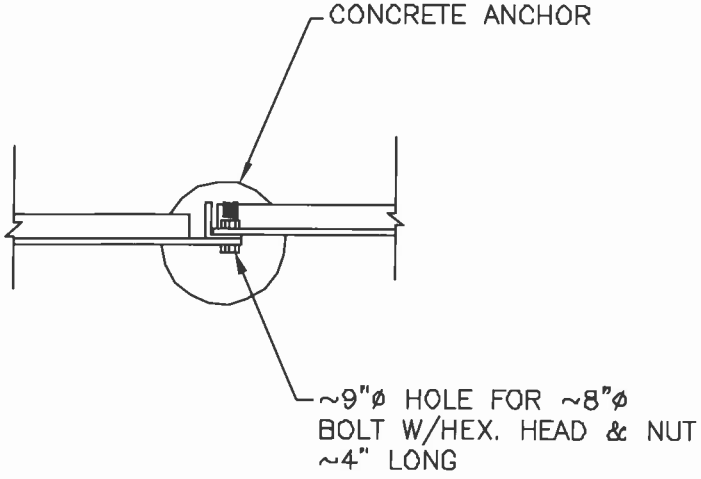
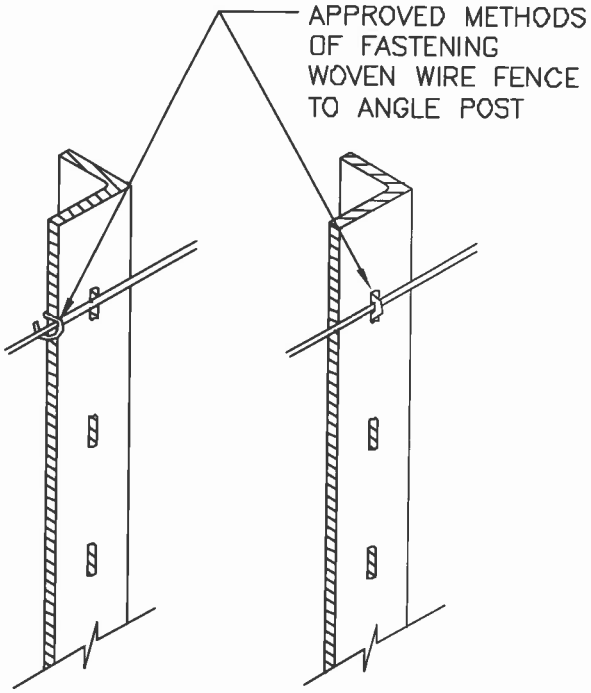
NOT TO SCALE

FIG. 607-6



PLAN



SLOTTED HOLE SELF-FASTENING

WIRE FASTENING DETAILS

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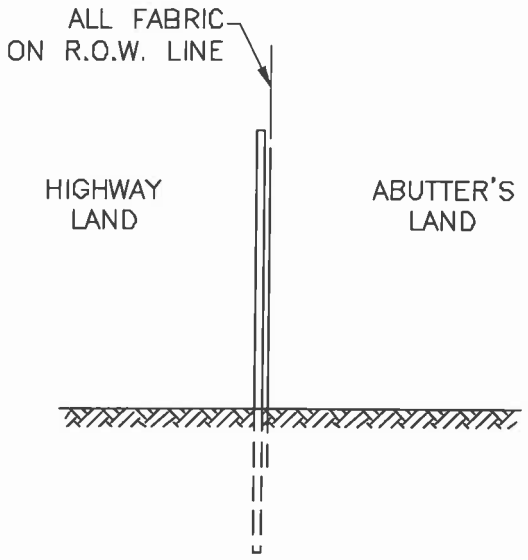
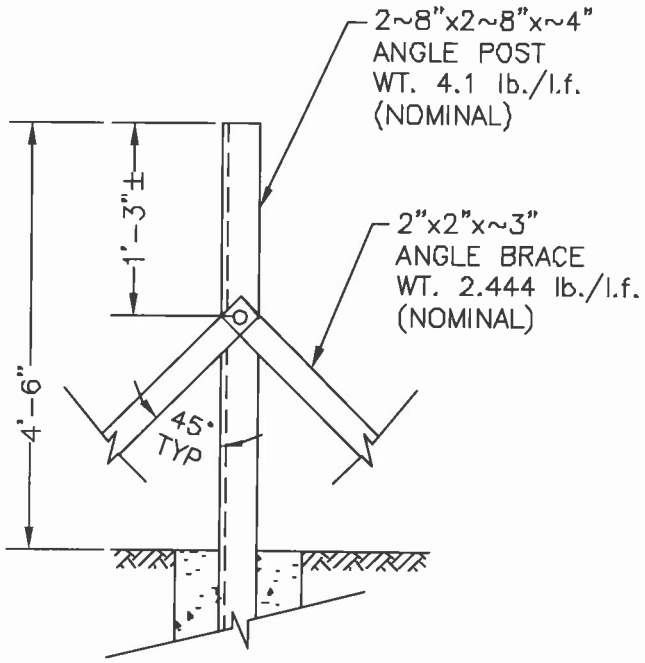
NOT TO SCALE

FIG. 607-7



SECTION VIEW ON R.O.W. LINE



ELEVATION

TYPICAL FENCE POST ASSEMBLY

2~8" x 2~8" ANGLE POST
WT. 4.1 lb./l.f. (NOMINAL)

WOVEN WIRE FENCE DETAILS

S:\DWG\DETAILS\607-8 WWFNCDET.DWG

NOT TO SCALE

FIG. 607-8

SECTION 608 -- SIDEWALKS

Description

1.1 This work shall consist of constructing sidewalks of either bituminous concrete, Portland cement concrete, reinforced when specified or of brick pavers. Portland cement concrete sidewalks shall be coated unless otherwise directed.

Materials

2.1 Base Course Materials shall conform to 304.2.5.

2.2 Portland Cement Concrete shall be Class B conforming to 520.

2.2.1 Coarse Aggregate shall be standard size #67.

2.2.2 Protective Coating shall conform to AASHTO M 233 as specified in 534.

2.3 Steel Mesh shall be in accordance with the Concrete Reinforcing Steel Institute with a minimum spacing of 6 x 6 - W 2.9 x W 2.9.

2.4 Joint Filler shall conform to AASHTO M 153, Type III.

2.5 Bituminous Concrete shall meet the material requirements of 401 except that the composition of mixtures shall conform to the limits of Table 1.

Table 1 - Composition of Mixtures - Master Ranges

Course	Binder	Wearing
Sieve Size	Percentage by Weight Passing	
1/2 inch	95 – 100	--
3/8 inch	90 – 100	98 - 100
No. 4	45 – 75	80 – 100
No. 10	30 - 50	40 - 65
No. 20	17 – 37	25 – 45
No. 80	10 – 30	30 – 33
No. 200	5 - 20	10 - 20
Asphalt Cement Percent of Mixture	5.5 – 7.5	6 - 9

2.6 Granite Pavers

2.6.1 Pavers shall conform to ASTM C 902 – Standard Specification for Pedestrian and Light Traffic Paving Brick.

2.6.2 Granite shall be hard, durable, reasonably uniform in appearance and free from weakening seams. Solid veins of feldspar or quartz will not be cause for rejection.

2.6.3 Granite shall be a gray color typical of New Hampshire sources.

2.6.4 Granite pavers shall be 2-1/4-inch nominal thickness, sawn edges. Top surface shall be thermal finished.

2.6.5 All pavers are subject to inspection prior to delivery and at any time during construction. New and salvaged pavers may be rejected or culled out by the ENGINEER because of failure to meet nominal dimensions or because of breakage, chipping, cracking, structural defects or failure to meet the selected color range or texture.

2.7 Brick Pavers

2.7.1 Brick pavers shall be Hanover Prest Brick Pavers as manufactured by Hanover Architectural Products or approved equal. Each brick paver furnished shall have a red/charcoal blend color and have a lightly exposed aggregate finish. all brick pavers furnished shall conform with the following specifications.

2.7.1.1 Brick pavers furnished for sidewalk and crosswalk construction shall be 4" x 8" x 2 3/8" or 4" x 8" x 3" in dimension with a maximum tolerance of 1/16" in all dimensions and a minimum compressive strength of 8,000 psi and maximum absorption of 5% or less at least 50 cycles of freeze/thaw per Section ASTM C67.

2.7.1.2 Materials used to manufacture brick pavers shall conform to the following

2.7.1.2.1 Cement – ASTM C150 Portland Cement, Type 1;

2.7.1.2.2 Aggregates – ASTM C33 washed, graded sand and natural aggregates, no expanded shale of lightweight aggregates;

2.7.1.2.3 Coloring agent shall be iron oxide natural pigment.

2.7.1.3 All brick pavers furnished shall be sound and free of defects of any kind and shall be of the same dimension, color and texture as the samples submitted.

2.7.1.4 Prior to shipment to the site, the Contractor shall supply the Engineer with a sample of brick pavers intended for use. No brick pavers shall be permitted until submittal has been approved by the Engineer.

2.7.1.5 Pre-molded joint filler shall conform with ASTM D 1752 for preformed sponge rubber and cork expansion joint fillers for concrete paving and structural construction.

2.7.1.6 Elastomeric sealant shall be a self leveling, two component polyurethane product of a color which approximates the color pattern of the adjoining brick pavers.

2.8 Brick for Mortar Setting on Concrete Bases.

2.8.1 Brick shall conform to ASTM C 902, Class SX, Type I, Application PS, sand struck, molded. Brick shall not be laminated.

2.8.2 Brick compressive strength shall be 8000 psi, minimum.

2.8.3 Brick cold water absorption shall be 4%, maximum.

2.8.4 Brick shall be English Red City Hall Paver, by Stiles & Hart Brick Company, Bridgewater, Massachusetts, or approved equal. Provide 4" x 8" x 2-1/4" (nominal) bricks for all new construction and applicable reconstruction and repair areas. Provide 4" x 8" x 1-1/4" bricks for applicable repair areas.

2.7.4.1 Bricks may be supplied with or without a parafin coating (150°F) on the unsanded face. This is a CONTRACTOR option to facilitate removal of excess mortar materials from the finished I face of the brick.

2.8 Brick for Dry Setting on Sand or Bituminous Beds.

2.8.1 Brick shall conform to ASTM C 902, Class SX, Type I, Application PS, extruded, 4" x 8" x 2-1/4" (nominal).

2.8.2 Brick shall be selected to match the color and texture of existing pavers in areas to be reconstructed.

2.9 Mortar

2.9.1 Mortar shall conform to ASTM C 270, Type S, and shall have a minimum 28-day compressive strength of 1800 psi.

2.9.2 Latex mortar admixtures shall be numbers 3701 and 4237 as manufactured by Laticrete International, Bethany, CT, or approved equal.

2.9.3 Color for jointing mortar shall be as manufactured by Laticrete, Davis or Scofield, or approved equal, and shall be as required to match existing sidewalks. Brick accent strips in new sidewalks shall have natural mortar color.

2.10 Isolation Joints

2.10.1 Isolation joint filler shall be polypropylene. Elastomeric sealant shall be self leveling polyurethane, white.

2.11 Tack Coat for Bituminous Setting Bed

2.11.1 Tack coat shall be a 2% neoprene latex modified asphalt, conforming to the following:

Mastic (Asphalt Adhesive)	
Solids (base)	75+/- 1%

Lbs/gal.	8-8.5 lb.
Solvent	Varsol (over 100° F flash)

Base (2% Neoprene, 10% Asbestos-free Fiber, 88% Asphalt

Melting Point – ASTM D-36	200°F min.
Penetration – 77°F 100 gram load 5 second (.1mm)	23-27
Ductility – ASTM D-113-44 @ 25°C 5 cms/per minute	125 cm min.

2.12 Joint Filler Sand

2.12.1 Sand for joint filling shall be a clean, fine sand with not less than 90% passing the #40 sieve and not more than 20% passing the #200 sieve.

2.13 Hot Bituminous Pavement Setting Bed

2.13.1 The hot bituminous pavement setting bed shall conform with Sections 401 and 403 of the City Standard Specifications. Base course shall be Type "B" and top course shall be Type "F".

Construction Requirements

3.1 Bituminous Sidewalks.

3.1.1 Subgrade and Base Course. The subgrade shall be carefully graded and compacted. The base course material shall be spread and rolled to a smooth surface and to the required cross-section.

3.1.2 General. The plant, mixing methods, and hauling shall conform to the provisions of 401. Sidewalks shall be constructed in accordance with Figure 608-1.

3.1.2.1 Binder Course. The compacted binder course shall be 1 inch less in thickness than the total thickness of the sidewalk.

3.1.2.2 Wearing Course. The compacted wearing course shall be 1 inch in thickness.

3.1.3 Placing. The bituminous concrete shall be spread uniformly in two courses as specified above. Each course shall be rolled with a roller weighing between 500 pounds and 2,000 pounds. The finished surface shall be uniform in appearance, free from irregularities, and shall present a smooth surface. The edges shall be trimmed as directed to secure uniform lines.

3.1.4 Backfilling. The sides of the sidewalk shall immediately be backfilled as necessary with suitable material compacted and finished flush with the top.

3.2 Concrete Sidewalks.

3.2.1 Excavation shall be made to the required depth and to a width that will permit the installation and bracing of the forms. The foundation shall be shaped and compacted to a firm, even surface conforming to the section shown on the plans. All soft and yielding material shall be removed and replaced with acceptable material.

3.2.2 Forms shall be of wood or metal and shall extend for the full depth of the concrete. All forms shall be straight, free from warp, and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

3.2.3 The foundation shall be thoroughly moistened immediately prior to the placing of the concrete. The proportioning, mixing, and placing of the concrete shall be in accordance with 520.3.

3.2.4 Steel mesh reinforcement, when required, shall be place as shown on the plans, using the methods described in 544.3.

3.2.5 The concrete sidewalks shall be placed in alternate slabs 30 feet in length except as otherwise ordered.

3.2.6 Finishing.

3.2.6.1 Concrete shall be finished by use of wood, or magnesium floats, by skilled concrete finishers. A fine grained broom finish may be required to provide a non-skid surface.

3.2.6.2 All outside edges and joints shall be edged with an edging tool having a radius of 1/4 inch.

3.2.7 Joints.

3.2.7.1 Expansion joints shall be of the dimensions specified, and shall be filled with preformed expansion joint filler. The sidewalk shall be divided into sections, as directed, by dummy joints formed by a jointing tool or other acceptable means as directed. These dummy joints shall extend into the concrete for at least 1/3 of the depth and shall be approximately 1/8 inch wide.

3.2.7.2 Construction joints shall be formed around all appurtenances such as manholes and utility poles, extending into and through the sidewalk. Preformed expansion joint filler of the thickness indicated shall be installed between concrete sidewalks and any fixed structure such as a building or a bridge. This expansion joint material shall extend for the full depth of the walk.

3.2.7.3 Concrete shall be cured for a minimum of 7 days. Curing compounds will not be permitted. Plastic sheets or other approved materials shall be placed in close contact with the finished concrete as soon as the concrete has set sufficiently to avoid damage from the placement of coverings. The protective covering shall be maintained vapor-proof in close contact with the concrete for the entire 7 day period. All traffic shall be excluded during the curing period. Vehicular traffic shall be excluded for such additional time as ordered.

3.2.9 Protective Coating.

3.2.9.1 The concrete must be at least 14 days old before application of the linseed oil mixture. The concrete shall have at least a 48 hour period without rain just prior to the application, and shall be cleaned to remove all oil, grease and loose particles which would prevent penetration. Immediately before the application, an air blast shall be directed over the concrete so as to remove all dust.

3.2.9.2 The mixture may be sprayed, brushed, squeegeed, or rolled. If a sprayer is used, the nozzle shall be held within 18 inches of the concrete or as directed. Unless otherwise directed, the temperature of the concrete and air shall be at least 40 degrees F at the time of application.

3.2.9.3 Two coats of protective coating shall be applied. The first coat shall be applied to the surface at a rate to obtain maximum penetration possible, taking care to prevent the material from discoloring curbs or other parts of the work. The second coat shall be applied as a seal coat, with special attention given to the lighter appearing areas. The rate of application shall be approximately 0.025 gallons per square yard for the first coat and 0.015 gallons per square yard for the second coat. The second application shall not be made until the concrete has regained its dry appearance, and in any event not until at least 24 hours have passed.

3.2.9.4 The linseed oil mixture is readily flammable and all due precautions shall be observed.

3.3 Brick or Brick Paver Sidewalks

3.3.1 Work includes pavers dry set on sand and bituminous beds and mortar set on concrete bases. All workmen shall be experienced in the installation of brick and granite masonry paving.

3.3.2 Verify that substrate is ready and acceptable to support pavers and traffic loads.

3.3.3 Verify that substrate elevations and slopes are correct.

3.4 Storage of Pavers

3.4.1 Store all pavers on raised platforms in such a manner as to prevent damage or intrusion of foreign matter. Storage piles or stacks shall be located to avoid or be protected from heavy or unnecessary traffic. Materials shall be stored under an approved roof or

covered with waterproof tarpaulins, at all times, except when masons are working and using the materials.

3.5 Bituminous Setting Bed – Reconstruction Areas

3.5.1 Existing pavers shall be removed and stockpiled 2-feet minimum beyond bituminous pavement match line. Saw cut existing bituminous bed. Place new bituminous pavement flush with existing bed.

3.5.2 Install isolation joint filler as directed.

3.5.3 Sweep entire surface of bituminous bed clean of dirt and debris.

3.6 Setting Bricks and Granite Pavers on Bituminous Bed

3.6.1 The Engineer shall approve a mock up section of the work (10' length by full width) of the sidewalk prior to additional work taking place

3.6.2 Where called for, layout granite accent grid pattern true and square with chalk or string lines.

3.6.3 The tack coat shall be applied by squeegeeing or trowelling over the surface of the bituminous concrete setting bed. If trowelled, the trowel shall be serrated with serrations not to exceed 1/16 inch.

3.6.4 Bricks and granite shall be set in tack coat over the compacted bituminous concrete bed. Match existing patterns.

3.6.5 Adjacent bricks and pieces of granite shall be placed "hand tight" with surface gaps of 1/16 inch to 1/4 inch.

3.6.6 Sprinkle sand over surface and sweep into joints. Moisten joints and recover with additional sand until firm joints are achieved. Remove excess sand.

3.6.7 Pre-molded joint filler and elastomeric sealant shall be installed in accordance with the manufactures recommended procedures.

3.7 Installation over Concrete Base

3.7.1 In existing sidewalk areas to be reconstructed, saw cut existing masonry at joint lines to sound masonry. Remove damaged masonry, concrete and debris. Place and compact crushed gravel as needed. Place and cure a 4-inch concrete slab to match existing. Moist cure for 14 days prior to installing brick pavers.

3.7.2 In new sidewalk areas, place and cure the concrete sidewalk to proper lines and grades with any accent block-outs accurately formed. Moist cure for 14 days prior to installing bricks.

3.7.3 After construction and curing of cement concrete base, the base shall be thoroughly cleaned of all dust, dirt and foreign matter prior to application of mortar setting bed.

3.7.4 The concrete base shall be thoroughly saturated with water before laying bricks and the surface of the slab shall be dry prior to application of mortar bed and bricks. The base shall be coated with a bond coat of Laticrete 3701, or approved equal, and neat cement just prior to placing the setting bed.

3.7.5 Bricks shall be laid in a full setting bed of mortar at the proper level, with the unsanded, waxed side up. Mortar shall be mixed with Laticrete 3701, or approved equal, in place of water. Trowel a mixture of one part Portland Cement and one part Silica Sand (or use Laticrete 211 pre-mix) wetted with Laticrete 4237, or approved equal, on the back of each pre-wetted paver and set the paver into the freshly installed setting bed, beating the paver level and true. Leveling of the paver should be done as the setting operation proceeds so that it is not necessary to disturb the pavers set earlier. Mortaring of joints should not proceed until the underbed sets and hardens (24 hours or more). Follow manufacturer's instructions for latex admixtures.

3.7.6 Joints shall be solidly filled to the full depth with mortar which has the colorant added as specified (existing sidewalks only). Joints shall be a nominal 3/8 inch to 1/2 inches wide. Care shall be taken not to smear mortar on adjoining brick, granite curbs, or other surfaces. Jointing mortar shall be mixed with Laticrete 3701, or approved equal, in place of water.

3.7.7 After the initial set of mortar, joints shall be finished by tooling with a one (1) inch diameter non-staining jointer (a hard maple jointer would be preferred) to produce a slightly concave polished joint, free from drying cracks.

3.7.8 After installation, the joints shall be cured for at least five days by covering with curing paper or other approved material.

3.7.9 After the joints have been cured, they shall be cleaned. If waxed, the wax shall be removed with high-pressure steam with equipment having the capacity of 150 gallons per hour, 325° coil temperature, at 120 psi. Care shall be taken not to damage mortar by overheating any area.

3.7.10 If waxed pavers are not used, the CONTRACTOR shall thoroughly clean the brick surface using mechanical means, soap and water. In extreme cases, an acid solution may be used, followed by thorough rinsing with fresh water. No mortar shall remain on the brick surfaces after cleaning operations.

3.7.11 All imperfect or frozen mortar joints shall be raked out to a depth of 3/8 inch and repointed.

3.7.12 No pavers shall be laid in inclement weather or when the temperature is 40°F, and dropping, nor shall any work be done on rising temperatures until the temperature reaches 40°F, and subgrade is free of frost.

3.7.13 Protect pavers from pedestrian and vehicular traffic for 72 hours, minimum, after joints are mortared.

Method of Measurement

4.1 Sidewalks will be measured by the square yard of finished surface, computed to the nearest 0.1 of a square yard.

4.1.1 Areas of curb will not be included in this item.

4.2 Base course material will be measured by the cubic yard based on the product of the area of sidewalk approved for payment and the depth shown on the plans or ordered.

Basis of Payment

5.1 The accepted quantities of sidewalks will be paid for at the contract unit price per square yard of the type and depth specified complete in place.

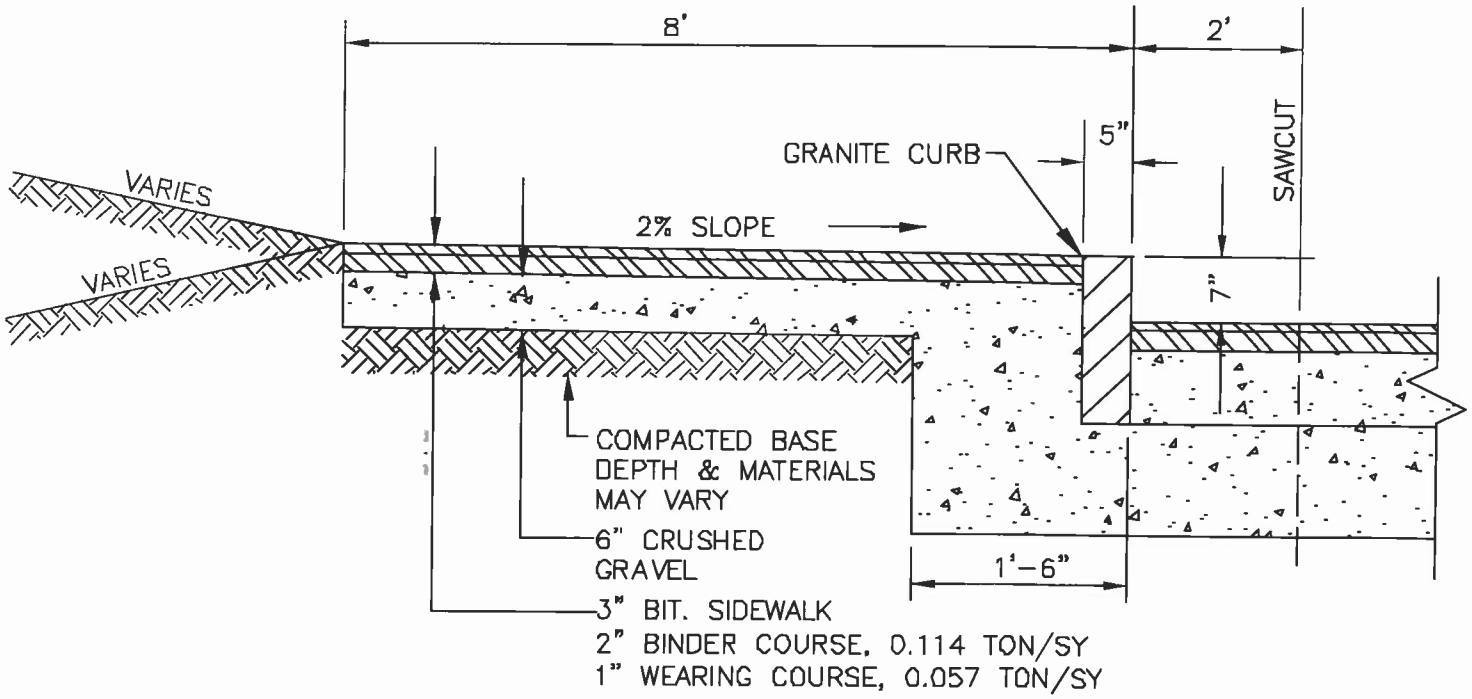
5.2 Base course material will be paid for under 304.

5.3 Necessary excavation will be paid for under 203.

5.4 Protective coating for concrete shall be subsidiary.

Pay items and units:

608.1	__ Inch Bituminous Sidewalk	Square Yard
608.2	__ Inch Concrete Sidewalk	Square Yard
608.3	__ Inch Reinforced Concrete Sidewalk	Square Yard
608.4	Brick Paver Sidewalk on Bituminous Bed	Square Yard



BITUMINOUS SIDEWALK

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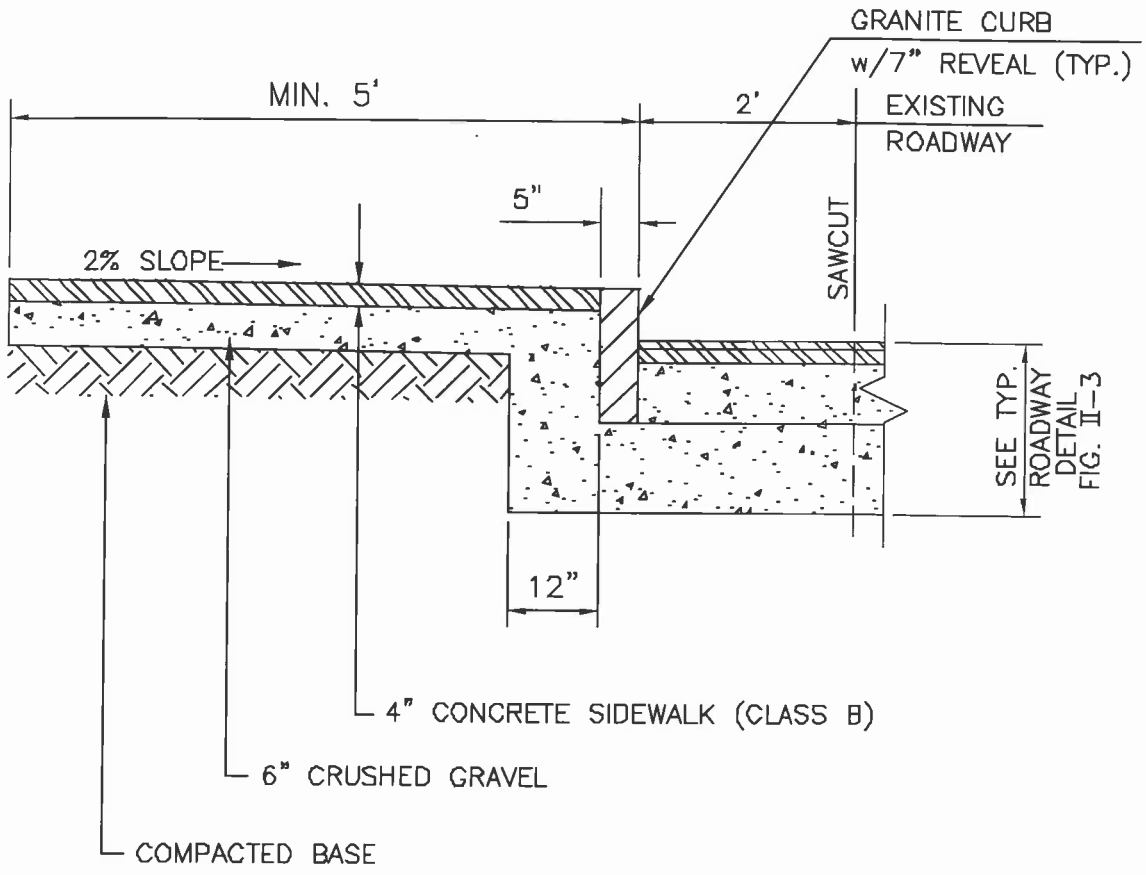
NOT TO SCALE

FIGURE 608-1



CONCRETE SIDEWALK DETAIL

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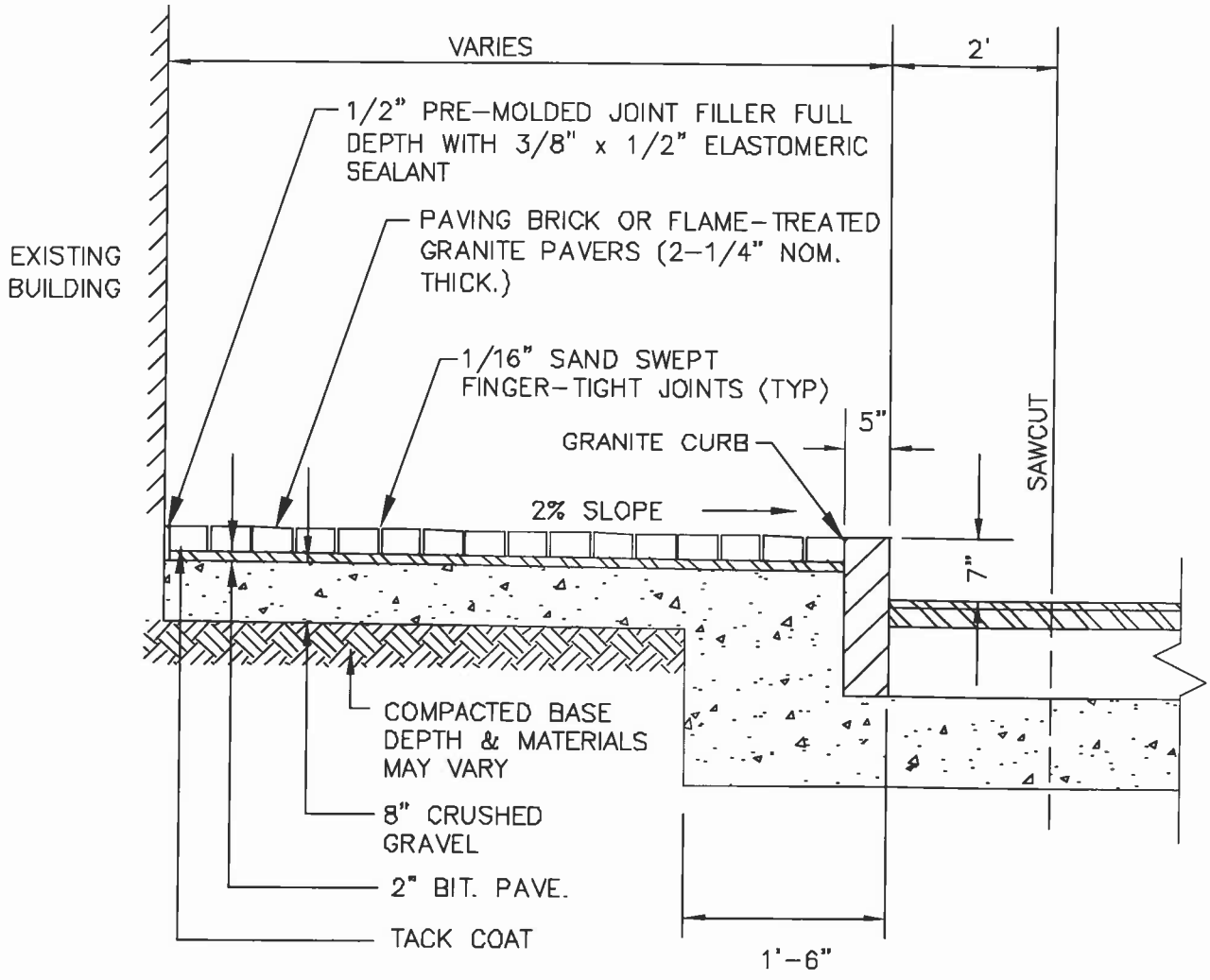
NOT TO SCALE
FIGURE 608-2



NOTE:
VIBRATE PAVERS INTO SCREEDED BITUMINOUS SETTING. MAINTAIN 1/16" JOINTS BETWEEN PAVERS AND SWEEP WITH SAND.

BRICK SIDEWALK

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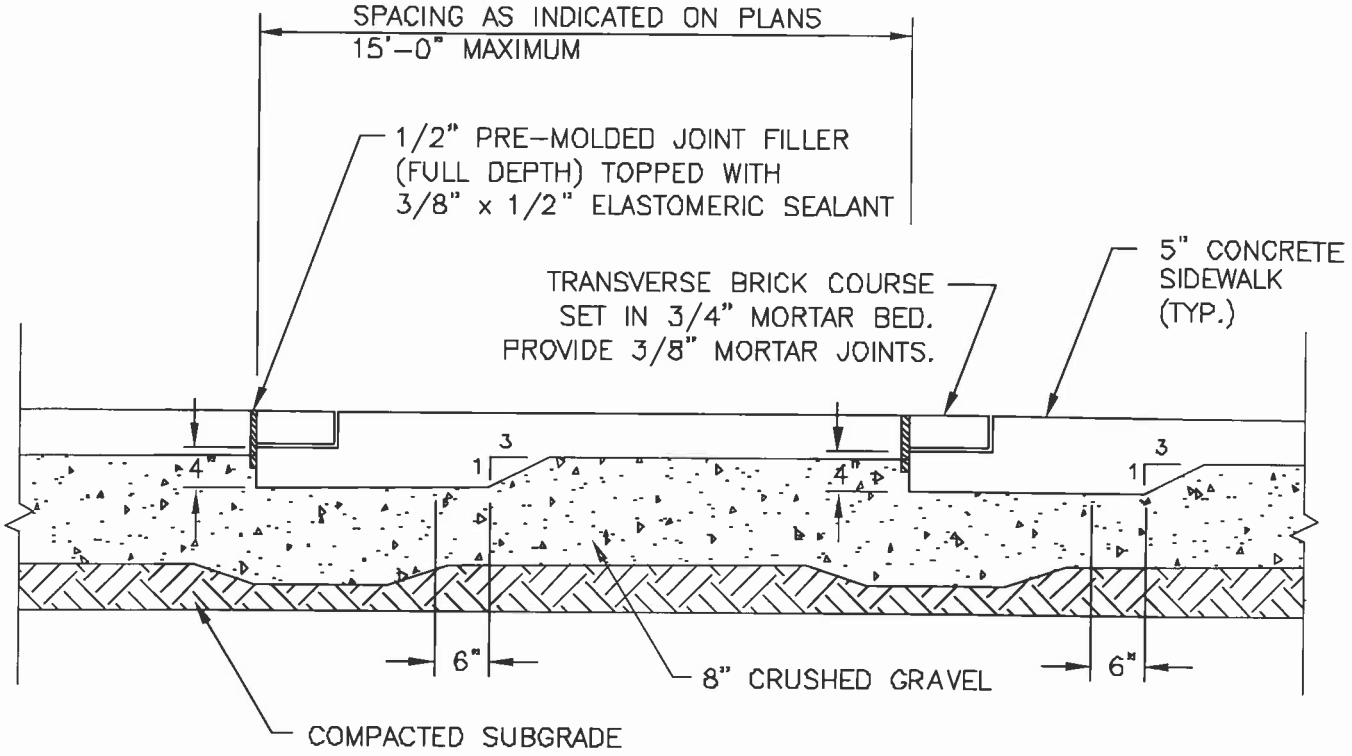
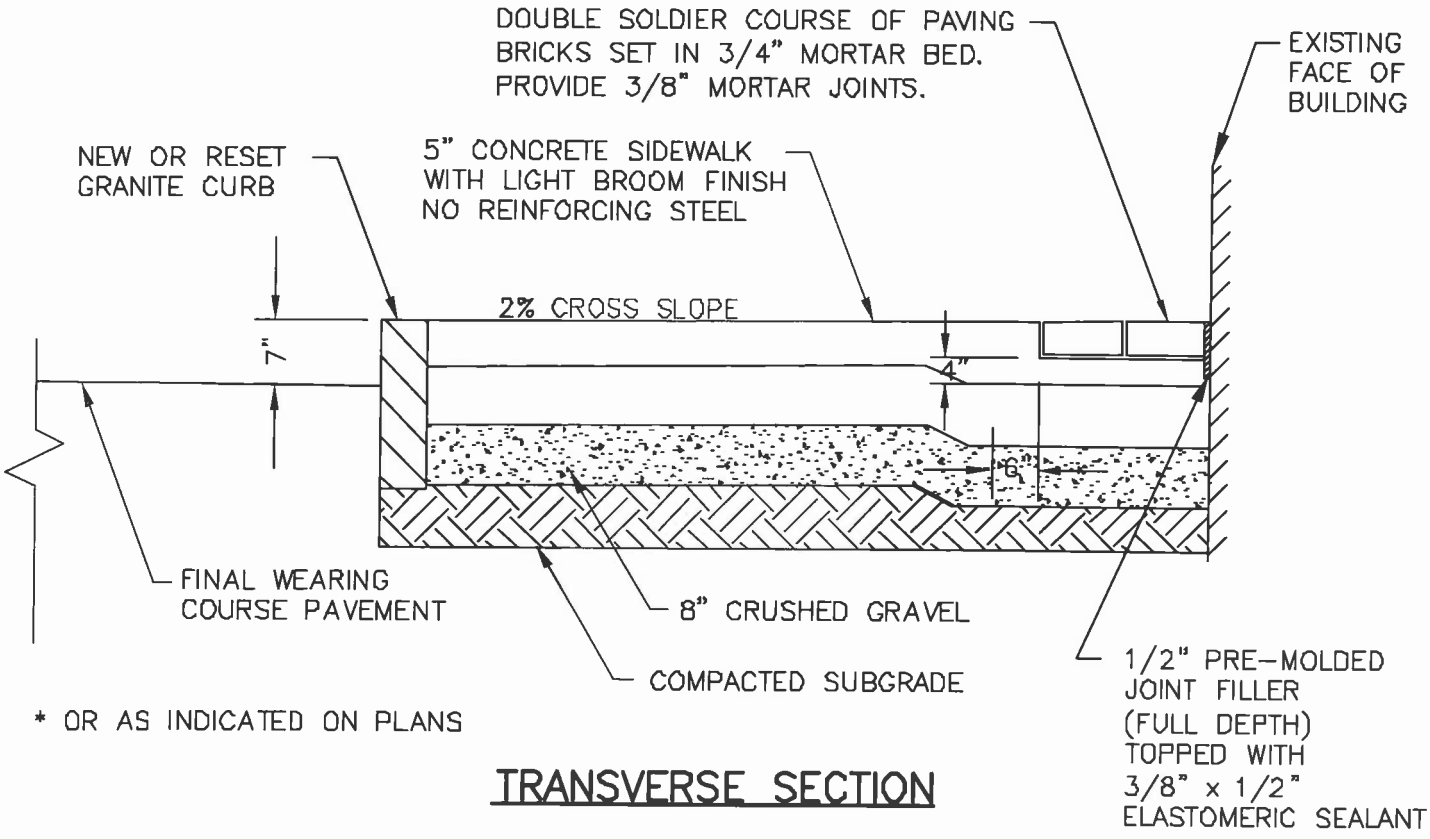
NOT TO SCALE

FIGURE 608-3



LONGITUDINAL SECTION



* OR AS INDICATED ON PLANS

TRANSVERSE SECTION

TYPE 'C' CONCRETE SIDEWALKS (WITH BRICK ACCENTS)

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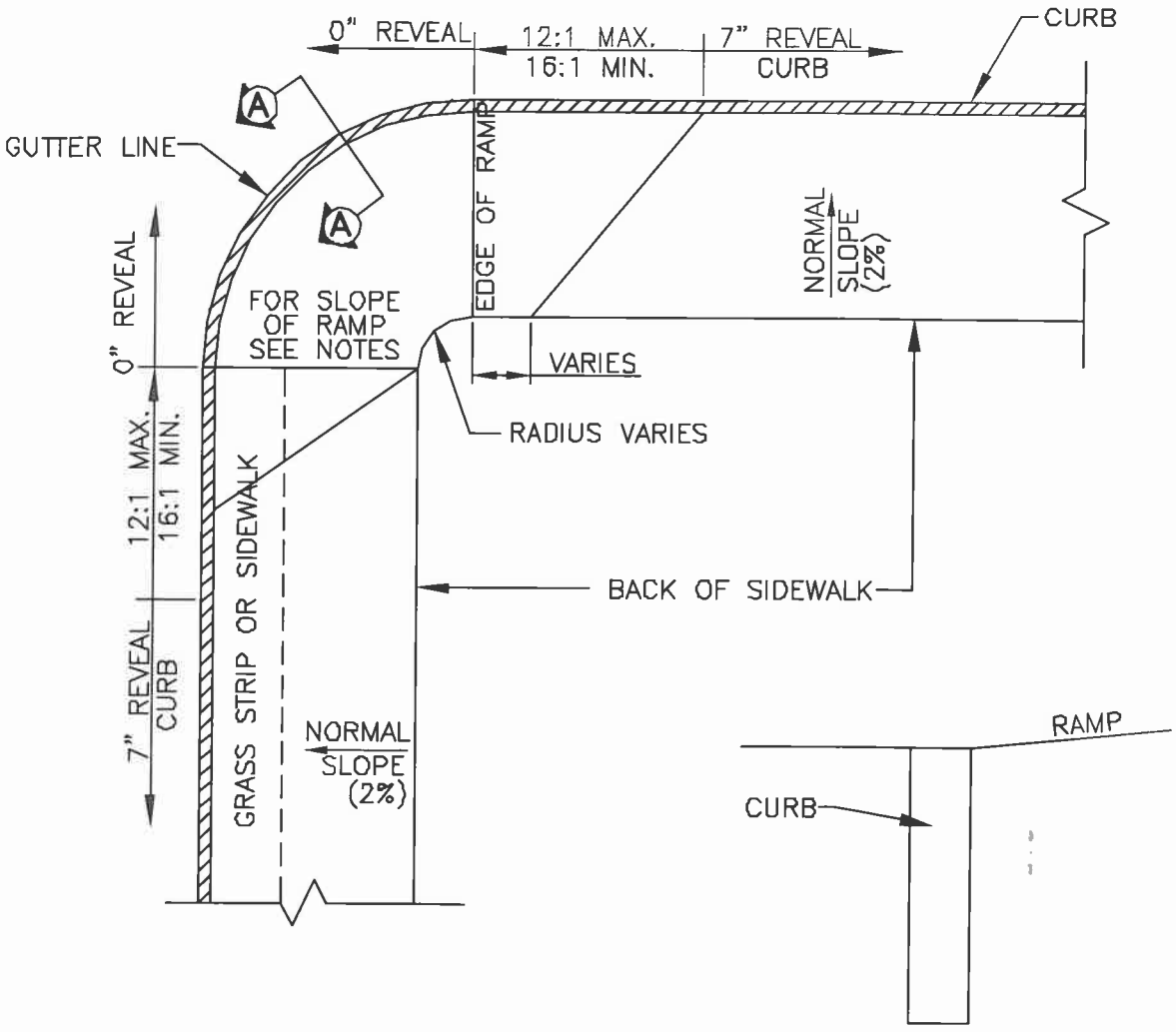
NOT TO SCALE

FIG 608-4



SECTION A–A

1) SLOPE OF RAMP VARIES WITH SIDEWALK WIDTH AND HEIGHT, WITH A MAXIMUM SLOPE OF 12:1 AND MINIMUM SLOPE OF 16:1.
2) A BROOM FINISH TRANSVERSE TO THE SLOPE OF THE RAMP SHALL BE USED ON PORTLAND CEMENT CONCRETE RAMPS.
3) MAINTAIN THE NORMAL GUTTER PROFILE THROUGHOUT THE RAMP AREA.
4) INTERCEPT DRAINAGE ALONG THE CURB IN ADVANCE OF THE RAMP.
5) MAINTAIN 0" OF CURB REVEAL AT THE RAMP. (SEE SECTION A–A)
6) A MINIMUM OF 4 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (IE. HYDRANTS, UTILITY POLES, SIGNS, ETC.)

CORNER SIDEWALK RAMP

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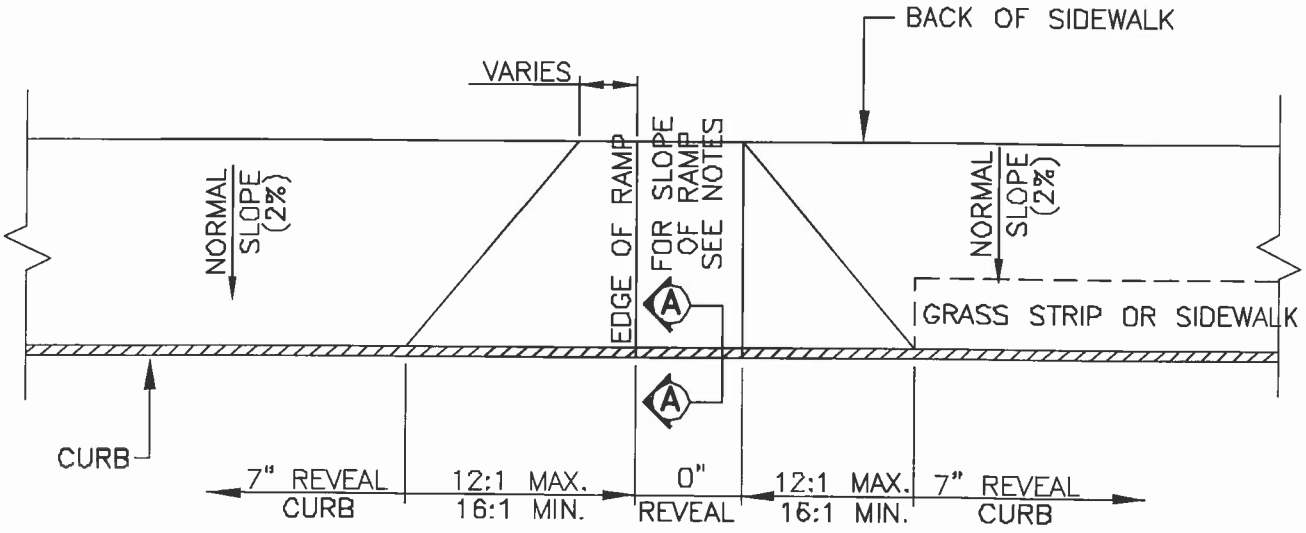
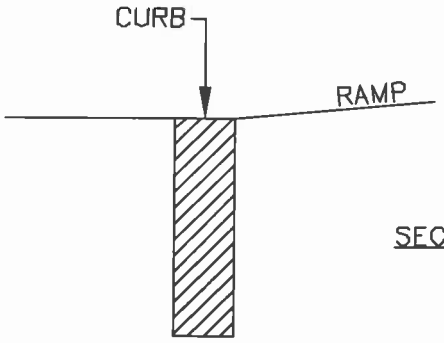
NOT TO SCALE
FIG 608–5



PLAN



SECTION A–A

1) SLOPE OF RAMP VARIES WITH SIDEWALK WIDTH AND HEIGHT, WITH A MAXIMUM SLOPE OF 12:1 AND MINIMUM SLOPE OF 16:1.
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4) INTERCEPT DRAINAGE ALONG THE CURB IN ADVANCE OF THE RAMP.
5) MAINTAIN 0" OF CURB REVEAL AT THE RAMP. (SEE SECTION A–A)
6) A MINIMUM OF 4 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (IE. HYDRANTS, UTILITY POLES, SIGNS, ETC.)

TYPICAL SIDEWALK RAMP

S:\DWG\DETAILS\608-6 SWLK-RMP.DWG

NOT TO SCALE
FIG. 608-6

SECTION 609 -- CURBS

Description

1.1 This work shall consist of constructing or resetting curbing as shown on the plans or as ordered.

Materials

2.1 General. Curb shall be constructed of new granite curbing, salvaged granite curbing, or bituminous concrete, as indicated in the proposal.

2.2 Granite shall be hard, durable, reasonably uniform in appearance, and free from weakening seams; solid quartz or feldspar veins will not be cause for rejection.

2.2.1 Surfaces of each stone shall be finished in accordance with the requirements of Table 609-1. All comparable curbs on the project shall have similar finishes.

2.2.2 When the slope curb item description does not indicate a specific height, the size of the stone shall be that as shown on the standard entitled "Granite Slope Curb". The setting reveal (the vertical height of the exposed face when set) shall be 4 inches or as shown on the plans.

2.3 Salvaged Granite Curbing shall, if necessary, be dressed to obtain joints of the same width as specified for new curb.

TABLE 609-1
FINISHED SURFACES AND TOLERANCES, INCHES
FOR GRANITE CURBING

TYPE	AREA	FINISHED SURFACE	TOLERANCE, INCHES(a)	
STRAIGHT OR CURVED	Top	5 inches wide or as otherwise shown, sawn true plane.	+1/8	-1/8
		Front and back arris lines pitched straight and parallel.	+1/8	-1/8
	Front face	Right angle to top, approximately true plane. No drill holes showing in top 10 inches.	+1	-1/2
Back face:	Exposed	Plane parallel with front face. Straight split to 1-1/2 inches below exposed surface. No larger than 1/4 inch segment of drill holes showing in arris lines.	+1	-1
	Concealed	Below 1-1/2 inches from exposed surface.	+1-1/2	-1-1/2
Bottom:		Approximately parallel to top. Minimum width: 3 inches	See plans.	
Ends:	Exposed portion	Square with planes of top and face.		
Joints:	Exposed Concealed	Optimum width: 1 inch. To break back no more than 4 inches.	+3/4	-3/4
Lengths of stones		3 feet to 10 feet with 50 percent of sections to be 5 feet or greater, or as indicated		

TYPE	AREA	FINISHED SURFACE	TOLERANCE, INCHES(a)	
BRIDGE		Conform to Straight Curb except as specified below.		
	Exposed surfaces	No drill holes showing; none in back face arris lines.		
	Bottom	Width equal to width of top.	+1	-1
Joints:	Exposed	Maximum width: 1/2 inch	+1/4	
	Concealed	To break back no more than 1 inch.		
Surface		**To conform to that of Curb A or to other curb to which it is adjacent.**		
Inlet		**Opening shall be bush hammered or flame finished, to a reasonably smooth finish.**		
SLOPE	Arris lines	Straight and true on top, front and ends. Drill holes not deeper than ¼ inch allowed in arris lines.	+1/4	-1/4
	Faces:			
	Exposed part	Planes; no drill holes in faces longer than 8 inches or deeper than 1/4 inch.	+1	-1
	Concealed part	Drill holes not objectionable.		
	Ends	Square with face except as indicated.		
	Joints	On tangent, maximum width: 1 inch. On curves over 15 foot radius, widen top or bottom from 1 inch as necessary. On curves with 15 foot radius and under, use radial joints or curved curb as indicated.	+1/2	-1/2
	Length of stones	Min. and max. specified lengths.	See plans.	

(a) + Projection in stone; -Depression in stone

2.4 Bituminous Concrete shall meet the requirements of 401 except that the composition of the mixture shall conform to the limits of Table 609-2. The mixture shall extrude properly with a uniform, smooth appearance.

TABLE 609-2
REQUIRED GRADING FOR BITUMINOUS CONCRETE CURB

SIEVE SIZE	PERCENTAGE BY WEIGHT PASSING
3/4 inch	100
1/2 inch	86 - 100
3/8 inch	75 - 100
No. 4	60 - 80
No. 10	40 - 60
No. 40	18 - 35
No. 200	3 - 10
Asphalt Cement, percent of Mix:	7.0 - 9.0

2.4.1 Polyester fibers, as approved by the Engineer, shall be uniformly incorporated in the dry mix in the proportion of approximately 1/4 percent of the total batch weight.

2.4.2 Acrylic emulsion curb paint shall conform to 708-NH 4.31.

2.4.3 Beads for reflectorization shall conform to 708-NH 4.13.

2.5 Cement Mortar shall conform to 707 except that cement mortar for bedding curb (bridge) shall be an approved mortar consisting of sand, cement, and additives necessary to produce a non-shrinking, non-ferrous grout when mixed with water at the rate recommended by the manufacturer. When the bedding is more that 3/4 inch in height, a 3/8 inch washed stone may be mixed into the mortar at the maximum of 1 part stone to 4 parts dry mortar.

2.6 Curb Anchors shall be steel of shapes and dimensions on the plans.

Construction Requirements

3.1 Granite Curb, New and Reset.

3.1.1 Excavation for curb shall be made to the required depth, and the base upon which the curb is to be set shall be compacted to a firm, even surface.

3.1.2 Installation of curbing shall be so that the front top arris line conforms to the line and grade required. All spaces under the curbing shall be filled with material

conforming to the requirements for roadway base course. This material shall be thoroughly tamped.

3.1.3 Joints shall be of the width indicated in Table 609-1. They shall be pointed with mortar and the exposed portions finished with a jointer.

3.1.4 Curbing to be salvaged and reset shall be carefully removed and stored. The Contractor shall replace any curbing damaged or lost because of his negligence. All exposed portions of reset curbing shall be cleaned by sand blasting.

3.1.5 Backfilling shall be accomplished immediately after the curb is set and jointed. Backfill shall be approved material, placed and thoroughly tamped.

3.1.6 Bridge curb shall be set on a mortar bed of non- shrink mortar. The front face shall be plumb and the top shall conform to the required line and grade. All joints shall be grouted and the exposed portions finished with a jointer. Long and short lengths of curb shall be laid alternately unless otherwise ordered.

3.1.6.1 Curb anchors shall be set and grouted as shown on the plans.

3.1.7 Granite curb inlets shall be set in full mortar beds and shall conform to the required line and grade.

3.2 Bituminous Concrete Curb.

3.2.1 Prior to placing the curbing, the surface of the pavement shall be cleaned as directed and painted with a tack coat of bituminous material when ordered.

3.2.2 The curbing shall be placed by means of an approved extruding curb paver. The curbing shall be compacted to a minimum density of 90 percent of a laboratory compacted sample of the same mix. A tight bond shall be obtained between the prepared course and the curb and between the necessary curb joints.

3.2.3 Unless unpainted curb is specified, after a curing period which shall be as long as project conditions permit, but not less than 7 days, exposed surfaces of curbing shall be sprayed with 2 coats of acrylic emulsion curb paint. Primer and finish coats shall be applied at a rate to obtain a wet thickness of 16 mils each application. The finish coat is intended to serve as the vehicle for holding the beads for reflectorization.

3.2.4 The beads for reflectorization shall be applied by the drop-on method at the time of application of the second coat of paint, evenly and uniformly, at the rate to obtain
the adhesion of the maximum number of beads possible. Dead spots, found upon testing after dark, when ordered, shall be repainted and additional beads applied.

Method of Measurement

4.1 Curb will be measured by the linear foot to the nearest 0.1 of a foot from end to end along the lower edge of the exposed face of the curbing. Only curbing actually cut to a radius will be considered as

curved curb. Slope curb shown or ordered to be cut on radial joints, (not square with face) will be measured separately.

4.2 Granite curb inlets will be measured by the number of units installed.

Basis of Payment

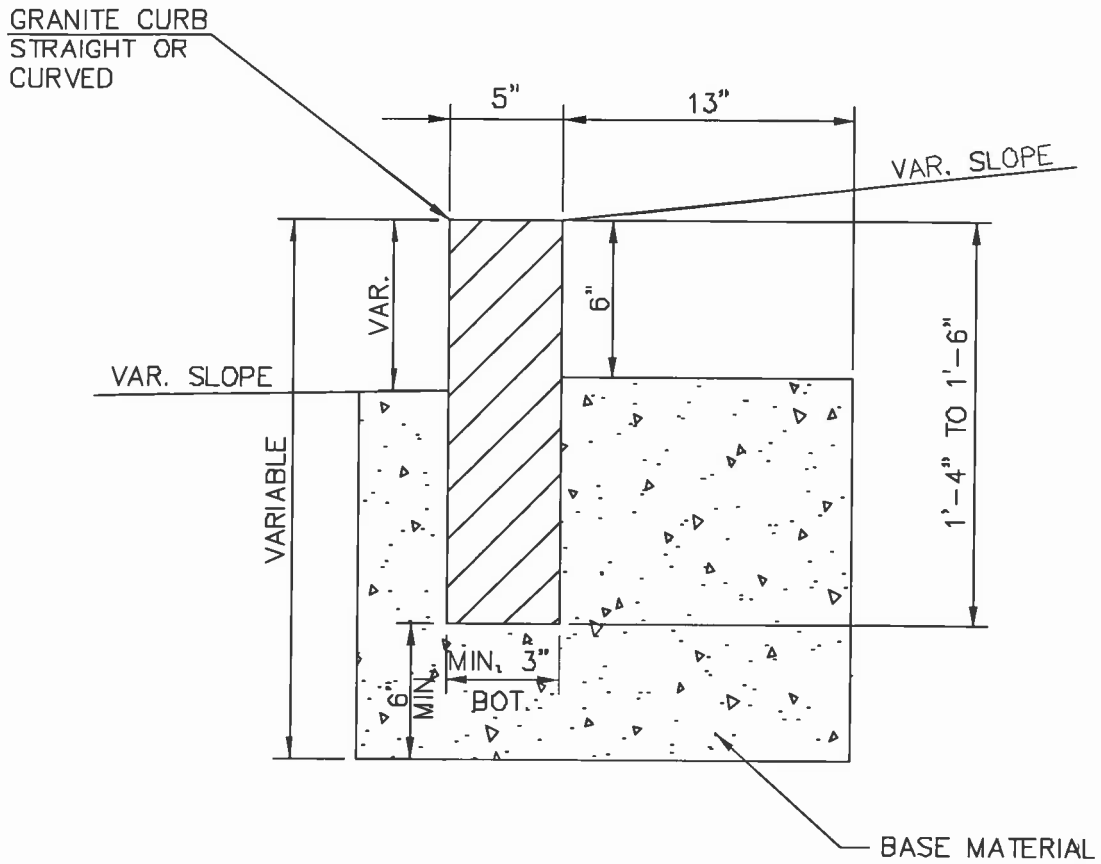
5.1 The accepted quantities of curb will be paid for at the contract unit price per linear foot for each type of curbing specified complete in place, except that all special cutting ordered due to changes in the plans will be paid for as Extra Work.

5.2 The accepted quantities of granite curb inlets will be paid for at the contract unit price per each complete in place.

5.3 Roadway base course material adjacent to the curb will be paid for under the appropriate items and no deduction will be made for the volume occupied by the curb. In the process of setting the curb, excavation and backfill of the material that has been placed by the Contractor will be considered as incidental to the item.

Pay items and units:

609.01	Straight Granite Curb	L.F.
609.02	Curved Granite Curb	L.F.
609.21	Straight Granite Slope Curb	L.F.
609.22	Straight Granite Slope Curb with Radial Joints	L.F.
609.23	Curved Granite Slope Curb	L.F.
609.41	Granite Curb Inlets A	Each
609.42	Granite Curb Inlets B	Each
609.5	Reset Granite Curb	L.F.
609.8	Bituminous Concrete Curb	L.F.
609.81	Bituminous Concrete Curb, Unpainted	L.F.



SECTION

RADIUS	MAX. LENGTH
21'	3'
22'-28'	4'
29'-35'	5'
36'-42'	6'
43'-49'	7'
50'-56'	8'
57'-60'	9'
OVER 60'	10'

NOTE:

MINIMUM LENGTH OF CURB STONES – 3'

MAXIMUM LENGTH OF CURB STONES – 10'

MAXIMUM LENGTH OF STRAIGHT CURB STONES LAID ON CURVES – SEE CHART.

ADJOINING STONES SHALL HAVE THE SAME OR APPROXIMATELY THE SAME LENGTH.

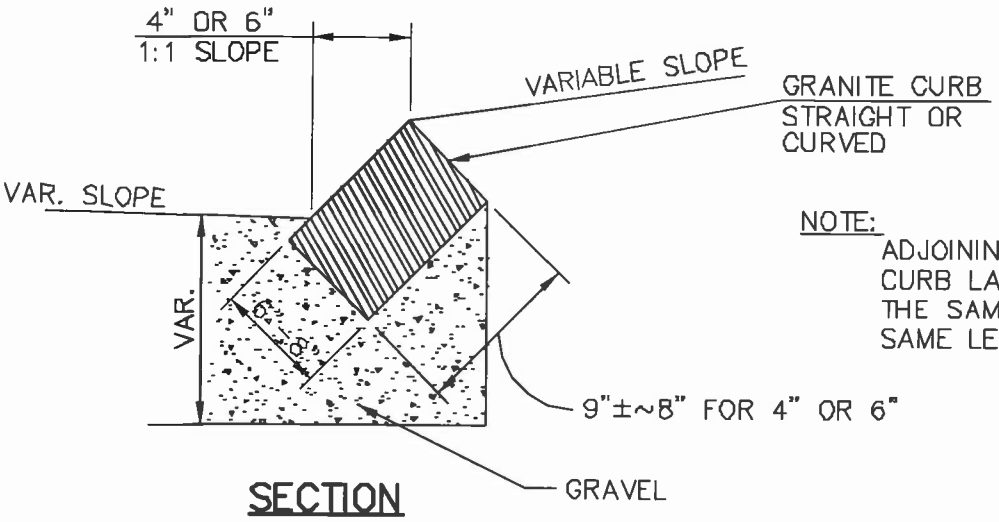
CURB ENDS TO BE TIPPED DOWN.

GRANITE CURB

S:\DWG\DETAILS\609-1 CURB-G.DWG

NOT TO SCALE

FIG. 609-1



NOTE:
ADJOINING STONES OF STRAIGHT CURB LAID ON CURVES SHALL HAVE THE SAME OR APPROXIMATELY THE SAME LENGTH.

SECTION

MINIMUM LENGTH OF STRAIGHT CURB STONES – 18"

MAXIMUM LENGTH OF STRAIGHT CURB STONES – 8'

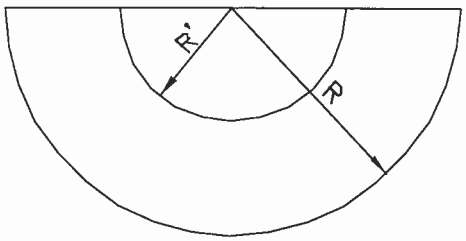
MAXIMUM LENGTH OF STRAIGHT CURB STONES LAID ON CURVES – SEE CHART

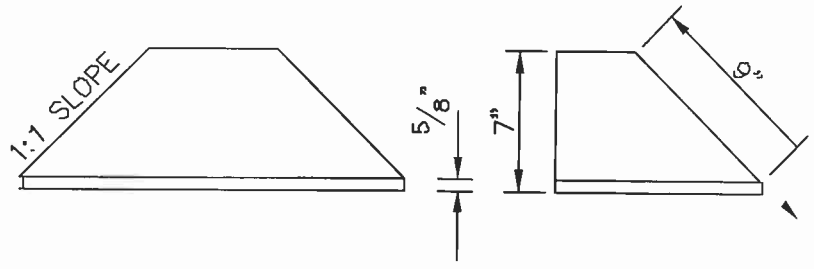
RADIUS FOR STONES WITH SQUARE JOINTS	MAX. LENGTH
16'–28'	1'–6"
29'–41'	2'
42'–55'	3'
56'–68'	4'
69'–82'	5'
83'–96'	6'
97'–110'	7'
OVER 110'	8'

FOR 1' OR 1.5' RADIUS = R

R' = 5~0" FOR 1' R

R' = 11~0" FOR 1.5' R





USE WITH SLOPE CURB

GRANITE SLOPE CURB DETAILS

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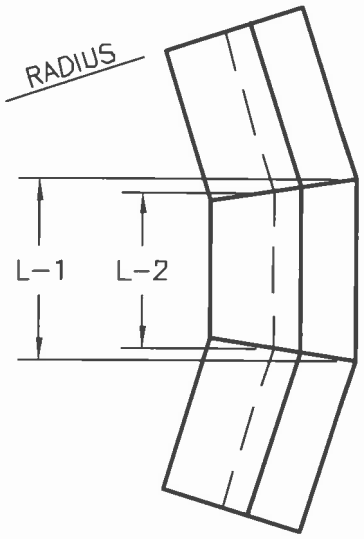
NOT TO SCALE

FIG. 609–2



DETAIL FOR CUTTING STRAIGHT GRANITE SLOPE CURB WITH RADIAL JOINTS. (FOR USE WITH 2' TO 15' RADII)

L-1	RADIUS											
	2'	2.5'	3'	3.5'	4'	5'	6'	8'	10'	12'	14'	15'
	L-2											
9"	6.50"											
12"	8.75"	9.50"										
13"	9.50"	10.25"										
14"	10.25"	11.00"	11.50"									
15"	11.00"	11.75"	12.25"									
16"	11.75"	12.50"	13.25"	13.50"								
17"	12.50"	13.50"	14.00"	14.50"	14.75"	15.25"	15.50"	16.00"	16.00"	16.25"	16.25"	16.25"
18"	13.25"	14.25"	14.75"	15.25"	15.50"	16.00"	16.50"	16.75"	17.00"	17.25"	17.25"	17.25"
19"	14.00"	15.00"	15.75"	16.00"	16.50"	17.00"	17.25"	17.75"	18.00"	18.25"	18.25"	18.25"
20"	14.75"	15.75"	16.50"	17.00"	17.25"	18.00"	18.25"	18.75"	19.00"	19.00"	19.25	19.25"
							19.25"	19.50"	20.00"	20.00"	20.25"	20.25"
							20.00"	20.50"	20.75"	21.00"	21.25"	21.25"
							21.00"	21.50"	21.75"	22.00"	22.25"	22.25"
							22.00"	22.50"	22.75"	23.00"	23.00"	23.00"
											24.00"	24.00"
											25.00"	25.00"
											26.00"	26.00"
											27.00"	27.00"
											28.00"	28.00"
											28.75"	29.00"
											29.75"	29.75"
											30.75"	30.75"

CUTTING STRAIGHT GRANITE SLOPE CURB WITH RADIAL JOINTS

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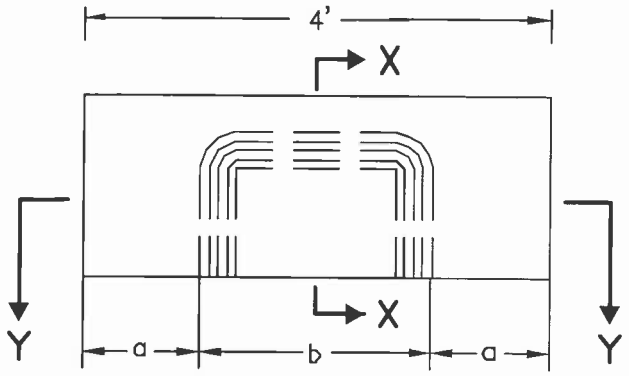
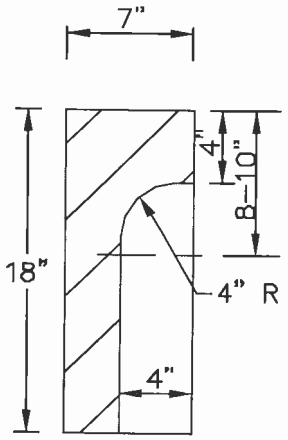
NOT TO SCALE

FIG. 609-3

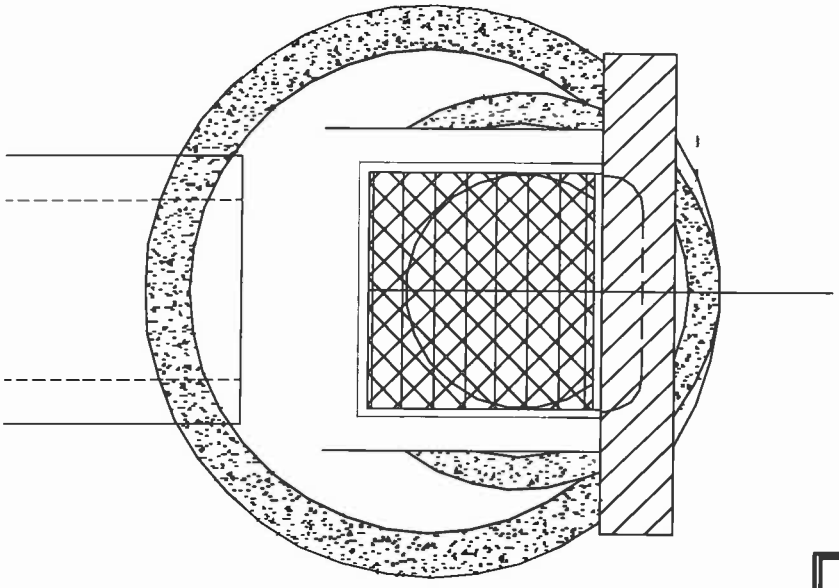


ELEVATION

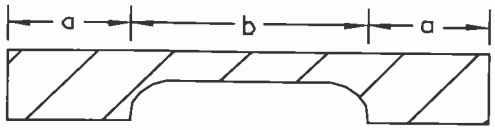
TO BE USED WITH C.B.'S AND D.I.'S
AS CALLED FOR ON THE PLANS.



SECTION X-X



PLAN



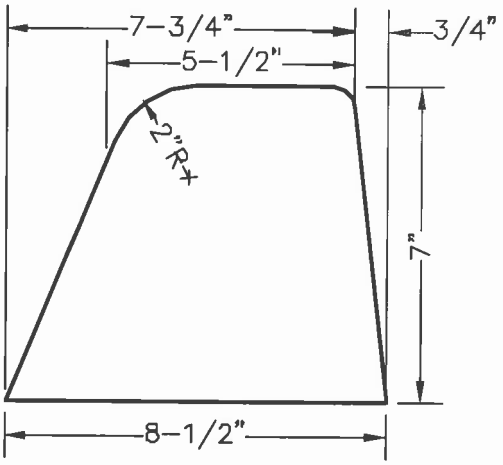
SECTION Y-Y

TYPE INLET	a	b
A	12"	24"
B	13.25"	21.5"

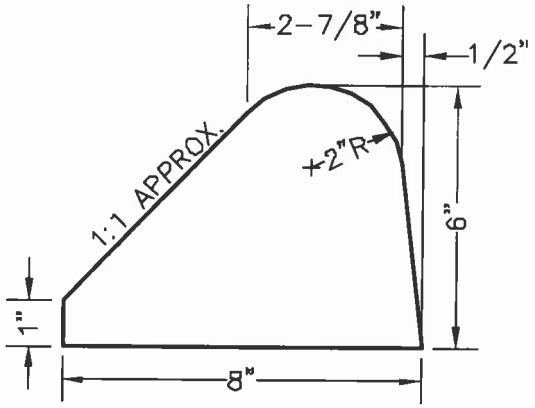
GRANITE CURB INLETS

5:\DWG\DETAILS\608-4 GC-INLET.DWG

NOT TO SCALE
FIG. 609-4



TYPE A



TYPE B

BITUMINOUS CONCRETE CURB

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NOT TO SCALE

FIG. 609-5

SECTION 610 -- DRIVEWAYS

Description

1.1 This work shall consist of constructing driveways of either bituminous concrete or Portland Cement Concrete, reinforced when specified.

Materials

2.1 Base course materials shall conform to 304.2.1.2.

2.2 Portland Cement Concrete shall be Class A conforming to 520.

2.2.1 Coarse aggregate shall be standard size #67.

2.3 Steel mesh shall be in accordance with the Concrete Reinforcing Steel Institute with a minimum spacing of 6x6- W2.9 x W2.9.

2.4 Joint filler shall conform to AASHTO M 153, Type III.

2.5 Bituminous concrete shall meet the material requirements of 401.

Construction Requirements

3.1 Bituminous Driveways

3.1.1 Subgrade and Base Course. The subgrade shall be carefully graded and compacted. The base course material shall be spread and rolled to a smooth surface and to the required cross-section.

3.1.2 General. The plant, mixing methods and hauling shall conform to the provisions of 401.

3.1.2.1 Binder Course. The compacted binder course shall be 1 inch less in thickness than the total thickness of the driveway.

3.1.2.2 Wearing Course. The compacted wearing course shall be 1 inch in thickness.

3.1.3 Placing. The bituminous concrete shall be spread uniformly in two courses as specified above. Each course shall be rolled with a roller weighing between 500 pounds and 2,000 pounds. The finished surface shall be uniform in appearance, free from irregularities and shall present a smooth surface. The edges shall be trimmed as directed to secure uniform lines.

3.1.4 Backfilling. The sides of the driveway shall immediately be backfilled as necessary with suitable material compacted and finished flush with the top of the driveway.

3.2 Concrete Driveways.

3.2.1 Excavation shall be made to the required depth and to a width that will permit the installation and bracing of forms. The foundation shall be shaped and compacted to a firm, even surface conforming to the section shown on the plans or as ordered. All soft and yielding material shall be removed and replaced with acceptable material.

3.2.2 Forms shall be of wood or metal and shall extend for the full depth of the concrete. All forms shall be straight, free from warp and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

3.2.3 The foundation shall be thoroughly moistened immediately prior to the placing of the concrete. The proportioning, mixing and placing of the concrete shall be in accordance with 520.3.

3.2.4 Steel mesh reinforcement when required, shall be placed as shown on the plans, using the methods described in 544.3.

3.2.5 The concrete driveways shall be placed in alternate slabs 30 feet in length except as otherwise ordered.

3.2.6 Finishing.

3.2.6.1 Concrete shall be finished by use of wood, carpet, canvas or cork floats by skilled concrete finishers leaving a fine-grained, non-skid texture.

3.2.7 Joints.

3.2.7.1 Expansion joints shall be of the dimensions specified and shall be filled with preformed expansion joint filler. The driveway shall be divided into sections, as directed, by dummy joints formed by a jointing tool or other acceptable means as directed. These dummy joints shall extend into the concrete for at least 1/3 of the depth and shall be approximately 1/8 inch wide.

3.2.7.2 Construction joints shall be formed around all appurtenances such as manholes and utility poles, extending into and through the driveways and any fixed structure such as a building foundation. This expansion joint material shall extend for the full depth of the driveway.

3.2.8 Concrete shall be cured for a minimum of 7 days. Curing compounds will not be permitted. Plastic sheets or other approved materials shall be placed in close contact with the finished concrete as soon as the concrete has set sufficiently to avoid damage from the placement of coverings. The protective covering shall be maintained vapor-proof in close contact with the concrete for the entire 7 day period. All traffic shall be excluded during the curing period. Vehicular traffic shall be excluded for such additional time as ordered.

Method of Measurement

4.1 Reinforced concrete driveways will be measured by the square yard of finished surface, computed to the nearest 0.1 of a square yard.

4.2 Base course material will be measured by the cubic yard based on the product of the area of driveway approved for payment and the depth shown on the plans or ordered.

Basis of Payment

5.1 The accepted quantities of concrete driveways will be paid at the contract unit price per square yard of the type and depth specified complete in place.

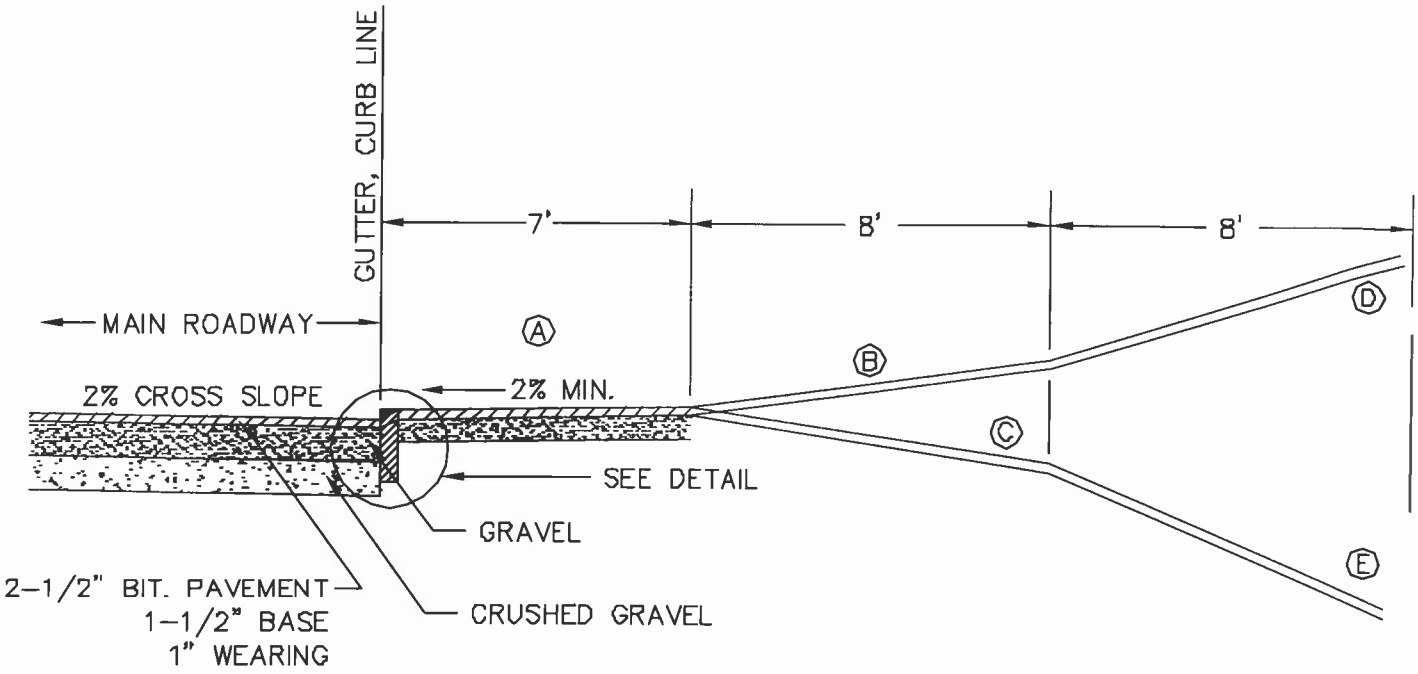
5.2 Hot bituminous pavement will be paid for under 403.

5.3 Base course material will be paid for under 304.

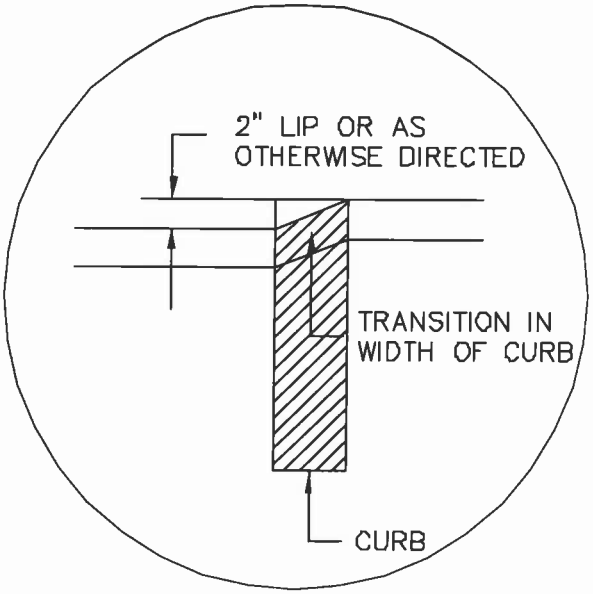
5.4 Necessary excavation will paid for under 203.

Pay Items and Units:

610.1	_ Inch Concrete Driveway	S.Y.
610.2	4 Inch Reinforced Concrete Driveway	S.Y.



Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
+2% MIN.	+12% MAX.	−8% MAX.	+15% MAX.	
+3%	+13% MAX.	−7% MAX.		
+4%	+14% MAX.	−6% MAX.		
+5%	+15% MAX.	−5% MAX.		−15% MAX.
+6%		−4% MAX.		−14% MAX.
+7%		−3% MAX.		−13% MAX.
+8% MAX.		−2% MAX.		−12% MAX.



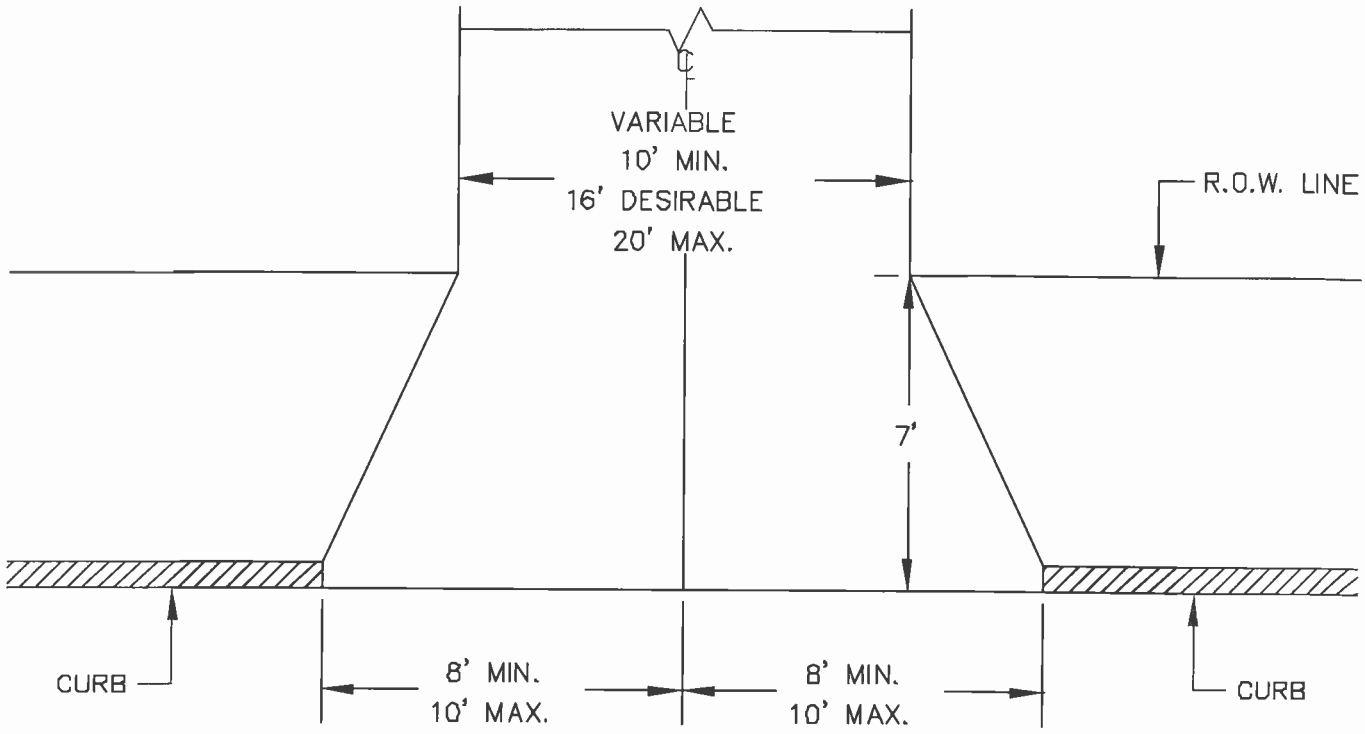
DETAIL

TYPICAL DRIVEWAY PROFILE

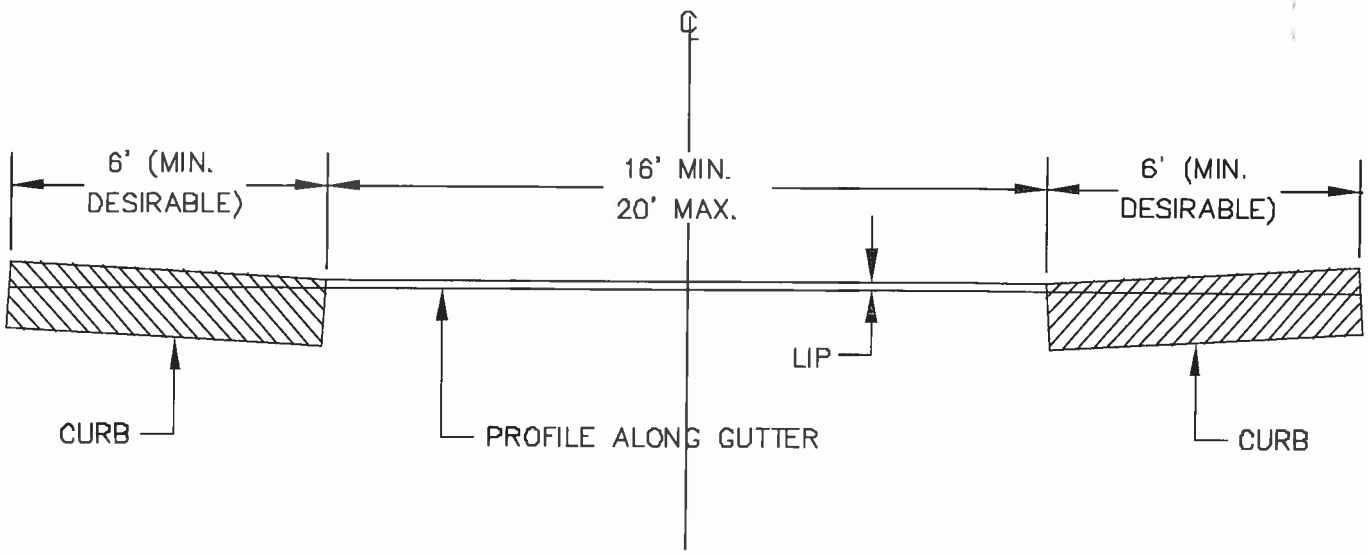
S:\DWG\DETAILS\610-1 DRVTYPPR.DWG

NOT TO SCALE

FIG. 610–1



PLAN

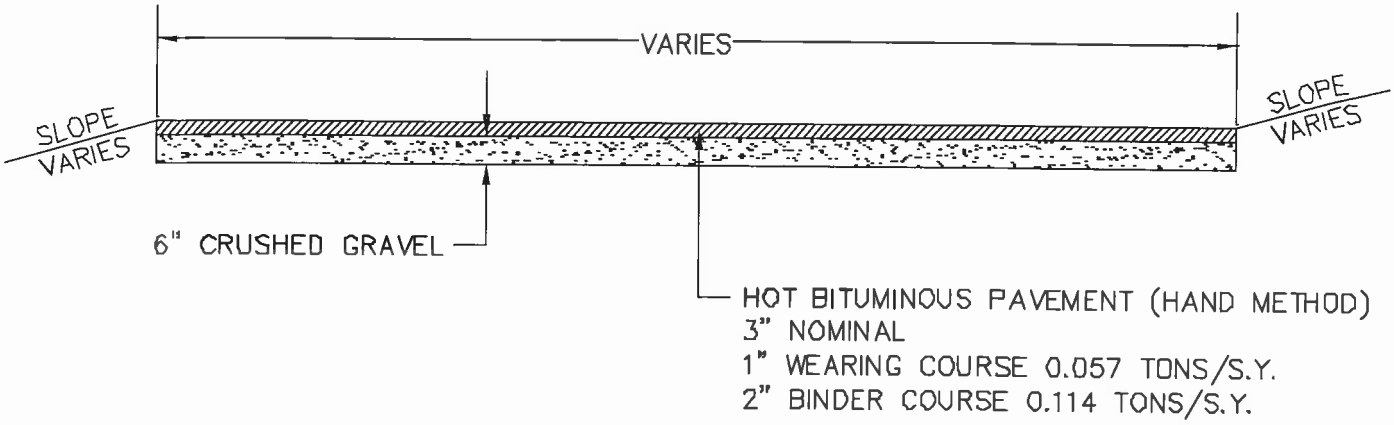


ELEVATION

RESIDENTIAL DRIVES

S:\DWG\DETAILS\610-2 RESDRIVE.DWG

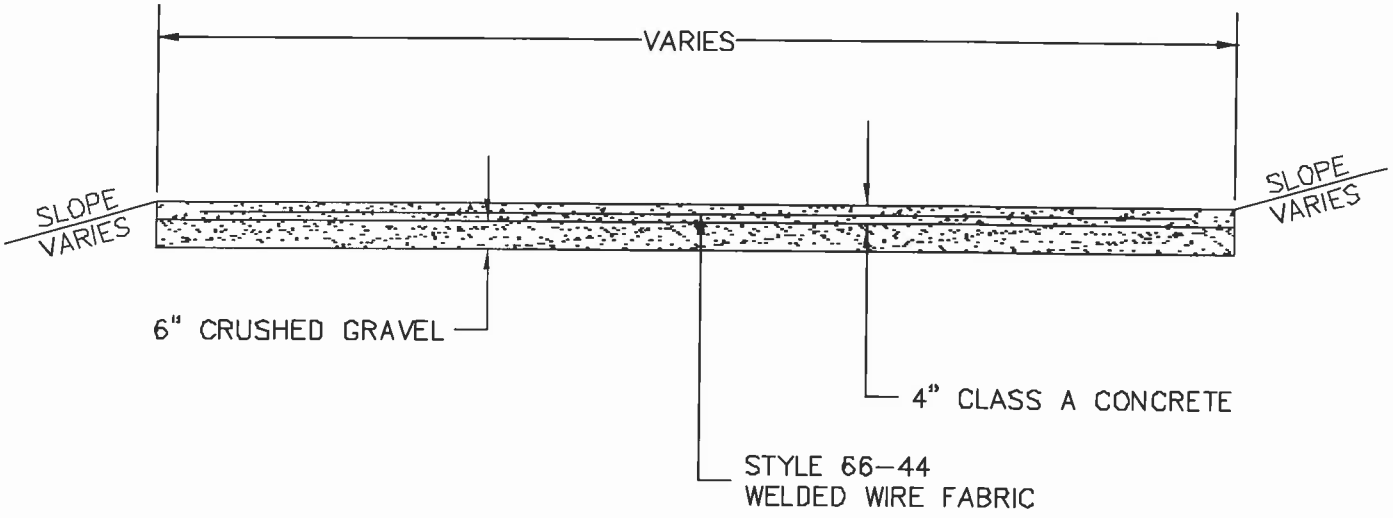
NOT TO SCALE
FIG 610-2



DETAIL–BITUMINOUS DRIVEWAY

S:\DWG\DETAILS\610–3,610–4 DRIVETYP.DWG

NOT TO SCALE
FIG. 610–3



DETAIL–CONCRETE DRIVEWAY

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NOT TO SCALE
FIG. 610–4