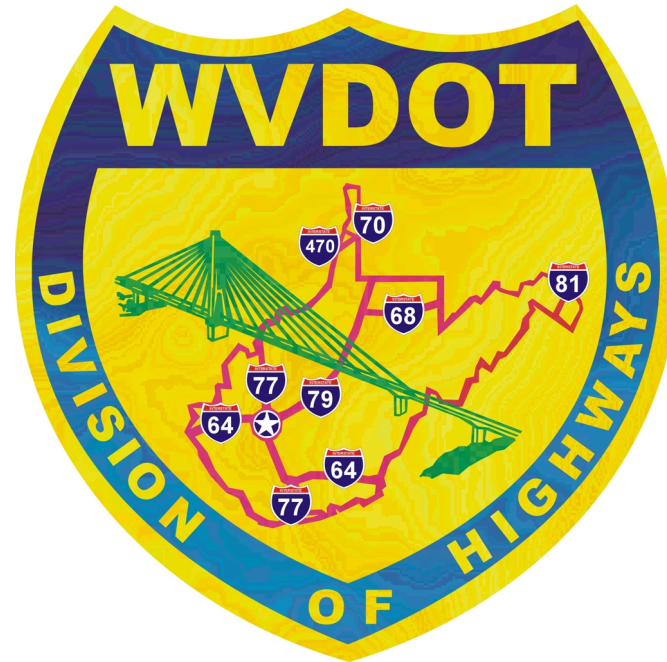


# TYPICAL SECTIONS AND RELATED DETAILS



**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS**

**2000**

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## **INTRODUCTION**

The applicable sheets of the 2000 edition “Typical Sections and Related Details” are to be used in the preparation of contract plans. Changes and/or exceptions to these details are to be approved by Engineering Division or District Director of Engineering.

## **GENERAL INFORMATION**

A numbering sequence has been assigned to the various items in the legends to retain consistency throughout and to avoid duplication. Blank spaces have been provided for certain items such as widths, thicknesses, rates of application, aggregate items and classes, etc.

## **DITCHES**

It is the Design Policy of the Division to divert water from the pavement. The desirable ditch in-slope should be 4:1 or flatter with the ditch bottom 6” lower than the subgrade.

When the proper ditch requirements cannot be met the alternative to using a ditch section is a non-ditch section with proper drainage of the subbase. These typicals may be modified to accommodate a non-ditch section. If a non-ditch section is provided the contract documents are to be accompanied by an explanation of the factors involved, such as traffic volume, right-of-way requirements, and cost differences.

## **EMBANKMENTS**

Fill slopes are to be 2:1 or flatter for adequate soil stability. Where the height of the fill is 10’ or less, it is desirable to flatten the slopes to 4:1 or flatter if possible. When a 1 1/2:1 fill slope is required the embankment must be constructed of rock (select embankment or rock borrow excavation). Sliver fills require benching to provide stability and to allow compacting by equipment. Fill benching (Sheets 36-39) should be considered from the first feasibility study to the final plans as it can be a substantial cost item.

## **SHOULDER WIDTHS**

Shoulder widths on certain typical sections, where indicated, are to be designated as maximum and minimum. In some cases, the two dimensions are equal because of non-varying widths. The designer shall measure the shoulder widths and specify the maximum and minimum to ensure proper quantity calculations and to assure that the full width is stabilized by the addition of stone. The existing and available shoulder widths are to be preserved. On projects where shoulder widths are predominantly less than two feet, the shoulders should be paved and edge striping is to be placed at the previous pavement edge.

## **SHOULDERS AND DITCHES**

In extreme erosion areas, ditches may require rock borrow excavation as shown in Sheet #30 “Correcting Deep Ditches.” Correcting of ditch depth is in the interest of safety, but flowline of ditches should be maintained to provide a minimum 6” of freeboard for effective road drainage.

## **SHOULDER RECONSTRUCTION**

Appropriate shoulder reconstruction details shall be included with the resurfacing typical section in the contract plans. Shoulders can become too steep by successive resurfacing, erosion, or ditch cleaning operations and should be restored to an appropriate slope. Repairs may require rock borrow excavation or gabions to prevent stream or right-of-way encroachment. Shoulders are to be restored with stone or pavement to a height equal to the finished roadway.

### **DRIVEWAY AND SIDEROAD TREATMENT**

The intent of this detail is to assure, during resurfacing operations, proper treatment of driveways and sideroads to maintain safe vehicle operation on the main road. On paved driveways and sideroads, a minimum amount of HMA is usually necessary to avoid an elevation difference (drop-off) at the pavement edge. The intent is not to pave every unpaved approach.

It is the designer's responsibility to recognize existing and potential problem approaches they are to be listed in the table provided and included in the contract documents. If more space is required, additional tables shall be provided. All problem approaches shall be documented with proper justification in the project file.

Underdrain or fabric drain is to be installed where approaches have caused pavement distress by trapping water.

### **BASE FAILURE REPAIR**

Identify in the contract documents, all areas of base failure that are to be repaired.

### **HMA SKID RESISTANT PAVEMENT**

All Hot-Mix Asphalt wearing course must be a skid-resistant mix in accordance with DD-644. If a project has severe curvature, high wet accident data, or high frictional demand, skid-resistant pavement may be required and should be documented in the project file.

### **WINTER GRADE PATCHING REMOVAL**

The designer should determine the extent and condition of any winter grade patching material that is to be resurfaced in a particular project. Any such material, which would be detrimental to the new surface, is to be removed and replaced with Hot-Mix Asphalt. If any removal is necessary the plans shall indicate an approximate quantity and method for pavement repair.

### **ADJUSTING MANHOLES, INLET GRATES, AND VALVE BOXES**

Many objects, such as manholes, gas and water valves, etc; must be adjusted for a smooth riding surface. When utility companies own such items the Designer will coordinate with the District Utilities Supervisor to determine all intended work and the required amount of adjustments. If certain utilities are not capable of the adjustments prior to the start of the work it shall be included in the contract. If it is determined by the District Utilities Supervisor that the work is to be reimbursed by the affected utility company the Designer shall prepare a separate engineer's estimate for each utility company and include them with the normal engineer's estimate when the P.S. & E. package is submitted to the Program Administration Division.

### **MATERIALS**

Testing of materials may be waived on minimum usage items. The designer should make this determination on a project by project basis and so note on the appropriate plan sheets or in a general note.

### **GUARDRAIL**

The class of guardrail to be installed on a particular project shall be as specified by the current Design Directive, DD-662. When the top of the guardrail is less than 24" or greater than 30" above the finished grade, the guardrail shall be removed and reset to the correct height, as per standard details, in conjunction with adjacent work.

## **GUARDRAIL INSTALLATION ON HEADWALLS, PARAPETS, BOXES CULVERTS, AND BRIDGES**

Many bridge parapets have intermediate vertical faces that can catch vehicles and cause damage. It is the policy of the Division to remove or isolate these hazards. The intent is to avoid guardrail installations where a lack of connection to the structure allows vehicles to deflect the rail and hit the concrete. The purpose of these details is to provide safe methods of guardrail installation where existing headwalls and/or parapets present a hazard to vehicles. However, there are certain physical limitations that may require such structures to remain. Before guardrail is added to a structure a comparison should be made to determine the feasibility of removing the obstruction and extending the culvert rather than installing guardrail. In many cases it is safer to install guardrail along the length of the parapet to minimize vehicle contact.

These details, which are to be inserted into the contract document, include a table that should be used to specify locations, lengths, class of guardrail and quantities of various appropriate end treatments, unless such information is shown in full-size plans for the projects.

The details should be applicable in the majority of situations where existing headwalls and bridge parapets are to remain. Certain bridges will require special consideration and design. Modifications of these details may be made for a project only after approval by the Engineering Division.

## **GUARDRAIL PLACEMENT AT INTERSECTIONS**

Details for guardrail placement at intersections are to be included in the plans to ensure well define end points for guardrail and guardrail end terminals. The designer is to add information such as the A, B, and C dimensions, the end treatment (TET, FET, CST, or buffer end), and the approximate milepost (or station) of the intersection in the spaces provided. Some intersections will require more than one detail sheet where guardrail is to be installed in more than one quadrant.

### **The following is a list of considerations in specifying guardrail:**

1. TET's, FET's, and CST's are the end treatments are the most commonly used.
2. Errant vehicles normally leave the roadway at an angle of 8° or less.
3. The departure must also be considered for the traffic movement in the opposite direction on the other side of the highway, but the near side would normally be more critical.
4. It is desirable to extend the guardrail around the intersecting roadway radius to move the end away from the mainline traffic.
5. The ending point of the guardrail must be established considering the departure, the significance of roadside hazard adjacent to the roadway and the available right-of-way.
6. If the guardrail end is within the angle of departure, a FET, TET, or CST is required.
7. If the guardrail can be extended around the radius to outside the departure angle, the need for an end treatment for the intersecting must be considered. If the guardrail can be extended around the radius enough to develop strength for the guardrail adjacent to the mainline, a buffer end is adequate.
8. Additional data may be found in Design Directive 662.

### **MODIFIED CUT SLOPE TERMINAL**

This detail should only be used on 3-R type projects where a cut slope terminal is desired but the cost of drainage through the cut slope area is uneconomical. If the existing ditch is more than 18” below the required grade for a CST the ditchline will need adjusted.

### **MODIFIED CONCRETE END POST**

This detail is to be used on NHS 3R-type projects to upgrade existing bridge end posts to a shape which will accept the Thrie Beam Guardrail Bridge Transition and Connection as per Standard Detail GR9.

The designer should determine if non-NHS end posts should be upgraded based upon the specific location with emphasis on the likelihood of impact, traffic data, etc.

### **TRAFFIC CONTROL PLAN**

The traffic control plan (applicable sheet 25 or 26) can be used on most resurfacing, widening, and stabilization projects. If the project contains work beyond the scope of the resurfacing traffic control plan the designer shall develop a more appropriate, detailed traffic control plan.

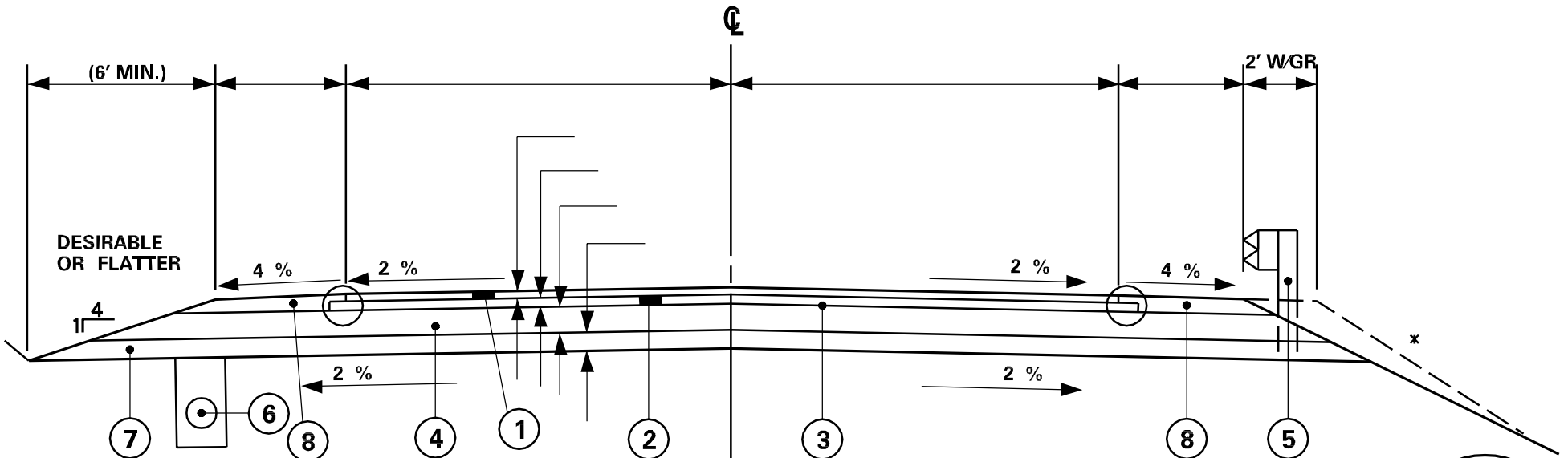
Additional signs or devices needed are to be listed on the table in the traffic control plan and the unit values for the additional signs are to be obtained from Section 636 of the Specifications.

The manual “Traffic Control for Street and Highway Construction and Maintenance Operations” is to be used for additional methods of traffic control and promotion of safety through the work area.

### **INSTALLATION OF HAZARD PANELS**

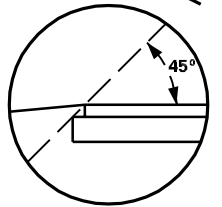
Hazard panels are to be installed within the clear zone of the project when it is not feasible to remove or isolate the hazards with guardrail. Hazard panels are to be installed at headwalls, box culverts and bridge parapets protected by guardrail whenever the bridge shoulder widths are 8 feet or less.

The designer is to designate locations of the panels and delineators in the table on the appropriate detail sheets.

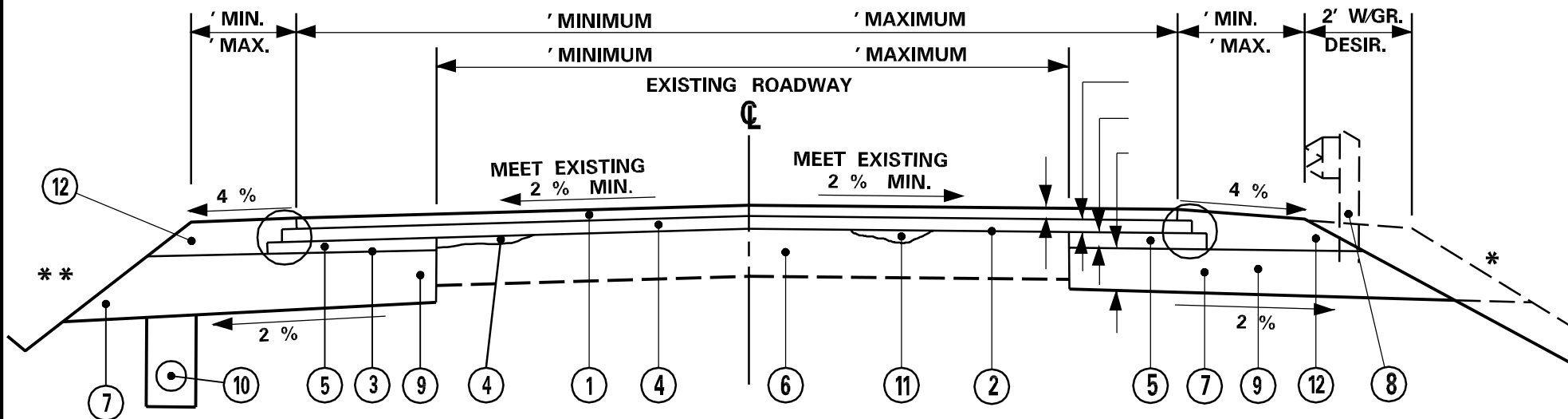


- ① ITEM 40 -001, HOT-MIX ASPHALT , STONE OR GRAVEL, TYPE OR  
ITEM 40 -002, HOT-MIX ASPHALT , SLAG, TYPE
- ② ITEM 401001-001, HOT-MIX ASPHALT BASE COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401001-002, HOT-MIX ASPHALT BASE COURSE, SLAG, TYPE
- ③ ITEM 409002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ④ ITEM 307001-00 , AGGREGATE BASE COURSE, CLASS
- ⑤ ITEM 607001-001, TYPE I GUARDRAIL, CLASS
- ⑥ ITEM 606025- , INCH UNDERDRAIN PIPE OR  
ITEM 606020-001, FABRIC UNDERDRAIN, AS SPECIFIED IN PLANS.
- ⑦ ITEM 207002-000, SUBGRADE
- ⑧ ITEM 308001-001, AGGREGATE BASE COURSE, STONE OR GRAVEL, CLASS OR  
ITEM 308001-002, AGGREGATE BASE COURSE, SLAG, CLASS

\* EMBANKMENT SLOPE GUIDE  
SLOPE  
HT. OF EMB.  
0' TO 10' 2:1 MAX. 4:1 DESIRABLE  
> 10' 2:1 DESIRABLE 1 1/2:1 MAX.



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ITEM 401001-002, HOT-MIX ASPHALT BASE COURSE, SLAG, TYPE
- ③ ITEM 409002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ④ ITEM 401003-001, HOT-MIX ASPHALT PATCHING AND LEVELING COURSE, STONE OR GRAVEL OR  
ITEM 401003-002, HOT-MIX ASPHALT PATCHING AND LEVELING COURSE, SLAG
- ⑤ ITEM 401001-001, HOT-MIX ASPHALT BASE COURSE, STONE OR GRAVEL, TYPE OR
- ⑥ EXISTING PAVEMENT
- ⑦ ITEM 307001-00 , AGGREGATE BASE COURSE, CLASS
- ⑧ ITEM 607001-001, TYPE I GUARDRAIL, CLASS
- ⑨ ITEM 207001-001, UNCLASSIFIED EXCAVATION
- ⑩ ITEM 606025- , INCH UNDERDRAIN PIPE OR  
ITEM 606020-001 FABRIC UNDERDRAIN, AS SPECIFIED IN PLANS
- ⑪ POT HOLE REPAIR - SEE DETAIL
- ⑫ ITEM 308001-001, AGGREGATE BASE COURSE, STONE OR GRAVEL, CLASS OR  
ITEM 308001-002, AGGREGATE BASE COURSE, SLAG, CLASS

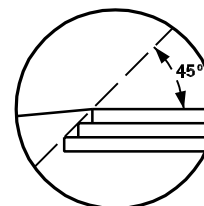
\*\* AS NOTED OR AS PER CROSS-SECTION

Note : Amount of widening on each side may vary thru the project because of physical restrictions. Dimension right and left will vary as shown in the plans or as directed by the engineer.

\* EMBANKMENT SLOPE GUIDE

HT. OF EMB.	SLOPE
0' TO 5'	6:1
5' TO 10'	4:1
> 10'	2:1

1 1/2:1 MAX. W/ROCK FILL

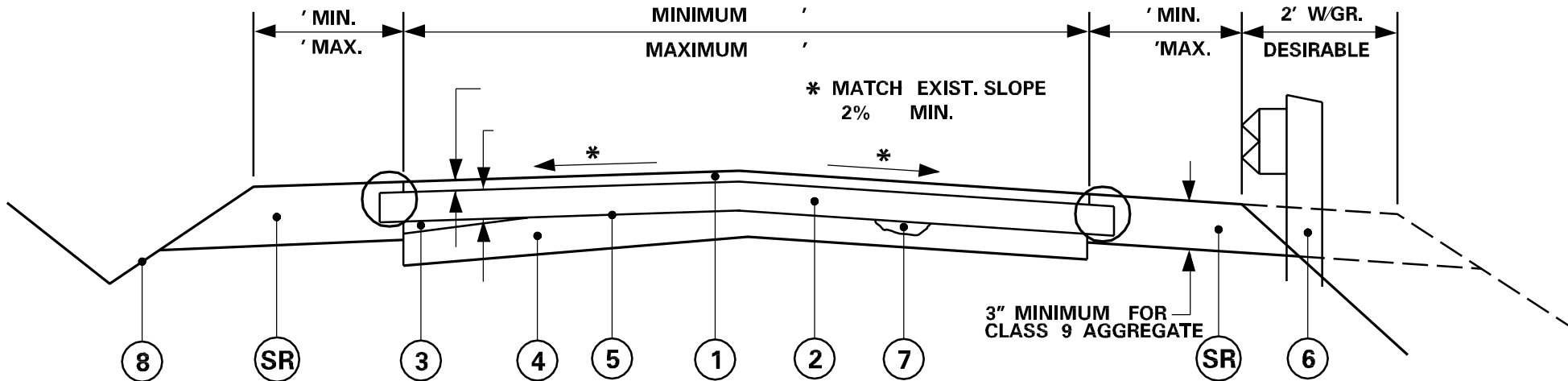


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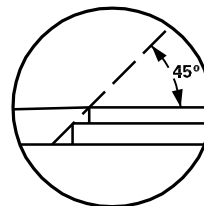


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- ② ITEM 401001-001, HOT-MIX ASPHALT BASE COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401001-002, HOT-MIX ASPHALT BASE COURSE, SLAG, TYPE
- ③ ITEM 401003-001, HOT-MIX ASPHALT PATCH AND LEVEL COURSE, STONE OR GRAVEL OR  
ITEM 401003-002, HOT-MIX ASPHALT PATCH AND LEVEL COURSE, SLAG
- ④ EXISTING ROADWAY
- ⑤ ITEM 408002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- SR SHOULDER RECONSTRUCTION (SEE DETAIL)
- ⑥ ITEM 607001-001, TYPE I GUARDRAIL, CLASS PER L.F.
- ⑦ POT HOLE REPAIR (SEE DETAIL)
- ⑧ ITEM 229001-000 SHOULDERS AND DITCHES (SEE DETAIL)

**SHOULDER WIDTHS:**

Reconstruct shoulders to the full width of existing shoulders up to the maximum as shown above.

Note : Refer to Heel-in Detail(s).



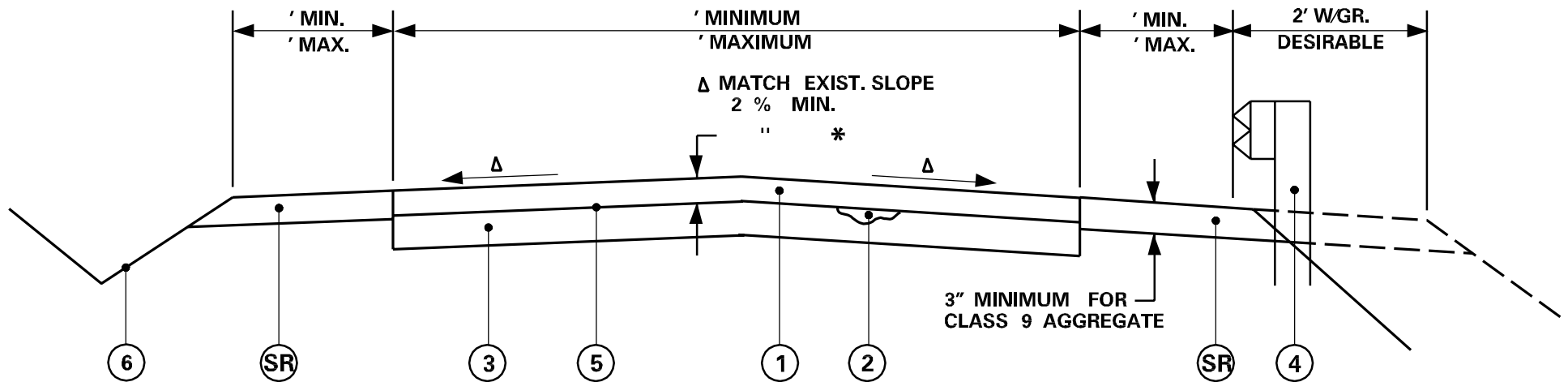
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- ① ITEM 401 -001, HOT-MIX ASPHALT COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401 -002, HOT-MIX ASPHALT COURSE, SLAG, TYPE
- ② POT HOLE REPAIR (SEE DETAIL)
- ③ EXISTING ROADWAY
- SR SHOULDER RECONSTRUCTION (SEE DETAIL)
- ④ ITEM 607001-001, TYPE I GUARDRAIL, CLASS
- ⑤ ITEM 408002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ⑥ ITEM 229001-000 SHOULDERS AND DITCHES (SEE DETAIL)

\* The intent of this dimension is to provide a quantity of HLBC for leveling the existing road and simultaneously provide a smooth riding surface.

#### SHOULDER WIDTHS:

Reconstruct shoulders to the full width of existing shoulder up to the maximum as shown above.

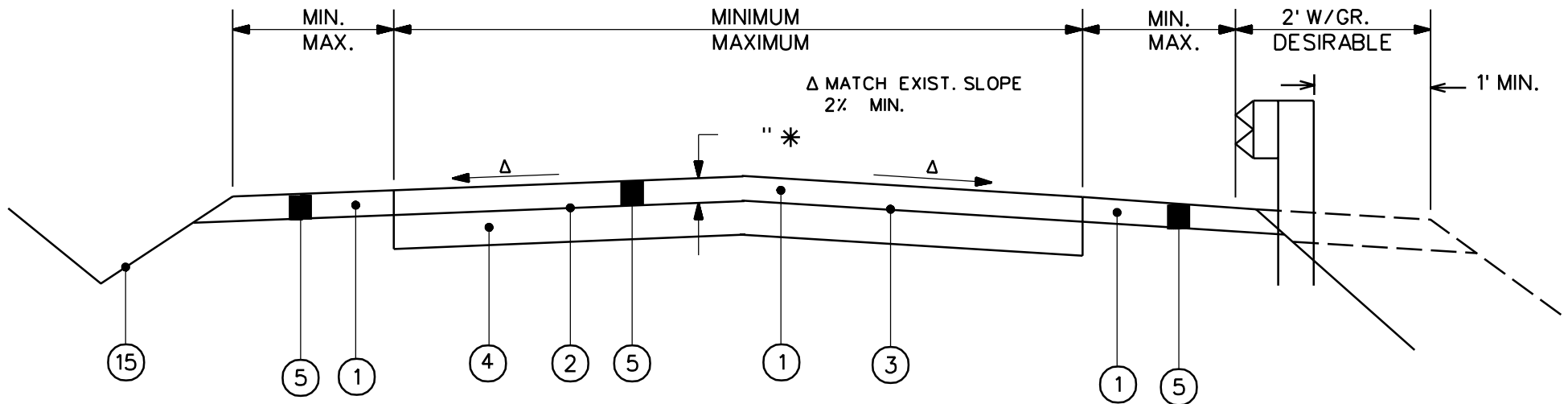
Note : Refer to Heel-in Detail(s).

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- ① ITEM 40\_0\_00, H.M.A.
- ② ITEM 401007, H.M.A., SCRATCH
- ③ ITEM 408002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ④ EXISTING ROADWAY
- ⑤ SR SHOULDER RECONSTRUCTION (SEE DETAIL)
- ⑤ ITEM 415005-001, REMOVE EXISTING PAVEMENT SURFACE
- ⑮ ITEM 229001-000 SHOULDERS AND DITCHES (SEE DETAIL)

\* The intent of this dimension is to provide a quantity of HMA for leveling the existing road and simultaneously provide a smooth riding surface.

### SHOULDER WIDTHS:

Reconstruct shoulders to the full width of existing shoulder up to the maximum as shown above.

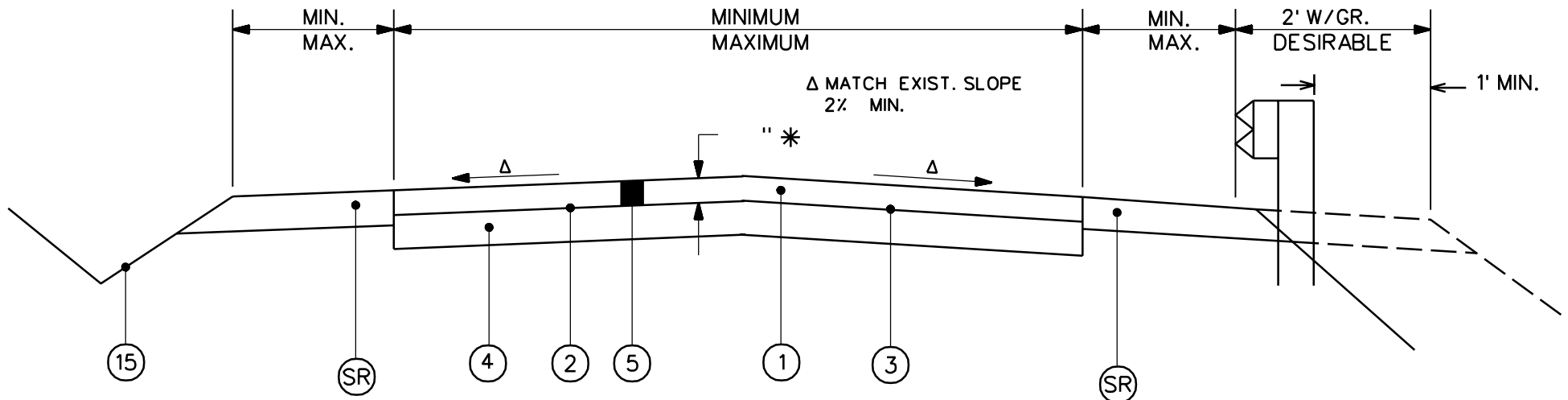
Note : Refer to Heel-in Detail(s).

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- ① ITEM 40\_0\_0, H.M.A.
- ② ITEM 401007, H.M.A., SCRATCH
- ③ ITEM 408002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ④ EXISTING ROADWAY
- SR SHOULDER RECONSTRUCTION (SEE DETAIL)
- ⑤ ITEM 415005-001, REMOVE EXISTING PAVEMENT SURFACE
- ⑮ ITEM 229001-000 SHOULDERS AND DITCHES (SEE DETAIL)

\* The intent of this dimension is to provide a quantity of HMA for leveling the existing road and simultaneously provide a smooth riding surface.

#### SHOULDER WIDTHS:

Reconstruct shoulders to the full width of existing shoulder up to the maximum as shown above.

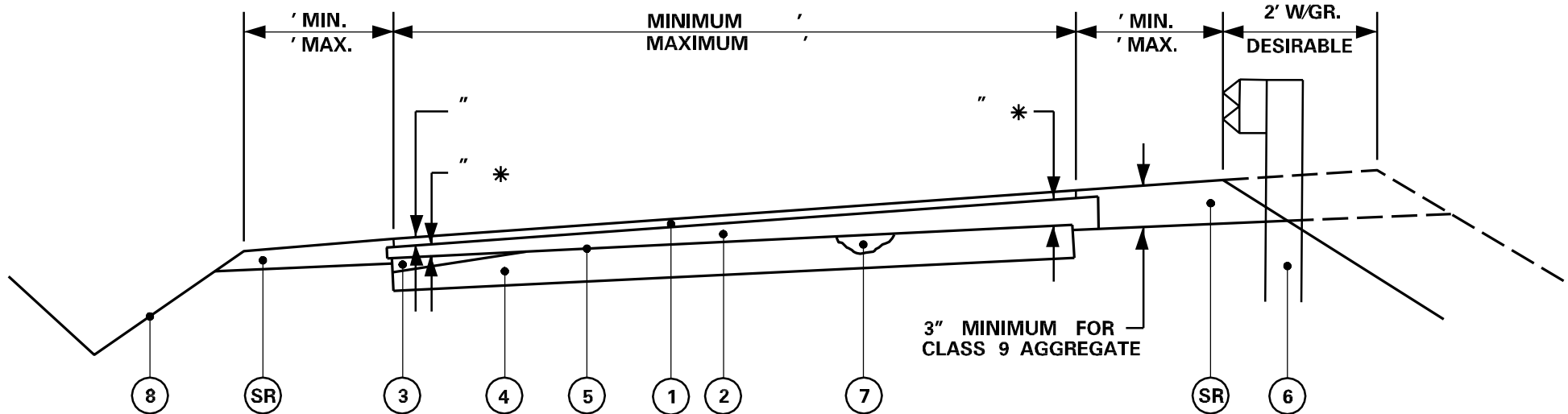
Note : Refer to Heel-in Detail(s).

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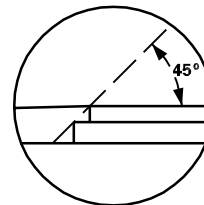
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- ① ITEM 40 -001, HOT-MIX ASPHALT, STONE OR GRAVEL, TYPE OR  
ITEM 40 -002, HOT-MIX ASPHALT, SLAG, TYPE
- ② ITEM 401001-001, HOT-MIX ASPHALT BASE COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401001-002, HOT-MIX ASPHALT BASE COURSE, SLAG, TYPE
- ③ ITEM 401003-001, HOT-MIX ASPHALT PATCH AND LEVEL COURSE, STONE OR GRAVEL, OR  
ITEM 401003-002, HOT-MIX ASPHALT PATCH AND LEVEL COURSE, SLAG, TYPE
- ④ EXISTING ROADWAY
- ⑤ ITEM 408002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- SR SHOULDER RECONSTRUCTION (SEE DETAIL)
- ⑥ ITEM 607001-001, TYPE I GUARDRAIL, CLASS
- ⑦ POT HOLE REPAIR (SEE DETAIL)
- ⑧ ITEM 229001-000 SHOULDERS AND DITCHES (SEE DETAIL)



### SHOULDER WIDTHS:

Reconstruct shoulders to the full width of existing shoulders up to the maximum as shown above.

Note : Refer to Heel-in Detail(s).

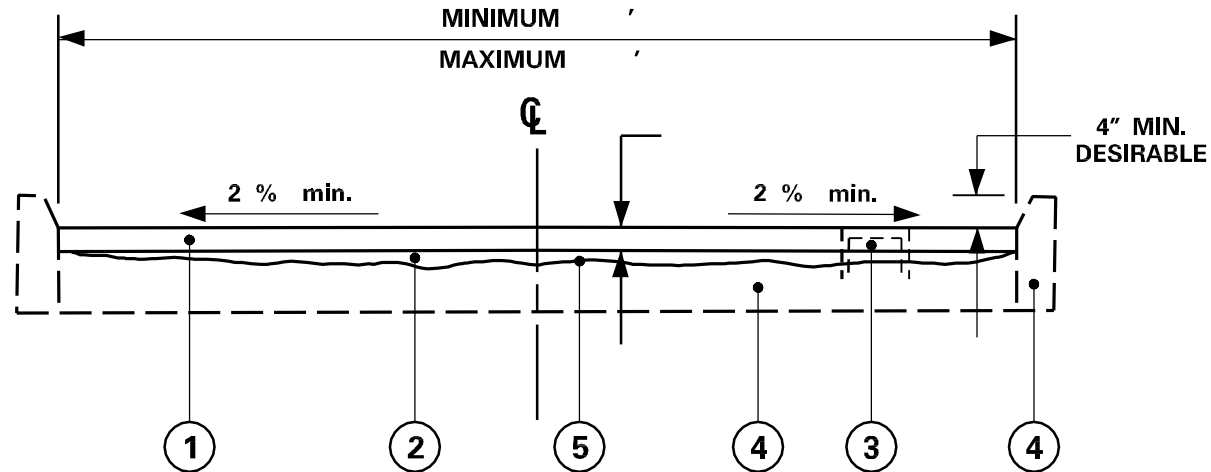
\* The intent of these dimensions is to provide a quantity of HMA for rebuilding roadway superelevation .

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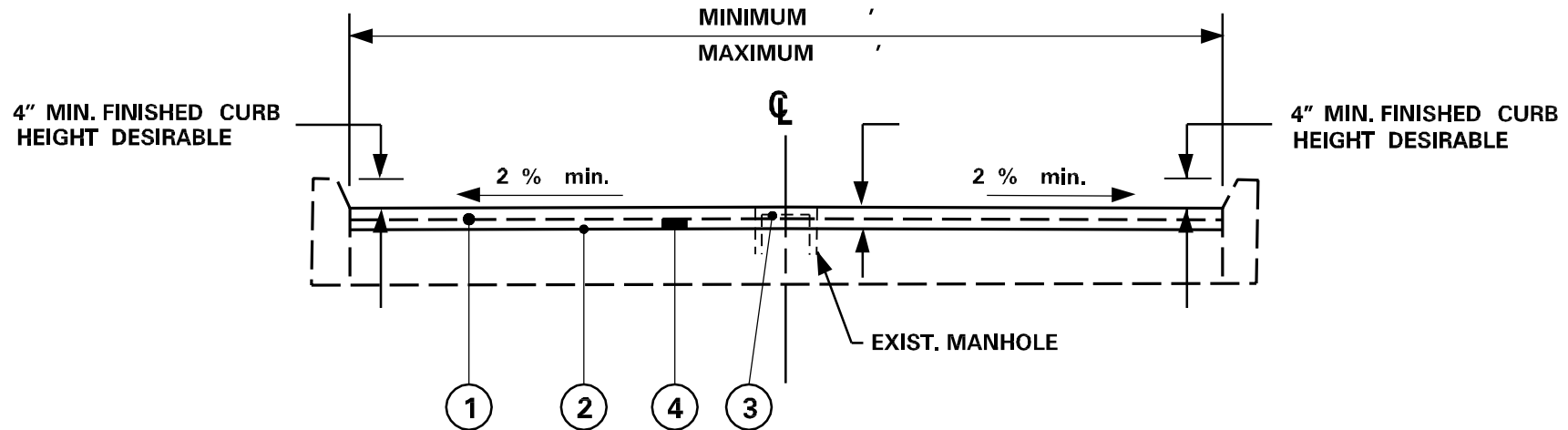
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 ITEM 401003-002, HOT-MIX ASPHALT PATCH AND LEVEL COURSE, SLAG, TYPE OR
- ③ ITEM 605015-001, ADJUST MANHOLE TYPE
- ④ EXISTING PAVEMENT AND CURBS
- ⑤ ITEM 408002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.

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- ① ITEM 40 -001, HOT-MIX ASPHALT , STONE OR GRAVEL, TYPE OR  
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- ② ITEM 408002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ③ ITEM 605015-001, ADJUST MANHOLE TYPE
- ④ ITEM 415005-001, REMOVING EXISTING PAVEMENT SURFACE

NOTES :

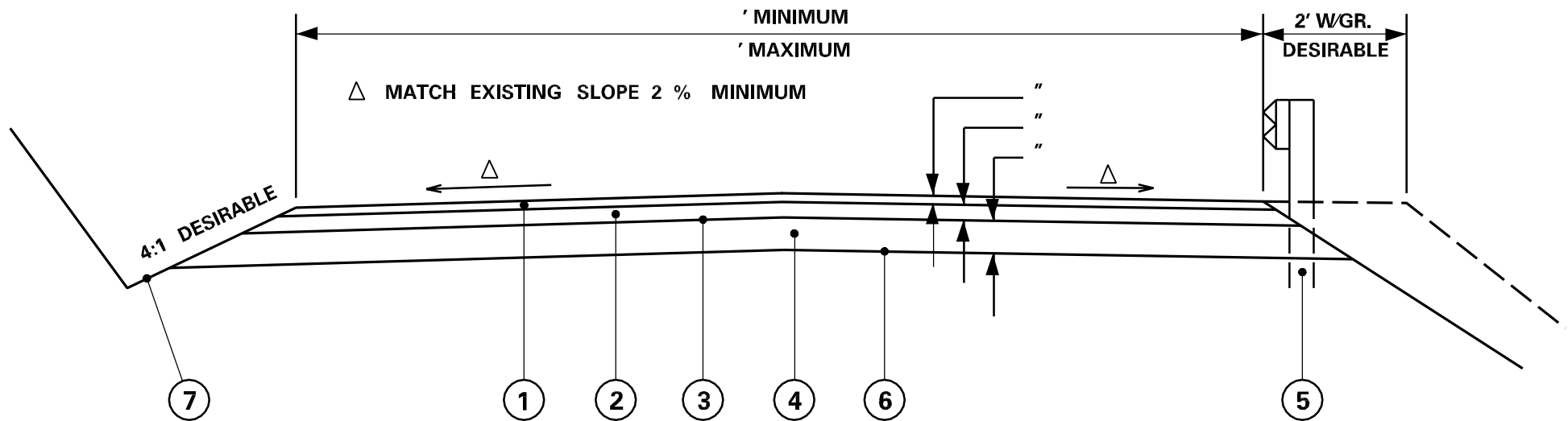
- ④ REMOVAL OF EXISTING BITUMINOUS PAVEMENT IS INTENDED TO ACHIEVE A 4" FINISHED CURB HEIGHT. REMOVAL IS TO BE OF VARIABLE THICKNESS TO ACHIEVE A SMOOTH - RIDING SURFACE.

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- ① ITEM 401002-001, HOT-MIX ASPHALT WEARING COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401002-002, HOT-MIX ASPHALT WEARING COURSE, SLAG, TYPE
- ② ITEM 401001-001, HOT-MIX ASPHALT BASE COURSE, STONE OR GRAVEL, TYPE OR  
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- ④ ITEM 307001-00 , AGGREGATE BASE COURSE, CLASS
- ⑤ ITEM 607001-001, TYPE I GUARDRAIL, CLASS
- ⑥ ITEM 228001-000, SUBGRADE PREPARATION
- ⑦ ITEM 229001-000, SHOULDERS AND DITCHES (SEE DETAIL)

**NOTE :**

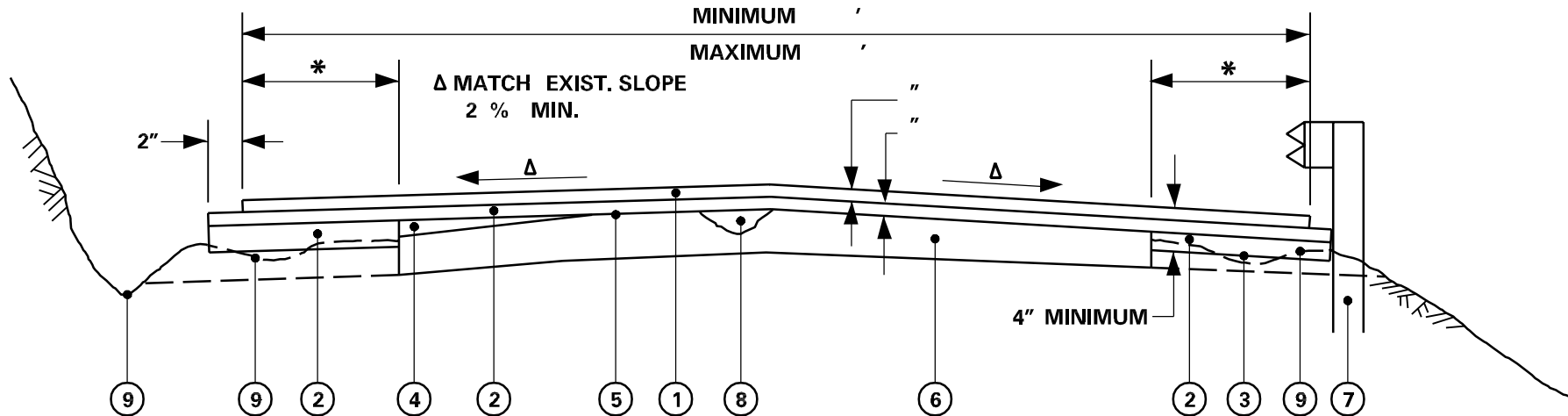
WHERE DITCH IS NOT OF SUFFICIENT DEPTH TO INSURE POSITIVE DRAINAGE FROM BASE COURSE, CURB SECTION AND OR UNDERDRAIN IS TO BE USED AS SHOWN IN NON-DITCH DETAILS. (No.28 AND No.29)

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- ① ITEM 401002-001, HOT-MIX ASPHALT WEARING COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401002-002, HOT-MIX ASPHALT WEARING COURSE, SLAG, TYPE
- ② ITEM 401001-001, HOT-MIX ASPHALT BASE COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401001-002, HOT-MIX ASPHALT BASE COURSE, SLAG, TYPE
- ③ ITEM 409002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ④ ITEM 401003-001, HOT-MIX ASPHALT PATCH AND LEVEL COURSE, STONE OR GRAVEL OR  
ITEM 401003-002, HOT-MIX ASPHALT PATCH AND LEVEL COURSE, SLAG, TYPE
- ⑤ ITEM 408002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ⑥ EXISTING PAVEMENT
- ⑦ ITEM 607001-001, TYPE I GUARDRAIL, CLASS PER L.F.
- ⑧ POT HOLE REPAIR - (SEE DETAIL)
- ⑨ ITEM 229001-000, SHOULDERS AND DITCHES (SEE DETAIL)

\* WIDTH OF EXISTING SHOULDERS  
GENERALLY LESS THAN 2 FEET  
RESULTING IN COMPACTION  
DIFFICULTIES IF STONE IS SPECIFIED.

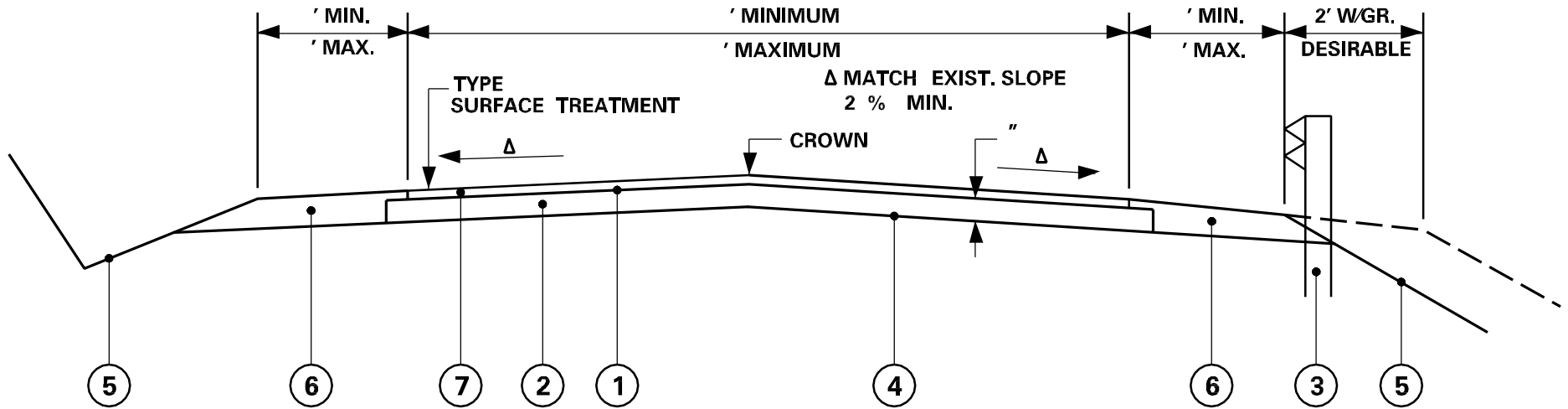
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**NOTES**

CROWN TANGENT SECTIONS WHEN PAVEMENT IS WIDE ENOUGH FOR 2-LANE TRAFFIC (16' MINIMUM).

ONE-LANE PAVEMENT TO BE SLOPED AT 2% TOWARD FILL SIDE WHERE PRACTICAL. CURVES TO BE REVERSE-SLOPED OR SUPERELEVATED AS NECESSARY.

\* WHERE SHOULDERS ARE GENERALLY LESS THAN 2' WIDE, SHOULDER WIDTH WILL BE SHOWN AS 0 ABOVE INDICATING THAT SUCH SHOULDERS ARE TO BE PAVED WITH SAME MATERIAL AS TRAVELLED LANES.

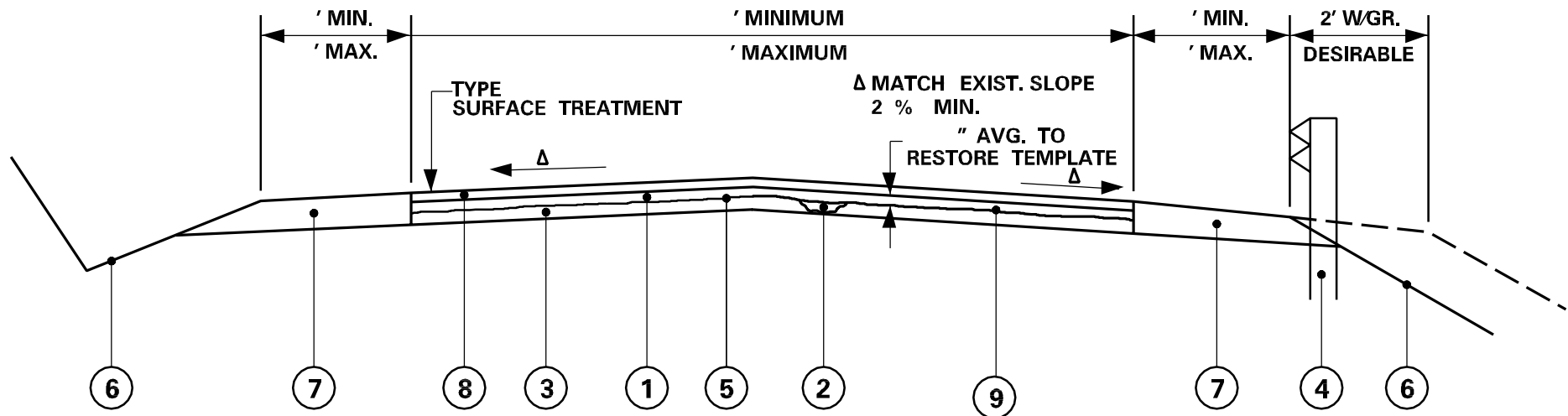
- ① ITEM 409002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ② ITEM 307001-00 , AGGREGATE BASE COURSE, CLASS
- ③ ITEM 607001-001, TYPE I GUARDRAIL, CLASS
- ④ ITEM 228001-000, SUBGRADE PREPARATION
- ⑤ ITEM 229001-000, SHOULDERS AND DITCHES (SEE DETAIL)
- \* ⑥ ITEM 307001-00 , AGGREGATE BASE COURSE, CLASS
- ⑦ ITEM 405001-001, SURFACE TREATMENT AGGREGATE, STONE OR GRAVEL, TYPE OR  
 ITEM 405001-002, SURFACE TREATMENT AGGREGATE, SLAG, TYPE  
 ITEM 405003-001, BITUMINOUS MATERIAL

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① ITEM 40 -001, HOT-LAID ASPHALT , STONE AND GRAVEL, CLASS OR  
 ITEM 40 -002, HOT-LAID ASPHALT , SLAG, CLASS

② POT-HOLE REPAIR (SEE DETAIL)

③ EXISTING ROADWAY

④ ITEM 607001-001, TYPE I GUARDRAIL, CLASS

⑤ ITEM 408002-001, BITUMINOUS MATERIAL

⑥ ITEM 229001-000, SHOULDERS AND DITCHES (SEE DETAIL)

\* ⑦ ITEM 308001-001, AGGREGATE BASE COURSE, STONE OR GRAVEL, CLASS OR  
 ITEM 308001-002, AGGREGATE BASE COURSE, SLAG, CLASS

⑧ ITEM 405001-001, SURFACE TREATMENT AGGREGATE, STONE OR GRAVEL OR  
 ITEM 405001-002, SURFACE TREATMENT AGGREGATE, SLAG  
 ITEM 405003-001, BITUMINOUS MATERIAL

⑨ ITEM 405002-001, PATCHING AND LEVELING AGGREGATE, STONE OR GRAVEL OR  
 ITEM 405002-002, PATCHING AND LEVELING AGGREGATE, SLAG

#### NOTES

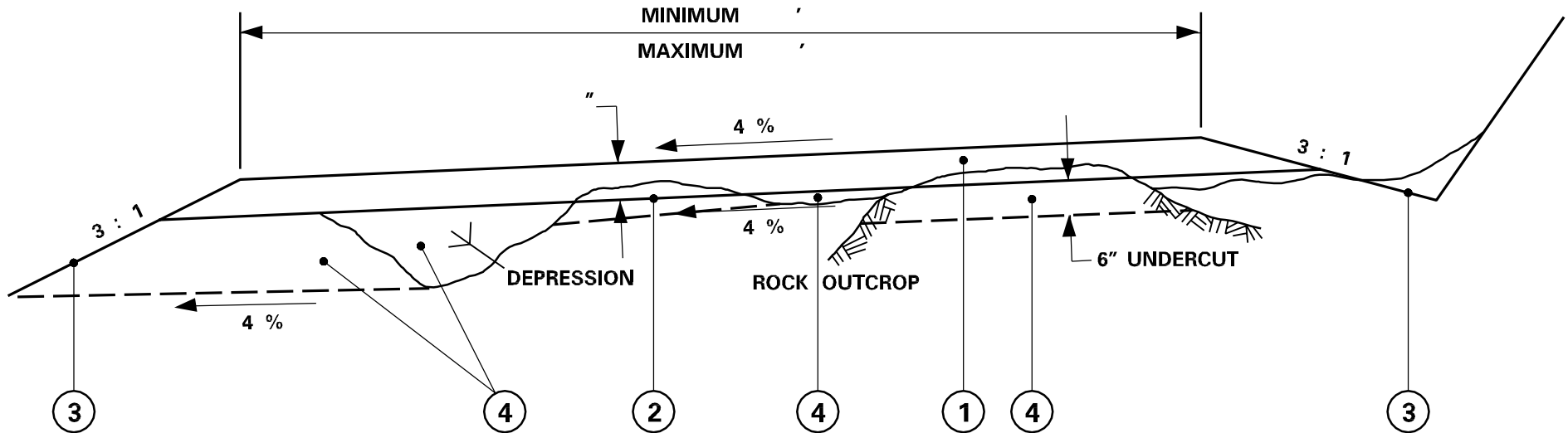
\* WHERE SHOULDERS ARE GENERALLY LESS THAN 2' WIDE, SHOULDER WIDTH WILL BE SHOWN AS 0 ABOVE INDICATING THAT SUCH SHOULDERS ARE TO BE PAVED WITH SAME MATERIAL AS TRAVELED LANES.

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- ① ITEM 308001-001, AGGREGATE BASE COURSE, STONE OR GRAVEL, CLASS      OR  
 ITEM 308001-002, AGGREGATE BASE COURSE, SLAG, CLASS
- ② ITEM 207002-000, SUBGRADE PREPARATION (PAID FOR UNDER SECTION 308)
- ③ ITEM 229001-000, SHOULDERS AND DITCHES (SEE DETAIL)
- ④ ITEM 307001-00 , AGGREGATE BASE COURSE, CLASS      DEPRESSIONS

**NOTE : SUBGRADE PREPARATION SHALL INCLUDE**

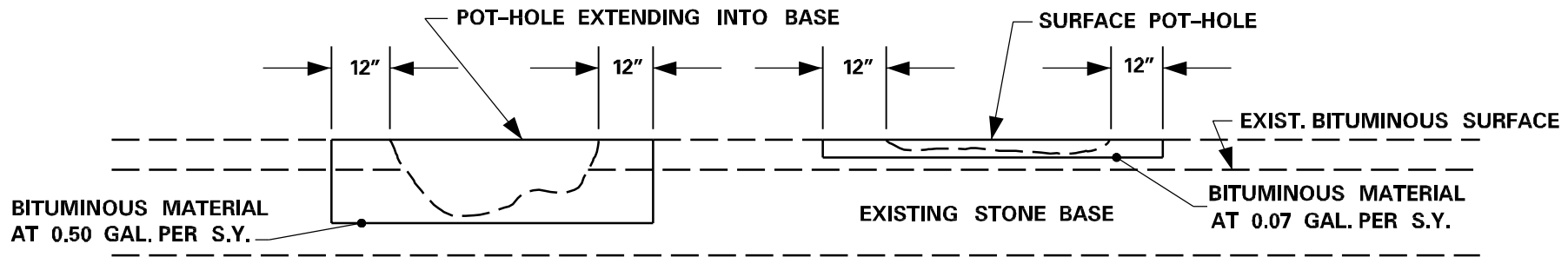
- A. DEPRESSION REPAIR-NECESSARY GRADING TO POSITIVELY DRAIN AREA TO BE FILLED WITH STONE.
- B. ROCK OUTCROP UNDERCUT-NECESSARY RIPPING AND/ OR BLASTING.

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### (ELEVATION VIEW)

THE SIDES AND BOTTOMS MUST BE CLEANED AFTER THE HOLE IS SHAPED TO FORM A SQUARE OR RECTANGLE WHOSE SIDES ARE PARALLEL OR AT RIGHT ANGLES TO THE DIRECTION OF TRAFFIC WITH THE EDGES NEAT AND AS NEARLY VERTICAL AS POSSIBLE.

THE EXISTING BASE WILL BE REPLACED WITH HOT-LAID ASPHALT.

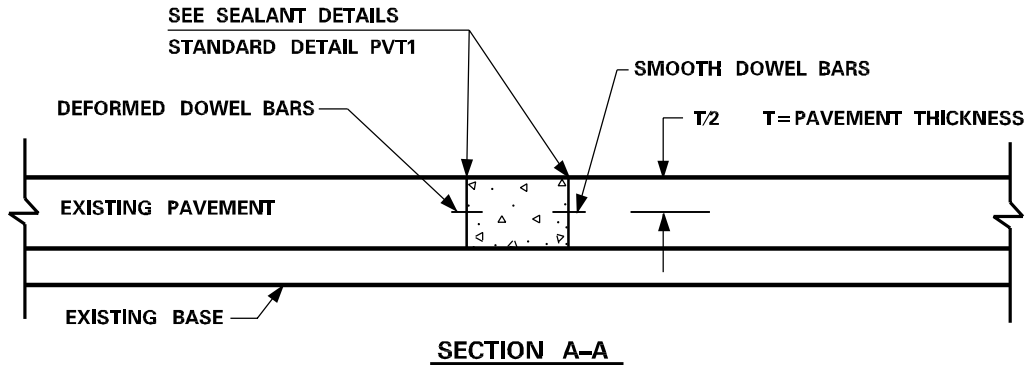
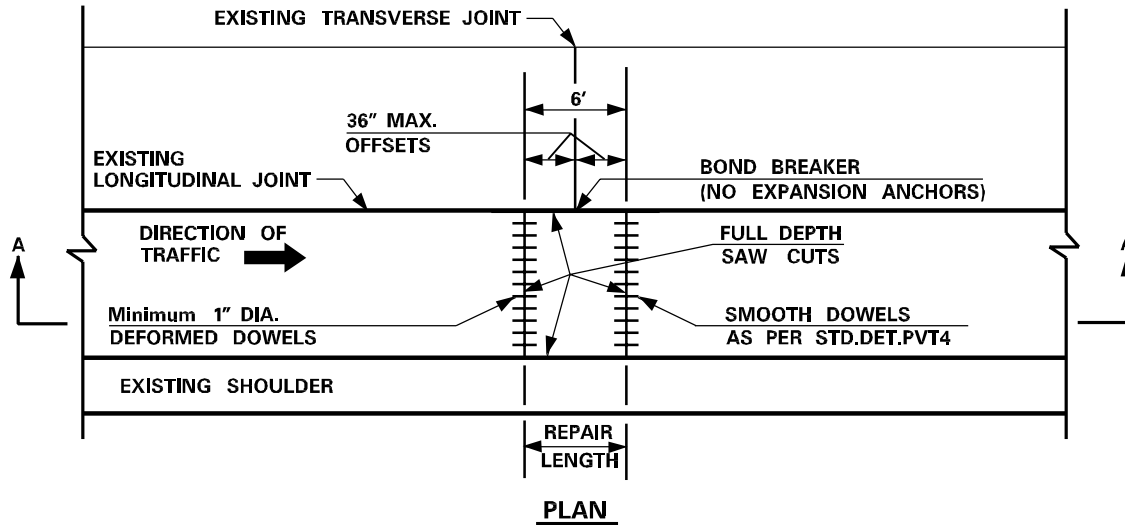
THE REMAINING SURFACE POT-HOLE WILL BE FILLED WITH HOT-LAID ASPHALT BASE COURSE TYPE MEETING REQUIREMENTS OF SECTION 401 OF THE SPECS. ENOUGH MATERIAL MUST BE USED TO BRING THE SURFACE OF THE REPAIR ABOUT 1/4" ABOVE THE LEVEL OF THE ORIGINAL PAVEMENT TO ALLOW FOR FURTHER COMPACTION BY TRAFFIC AND/OR RESURFACING.

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**METHOD A**

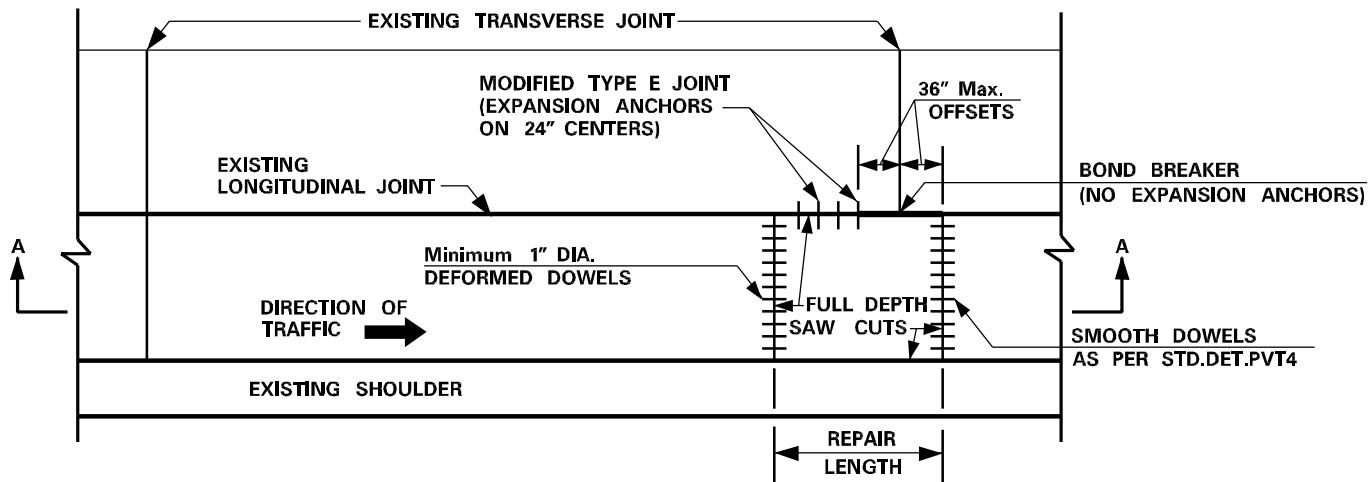
REPAIRS PERFORMED AT AN EXISTING TRANSVERSE JOINT EVEN THOUGH ONLY ONE SIDE NEEDS REPAIR. THE TOTAL REPAIR LENGTH SHALL BE 6' CENTERED ON THE ADJACENT TRANSVERSE JOINT.

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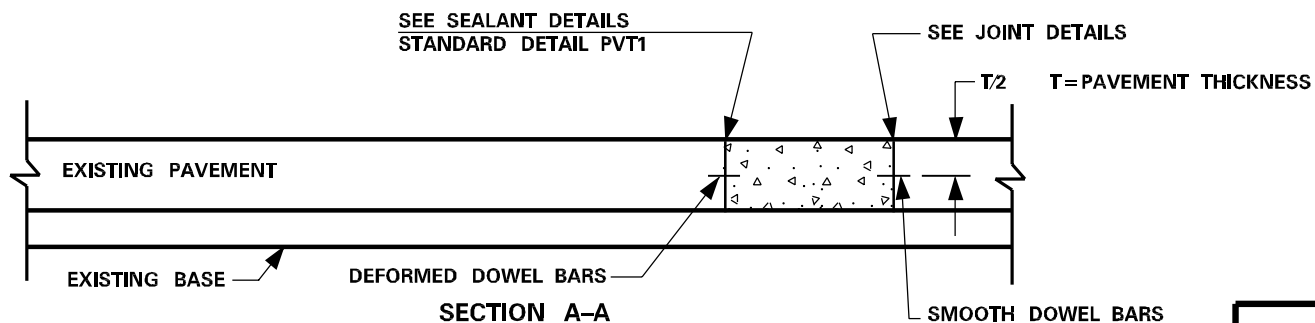
Federal Project No. \_\_\_\_\_

County \_\_\_\_\_

Sheet \_\_\_\_\_ of \_\_\_\_\_



PLAN

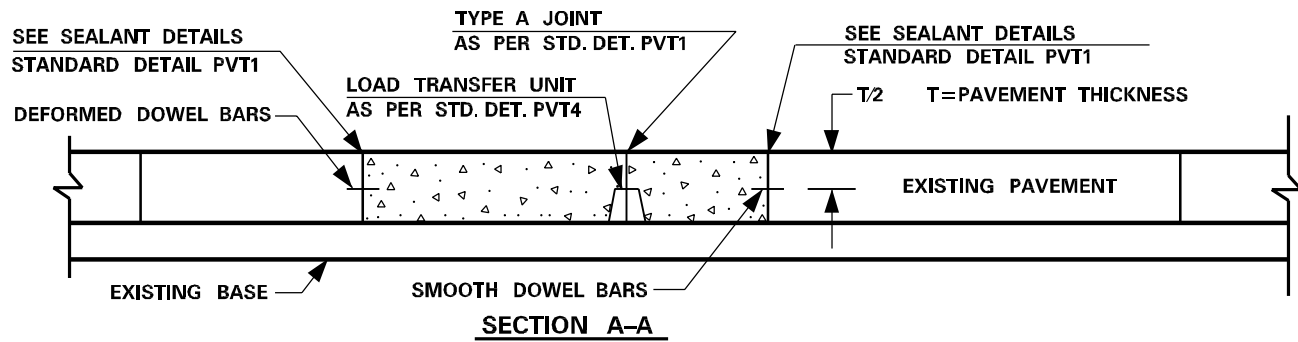
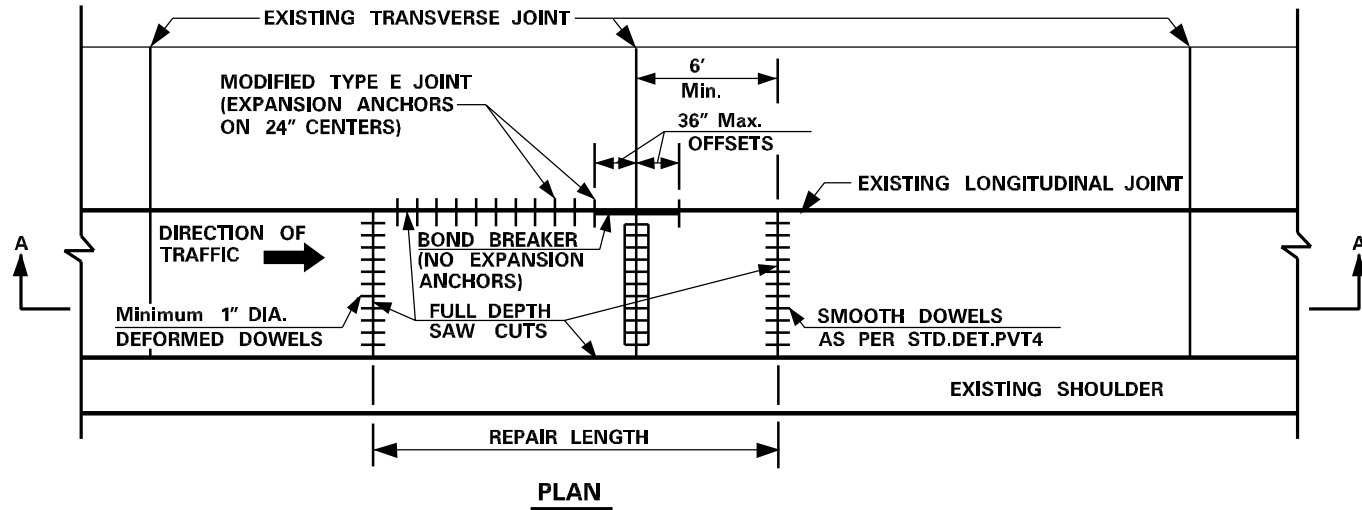


SECTION A-A

**METHOD B**

REPAIRS PERFORMED AT AN EXISTING TRANSVERSE JOINT WHEN THE REPAIR EXCEEDS 36" ON ONLY ONE SIDE OF THE JOINT.(NOTE THAT THE 36" OFFSET IS TO ALLOW FOR THE REMOVAL AND REPLACEMENT OF DOWELS.) REPAIRS ARE GREATER THAN 6' BUT LESS THAN 15' IN LENGTH AND REQUIRE LONGITUDINAL MODIFIED TYPE E JOINTS.

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METHOD C

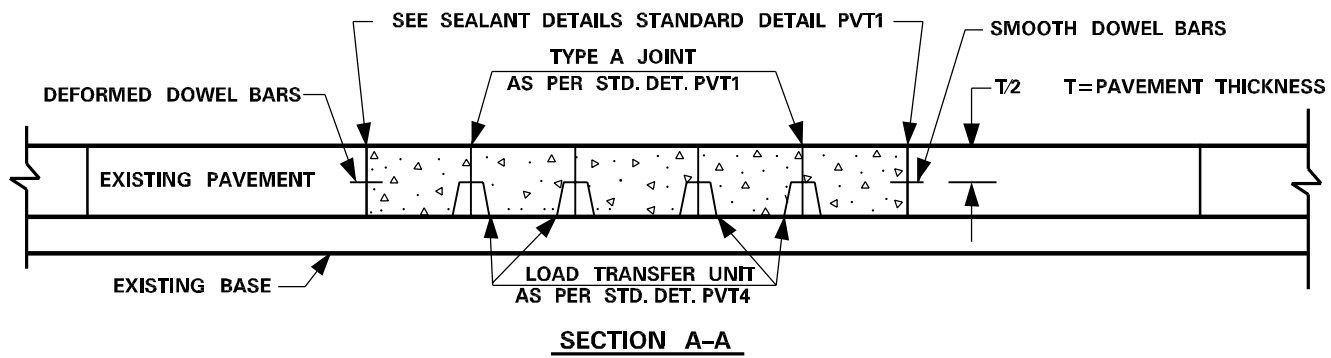
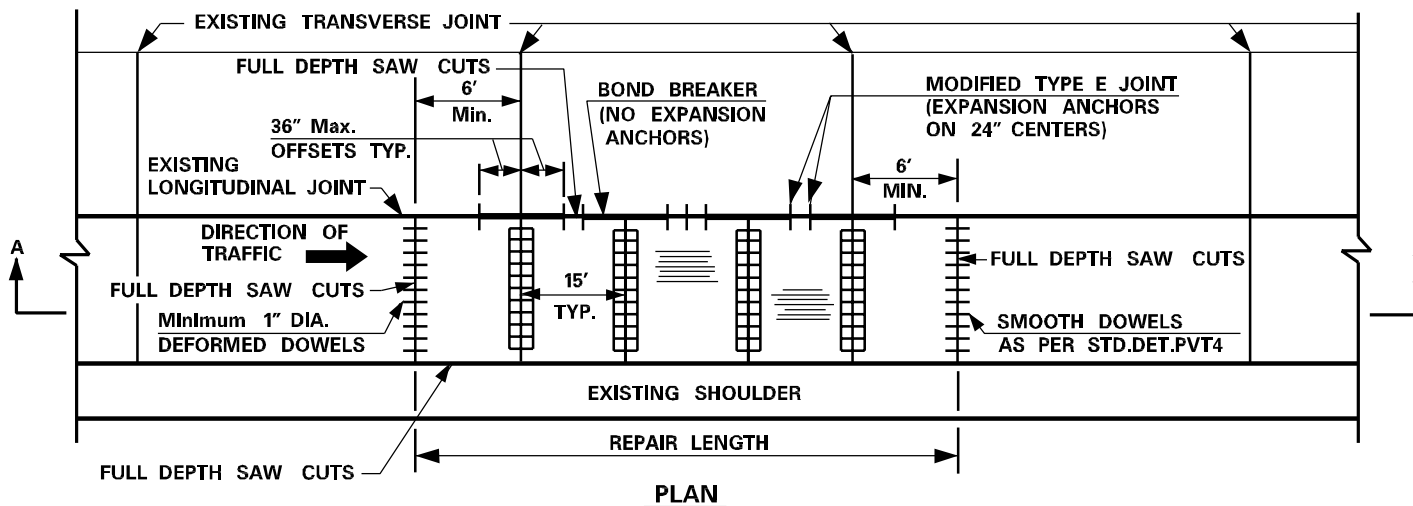
REPAIRS EXCEEDING 36" ON BOTH SIDES OF AN EXISTING TRANSVERSE JOINT, REPAIR SLABS AND REMAINS OF EXISTING SLABS SHALL NOT BE LESS THAN 15' IN LENGTH.

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**METHOD D**

REPAIRS PERFORMED TO COMPLETELY REPLACE SLABS BETWEEN TWO JOINTS. EXISTING DOWELS AND ASSEMBLIES SHALL BE COMPLETELY REMOVED WHEN A REPAIR IS PERFORMED AT A TRANSVERSE JOINT.

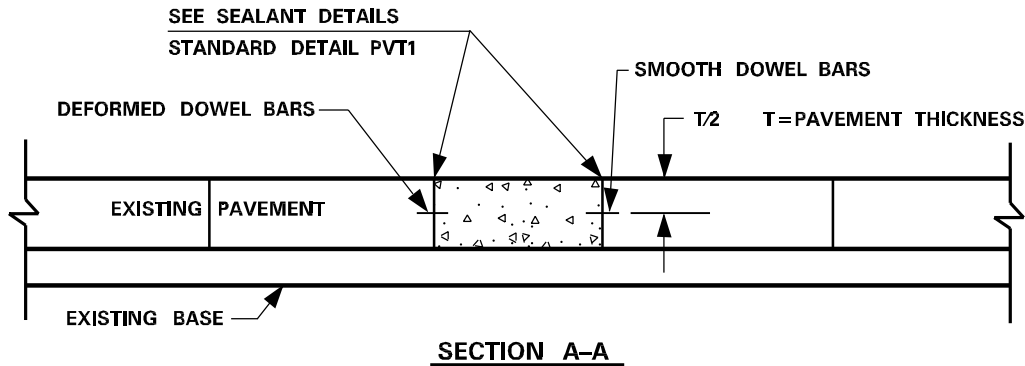
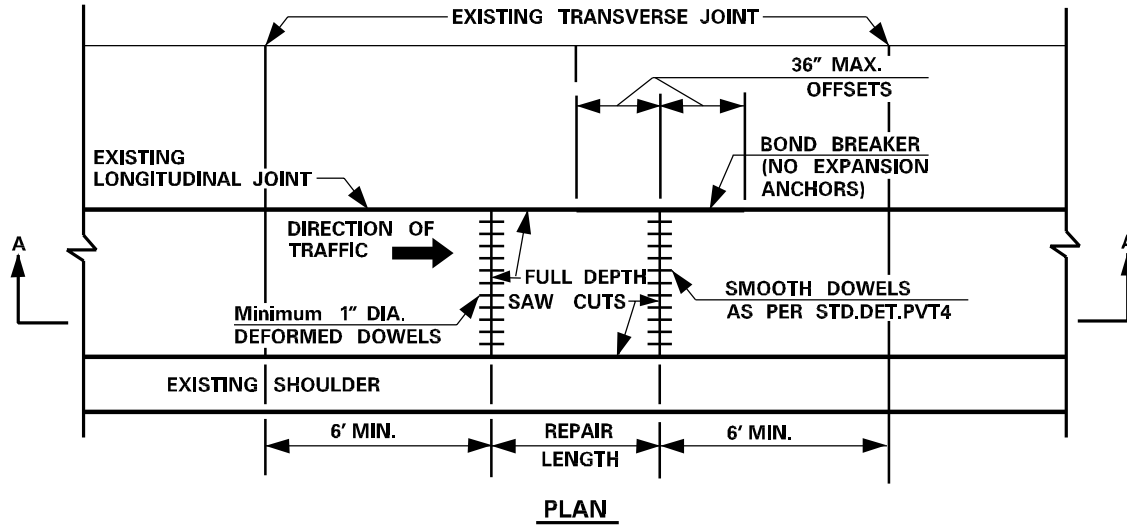
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**METHOD E**

REPAIRS PERFORMED AT MID SLAB OR A MINIMUM OF 6' FROM AN EXISTING TRANSVERSE JOINT. ALL REPAIRS OFFSET MORE REPAIR LENGTH SHALL BE 6' CENTERED ON THE ADJACENT TRANSVERSE JOINT.

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GENERAL NOTES

REPAIRS SHALL BE MADE USING CONCRETE MEETING THE REQUIREMENTS OF SECTION 501 OF THE SPECIFICATIONS, SUBGRADE PREPARATION SHALL BE IN ACCORDANCE WITH SUBSECTION 228 OF THE SPECIFICATIONS AND MAY REQUIRE ADDITIONAL MATERIAL TO FACILITATE PLACEMENT OF LOAD TRANSFER UNITS. COST TO BE INCLUDED IN VARIOUS ITEMS IN THE CONTRACT. HOLES FOR THE DOWELS AND LOAD TRANSFER UNITS SHALL BE DRILLED SIMULTANEOUSLY TO THE REQUIRED DEPTH USING FRAME MOUNTED DRILLS WHICH WILL MAINTAIN THE DRILLS IN A LOGITUDINALLY PARRALLEL POSITION. HOLE DIAMETER SHALL BE 1/4" LARGER THAN THE BAR DIAMETER. AN EPOXY BONDING COMPOUND AS APPROVED BY THE WVDOT MATERIALS CONTROL, SOIL AND TESTING DIVISION SHALL BE USED TO SECURE THE DOWEL/TIE BARS IN PLACE. JOINTS SHALL BE MADE IN ACCORDANCE WITH SECTION 501 OF THE SPECIFICATIONS AND DETAILS ATTACHED IN PLANS. ALL DOWELS SHALL BE EPOXY COATED. PAYMENT SHALL BE FULL COMPENSATION FOR ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED FOR REMOVING AND REPLACING EXISTING PORTLAND CEMENT CONCRETE PAVEMENT IN ACCORDANCE WITH THE ABOVE DETAILS. COST SHALL BE INCLUDED IN THE UNIT BID PRICE FOR ITEM 506001-001 CONCRETE PAVEMENT REPAIR. THE CONTRACTOR IS REQUIRED TO SCHEDULE WORK ON ALL CONCRETE PAVEMENT REPAIRS IN SUCH A MANNER THAT WILL NOT PERMIT OPEN HOLES TO REMAIN OPEN OVERNIGHT OR ON WEEKENDS.

OVERSAWING INTO ADJACENT SLABS WHEN ONLY ONE LANE OR PORTION OF A LANE IS TO BE REMOVED SHALL BE KEPT TO THE MINIMUM NECESSARY TO ENSURE THAT FULL DEPTH CUTS IN THE CORNERS HAVE BEEN ACHIEVED. ALL OVERSAWING SHALL BE THOROUGHLY CLEANED AND REPAIRED WITH AN EPOXY BONDING COMPOUND AS APPROVED BY THE WVDOT MATERIALS CONTROL, SOILS AND TESTING DIVISION.

MINIMUM 1" DEFORMED EPOXY COATED DOWEL BARS WILL BE INSTALLED AT THE FIXED END OF THE PAVEMENT REPAIR WHICH WILL BE THE APPROACH TRAFFIC END OF THE REPAIR. THE WORKING END OF THE REPAIR WILL BE THE TRAILING END IN RELATION TO TRAFFIC. MINIMUM 1 1/4" DIAMETER PLAIN EPOXY COATED DOWEL BARS, AS PER STANDARD DETAIL SHEET PVT4, WILL BE USED AT THE WORKING END OF THE REPAIR. SPACING FOR BOTH CASES SHALL BE ON 12" CENTERS.

TYPE E OR MODIFIED TYPE E JOINTS AS PER STANDARD DETAIL SHEETS PVT1 AND PVT2 MAY BE USED FOR THE LONGITUDINAL CONSTRUCTION JOINT. BARS SHALL BE SPACED ON 24" CENTERS WITH THE EXCEPTION THAT BARS WILL NOT BE PLACED WITHIN 36" OF A WORKING CONSTRUCTION JOINT OR AN ADJACENT TRANSVERSE CONTRACTION JOINT. A BOND BREAKER WILL BE PLACED IN THIS AREA IN LIEU OF THE EXPANSION ANCHORS.

FOR PAVEMENT REPAIR LENGTHS GREATER THAN 15', LOAD TRANSFER UNITS AS PER STANDARD DETAIL SHEET PVT4 SHALL BE INSTALLED:

1. TO MATCH ADJACENT CONTRACTION JOINTS OR RANDOM TRANSVERSE CRACKS IF ONLY ONE LANE IS REPLACED, OR
2. ON 15" CENTERS IF MORE THAN ONE LANE OF PAVEMENT REPAIR IS BEING REPLACED.

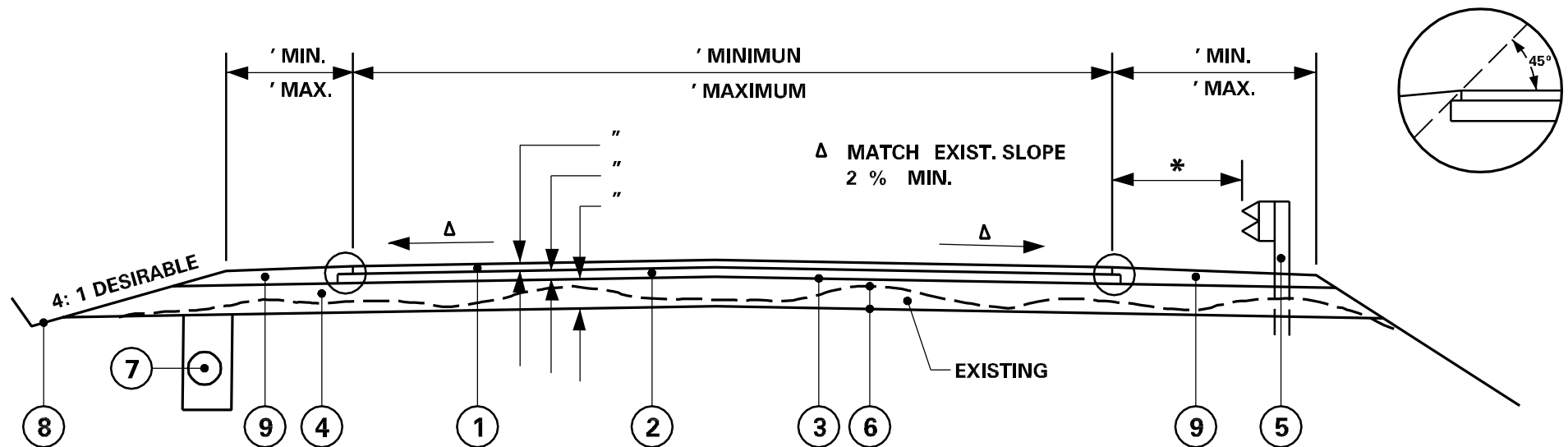
CONTRACTION JOINTS IN THE ADJACENT LANE SCHEDULED TO REMAIN SHALL BE SEALED ON THEIR LOGITUDINAL FACE PRIOR TO PLACEMENT OF CONCRETE IN THE REPAIR AREA IN ORDER TO PREVENT NEW CONCRETE FROM ENTERING.

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- ① ITEM 401002-001, HOT-MIX ASPHALT WEARING COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401002-001, HOT-MIX ASPHALT WEARING COURSE, SLAG, TYPE
- ② ITEM 401001-001, HOT-MIX ASPHALT BASE COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401001-001, HOT-MIX ASPHALT BASE COURSE, SLAG, TYPE
- ③ ITEM 409002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ④ ITEM 30700 -000, AGGREGATE BASE COURSE, CLASS
- ⑤ ITEM 607001-001, TYPE I GUARDRAIL, CLASS
- ⑥ ITEM 207001-001, UNCLASSIFIED EXCAVATION
- ⑦ ITEM 606025- , INCH UNDERDRAIN PIPE OR  
ITEM 606020-001, FABRIC UNDERDRAIN (AS SHOWN IN PLANS)
- ⑧ ITEM 229001-000, SHOULDERS AND DITCHES (SEE DETAIL)
- ⑨ ITEM 308001-001, AGGREGATE BASE COURSE, STONE OR GRAVEL, CLASS OR  
ITEM 308001-002, AGGREGATE BASE COURSE, SLAG, CLASS

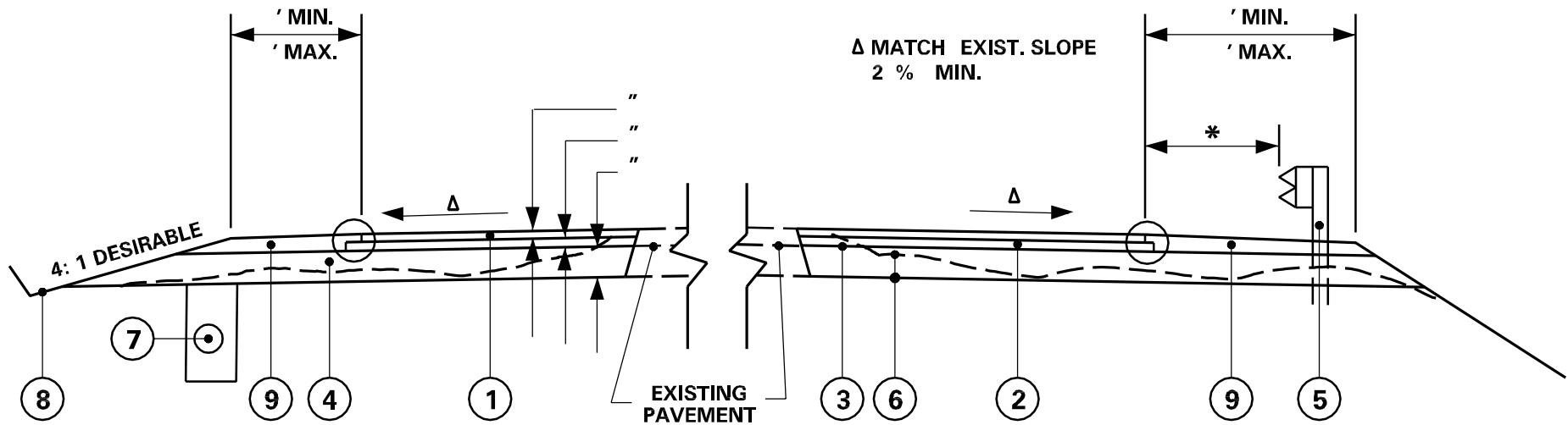
\* GUARDRAIL TO BE LOCATED AT THE  
PREVAILING OFFSET IN ADJACENT SECTIONS.

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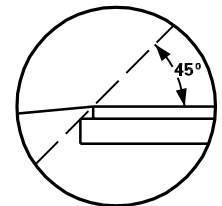
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- ① ITEM 401002-001, HOT-MIX ASPHALT WEARING COURSE, STONE OR GRAVEL, TYPE OR  
ITEM 401002-002, HOT-MIX ASPHALT WEARING COURSE, SLAG, TYPE
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ITEM 606020-001, FABRIC UNDERDRAIN (AS SHOWN IN PLANS)
- ⑧ ITEM 229001-001, SHOULDERS AND DITCHES (SEE DETAIL)
- ⑨ ITEM 308001-001, AGGREGATE BASE COURSE, STONE OR GRAVEL, CLASS OR  
ITEM 308001-001, AGGREGATE BASE COURSE, SLAG, CLASS



\* GUARDRAIL TO BE LOCATED AT THE PREVAILING OFFSET IN ADJACENT SECTIONS.

State Project No.

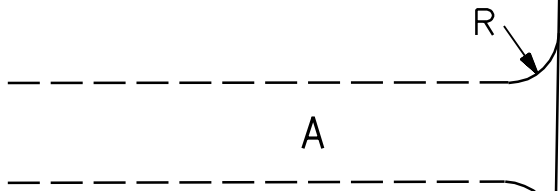
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**TYPE A - STONE DRIVEWAY**

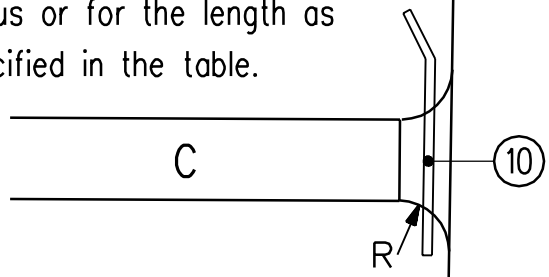
Apply mainline pavement to the back of radius or to the ditchline, whichever is less.



⑩ Item 606025, Underdrain Pipe or Item 606020-001, Fabric Underdrain as Specified in Plans.

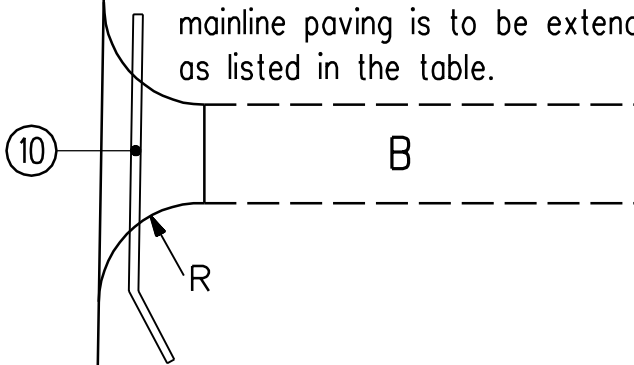
**TYPE C - PAVED SIDEROAD OR DRIVEWAY**

Apply wearing course overlay to the back of the radius or for the length as specified in the table.



**TYPE B - STONE SIDEROAD**

Apply mainline pavement to back of radius or a minimum of 25 ft, whichever is greater. If stone sideroad on State System is on a steep downgrade which causes mud or stone to be transferred to the mainline, mainline paving is to be extended as listed in the table.



If driveway or sideroad is not listed in the table at the right, stone entrance is to be built up with shoulder stone to the prevailing shoulder width and slope. HMA is to be tapered from the mainline surface for paved entrances to avoid bumps and to assure that no adverse slopes result when adjacent shoulders are finished to the desirable slope.

**PAVING LOCATIONS**

STATION	R/L	TYPE	LENGTH	WIDTH	TONS

All approaches are to be tied-in with HMA as directed by the engineer. \_\_\_\_\_ tons of HMA have been allocated for approaches.

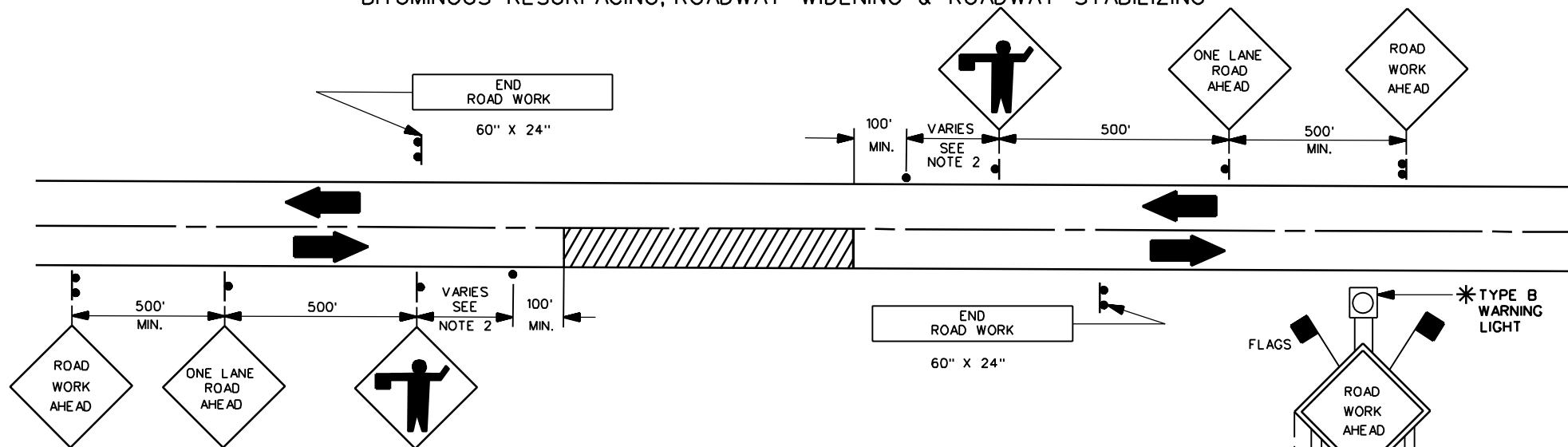
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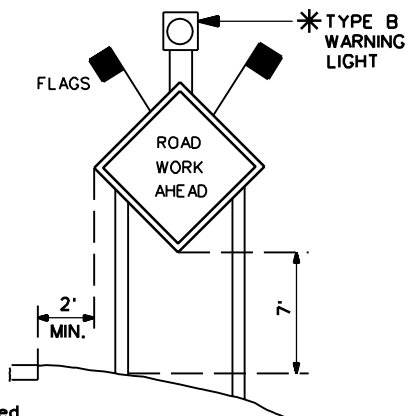
## BITUMINOUS RESURFACING, ROADWAY WIDENING & ROADWAY STABILIZING



**GENERAL NOTES**

- All warning signs shall have a minimum dimension of 48" x 48" and have black legend and border on a fluorescent orange background. Fluorescent orange sheeting see section 636 and 715 of specifications.
- The minimum distance from the Flagger Ahead sign to the Flagger is to be 200'. The maximum distance is to be determined by the Engineer, but not to exceed 1/2 the length of a days operation or one mile whichever is less.
- All portable signs are to be removed at completion of the days operation.
- Longitudinal dimensions may be adjusted slightly to fit field conditions.
- Flaggers shall be in sight of each other or in direct communication at all times.
- The maximum traffic delay is to be minutes.
- Any obstacles or excavated areas left unattended after working hours shall be protected by Type I or II barricades with flashing lights (Type A) at the expense of the Contractor.
- Additional warning signs are to be placed on major intersecting roadways as indicated in the table below.
- Payment for furnishing, installing, maintaining, and moving the "Advance Flagger" signs shall be incidental to Item 636014-001, "Flagger".

\* A Type B Warning Light is to be provided with each "Road Work Ahead" sign. The cost is to be incidental to Item 636011. Type B Warning Lights are required.



NOTE: Total Units include 15% (To be used at the direction of the engineer.)

- WORK AREA
- SIGN ON PERMANENT SUPPORT
- SIGN ON PORTABLE SUPPORT
- FLAGGER

BASE - 880 UNITS

DEV. NO.	DESCRIPTION	LOCATION	QUANTITY	UNITS/EA.	UNITS
<b>TOTAL UNITS -</b>					

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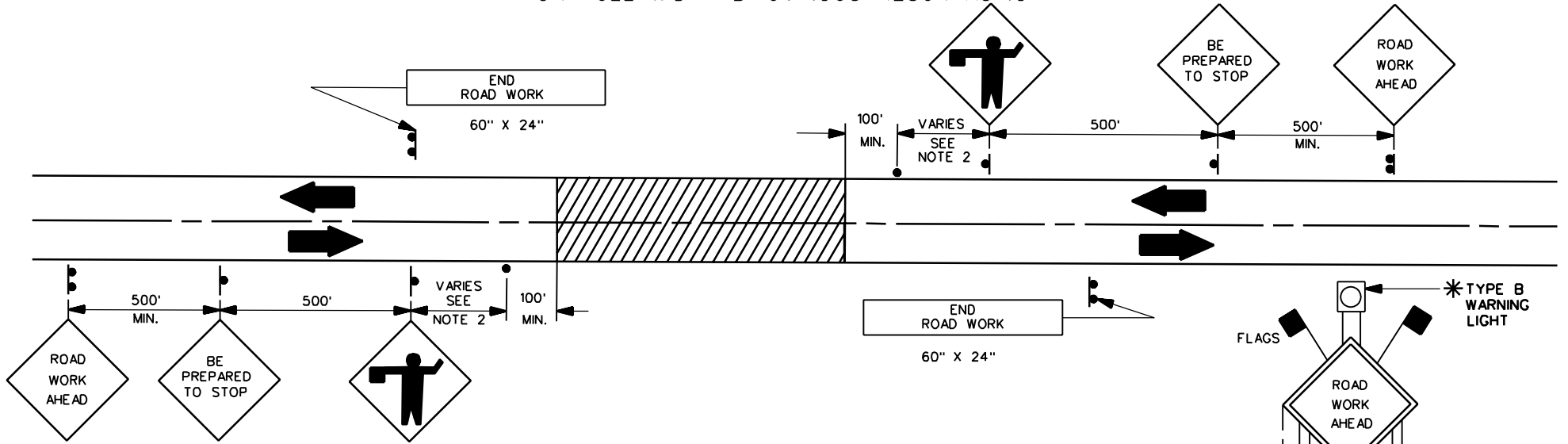
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TOTAL UNITS -

FOR FULL WIDTH BITUMINOUS RESURFACING



**GENERAL NOTES**

- All warning signs shall have a minimum dimension of 48" x 48" and have black legend and border on a fluorescent orange background. Fluorescent orange sheeting see section 636 and 715 of specifications.
- The minimum distance from the Flagger Ahead sign to the Flagger is to be 200'. The maximum distance is to be determined by the Engineer, but not to exceed 1/2 the length of a days operation or one mile whichever is less
- All portable signs are to be removed at completion of the days operation.
- Longitudinal dimensions may be adjusted slightly to fit field conditions.
- Flaggers shall be in sight of each other or in direct communication at all times.
- The maximum traffic delay is to be \_\_\_\_\_ minutes.
- Any obstacles or excavated areas left unattended after working hours shall be protected by Type I or II barricades with flashing lights (Type A) at the expense of the Contractor.
- Additional warning signs are to be placed on major intersecting roadways as indicated in the table below.
- Payment for furnishing, installing, maintaining, and moving the "Advance Flagger" signs shall be incidental to Item 636014-001, "Flagger".

\* A Type B Warning Light is to be provided with each "Road Work Ahead" sign. The cost is to be incidental to Item 636011. Type B Warning Lights are required.

NOTE: Total Units include 15% to be used at the direction of the engineer.

- WORK AREA
- SIGN ON PERMANENT SUPPORT
- SIGN ON PORTABLE SUPPORT
- FLAGGER

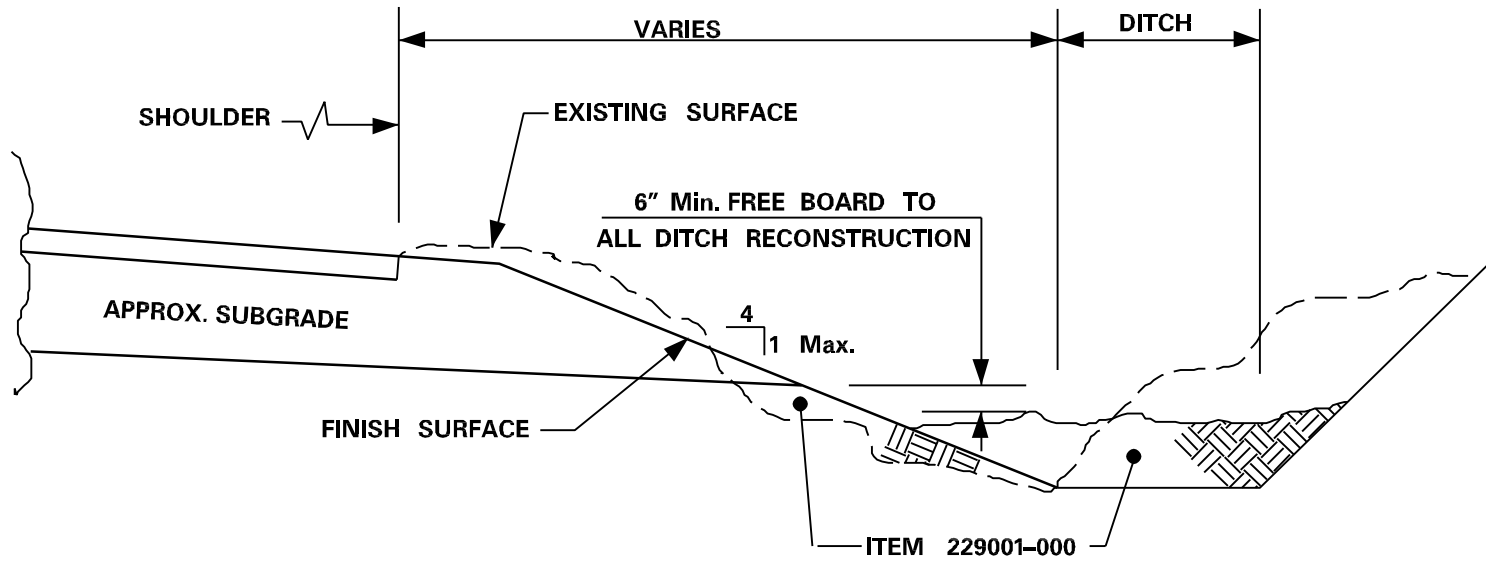
BASE - 880 UNITS					
DEV. NO.	DESCRIPTION	LOCATION	QUANTITY	UNITS/EA.	UNITS
TOTAL UNITS -					

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County \_\_\_\_\_

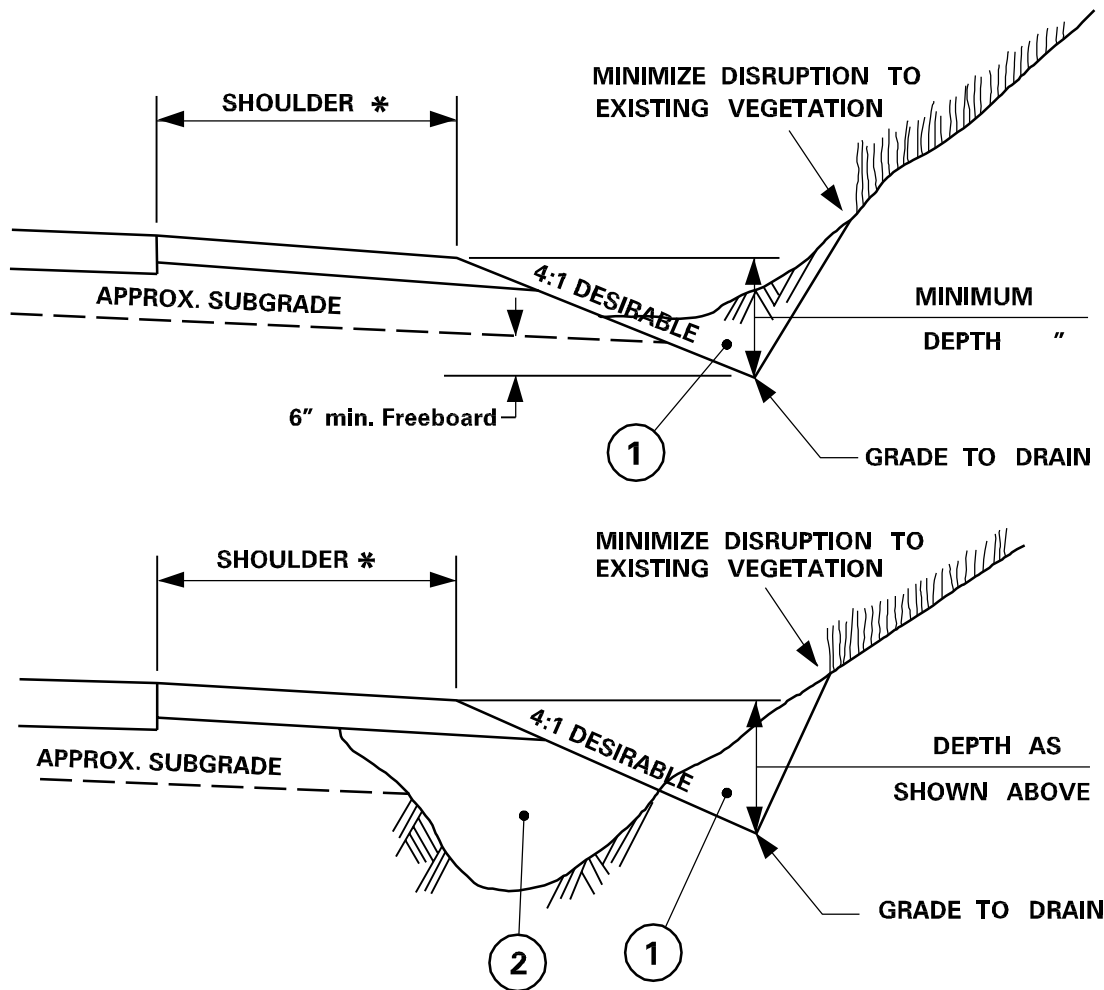
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MEDIANS, SHOULDERS, AND DITCHES

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**LEGEND**

① Item 229001-000, Shoulders & Ditches

This operation is intended to be minor shaping and scarifying of existing shoulder material plus shaping of ditches for proper drainage without leaving ditch soil on the shoulder area. This operation also includes cleaning of existing structure outlets and inlets.

② Item 211008-000, Rock Borrow Excavation

The intent of this item is to provide proper foundation for the shoulder while restoring the original shoulder width reduced by erosion. Additional material, as directed by the engineer, may be required by recent erosion and will be paid for as 211008- , Rock Borrow Excavation.

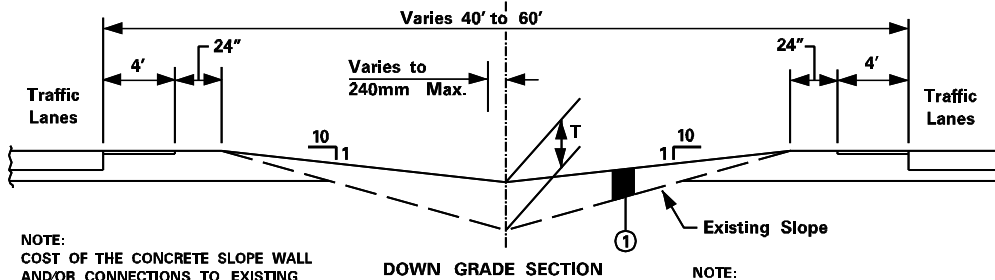
\* WIDTH, SLOPE, AND MATERIAL AS SPECIFIED ON TYPICAL SECTIONS AND SHOULDER RECONSTRUCTION DETAIL.

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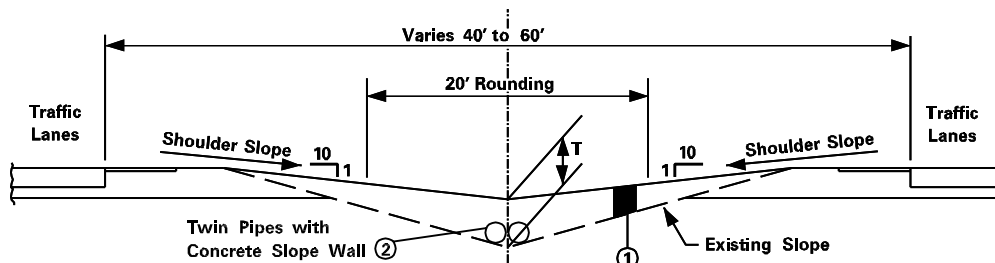
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NOTE:  
COST OF THE CONCRETE SLOPE WALL AND/OR CONNECTIONS TO EXISTING INLETS WILL BE INCLUDED IN THE UNIT PRICE BID FOR ITEM 604- 010200A2.

DOWN GRADE SECTION

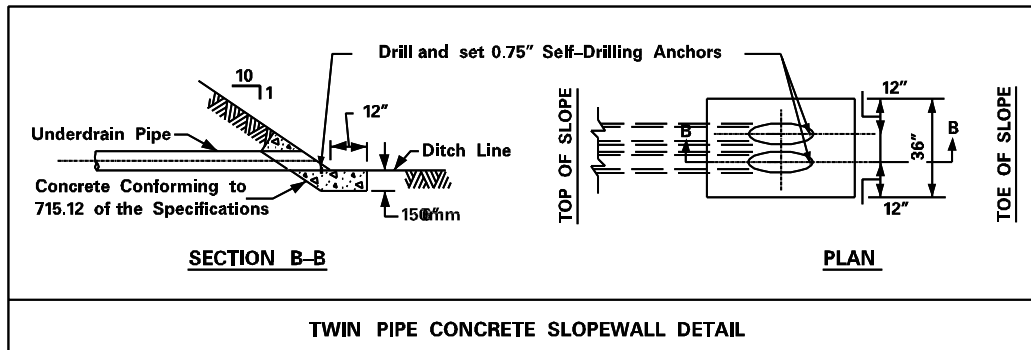
NOTE:  
COMPACTION FOR THE TWIN PIPES IN THE MEDIAN MODIFICATION WILL BE BY VISUAL INSPECTION ON THIS PROJECT.



LEGEND

- ① ITEM 211001-000, UNCLASSIFIED BORROW EXCAVATION
- ② ITEM 604001-006, 8 INCH METALIC COATED CURRUGATED STEEL PIPE,

T = 16.8" for 40' Median  
T = 26" for 60' Median



NOTES:

All modifications are to be seeded, mulched, and fertilized. Fertilizer, seeding, and mulching will be as specified in Section 652 of the Standard Specifications. No additional payment will be made for this work. The cost of this work will be included in the unit bid price for 211001-000, Unclassified Borrow Excavation.

Existing guardrail is to be removed prior to grading for median modifications. Drums will be placed on 25' centers along the shoulders for the entire length of the modification until the guardrail has been re-installed. All work related to the median modifications, ie, removing existing guardrail, adjusting inlets, installing pipes, grading, seeding, mulching, fertilizing, concrete slope walls, and installing or resetting guardrail, should be completed in such a manner as to be a continuous operation. The proposed guardrail is to be re-established within 72 hours (3 days) from initial removal.

If the guardrail is not re-established after three days and the adjacent lane is open to traffic, the contractor is required to install a positive barrier system consisting of temporary concrete barrier attached to the bridge parapet walls by approved connections and approach end treatments. This positive barrier system will remain in place until the guardrail is permanently installed. The cost of this work will be incidental to Item 211001-000 and no additional payment will be made.

All details and notes from Standard Detail Sheet GR8MS shall apply to this project.

Where existing median underdrain outlet pipes are in the proposed median modification location, the outlet pipes are to be connected to the proposed twin pipes or existing inlets and modified to allow for proper drainage as directed by the project engineer. No additional payment will be made for this work. Cost to be included in the bid price for Item 211001-000, Unclassified Borrow Excavation.

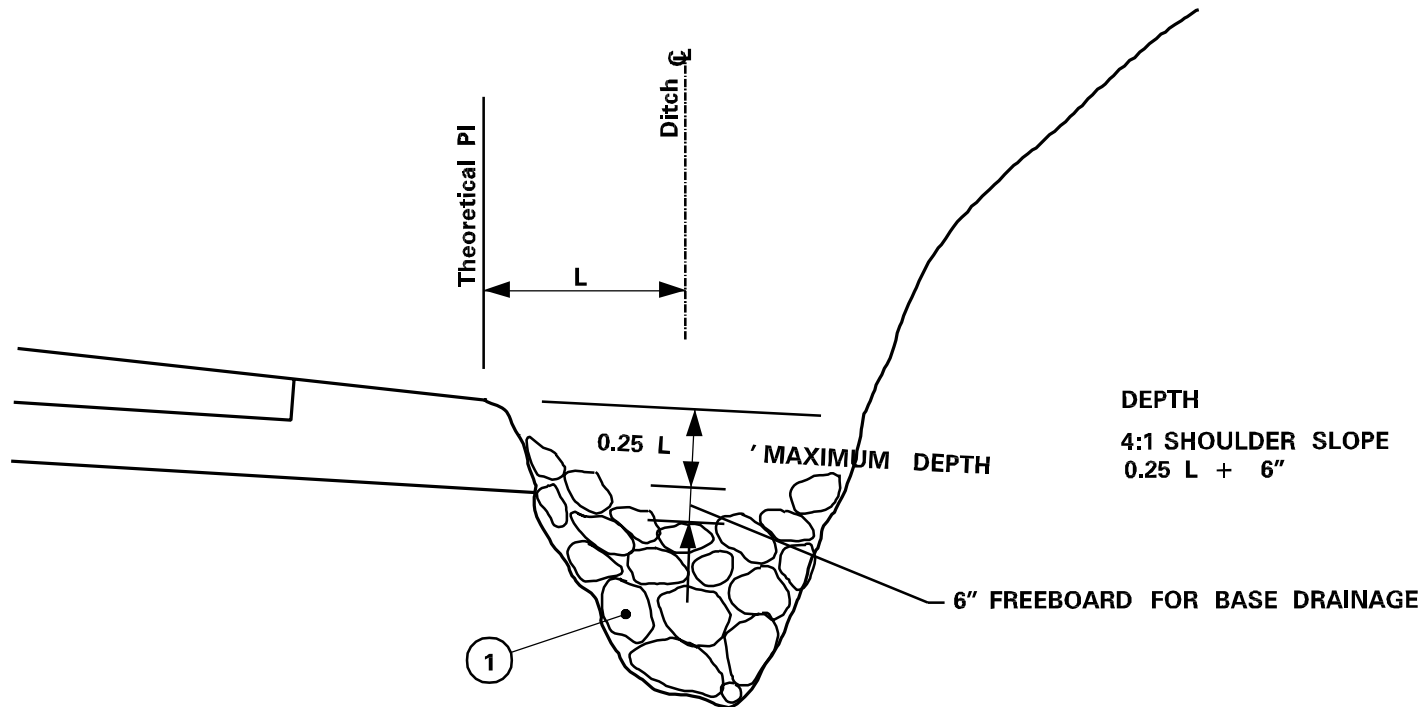
For length of modification, see Median Modification Table.

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① Item 211008-000, ROCK BORROW EXCAVATION

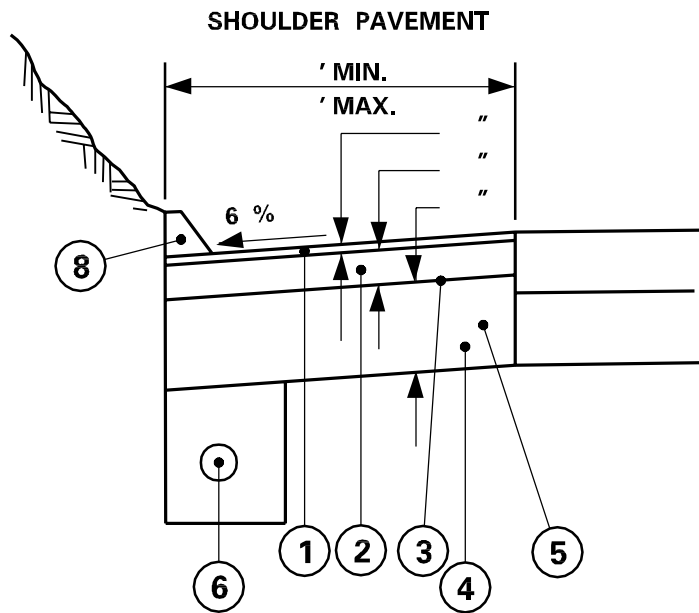
The intent of this operation is to eliminate hazardous ditch areas where erosion, especially on steep grades, has deepened the ditches beyond the limits of safe vehicle operation. The maximum size of rock in the top layer should be 4"; however, larger rock will be permitted in lower layers as appropriate for the conditions.

State Project No.

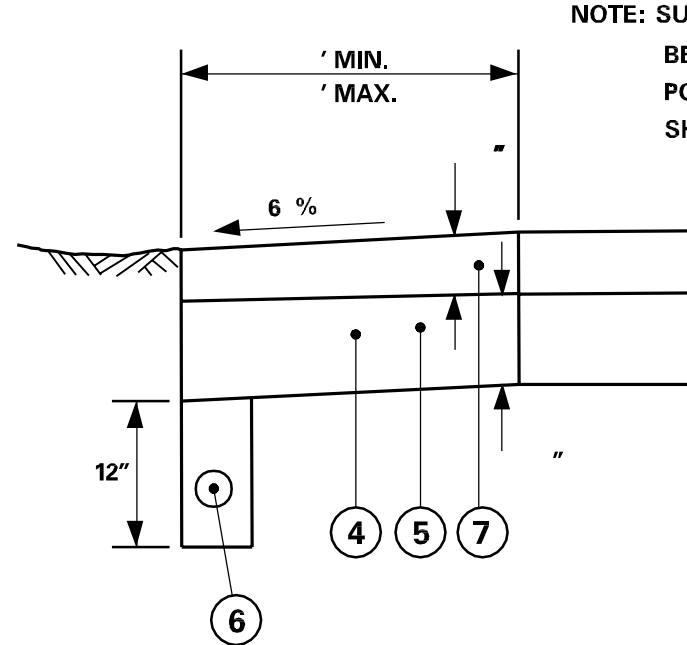
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CURB SECTION ALONG HILL



SHOULDER IN FLAT AREA

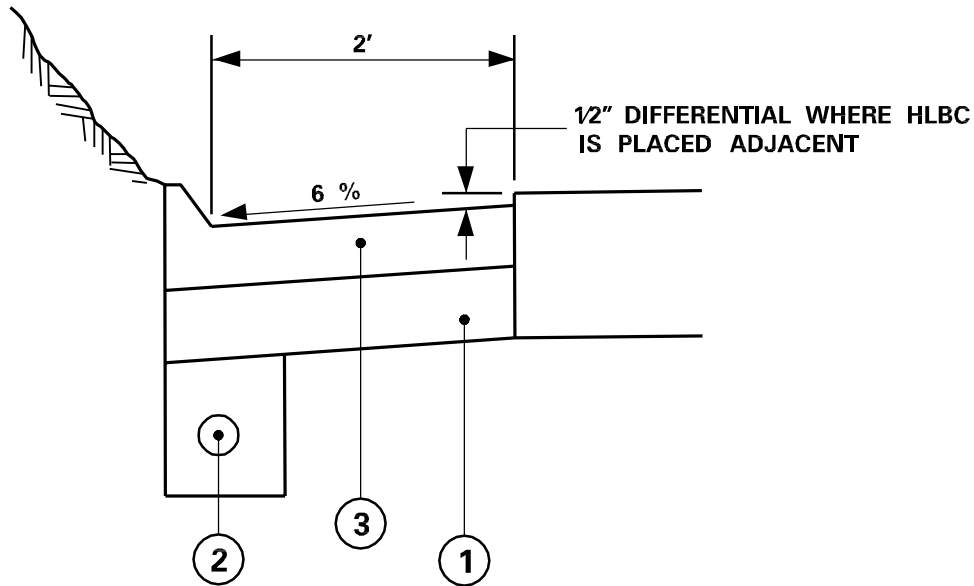
- ① ITEM 401002- , HOT-MIX ASPHALT WEARING COURSE, TYPE
- ② ITEM 401001- , HOT-MIX ASPHALT BASE COURSE, TYPE
- ③ ITEM 409002-001, BITUMINOUS MATERIAL, GAL. PER S.Y.
- ④ ITEM 307001-00 , AGGREGATE BASE COURSE, CLASS
- ⑤ ITEM 207001-001, UNCLASSIFIED EXCAVATION
- ⑥ ITEM 606025- , INCH UNDERDRAIN PIPE OR ITEM 606020- FABRIC UNDERDRAIN, AS SPECIFIED IN PLANS
- ⑦ ITEM 308001-00 , AGGREGATE BASE COURSE, CLASS
- ⑧ ITEM 610005- , BITUMINOUS CURBING, TYPE

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NOTE: SURFACE DRAINAGE TO BE COLLECTED IN A POSITIVE MANNER AS SHOWN IN PLANS.

- ① ITEM 307001-00 , AGGREGATE BASE COURSE, CLASS
- ② ITEM 606025- , INCH UNDERDRAIN PIPE OR ITEM 606020- , FABRIC UNDERDRAIN, AS SPECIFIED IN PLANS
- ③ ITEM 610003- , COMBINATION CONCRETE CURB AND GUTTER, TYPE

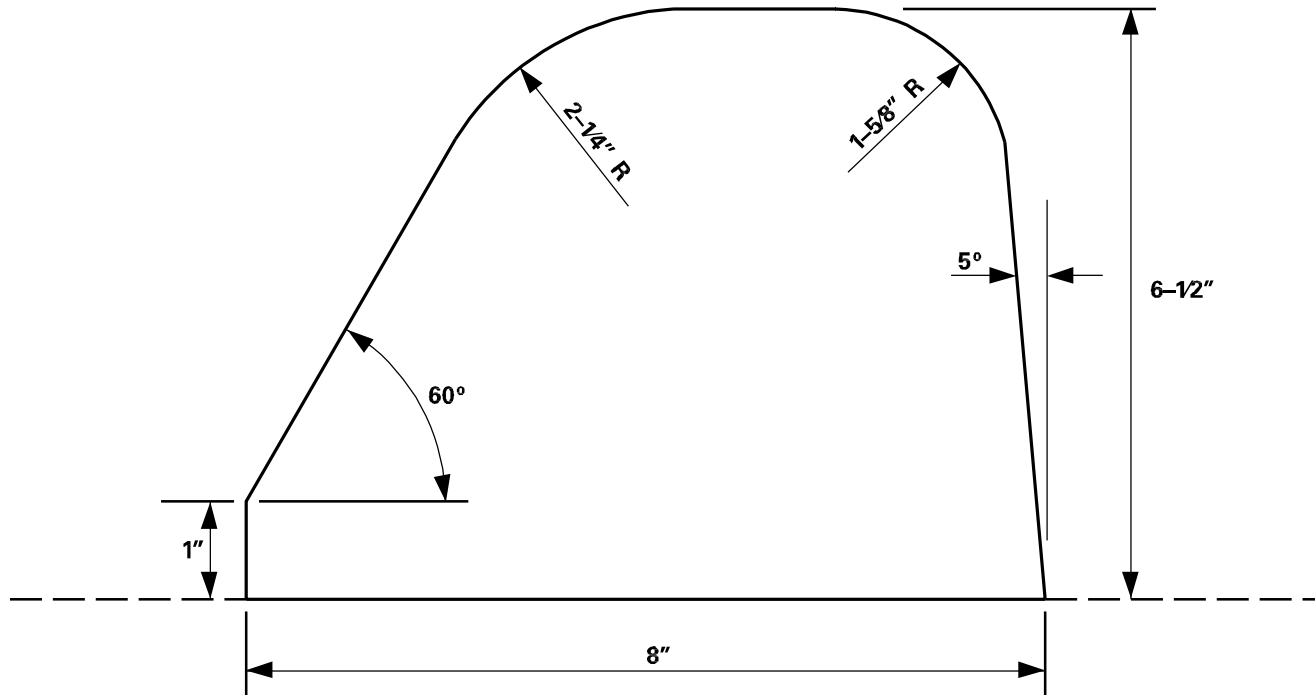
FOR ADDITIONAL DIMENSIONS SEE STANDARD PVT6  
THIS DETAIL IS TO BE USED IN SPECIAL CASES ONLY.

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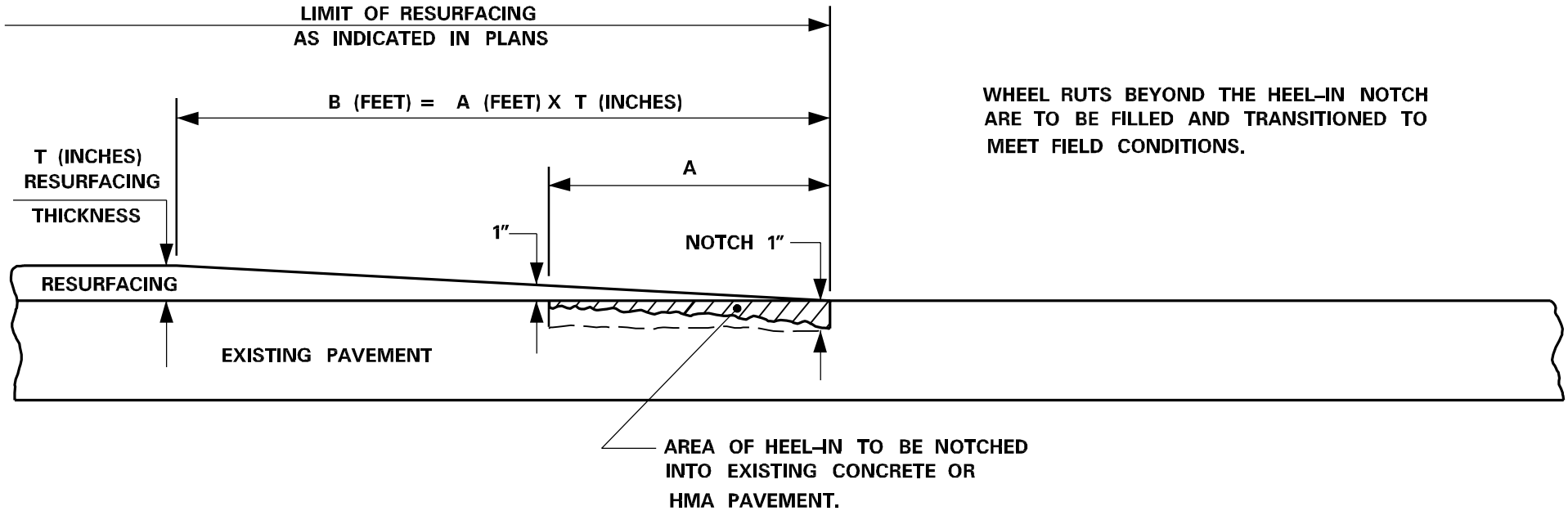
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ITEM 610005-002, BITUMINOUS CURB, TYPE II

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1. PAYMENT FOR HEEL-IN TO BE INCLUDED IN VARIOUS PAY ITEMS OF THIS PROJECT.
2. THIS DETAIL TO BE USED AT TERMINI OF RESURFACING PROJECTS AND AT ALL TERMINI FOR SKIP RESURFACING PROJECTS.
3. THIS DETAIL TO BE USED AT LOCATIONS FOR HEEL-IN INTERSECTIONS OF THIS PROJECT.
4. THE FOLLOWING NUMBER(S) OF HEEL-INS FOR THE MAINLINE ON THIS PROJECT SHALL BE:  
PERPENDICULAR  
SKEWED AT °

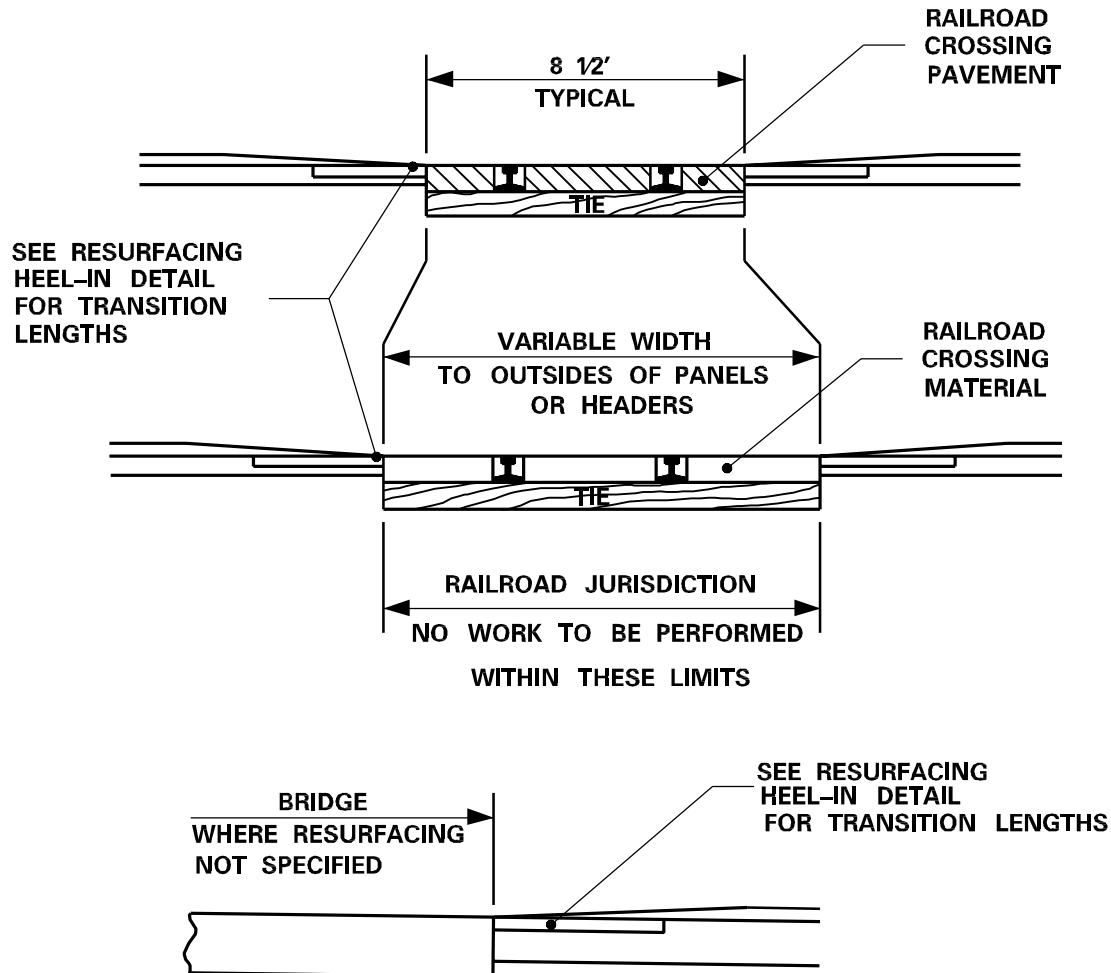
POSTED SPEED LIMIT	A
25mph	12'
30 TO 35mph	14'
40 TO 45mph	16'
50 TO 55mph	18'

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## RAILROAD CROSSING HEEL-IN:

1. THE CONTRACTOR SHALL OBTAIN A RAILROAD FLAGGER(S) FROM THE AFFECTED RAILROAD PER SECTION 107.8, TO PREFORM THE SOLE TASK OF PROVIDING WARNINGS TO THE WORKMEN OF APPROACHING TRAINS WHILE WORK IS BEING PERFORMED AT THE RAILROAD CROSSING. THE COST SHALL BE INCLUDED IN THE SECTION 401 ITEMS.
2. THE CONTRACTOR SHALL AVOID DAMAGE TO THE CROSSING SURFACE MATERIAL AND ALL OTHER RAILROAD FACILITIES.
3. THIS HEEL-IN DETAIL APPLIES AT ALL TRACKS ENCOUNTERED ON THE PROJECT.
4. No work shall be performed within 10' of the center of the Railroad track without permission of the affected Rail Road.

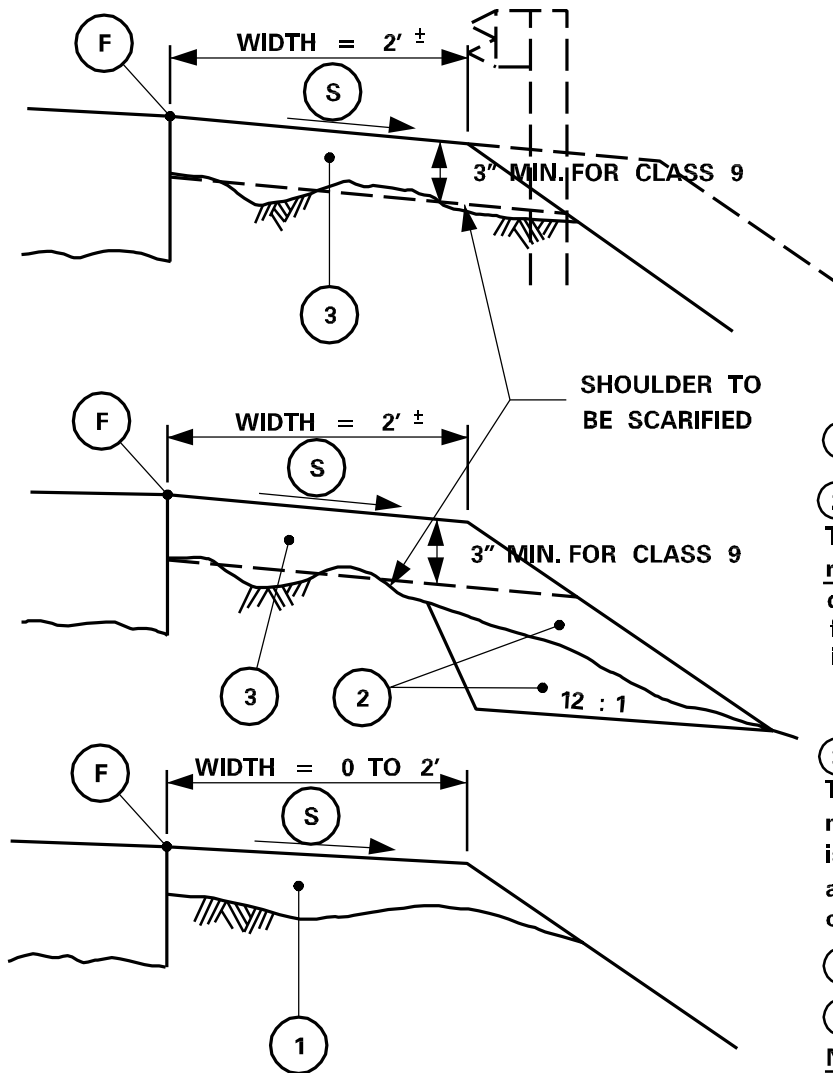
State Project No.

Federal Project No.

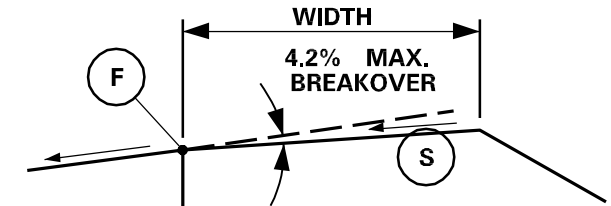
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NORMAL SECTIONS

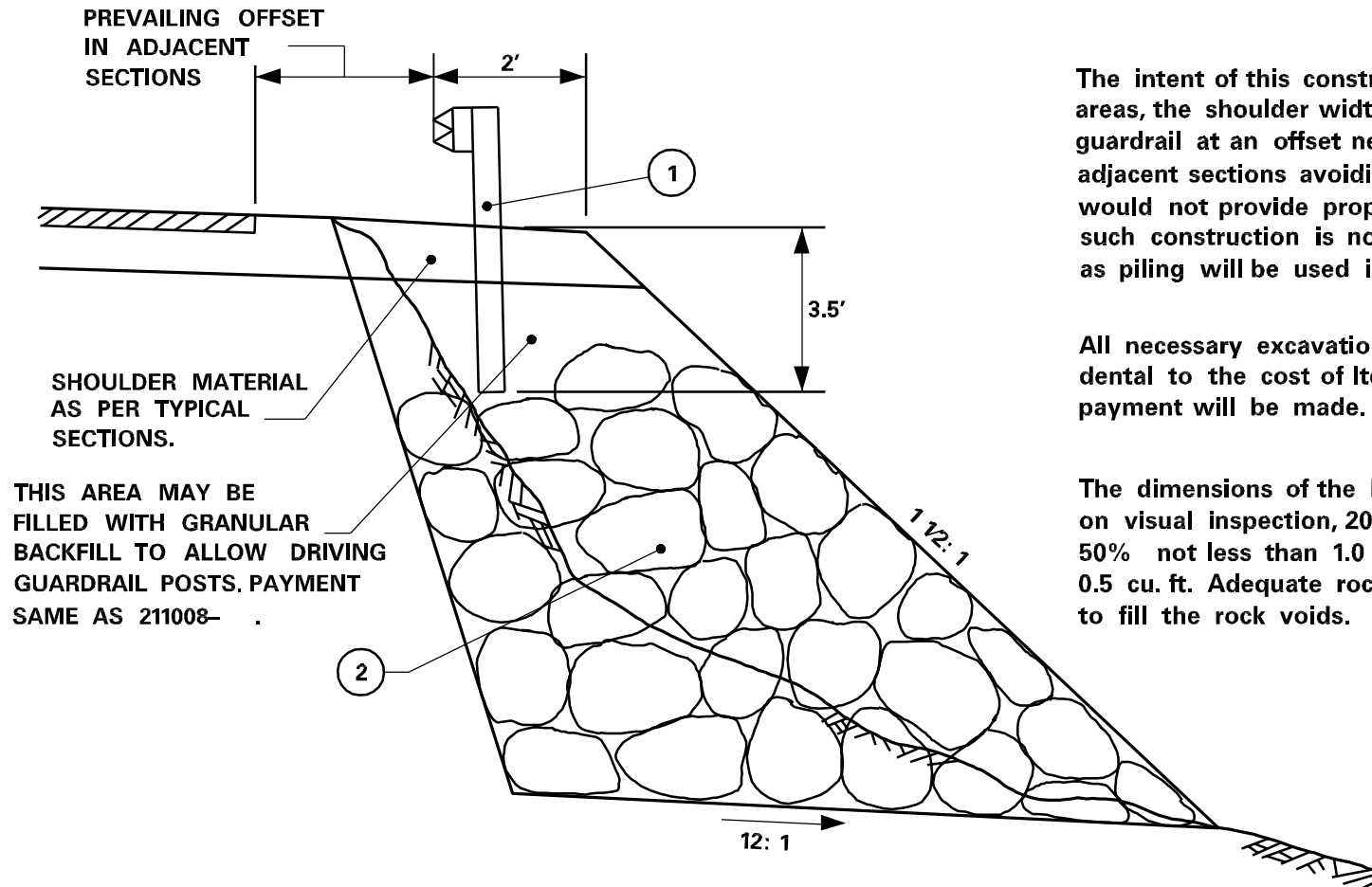


SUPERELEVATED SECTIONS-HIGH SIDE

**LEGEND**

- ① ITEM 401001- , HOT-MIX ASHALT BASE COURSE, TYPE
- ② ITEM 211008-000, ROCK BORROW EXCAVATION  
The intent of this item is to provide proper foundation for the shoulder while restoring the original shoulder width reduced by erosion. Additional material, as directed by the Engineer, may be required by recent erosion and will be paid for as 211008-000. Excavation of benches for placing, 211008-000 will be included in 211008-000.
- ③ ITEM 308001 - , AGGREGATE BASE COURSE, CLASS  
This item includes any necessary removal of existing shoulder material to a minimum of 3" below the finished pavement elevation when Class 9 aggregate is specified. Material removed shall be reused within the project limits or wasted as directed by the Engineer. Scarifying shall be in accordance with Section 308.3.1 of the Specifications.
- (F) FINISHED PAVEMENT ELEVATION
- (S) SHOULDER SLOPE  
Normal Sections : 6 %.  
Superelevated : Match rate of superelevation or reduce as shown above. Minimum slope to be 3/4" per foot, on low side of super-elevation.  
Paved Shoulders : 4 % or super-elevated.

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The intent of this construction is to restore, in limited areas, the shoulder width sufficiently to allow placing guardrail at an offset nearly equal to that prevailing in adjacent sections avoiding situations where posts would not provide proper strength. In areas where such construction is not practical, special designs such as piling will be used if specified in the plans.

All necessary excavation of the fill bench will be incidental to the cost of Item 211008-000, and no separate payment will be made.

The dimensions of the Rock Borrow shall be, based on visual inspection, 20% not less than 1.5 cu. ft., 50% not less than 1.0 cu. ft. and 30% not less than 0.5 cu. ft. Adequate rock fragments shall be included to fill the rock voids.

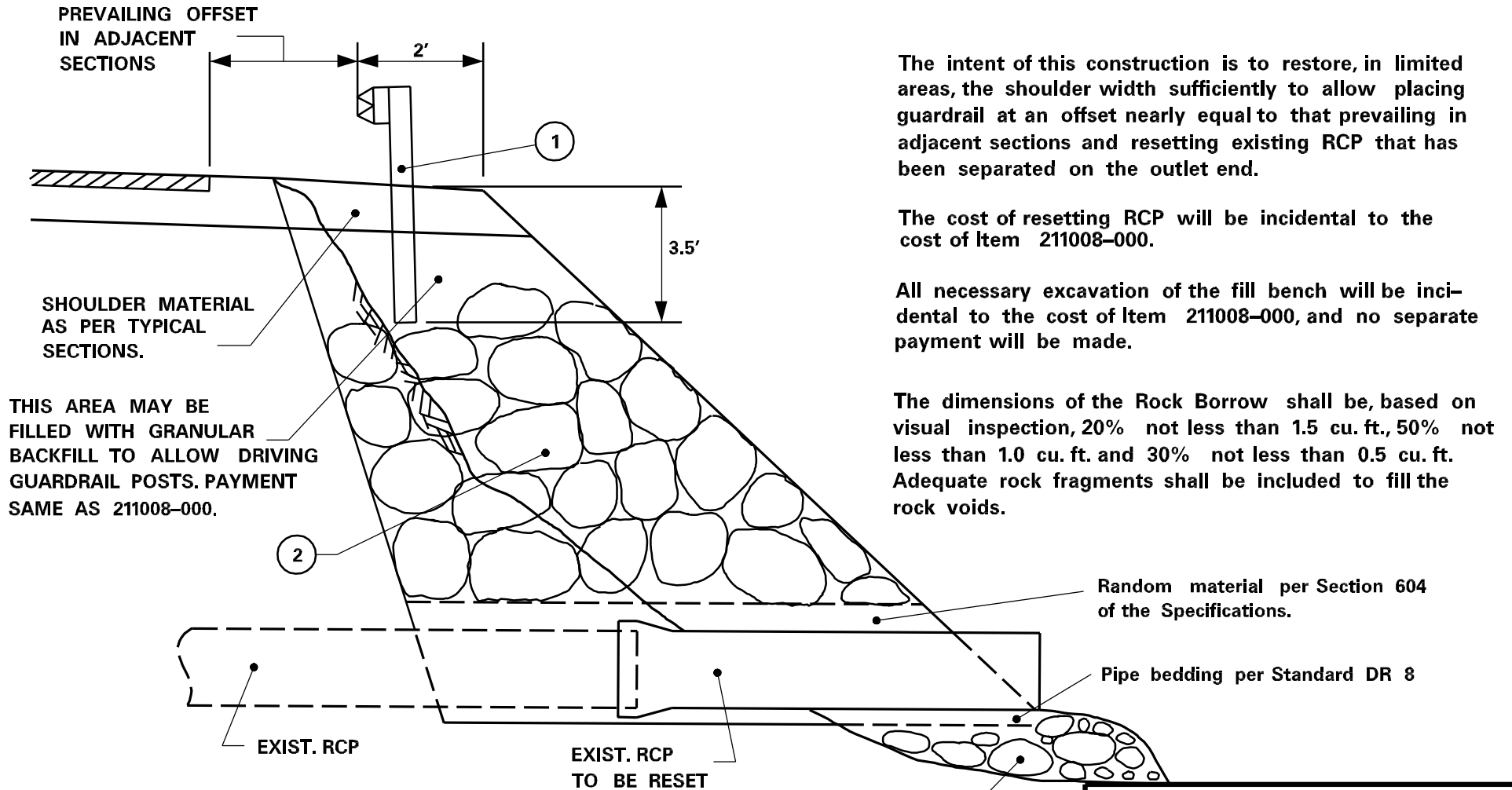
- 1 ITEM 607001-001, TYPE I GUARDRAIL, CLASS (AS SHOWN ON PLANS)
- 2 ITEM 211008-000, ROCK BORROW EXCAVATION

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The intent of this construction is to restore, in limited areas, the shoulder width sufficiently to allow placing guardrail at an offset nearly equal to that prevailing in adjacent sections and resetting existing RCP that has been separated on the outlet end.

The cost of resetting RCP will be incidental to the cost of Item 211008-000.

All necessary excavation of the fill bench will be incidental to the cost of Item 211008-000, and no separate payment will be made.

The dimensions of the Rock Borrow shall be, based on visual inspection, 20% not less than 1.5 cu. ft., 50% not less than 1.0 cu. ft. and 30% not less than 0.5 cu. ft. Adequate rock fragments shall be included to fill the rock voids.

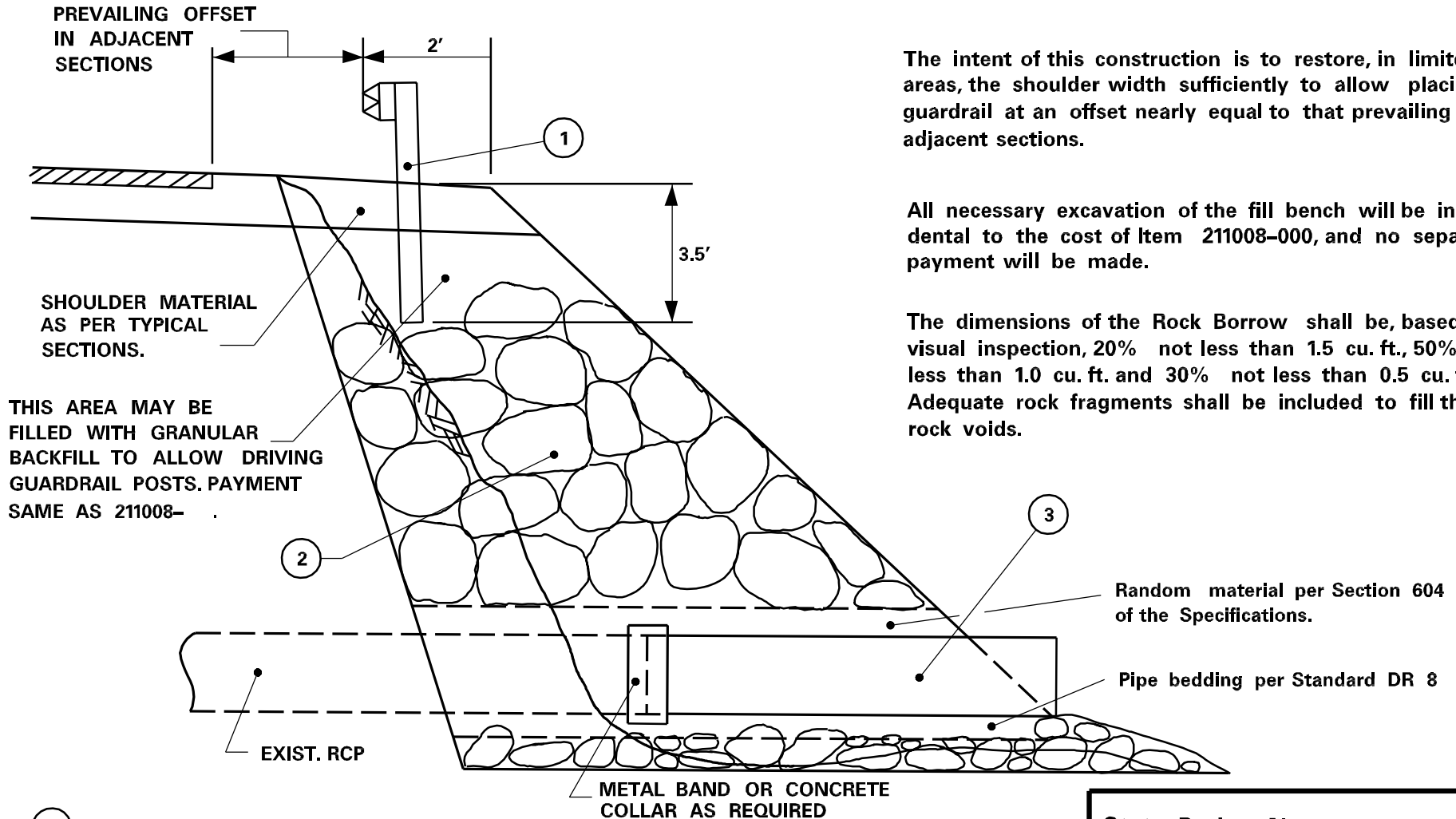
- 1 ITEM 607001-001, TYPE I GUARDRAIL, CLASS (AS SHOWN ON PLANS)
- 2 ITEM 211008-000, ROCK BORROW EXCAVATION

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The intent of this construction is to restore, in limited areas, the shoulder width sufficiently to allow placing guardrail at an offset nearly equal to that prevailing in adjacent sections.

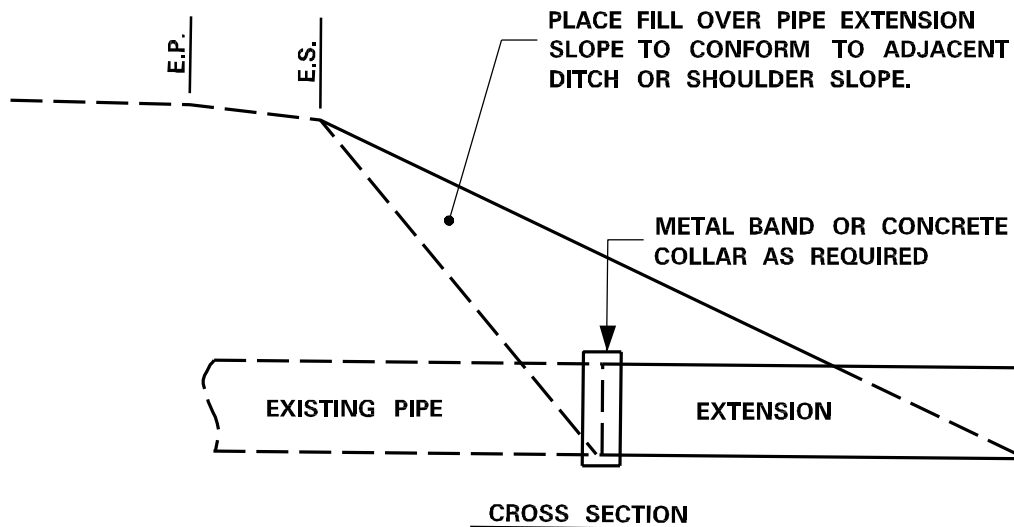
All necessary excavation of the fill bench will be incidental to the cost of Item 211008-000, and no separate payment will be made.

The dimensions of the Rock Borrow shall be, based on visual inspection, 20% not less than 1.5 cu. ft., 50% not less than 1.0 cu. ft. and 30% not less than 0.5 cu. ft. Adequate rock fragments shall be included to fill the rock voids.

- ① ITEM 607001-001, TYPE I GUARDRAIL, CLASS (AS SHOWN ON PLANS)
- ② ITEM 211008-000, ROCK BORROW EXCAVATION
- ③ PIPE (AS SHOWN ON PLANS)

Testing of the pipe material will not be required, however; the Contractor will be required to provide certification that the material meets Section 604 of the Specifications.

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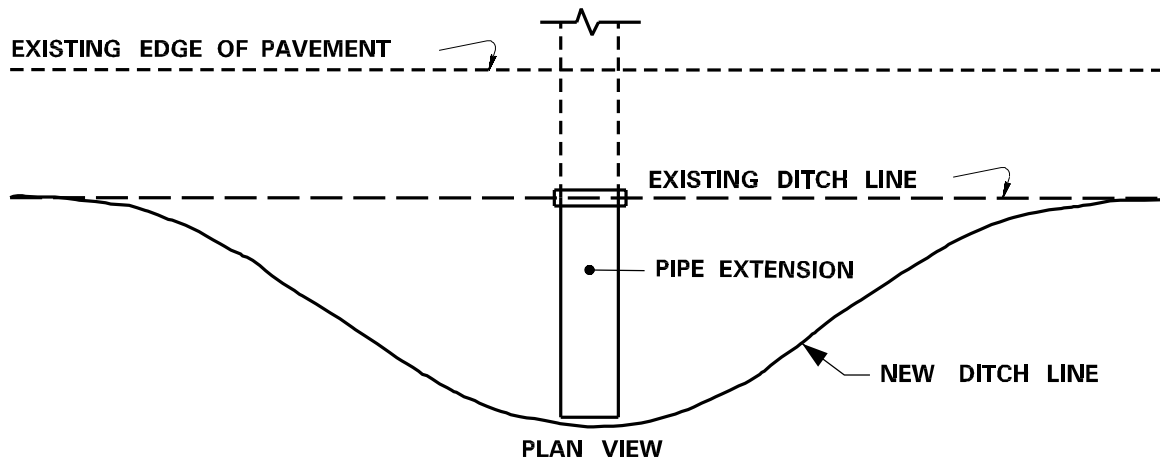


NOTES :

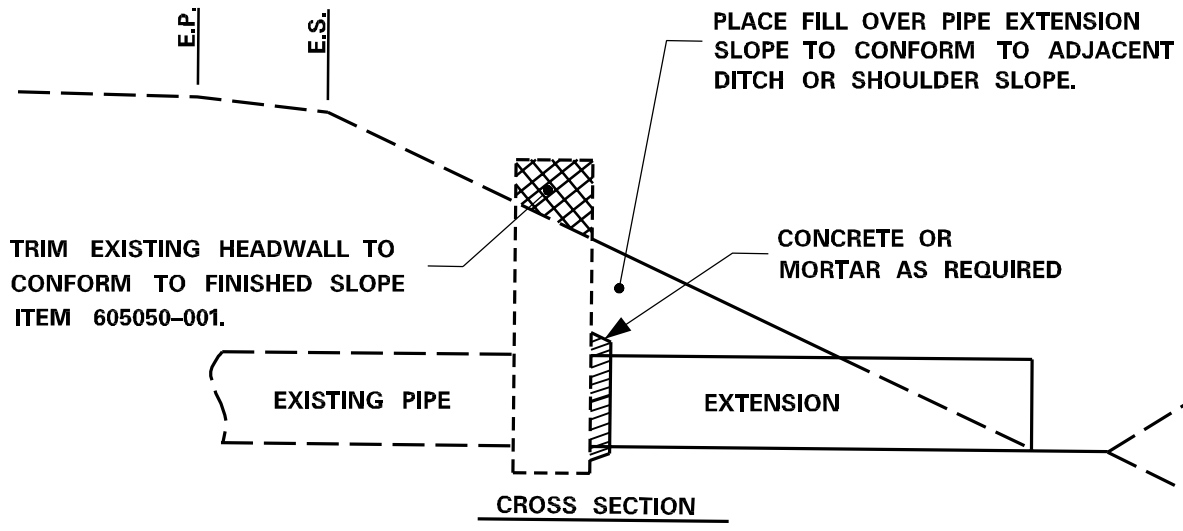
Fill area around pipe extension with suitable random material. Fill is to be placed in six inch loose lifts and compacted a minimum of four passes per lift with a mechanical tamper. Testing of compaction is not required.

The cost of fill material and reshaping of existing ditch to new ditch grade is to be included in the unit bid price for pipe.

The size and type of pipe will be as called for on the plans. Testing of the pipe material will not be required, however; the Contractor will be required to provide certification that the material meets Section 604 of the Specifications.



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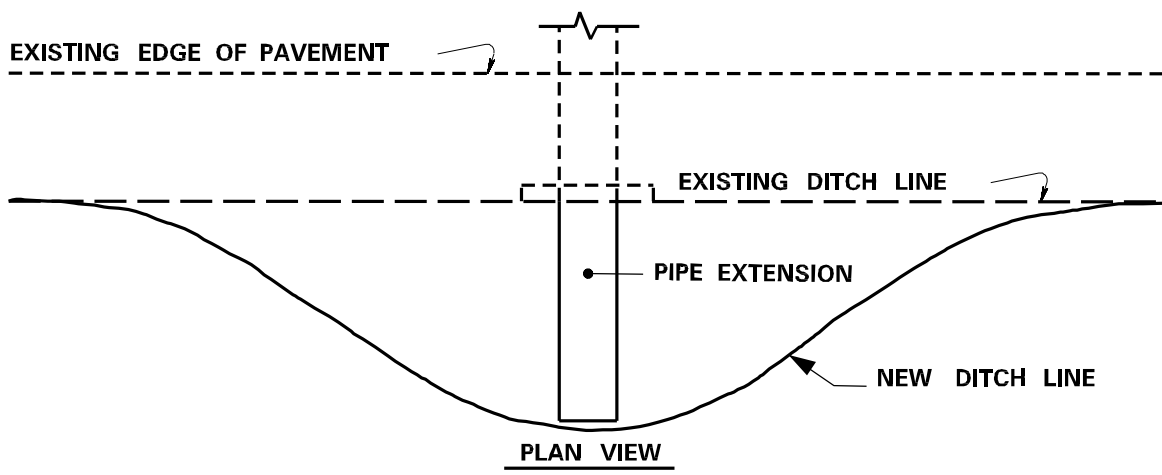


NOTES :

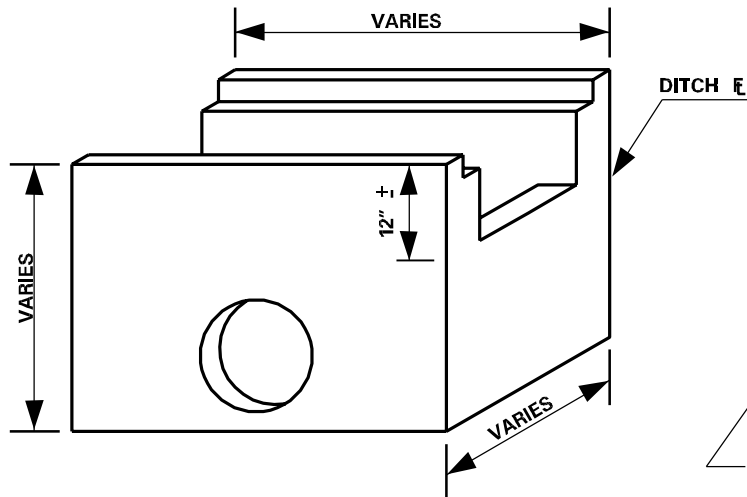
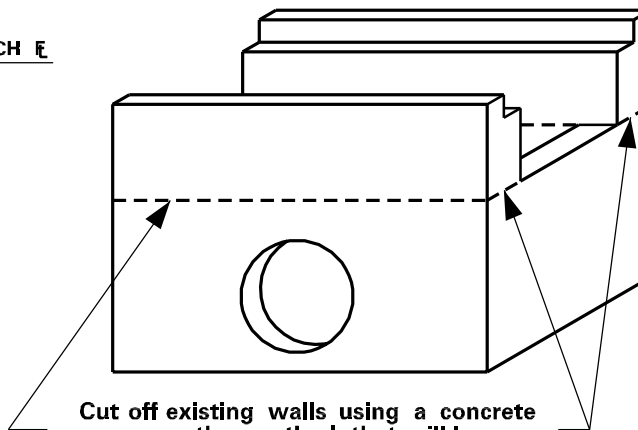
Fill area around pipe extension with suitable random material. Fill is to be placed in six inch loose lifts and compacted a minimum of four passes per lift with a mechanical tamper. Testing of compaction is not required.

The cost of fill material and reshaping of existing ditch to new ditch grade is to be included in the unit bid price for pipe.

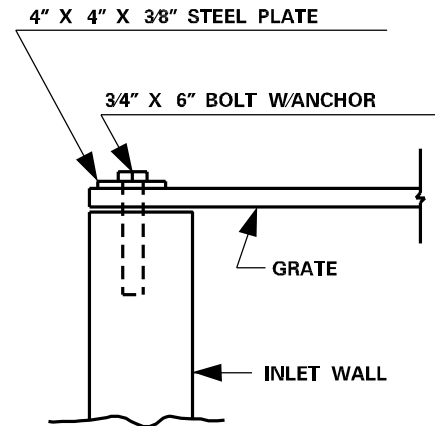
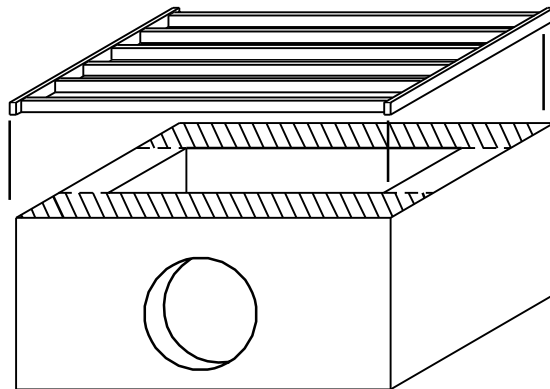
The size and type of pipe will be as called for on the plans. Testing of the pipe material will not be required, however; the Contractor will be required to provide certification that the material meets Section 604 of the Specifications. Testing of the concrete or mortar is not required.



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EXISTING INLET

Cut off existing walls using a concrete saw or other method that will leave a smooth surface.

ANCHOR DETAILNOTES :

The Contractor will perform all work and supply all materials necessary to complete inlet modification as specified.

Use standard Type G Inlet grate of sufficient size to cover inlet opening.

Grate to be fabricated per Type G Inlet Standard Detail.

Anchors to be self-drill such as Star 3400 series Self-Drill Shield,

Phillips Red Head Self-Drill Anchor or equal as approved by the Engineer.

Anchors to be placed in two sides (opposite). Testing requirements for the anchors has been waived.

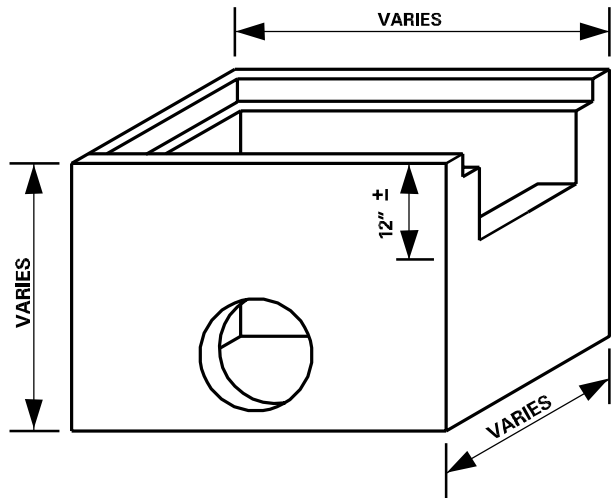
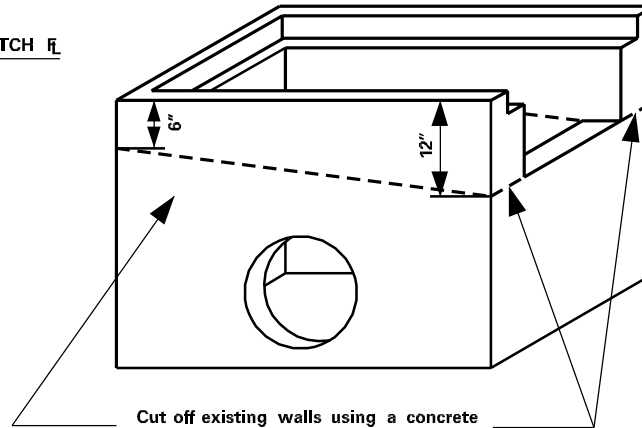
All work will be paid for as Item 605012-001, Adjust Inlet Type C, per each.

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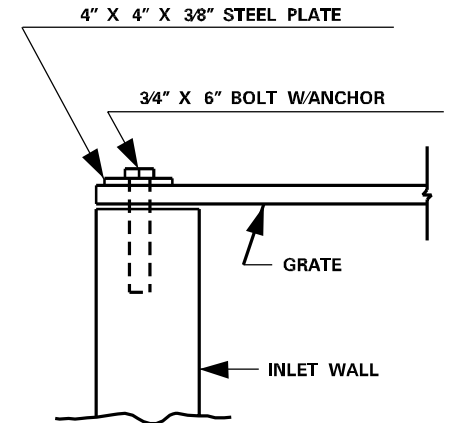
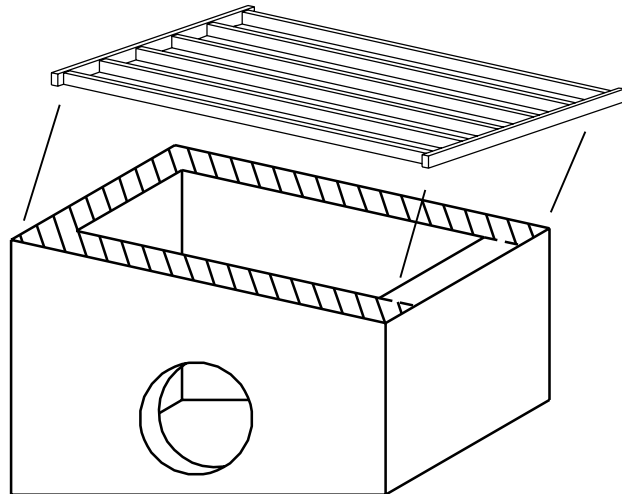
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EXISTING INLETDITCH  $\square$ 

Cut off existing walls using a concrete saw or other method that will leave a smooth surface.

ANCHOR DETAILNOTES :

The Contractor will perform all work and supply all materials necessary to complete inlet modification as specified.

Use standard Type G Inlet grate of sufficient size to cover inlet opening.

Grate to be fabricated per Type G Inlet Standard Detail.

Anchors to be self-drill such as Star 3400 series Self-Drill Shield, Phillips Red Head Self-Drill Anchor or equal as approved by the Engineer.

Anchors to be placed in two sides (opposite). Testing requirements for the anchors has been waived.

All work will be paid for as Item 605012-001, Adjust Inlet Type C, per each.

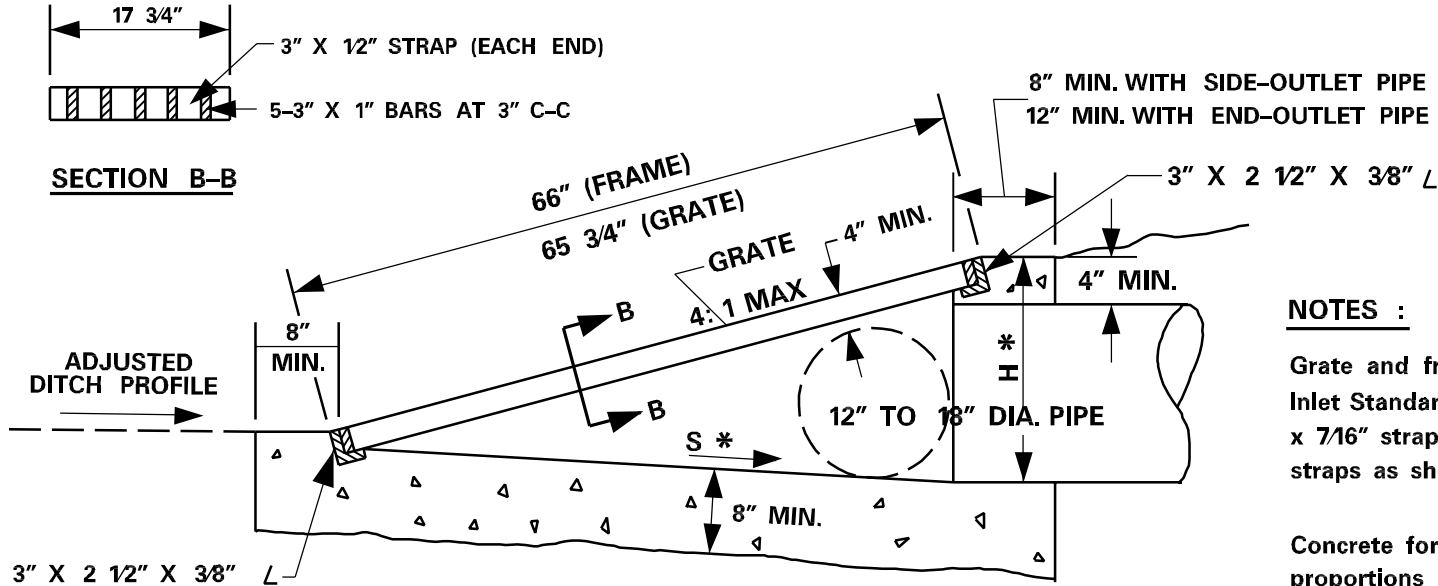
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**NOTES :**

Grate and frame to be fabricated as per Type G Inlet Standard Detail. 2 3/4" x 1" bars and 2 3/4" x 7/16" straps may be substituted for the bars and straps as shown hereon.

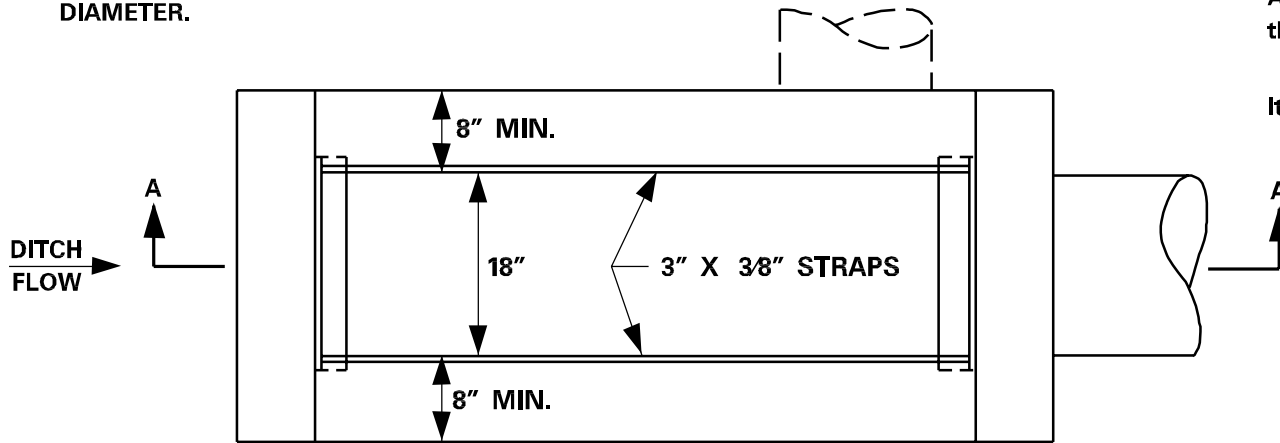
Concrete for constructing the inlet shall have mix proportions in accordance with Section 605 of the Specifications; however, testing will not be required.

All work, including pipe extension if called for on the plans, is to be included in the cost of inlet.

Item 605051-001, Type U Inlet, per each.

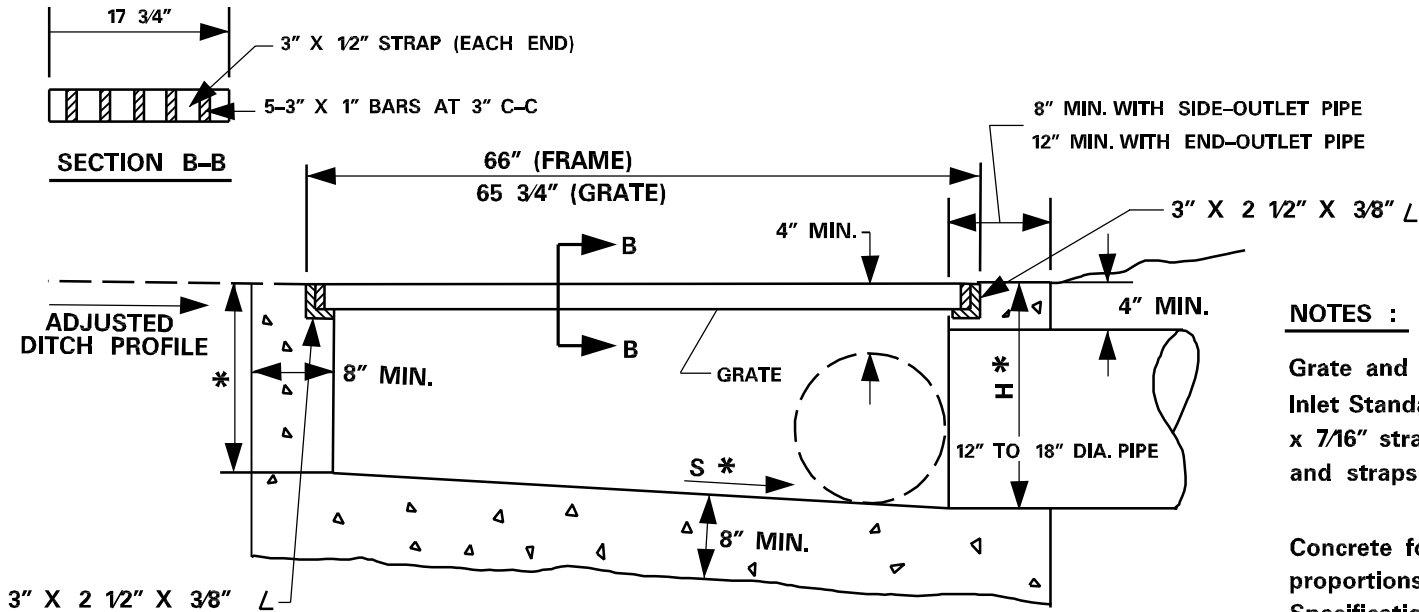
\* SLOPE & HEIGHT VARIES TO ACCOMIDATE PIPE DIAMETER.

**SECTION A-A**



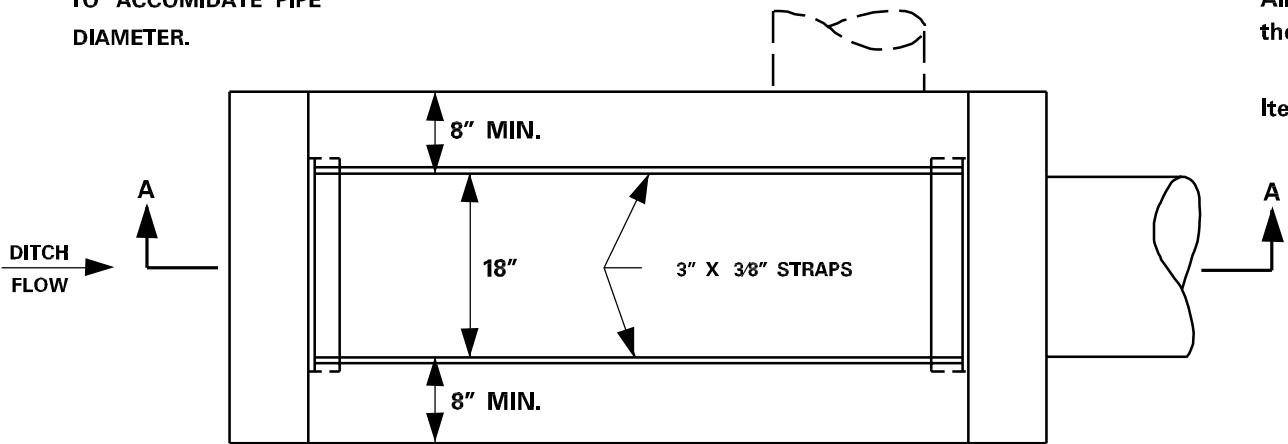
**PLAN (GRATE NOT SHOWN)**

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\* SLOPE & HEIGHT VARIES TO ACCOMIDATE PIPE DIAMETER.

SECTION A-A



PLAN (GRATE NOT SHOWN)

NOTES :

Grate and frame to be fabricated as per Type G Inlet Standard Detail. 2 3/4" x 1" bars and 2 3/4" x 7/16" straps may be substituted for the bars and straps as shown hereon.

Concrete for constructing the inlet shall have mix proportions in accordance with Section 605 of the Specifications; however, testing will not be required.

All work, including pipe extension if called for on the plans, is to be included in the cost of inlet.

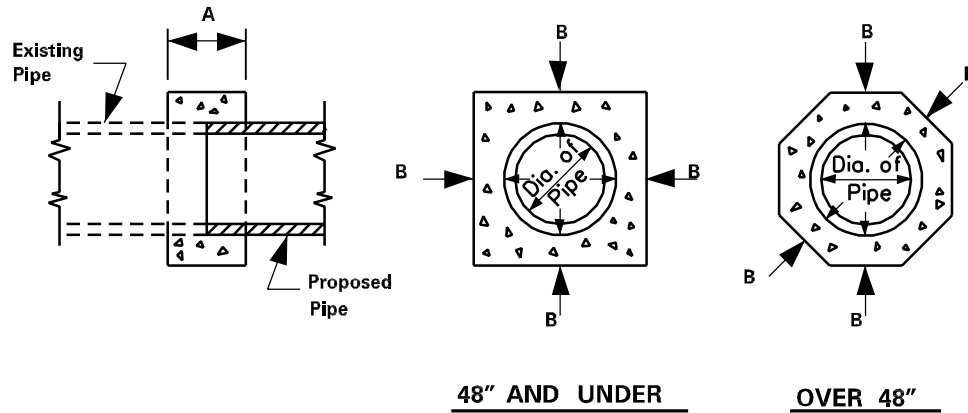
Item 605051-001, Type U Inlet, per each.

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**NOTES :**

A and B are minimum dimensions. Forming will not be required if minimum dimensions are obtained. Metal connecting bands may be substituted for a concrete collar to join existing and new metal pipes. The cost of metal bands are to be included in the unit bid price for the various pipes.

Concrete for constructing the collar shall be in accordance with Section 715.12 of the Specifications; however, testing will not be required. The cost of concrete collar is to be included in the unit bid price of proposed pipe.

DIAMETER OF PIPE	A	B	CU. YD. CONC.*	DIAMETER OF PIPE	A	B	CU. YD. CONC.*
15"	1'-0"	0'-6"	0.18	48"	2'-0"	1'-0"	2.10
18"	1'-0"	0'-6"	0.21	54"	2'-6"	1'-0"	2.09
21"	1'-0"	0'-6"	0.24	60"	3'-0"	1'-6"	4.31
24"	1'-0"	0'-6"	0.27	72"	3'-0"	1'-6"	5.03
30"	1'-6"	0'-9"	0.75	84"	3'-0"	2'-0"	7.94
36"	1'-6"	0'-9"	0.92	96"	3'-0"	2'-0"	8.90
42"	2'-0"	1'-0"	1.84	108"	3'-0"	2'-0"	9.87

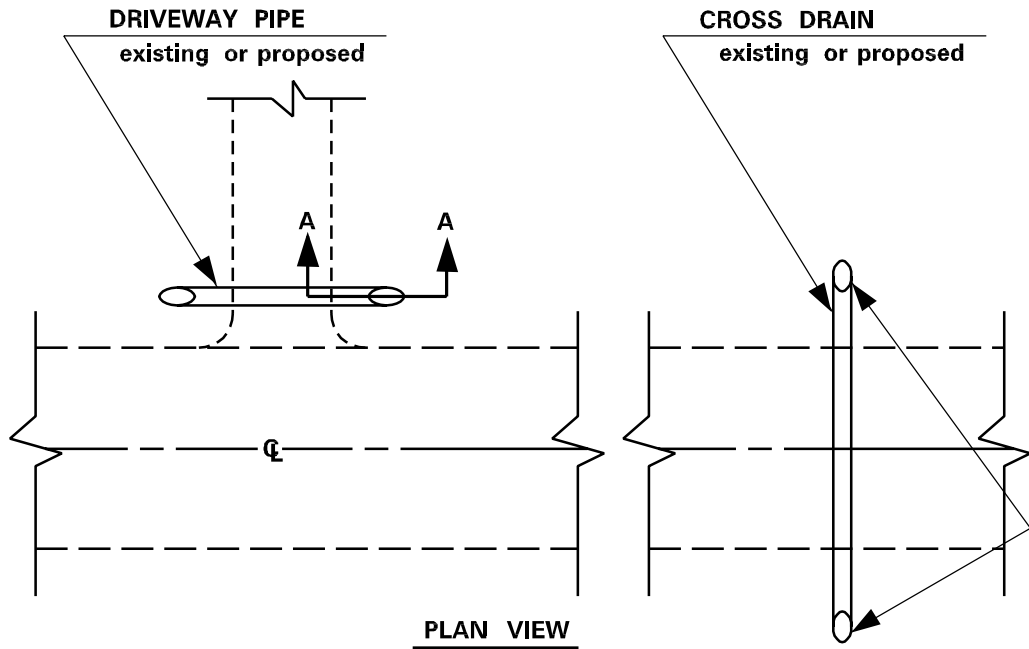
\* FOR INFORMATION ONLY

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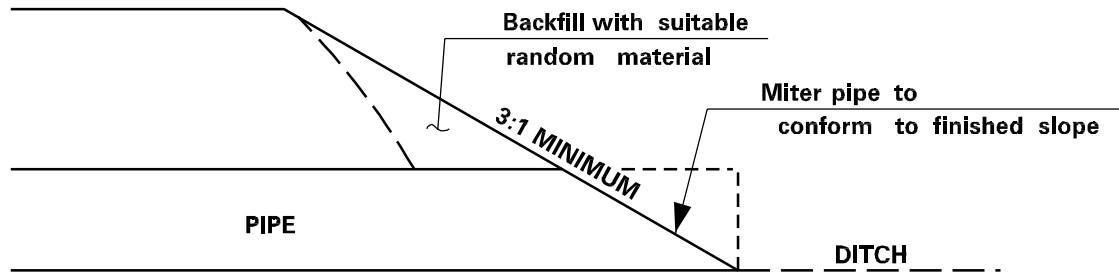
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**NOTES :**

This detail will only apply to the locations designated on the plans. The cost of mitering, site grading, and any fill material required for existing pipe modifications is to be incidental to the various unit bid prices of this project. The cost of mitering and site grading new pipe installations is to be included in the unit bid price of the new pipe.

Miter pipe and site grade to conform to adjacent slope



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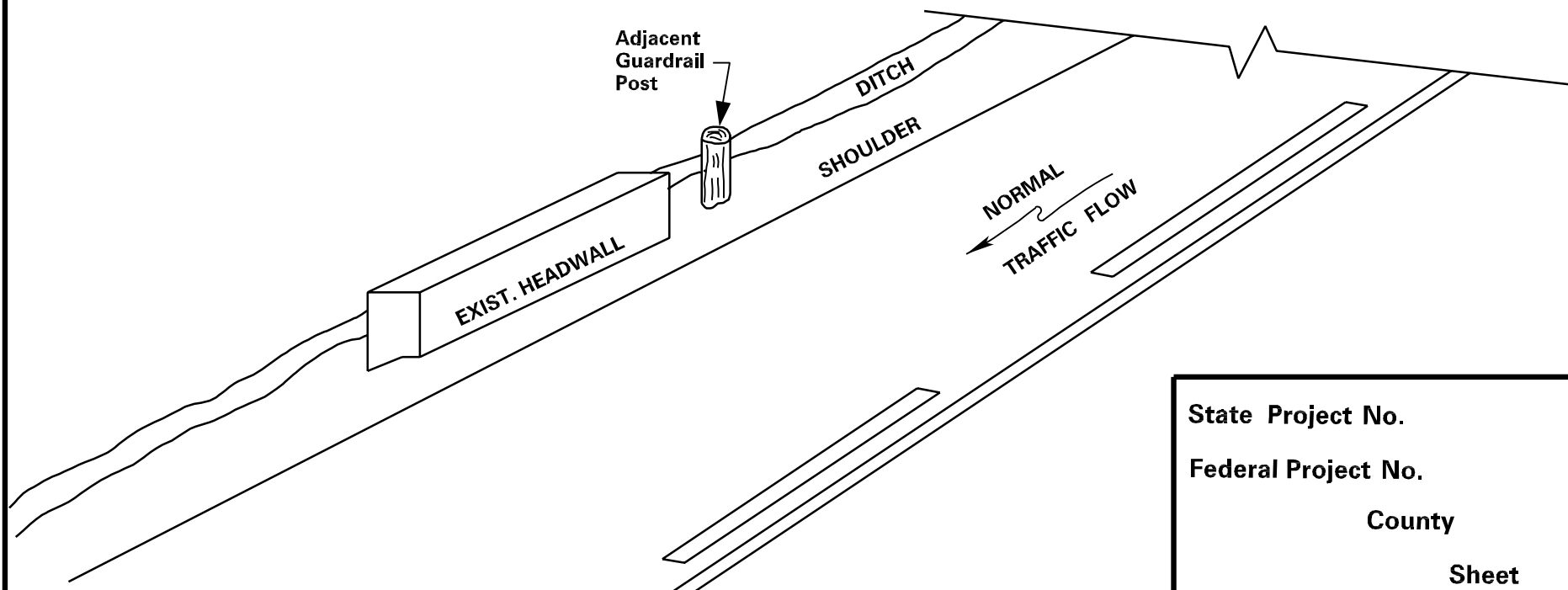
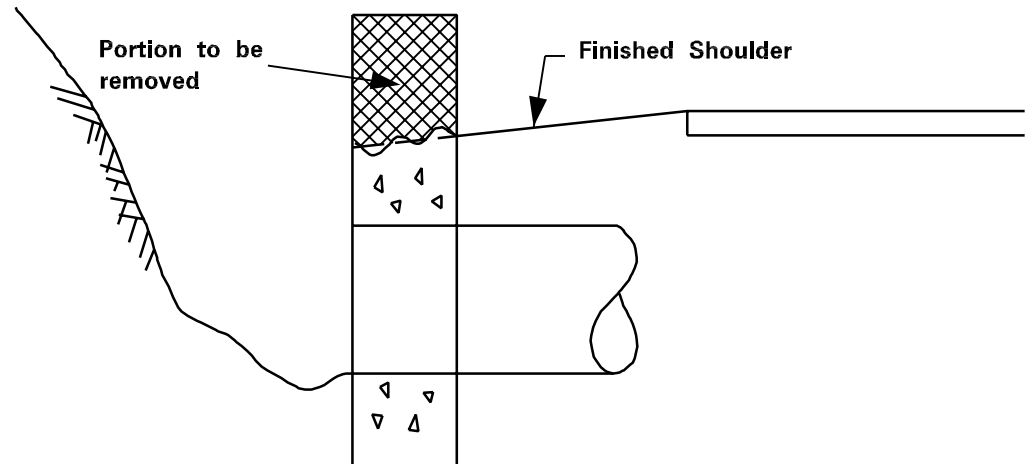
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The intent of this operation is to eliminate roadside hazards formed by concrete headwalls above the finished shoulder elevation on roads where operating speeds are expected to exceed 25mph. The headwalls, as listed in the table, are to be adjusted by removal of the top concrete by jackhammering or by other suitable methods as approved by the Engineer to achieve a top surface free of hazardous sharp edges and to avoid damages to the remaining headwall. Any adjacent guardrail posts which are used only as a hazard warning device are to be removed as a part of this operation.

Payment for this work is to be Item 605050-001 Adjusting Concrete Headwall, per each.



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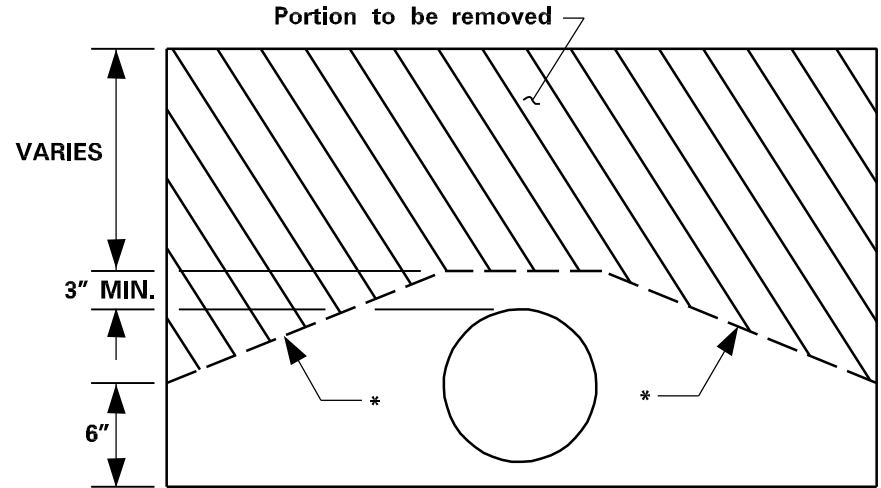
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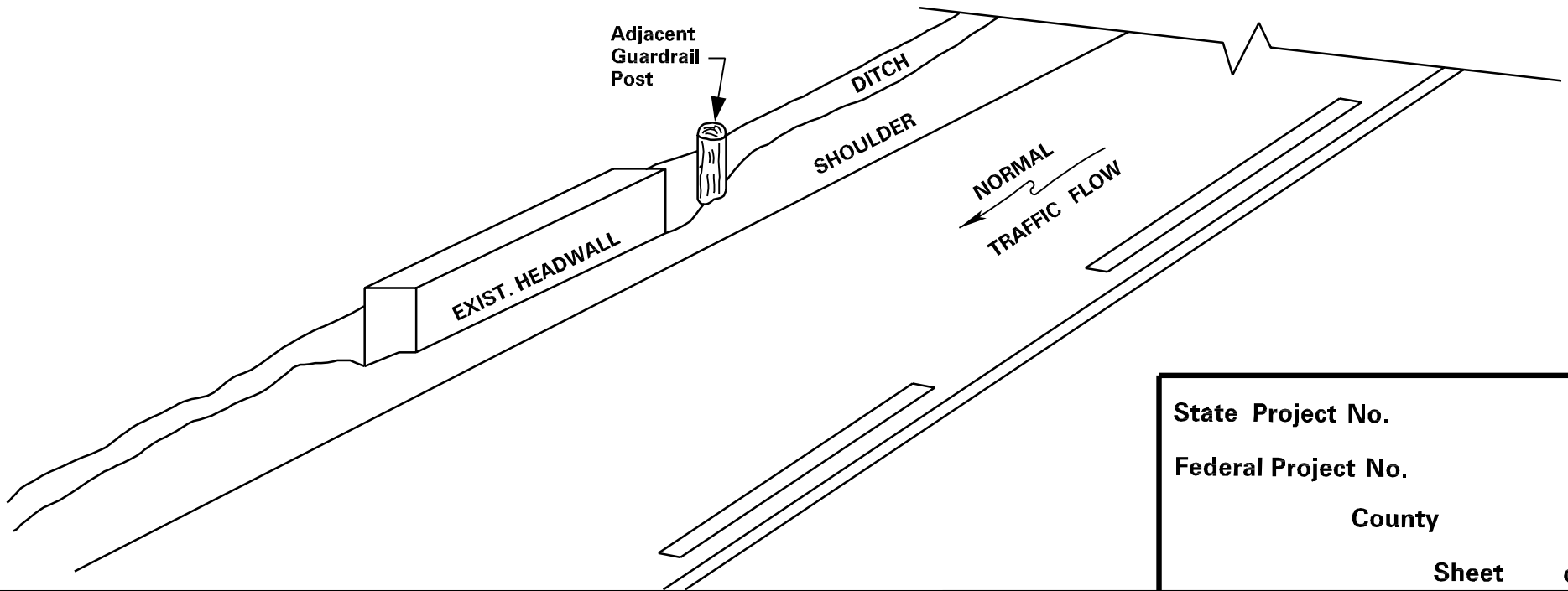
The intent of this operation is to eliminate roadside hazards formed by concrete headwalls above the finished shoulder elevation on roads where operating speeds are expected to exceed 25mph. The headwalls, as listed in the table, are to be adjusted by removal of the top concrete by jackhammering or by other suitable methods as approved by the Engineer to achieve a top surface free of hazardous sharp edges and to avoid damages to the remaining headwall. Any adjacent guardrail posts which are used only as a hazard warning device are to be removed as a part of this operation.

Payment for this work is to be Item 605050-001 Adjusting Concrete Headwall, per each.

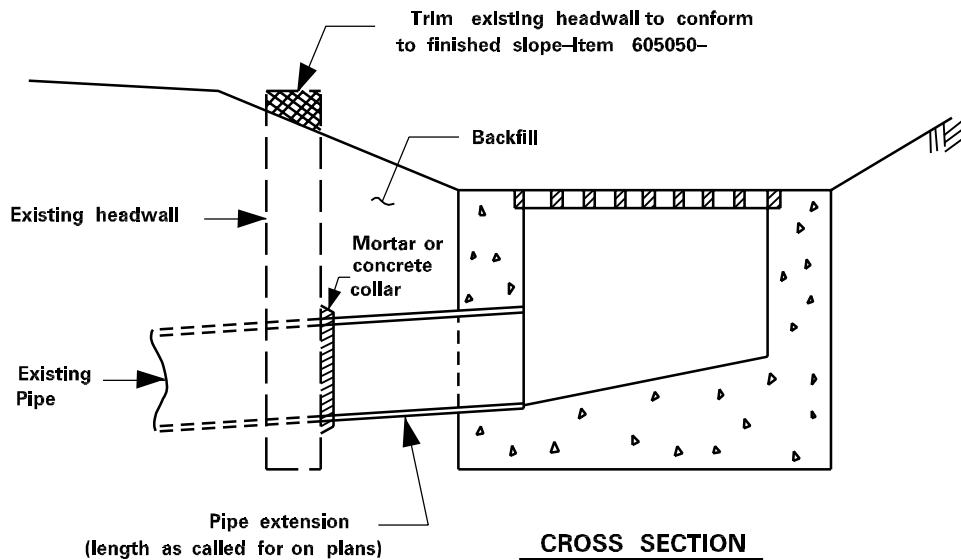
\* LINE OF REMOVAL TO MATCH EXISTING SLOPE INTERSECTION.



END VIEW OF HEADWALL



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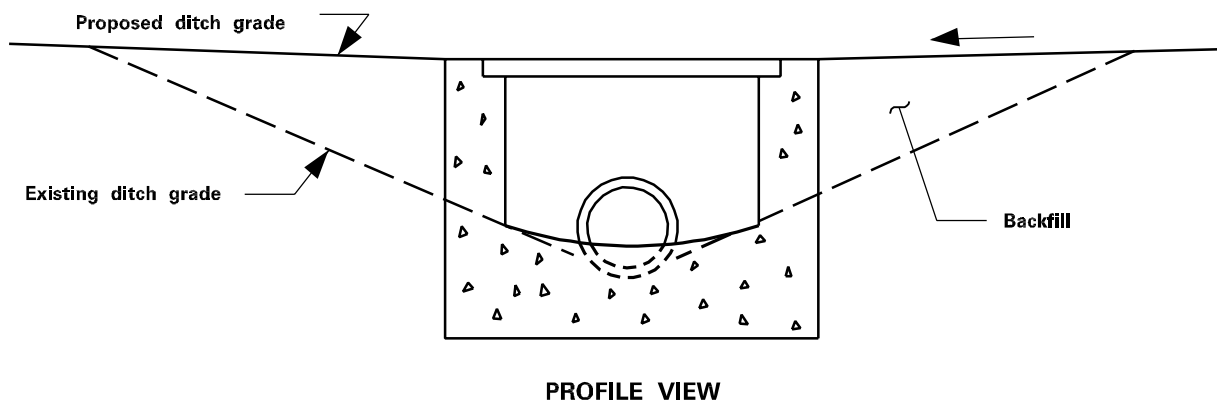
**NOTES**

See Standard DR6-G for inlet details.

Fill area around inlet with suitable random material. Fill is to be placed in 6" loose lifts and compacted a minimum of four passes per lift with a mechanical tamper. Testing of compaction is not required.

The cost of backfill material and reshaping existing ditch to new grade is to be included in the unit price bid for Item 605009-001, Type G Inlet, per each.

The pipe extension, as called for on the plans, shall be in accordance with Section 604 of the Specifications. Testing of the material will not be required, however; the Contractor will be required to provide certification that the materials meet Section 604 of the Specifications. Testing of mortar will not be required.

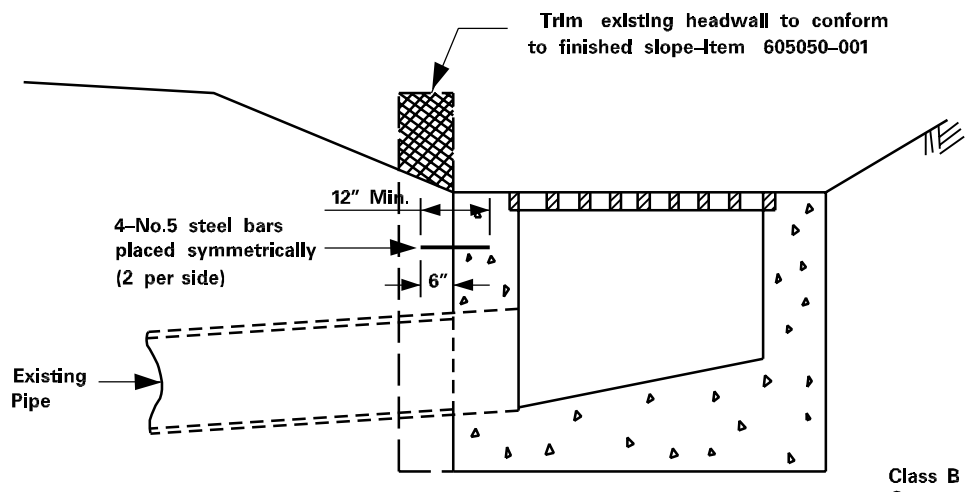


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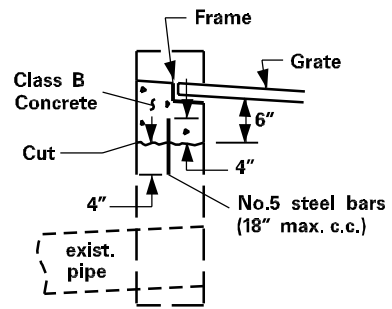
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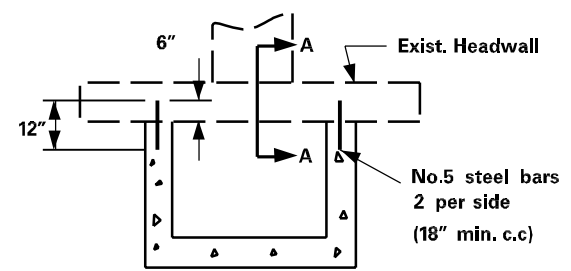
CROSS SECTION

NOTES

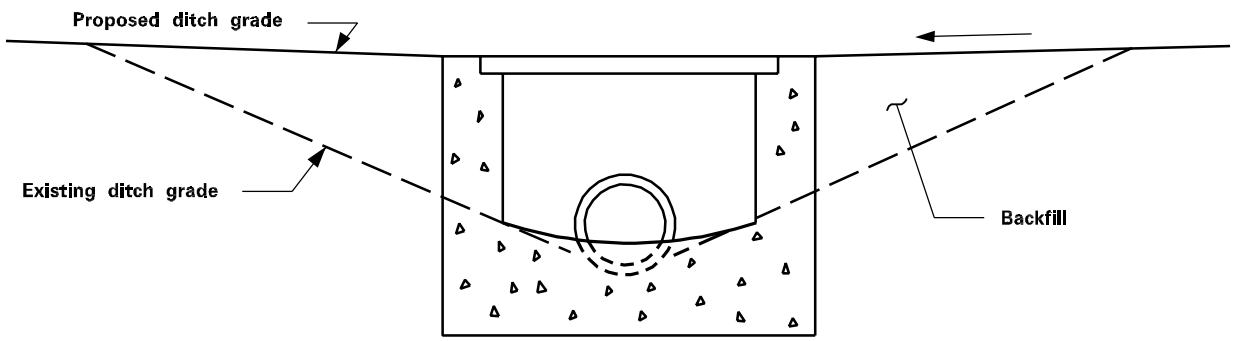
See Standard DR6-G for inlet details.  
 Fill area around inlet with suitable random material. Fill is to be placed in 6" loose lifts and compacted a minimum of four passes per lift with a mechanical tamper. Testing of compaction is not required.  
 The cost of backfill material and reshaping existing ditch to new grade is to be included in the unit price bid for Item 605009-001, Type G Inlet, per each.



SECTION A-A



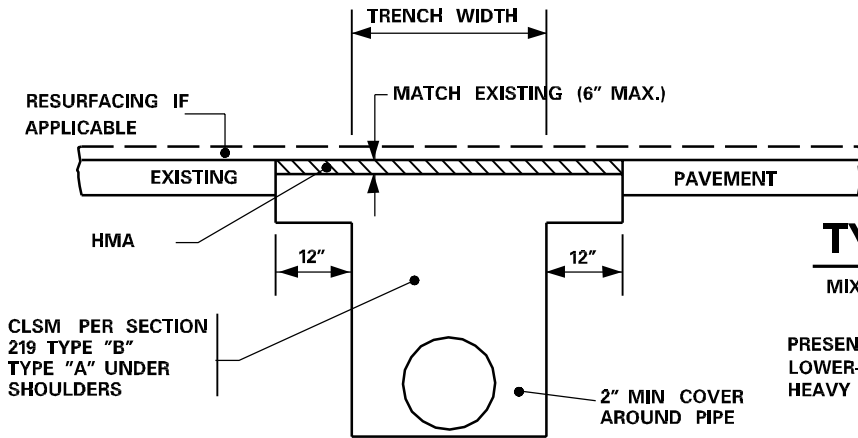
OPTIONAL CONSTRUCTION  
Elimination of Inlet Wall



PROFILE VIEW

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 County \_\_\_\_\_  
 Sheet \_\_\_\_\_ of \_\_\_\_\_





CONCRETE TO BE ROUGH FOR BONDING OF HMA

**TYPE A TRENCH**

MIX PAVEMENT

PRESENT ADT OVER 2000 OR LOWER-VOLUME ROADS WITH HEAVY TRUCK TRAFFIC (20 PER DAY)

NOTES

1. Types A,B, and C trenches to be used as applicable whether or not specified in the plans.  
 2. HMA thickness shown here are in addition to any resurfacing which may be included in this project. Trench to be completed before resurfacing.

3. Type of stone to be same as specified for base on this project and payment to be in tons or C.Y. as specified in those items. If such stone is not specified, cost is to be included in the unit price of pipe and stone to meet requirements of section 307 class I.

4. Payment for HMA to be in tons of material specified for the project. If such items are not specified cost is to be included in unit price of pipe. HMA base or patching and leveling may be used.

5. Cost of all labor, materials, and equipment required to complete the work to the surface of the existing pavement in accordance with the applicable detail(s) shall be included in the unit price for the pipe.

6. Where type A trenches are wider than 7' in existing bituminous pavement, concrete may be deleted if existing HMA thickness and 18" stone are restored.

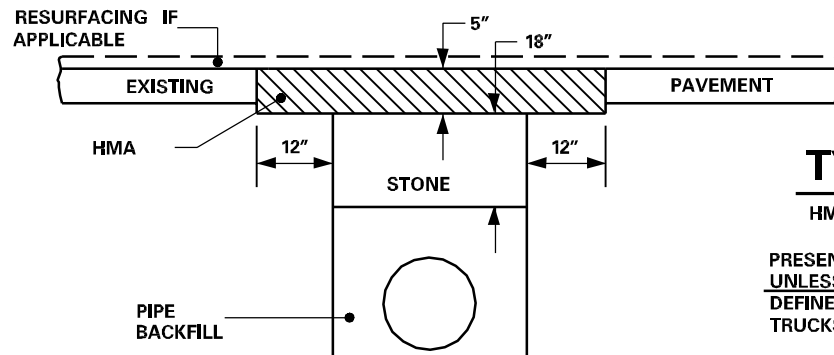
7. Traffic is to be maintained at all times by the use of appropriate traffic control devices. Use of metal plates, having sufficient rigidity to span Type A trench, is required to prevent wheel loads from being transmitted to the CLSM. The plates are to be securely anchored to prevent movement caused by traffic. The plates are to be left in place until the CLSM has attained a 50% of its compressive strength. Cost of such plates is to be included in the unit price bid for pipe.

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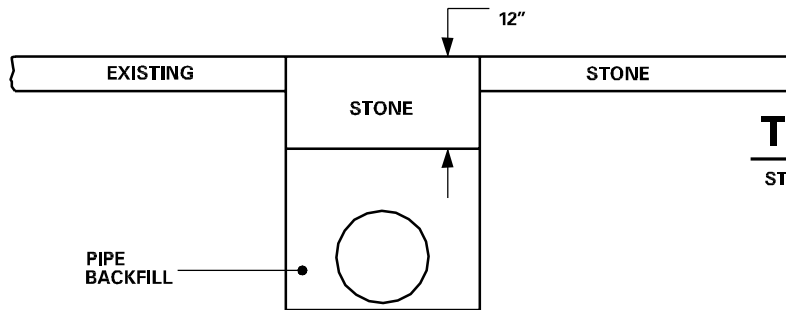
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**TYPE B TRENCH**

HMA PAVEMENT

PRESENT ADT UNDER 2000 UNLESS HEAVY TRUCK TRAFFIC, DEFINED AS 20 TANDEM-AXLE TRUCKS PER DAY, IS EVIDENT.

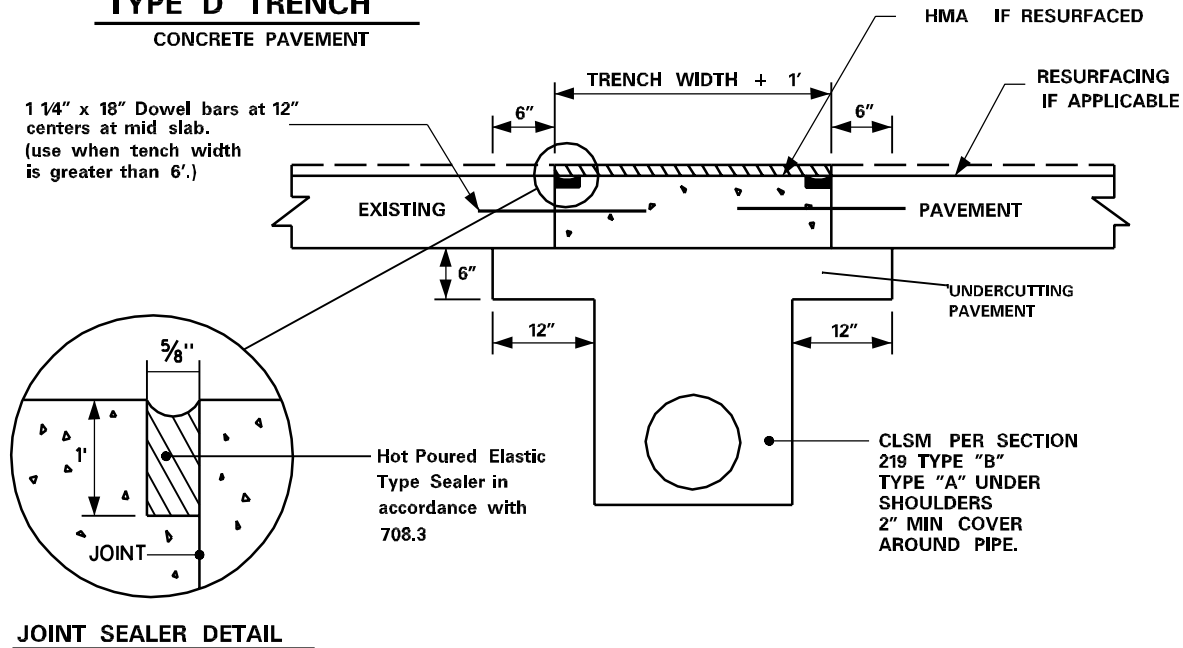


**TYPE C TRENCH**

STONE ROADWAY

### TYPE D TRENCH CONCRETE PAVEMENT

1 1/4" x 18" Dowel bars at 12" centers at mid slab.  
(use when trench width is greater than 6'.)



#### NOTES

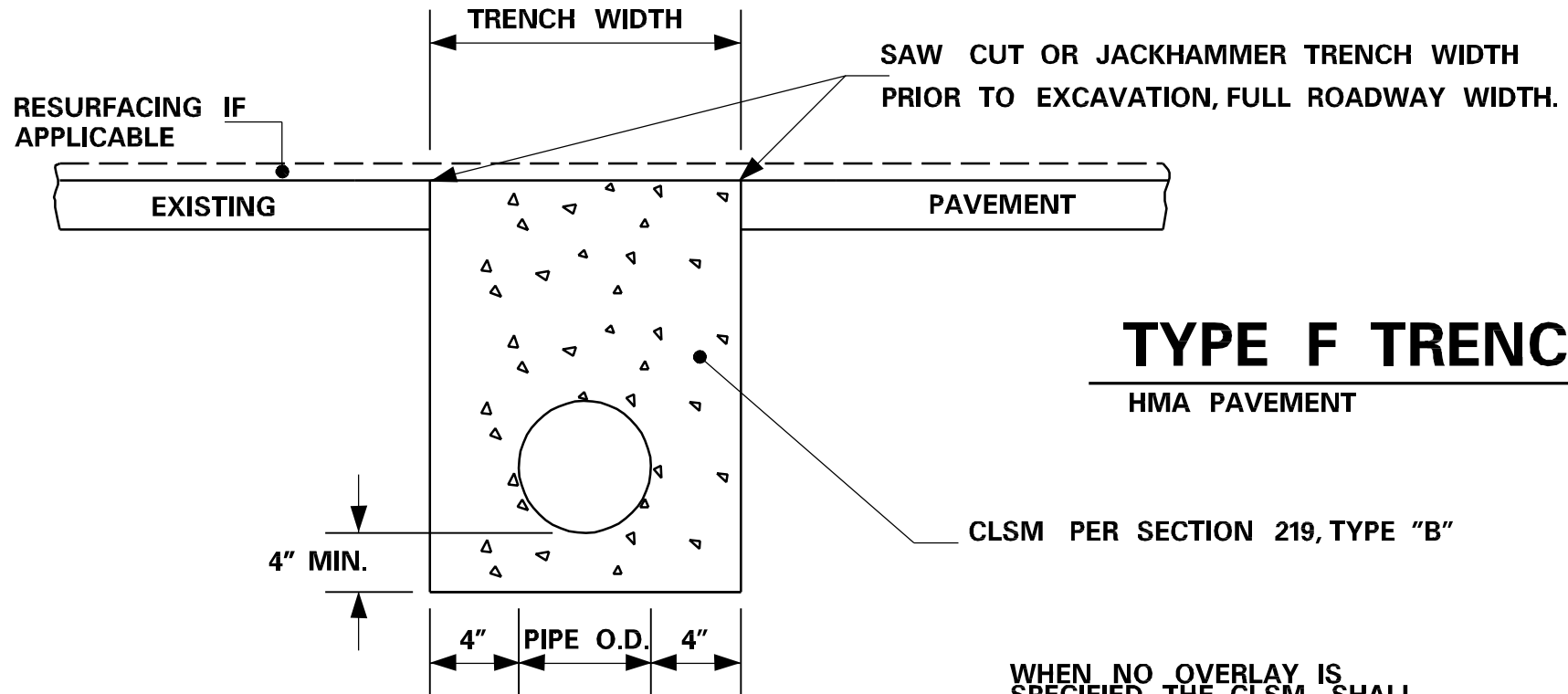
- Types D trenches to be used as applicable whether or not specified in the plans.
- Concrete surface to be rough for bonding of HMA if area to be resurfaced. Trench to be completed before resurfacing.
- Payment for HMA to be in tons of material specified for the project. If such items are not specified cost is to be included in unit price of pipe. H.L.B.C. base or patching and leveling may be used.
- Cost of all materials, and equipment required to complete the work to the surface of the existing pavement in accordance with the applicable detail(s) shall be included in unit bid price for the pipe.
- Testing of steel bars & dowels is waived; however the Engineer must verify dimensions.
- Traffic is to be maintained at all times by the use of appropriate traffic control devices. Use of metal plates, having sufficient rigidity to span Type D trenches, is required to prevent wheel loads from being transmitted to the concrete. The plates are to be securely anchored to prevent movement caused by traffic. The plates are to be left in place until concrete has attained a compressive strength. Cost of such plates is to be included in the unit price bid for pipe.
- Concrete shall be constructed in accordance with Section 501 except that testing is waived if from a Certified Supplier.
- Dowel bars are to be coated in accordance with Section 709.15 of the specifications.

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WHEN NO OVERLAY IS SPECIFIED THE CLSM SHALL BE A MIN. OF 2000 psi.

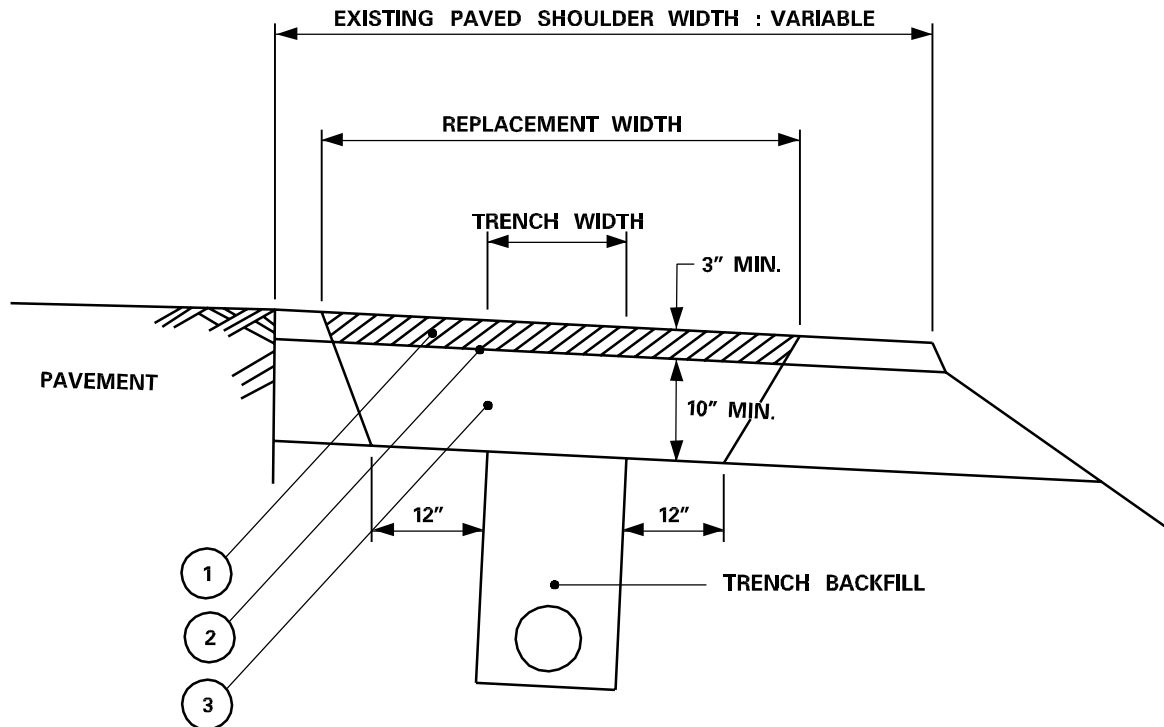
NOTE: IF TYPE F TRENCH IS USED WHERE THERE IS NO EXISTING OR PROPOSED INLET, THE CLSM SHALL BE POURED FULL DEPTH 2' PAST EACH E.P. THE PIPE SHALL BE ENCASED IN 4" OF CLSM AN ADDITIONAL 10' MAX. BEYOND E.P. IF THERE IS AN EXISTING OR PROPOSED INLET THE CLSM SHALL BE POURED FULL DEPTH TO THE INLET.

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**NOTES**

HMA and Class I Aggregate shall be placed to thicknesses equal to existing shoulder thicknesses or to the minimums as shown, which ever are greater.

Trench shall be backfilled and compacted in accordance with 670.4.5 of the Specifications.

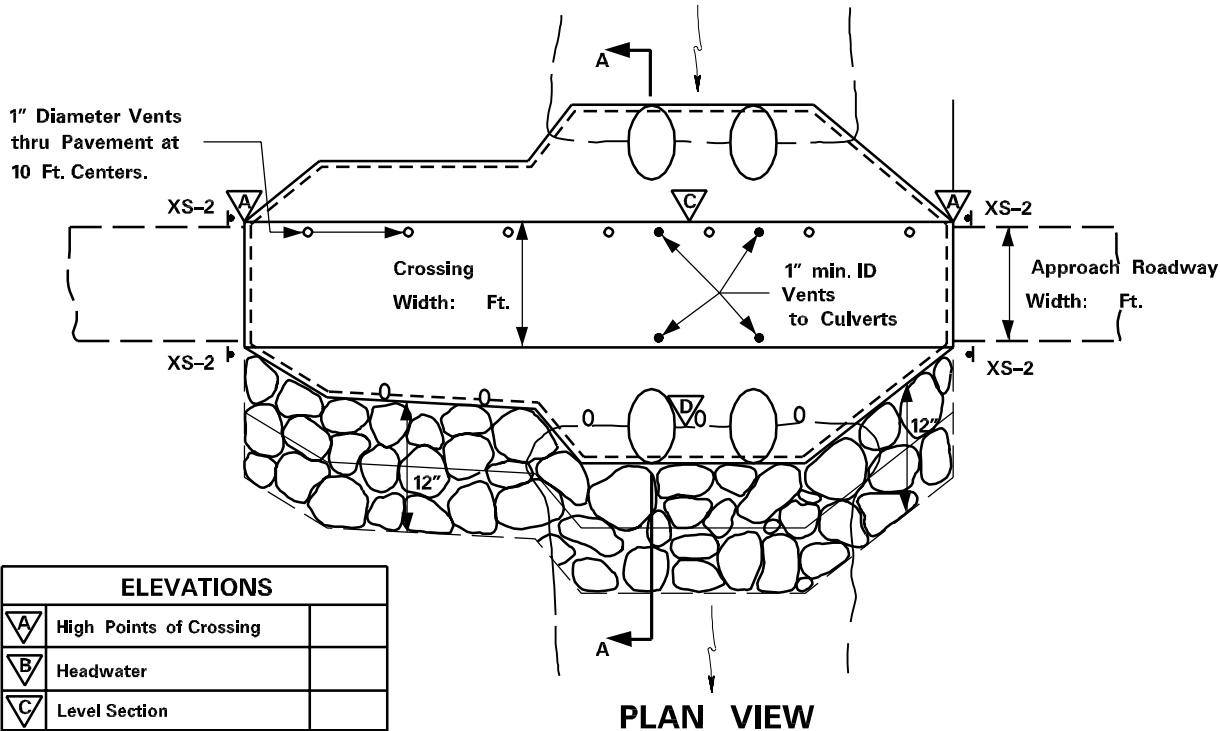
- ① ITEM 401001- , HOT-MIX ASPHALT BASE COURSE, TYPE
- ② ITEM 409002- , BITUMINOUS MATERIAL, GAL. PER S.Y.
- ③ ITEM 307001- , AGGREGATE BASE COURSE, CLASS

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ELEVATIONS	
	High Points of Crossing
	Headwater
	Level Section
	Normal Daily Stream Flow
	Streambed (Downstream)

PLAN VIEW

**WEEP DRAINS**

Weep drains are to be placed on downstream side only. Any type of pipe which will provide adequate forming of weep holes thru the wall may be used. Cost of pipe is to be included in various bid items.

**CULVERT PIPES**

Although these details indicate use of 2 culverts as typical situation, the crossing for this location requires pipe culvert(s); and sufficient quantities are included in the contract documents.

**INCIDENTAL ITEMS**

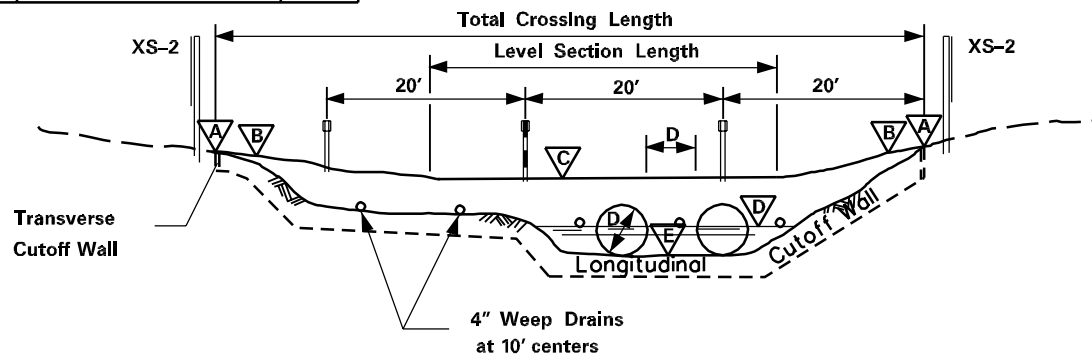
No separate payment for joint sealer, #5 bars, or vent pipes.

**HAZARD MARKERS & DELINEATORS**

XS-2 Hazard Markers as per Standard Sheet TP5-2 are to be installed at each corner of structure. U-Channel (2.00 #/FT.) as per Standard Sheet TEI-7A shall be used for hazard marker supports and for mounting bidirectional 3 1/4" delineators at maximum 20' spacing each side of structure. Cost of all materials and labor for installation of hazard markers and delineators is to be included in the various bid items and no separate payment will be made. At least one post to be stiped with black paint as shown in detail.

**VENT PIPES**

Vents may be commercially-available ABS, PVC, or PE.



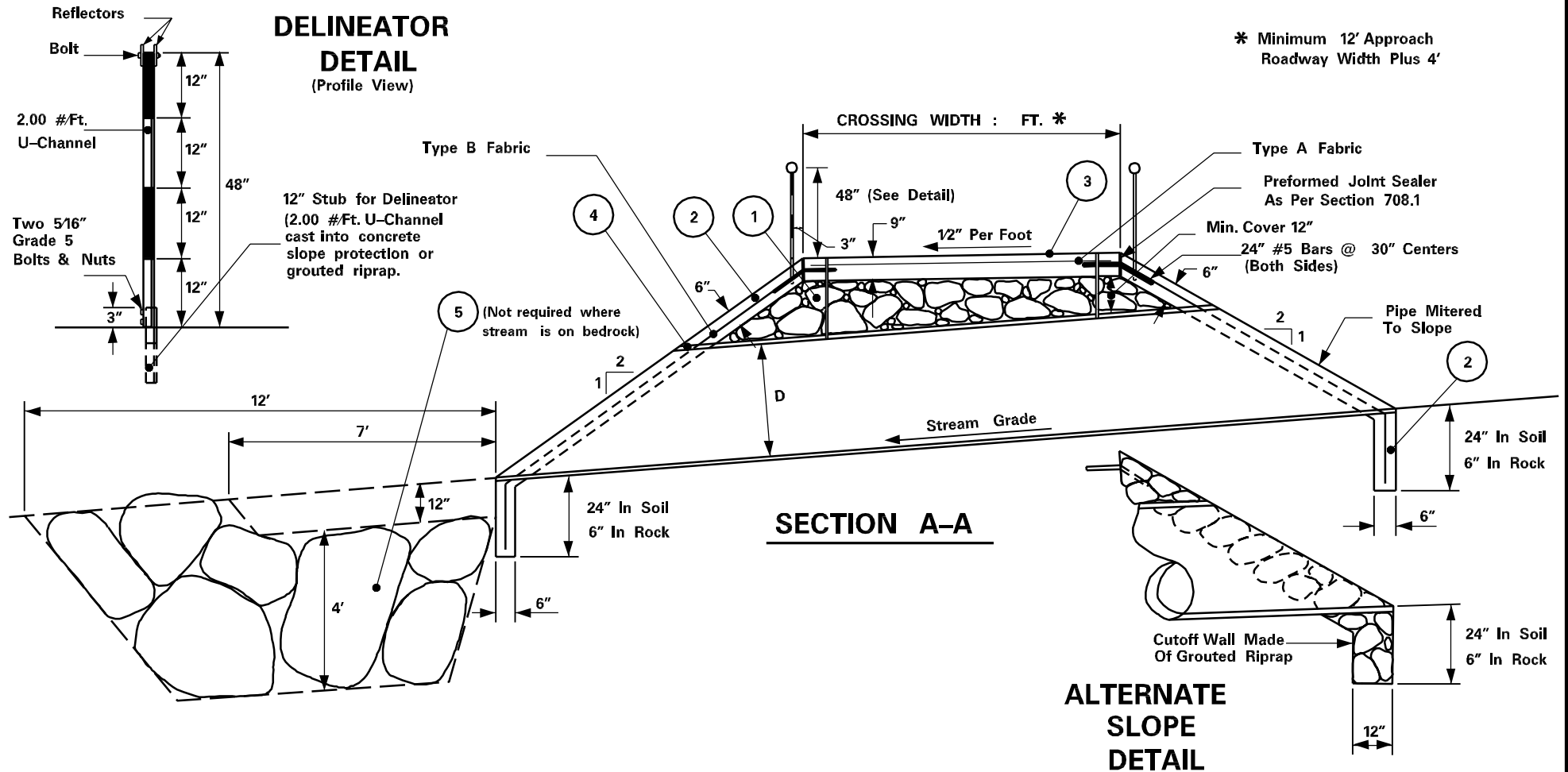
ELEVATION VIEW

State Project No. \_\_\_\_\_

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County \_\_\_\_\_

Sheet \_\_\_\_\_ of \_\_\_\_\_



\* Minimum 12' Approach Roadway Width Plus 4'

12" Stub for Delineator (2.00 #Ft. U-Channel cast into concrete slope protection or grouted riprap.

5 (Not required where stream is on bedrock)

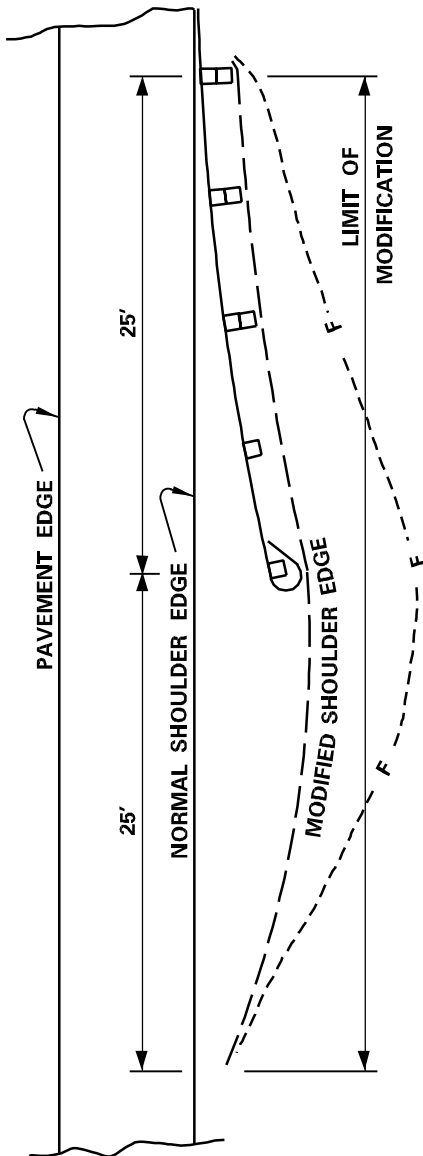
- ① Item 211008-000, Rock Borrow Excavation (Rock size maximum: 6" within 12" of pipe)
- ② Item 218005-000, Concrete Slope Protection (Item 218002-000, grouted riprap may be substituted as per alternate slope detail)
- ③ Item 501001-009, 9 Inch Reinforced Portland Cement Concrete Pavement
- ④ Item 604 - , Pipe,
- ⑤ Item 211008-000, Rock Borrow Excavation (Rock size minimum 18", maximum 48")

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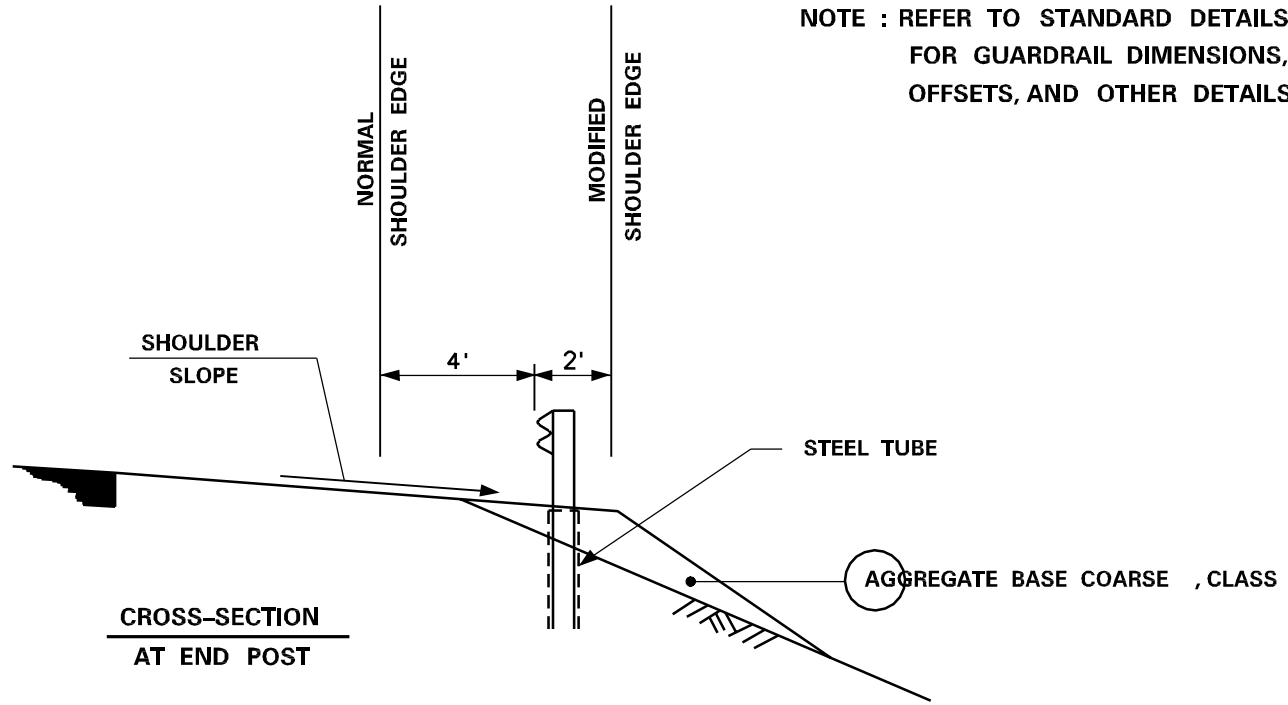
Federal Project No. \_\_\_\_\_

County \_\_\_\_\_

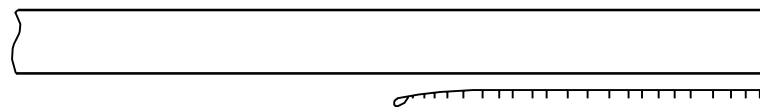
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ENLARGED PLAN

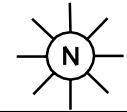


CROSS-SECTION AT END POST



PLAN VIEW

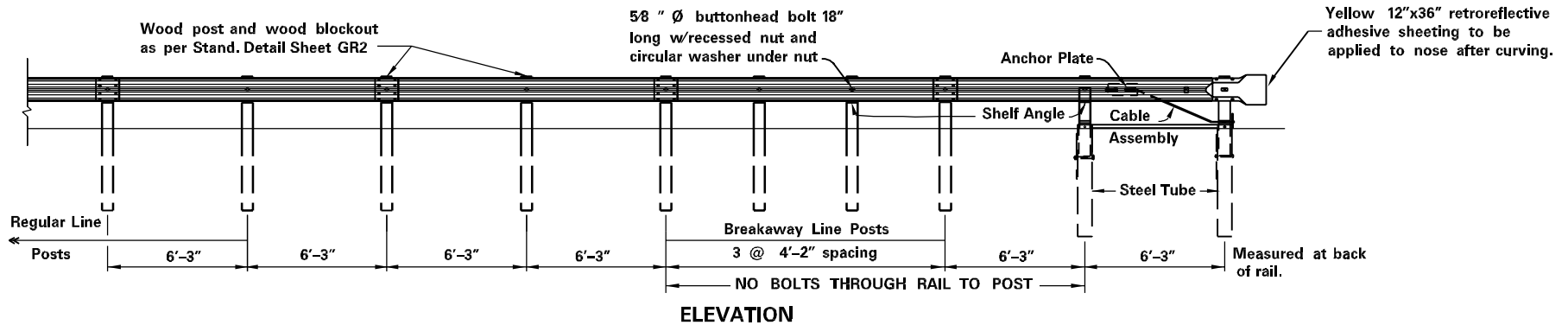
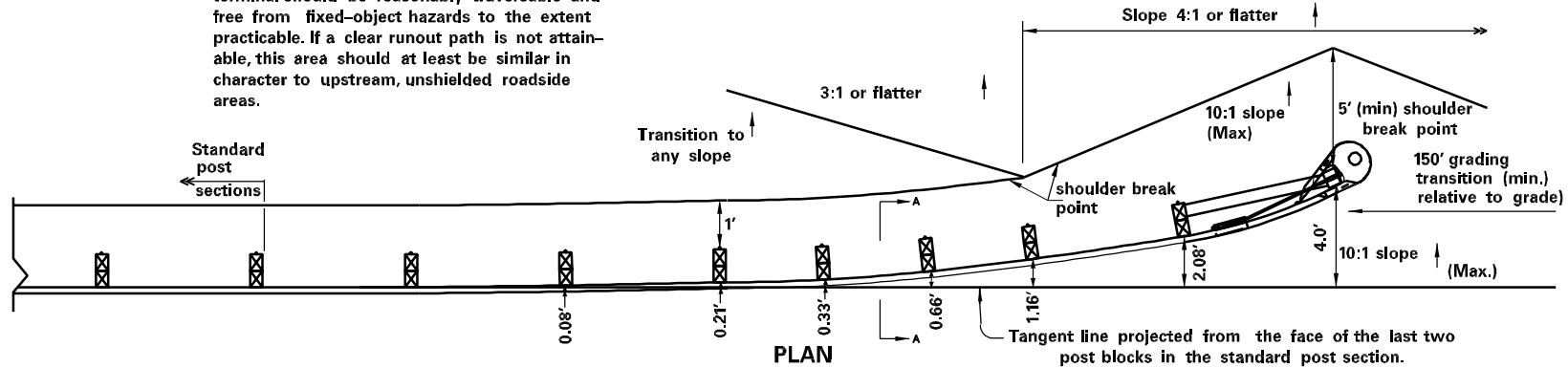
NOTE : REFER TO STANDARD DETAILS FOR GUARDRAIL DIMENSIONS, OFFSETS, AND OTHER DETAILS.



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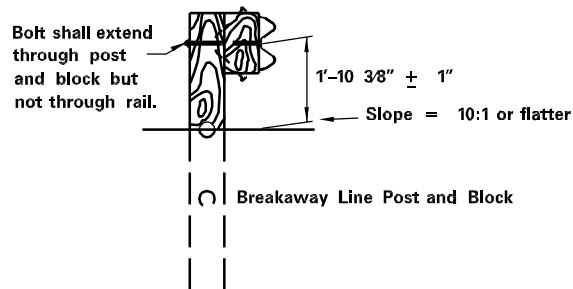
**SITE REMEDIATION**

The area immediately behind and beyond the terminal should be reasonably traversable and free from fixed-object hazards to the extent practicable. If a clear runout path is not attainable, this area should at least be similar in character to upstream, unshielded roadside areas.



**NOTE**

For other details of the M.E.L.T., see Standard Detail Sheet GR5.



SECTION A-A

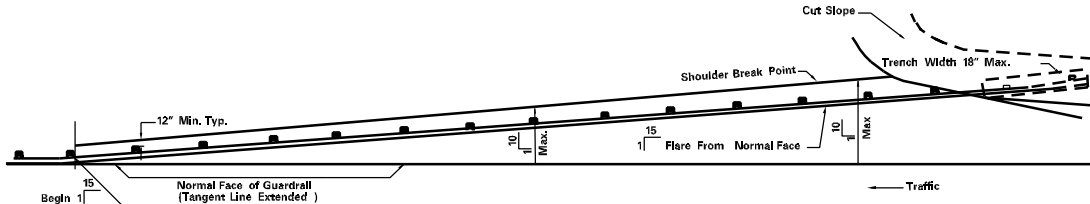
State Project No.

Federal Project No.

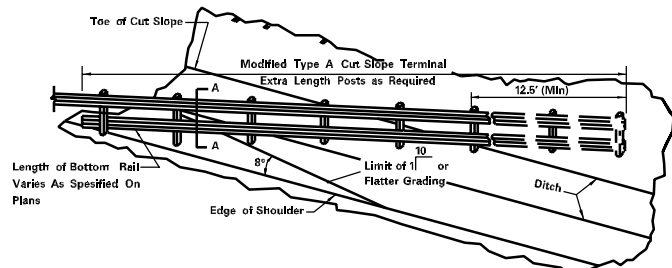
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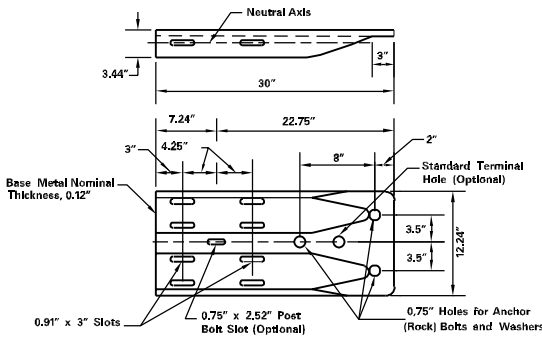




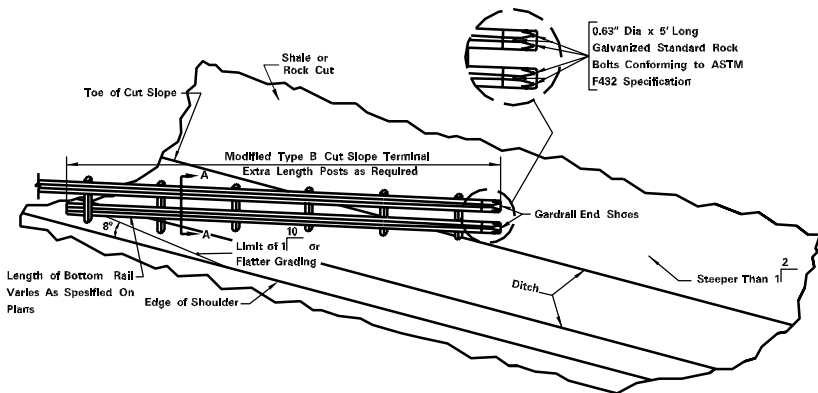
APPROACH END TREATMENT (MULTI-LANE DIVIDED AND 2-LANE HIGHWAYS)



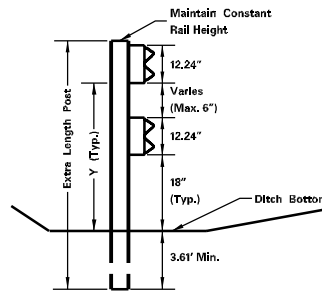
MODIFIED TYPE A (SOFT SHALE OR SOIL) CUT SLOPE TERMINAL INSTALLATION



GUARDRAIL END SHOE DETAIL



MODIFIED TYPE B (SHALE OR ROCK) CUT SLOPE TERMINAL INSTALLATION



Discontinue Bottom Rail When  $Y \leq 457\text{mm}$   
Section A - A

NOTES

THIS DETAIL IS APPLICABLE WHERE A CUT SLOPE TERMINAL IS DESIRED, BUT ADDITIONAL GRADING OR PLACEMENT OF MATERIAL INTO THE ROADWAY DITCH IS NOT DESIRED. THE TOP OF THE GUARDRAIL RELATIVE TO THE ELEVATION OF THE EDGE OF PAVEMENT MUST REMAIN CONSTANT.

MODIFIED TYPE A (SOFT SHALE OR SOIL) CUT SLOPE TERMINAL GUARDRAIL SHALL BE THAT GUARDRAIL WHICH (1) IS TO EXTEND A MINIMUM OF TWO 75' SPANS INTO THE CUT SLOPE, FROM THE FIRST POST BEYOND THE TOE OF THE CUT SLOPE, AS DETAILED HEREIN, AND (2) IS TO TERMINATE A MINIMUM OF 12" BELOW THE GROUND ELEVATION OF THE BACK SLOPE, AS DETAILED HEREIN, EXCEPT IN AREAS OF HEAVY ROCK OUTCROPPING WHERE THE MINIMUM DEPTH MAY BE 6".

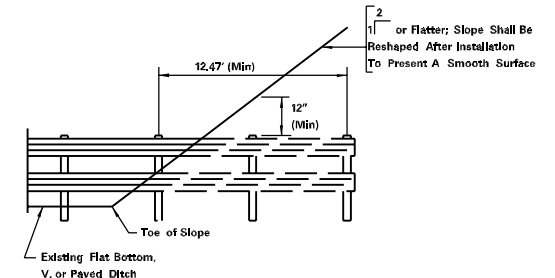
MODIFIED TYPE B (SHALE OR ROCK) CUT SLOPE TERMINAL INSTALLATION SHALL CONSIST OF ANCHORING THE GUARDRAIL AGAINST THE FACE OF THE CUT SLOPE UTILIZING GUARDRAIL END SHOES AND ROCK BOLTS, AS DETAILED HEREIN.

POSTS, BLOCKS, AND RAIL ELEMENTS SHALL BE THE SAME TYPES USED IN THE NORMAL GUARDRAIL INSTALLATION, EXCEPT FOR THE ADDITIONAL LENGTH POSTS WHOSE LENGTH WILL BE DETERMINED IN THE FIELD. THESE POSTS ARE TO BE MODIFIED TO ACCEPT THE ADDITIONAL GUARDRAIL SECTION. UNDERGROUND POSTS MAY BE W6" x 581.18" IN LENGTH, IN AREAS OF HEAVY ROCK OUTCROPPING. GUARDRAIL BLOCKS SHALL NOT BE USED ON ANY POSTS COMETELY UNDERGROUND.

A TRENCH NO GREATER THAN 17.72" IN WIDTH SHALL BE EXCAVATED INTO THE CUT SLOPE TO ACCOMMODATE THE MODIFIED TYPE A TERMINAL INSTALLATION. THE CONTRACTOR SHALL SO ARRANGE HIS WORK SEQUENCE TO PROVIDE THAT EACH MODIFIED TYPE A CUT SLOPE TERMINAL INSTALLATION SHALL BE EXCAVATED; POSTS DRIVEN; RAIL ELEMENTS AND GUARDRAIL COMPONENTS ASSEMBLED; THE TRENCH BACKFILLED; AND DISTURBED SLOPE SHAPED, SEEDED AND MULCHED; ALL IN ONE CONTINUOUS OPERATION.

THE COST OF FURNISHING AND INSTALLING MODIFIED CUT SLOPE TERMINAL (A OR B) SHALL INCLUDE EXCAVATING, BACKFILLING, RESHAPING, SEEDING AND MUCHING THE TRENCH, ADDITIONAL LENGTH GUARDRAIL POSTS AS REQUIRED, DRILLING HOLES INTO THE CUT SLOPE, FURNISHING AND INSTALLING ROCK BOLTS, END SHOES AND HARDWARE FOR BOTH THE UPPER AND LOWER GUARDRAIL SHALL BE INCLUDED IN THE UNIT PRICE BID FOR ITEM 607025-001, "CUT SLOPE TERMINAL, TYPE A OR B MODIFIED" PER EACH.

NORMAL GUARDRAIL COMPONENTS: I.E. POSTS, BLOCKS, RAIL ELEMENTS, HARDWARE, ETC. SHALL BE PAID FOR AS GUARDRAIL PER METER.



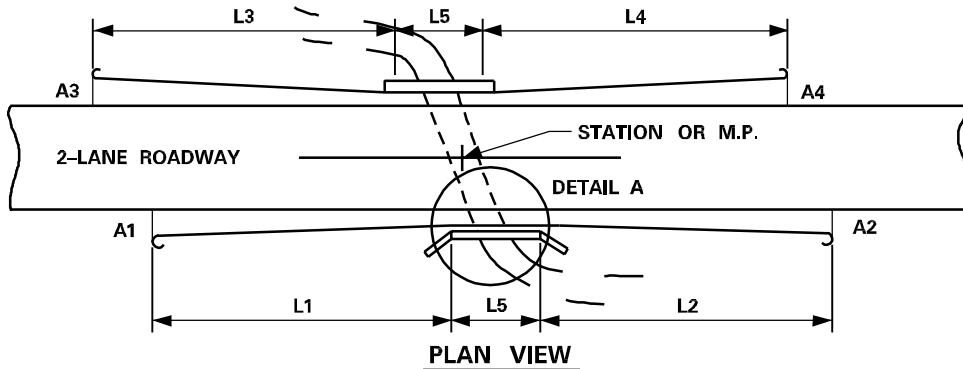
END VIEW (TYPE A CUT SLOPE TERMINAL)

State Project No.

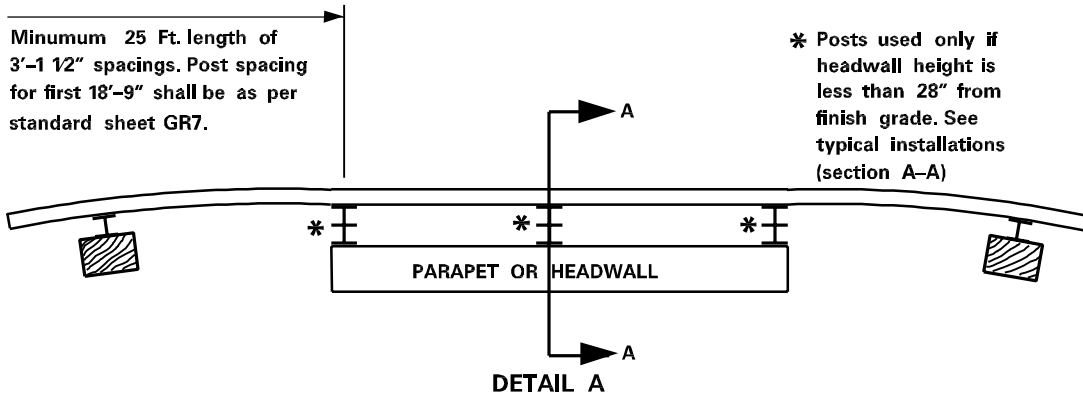
Federal Project No.

County

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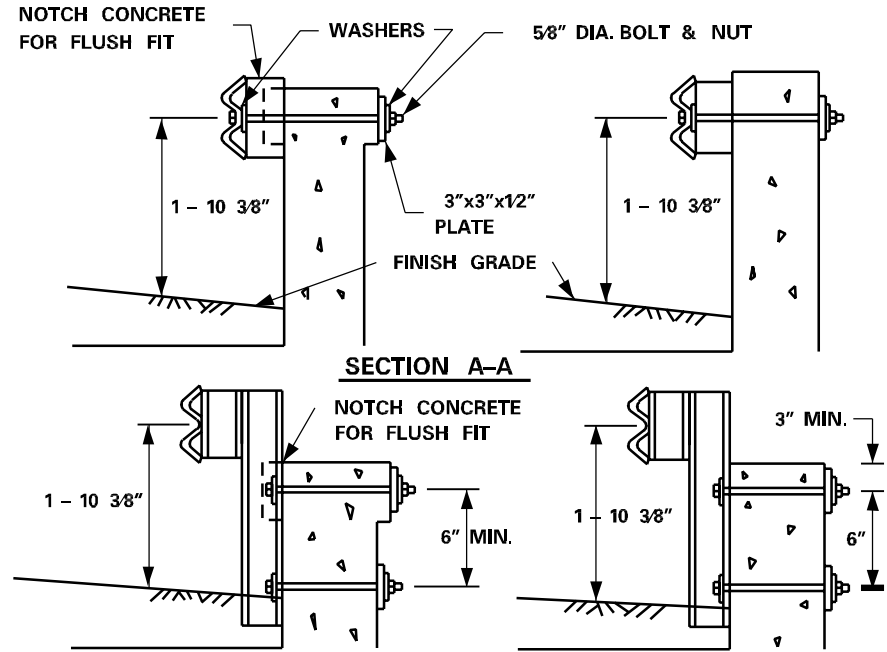


Minimum lengths of L1, L2, L3, and L4 are 43.75' feet unless special circumstances are encountered. Nearby intersection may require shorter lengths and/or curved installations. Refer to Roadside Design Guide to determine point of theoretical need. Length adjustments may be made as per the general notes on standard GR7.



Guardrail to be attached at each end of headwall or parapet and at a maximum of 3'-1 1/2" spacings along the entire length. All bolts, nuts, washers, and plates to be galvanized and meet strength requirements of similar items as depicted in the standards. Cost of all necessary hardware and installation procedures such as notching and drilling concrete included in the unit price bid for guardrail. Refer to guardrail standards.

Refer to special details for attaching guardrail to parapet if guardrail is not continued across structure.



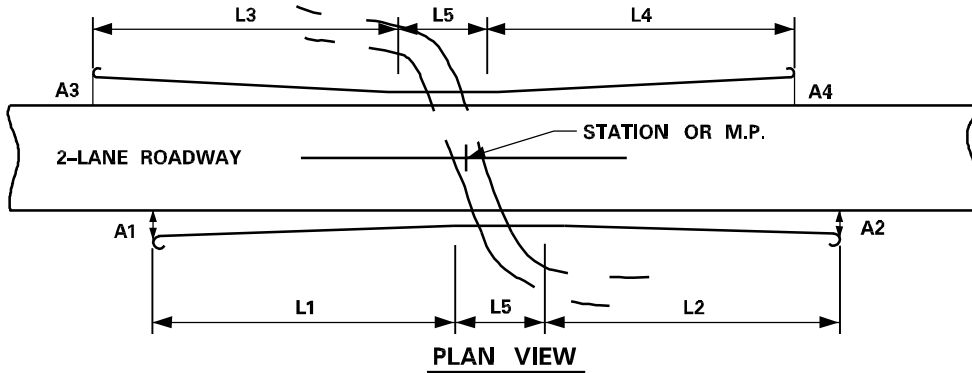
GUARDRAIL LENGTHS (FT.)	CLASS	FET/TET OR BUF	OFFSET FROM PAVEMENT
L1			A1
L2			A2
L3			A3
L4			A4
L5 X 2			

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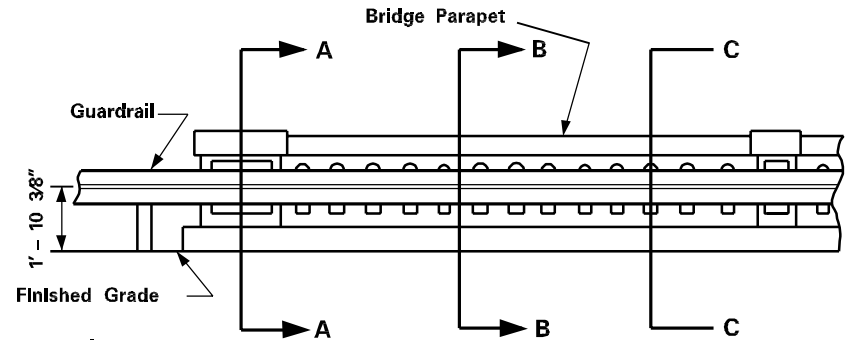
Federal Project No. \_\_\_\_\_

County \_\_\_\_\_

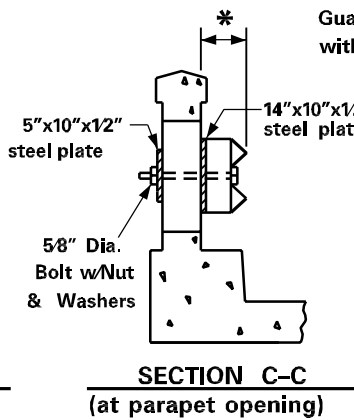
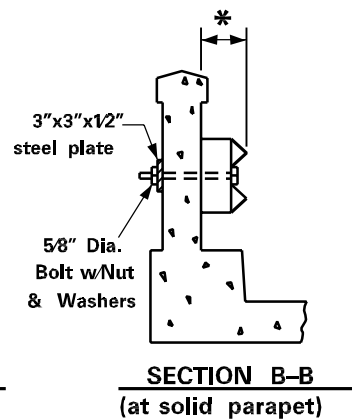
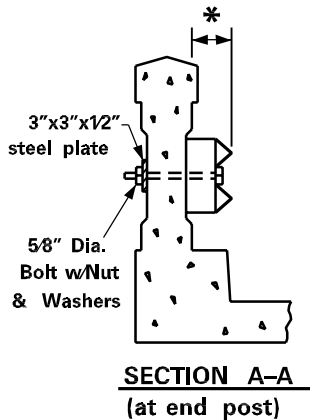
Sheet \_\_\_\_\_ of \_\_\_\_\_



Minimum lengths of L1, L2, L3, and L4 are 43.75' unless special circumstances are encountered. Nearby intersections may require shorter lengths and/or curved installations. Refer to Roadside Design Guide to determine point of theoretical need. Length adjustments may be made as per the general notes on Standard GR7.



\* Block thickness varies.  
Guardrail to be flush with curb.



GUARDRAIL LENGTHS (FT.)		CLASS	FET/TET OR BUF	OFFSET FROM PAVEMENT	
L1				A1	
L2				A2	
L3				A3	
L4				A4	
L5 X 2			—	—	—

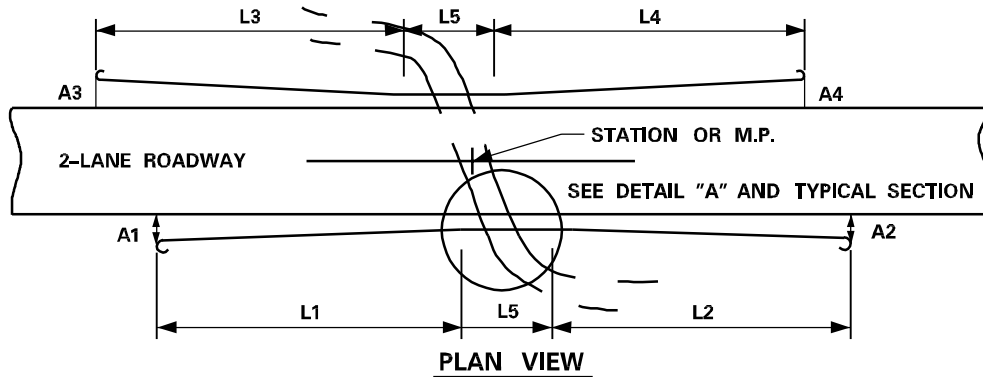
Guardrail to be attached to the structure at a maximum of 3'-1 1/2" post spacings along the entire length. All bolts, nuts, washers and plates are to be galvanized and meet strength requirements of similar items as depicted in the Standards. The cost of all necessary hardware and installation is to be included in the unit price bid for guardrail. L1, L2, L3 and L4 to have a minimum of 43'-9" with the post spacing for the first 18'-9" as per standard GR7.

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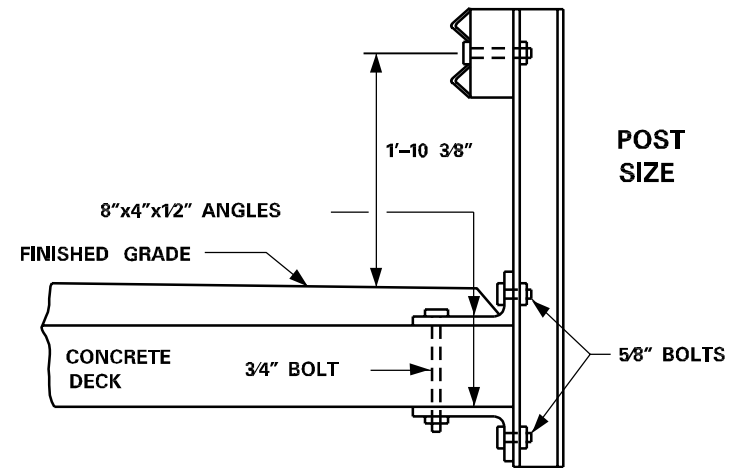
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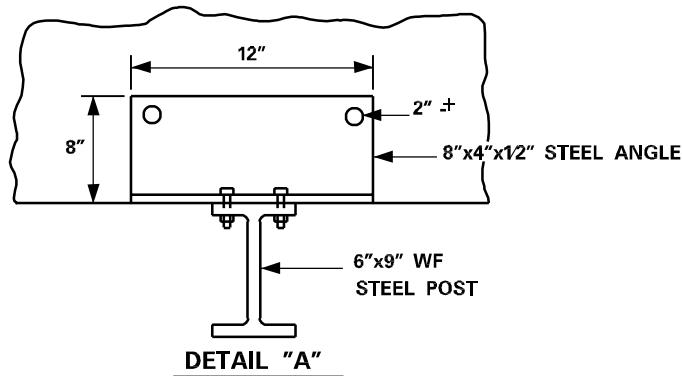


Minimum lengths of L1, L2, L3, and L4 are 43.75' unless special circumstances are encountered. Nearby intersections may require shorter lengths and/or curved installations. Refer to Roadside Design Guide to determine point of theoretical need. Length adjustments may be made as per the general notes on Standard GR7.



TYPICAL SECTION ON STRUCTURE

Testing requirements for the bolts and steel angles are waived.



DETAIL "A"

GUARDRAIL LENGTHS (FT.)		CLASS	FET/TET OR BUF	OFFSET FROM PAVEMENT	
L1				A1	
L2				A2	
L3				A3	
L4				A4	
L5 X 2					

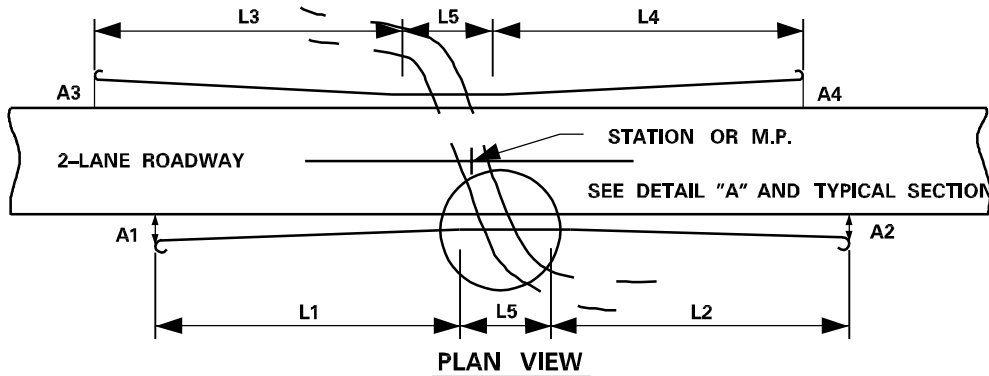
Guardrail to be attached to the structure at a maximum of 3'-1 1/2" post spacings along the entire length. All bolts, nuts, washers and plates are to be galvanized and meet strength requirements of similar items as depicted in the Standards. The cost of all necessary hardware and installation is to be included in the unit price bid for guardrail. L1, L2, L3 and L4 to have a minimum length of 43.75' with the post spacings for the first 18'-9" as per standard sheet GR7.

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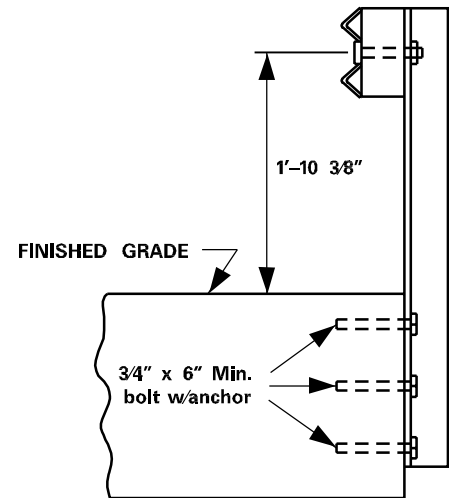
Federal Project No.

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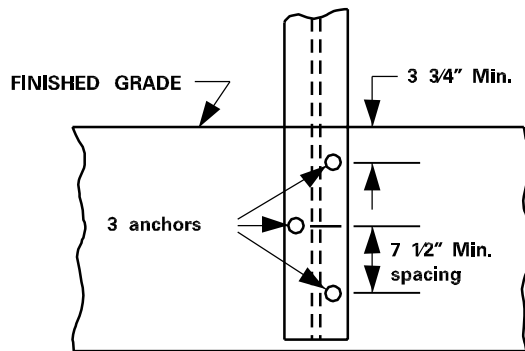


Minimum lengths of L1, L2, L3, and L4 are 43.75' unless special circumstances are encountered. Nearby intersections may require shorter lengths and/or curved installations. Refer to Roadside Design Guide to determine point of theoretical need. Length adjustments may be made as per the general notes on Standard GR7.



Guardrail posts to be bolted to outside face of structure. See Detail A

TYPICAL SECTION ON STRUCTURE



NOTE :

Anchors are to be expanding steel type as manufactured by Phillips Red Head, Hill Fastening Systems, Molly Parabolt or equal as approved by the Engineer.

Testing requirements for the bolts and steel angles are waived.

GUARDRAIL LENGTHS (FT.)		CLASS	FET/TET OR BUF	OFFSET FROM PAVEMENT	
L1	L2			A1	A2
L1					
L2					
L3					
L4					
L5 X 2					

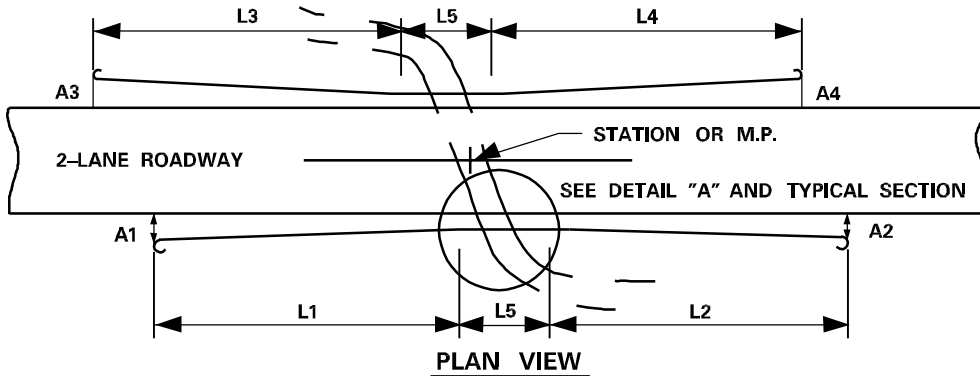
Guardrail to be attached to the structure at a maximum of 3'-1 1/2" post spacings along the entire length. All bolts, nuts, washers and plates are to be galvanized and meet strength requirements of similar items as depicted in the Standards. The cost of all necessary hardware and installation is to be included in the unit price bid for guardrail. L1, L2, L3 and L4 to have a minimum length of 43.75' with the post spacing for the first 18'-9" as per standard sheet GR7.

State Project No.

Federal Project No.

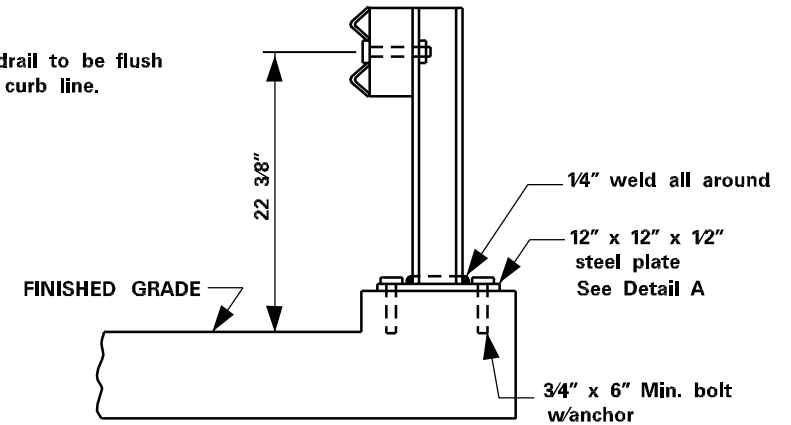
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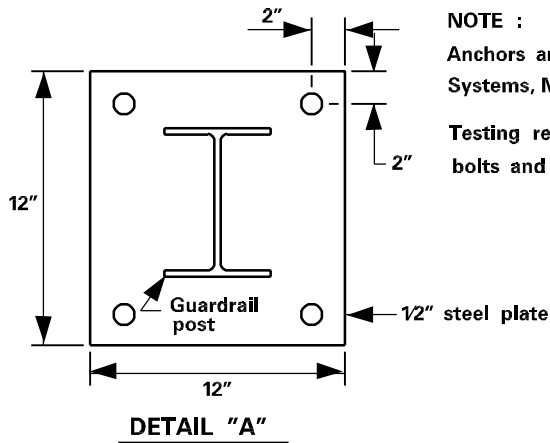


Minimum lengths of L1, L2, L3, and L4 are 43.75' unless special circumstances are encountered. Nearby intersections may require shorter lengths and/or curved installations. Refer to Roadside Design Guide to determine point of theoretical need. Length adjustments may be made as per the general notes on Standard GR7.

Guardrail to be flush with curb line.



**TYPICAL SECTION ON STRUCTURE**



**NOTE :**

Anchors are to be expanding steel type as manufactured by Phillips Red Head, Hilti Fastening Systems, Molly Parabol or equal as approved by the Engineer.

Testing requirements for the bolts and steel angles are waived.

GUARDRAIL LENGTHS (FT.)		CLASS	FET/TET OR BUF	OFFSET FROM PAVEMENT	
L1				A1	
L2				A2	
L3				A3	
L4				A4	
L5 X 2					

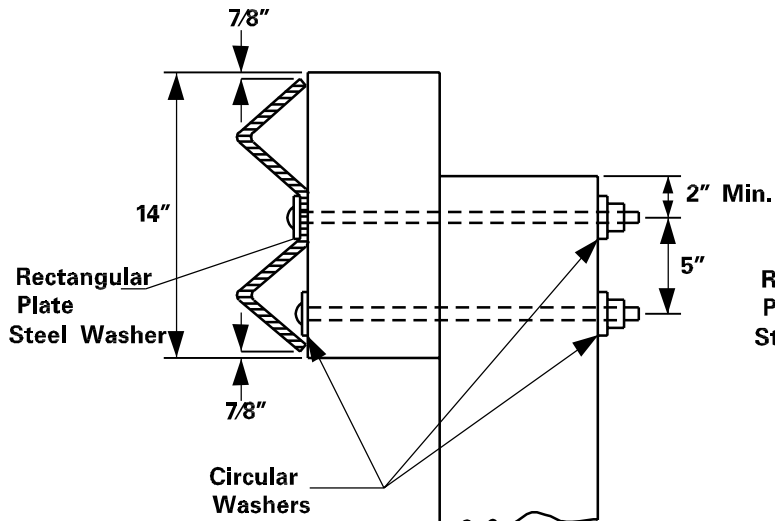
Guardrail to be attached to the structure at a maximum of 3'-1 1/2" post spacings along the entire length. All bolts, nuts, washers and plates are to be galvanized and meet strength requirements of similar items as depicted in the Standards. The cost of all necessary hardware and installation is to be included in the unit price bid for guardrail. L1, L2, L3 and L4 to have a minimum length of 43.75' with the post spacing for the first 18'-9" as per standard sheet GR7.

State Project No.

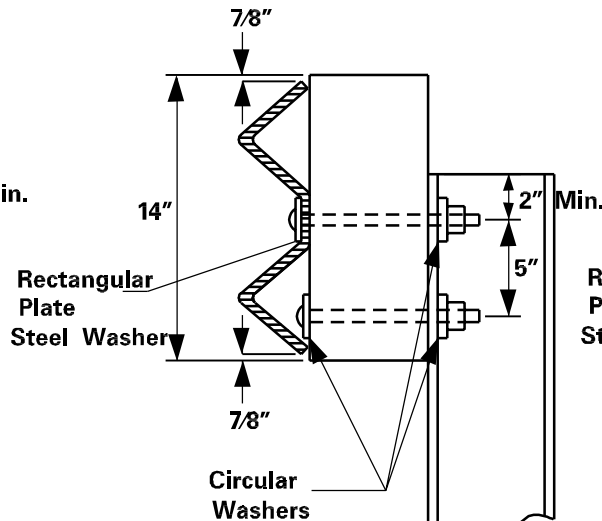
Federal Project No.

County

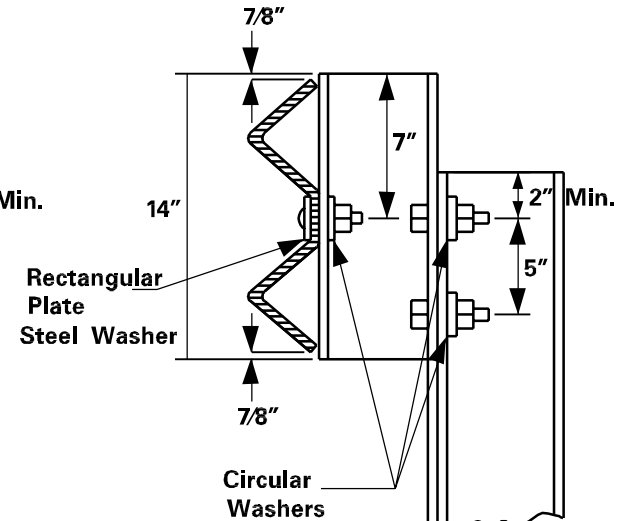
Sheet of



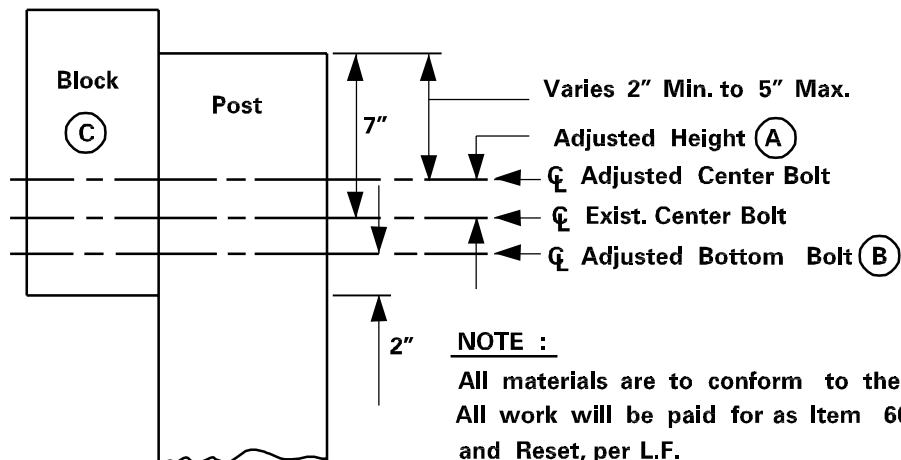
**WOOD GUARDRAIL POST  
(WOOD BLOCK)**



**STEEL GUARDRAIL POST  
(WOOD BLOCK)**



**STEEL GUARDRAIL POST  
(STEEL BLOCK)**



**NOTE :**

All materials are to conform to the Specifications and Standard Details. All work will be paid for as Item 607009-001, Type I Guardrail, Removed and Reset, per L.F.

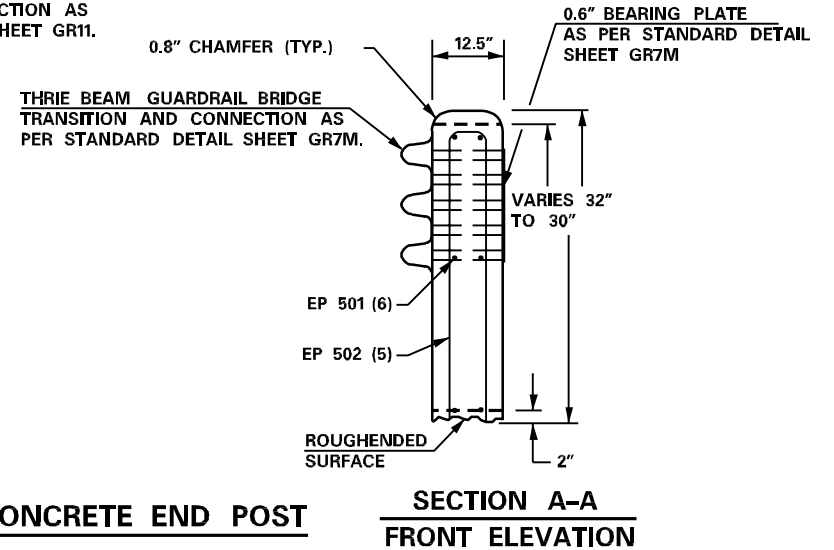
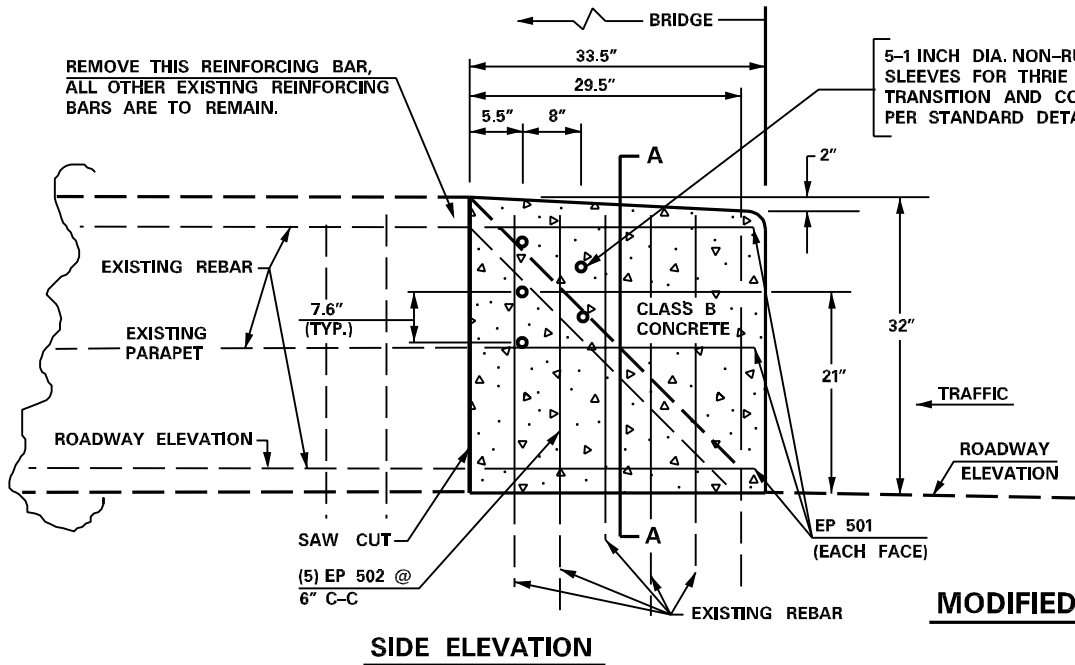
- (A) Adjustment height as specified in the plans varies from 2" Min. to 5" Max. When adjustments are to be made in a portion of an existing guardrail string, transitions from existing height to specified height shall be :  
 Adjustment Height : 2" 3" 4" 5"  
 No. of Post Spacings : 1 2 3 4
- (B) Bottom bolt not required with wood blocks for height adjustment of 3" or less.
- (C) Existing blocks may be redrilled and reinstalled. Existing hardware may be reinstalled as approved by the Engineer.

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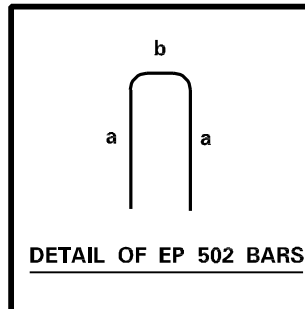


**MODIFIED CONCRETE END POST**

**NOTES**

1. EXISTING REINFORCING STEEL BARS AS SHOWN ON THIS SHEET ARE BASED ON ORIGINAL CONSTRUCTION PLAN SHEETS. FIELD MODIFICATIONS IN ORDER TO MEET EXISTING REINFORCING STEEL BARS SHOULD BE EXPECTED.
2. MAINTAIN 2 INCH MINIMUM CLEARANCE BETWEEN REINFORCEMENT AND FORMS.

REINFORCING STEEL BARS		NO. OF BARS	LENGTH (INCH)			TYPE
MARK	SIZE		a	b	TOTAL	
EP 501	NO. 15	6			32	STRAIGHT
EP 502	NO. 15	5	30	8	68	BENT



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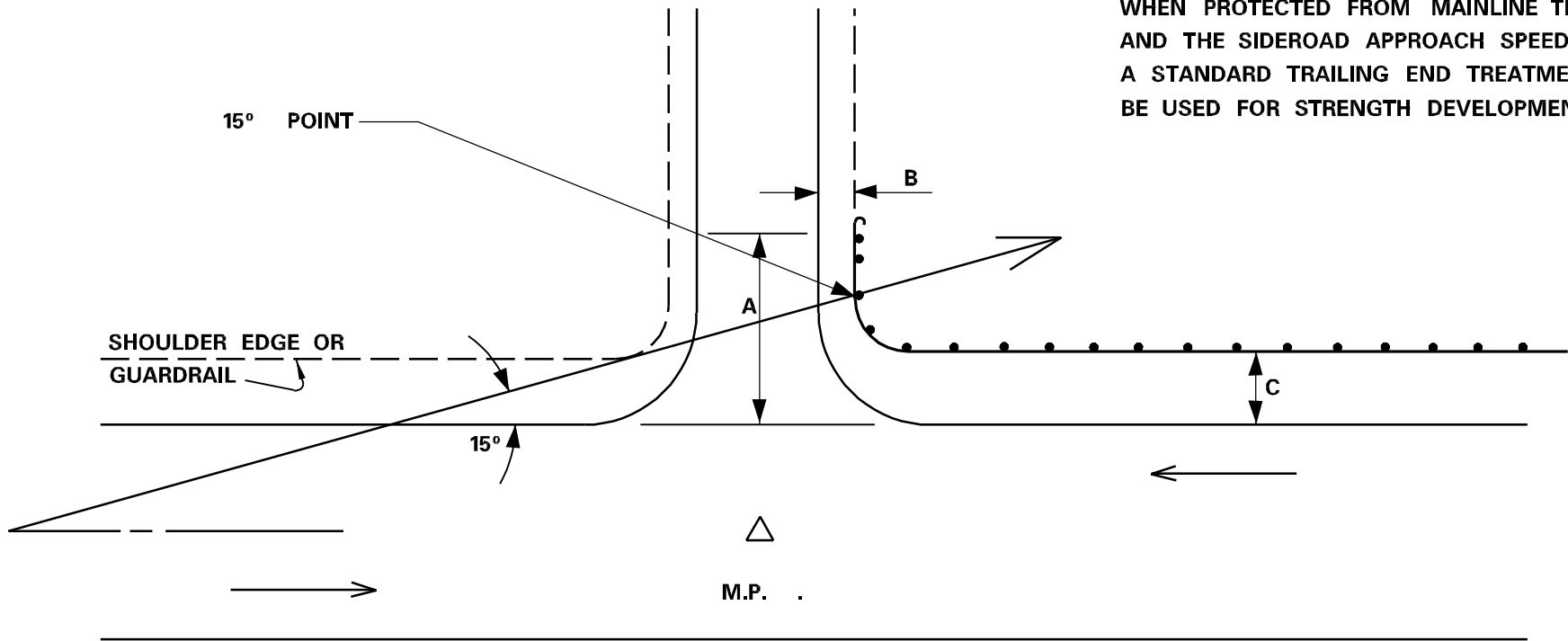
NOT TO SCALE

Sheet of



**NOTE:**

WHEN PROTECTED FROM MAINLINE TRAFFIC AND THE SIDEROAD APPROACH SPEED IS LOW, A STANDARD TRAILING END TREATMENT MAY BE USED FOR STRENGTH DEVELOPMENT.



A	
B	
C	
END TREATMENT	

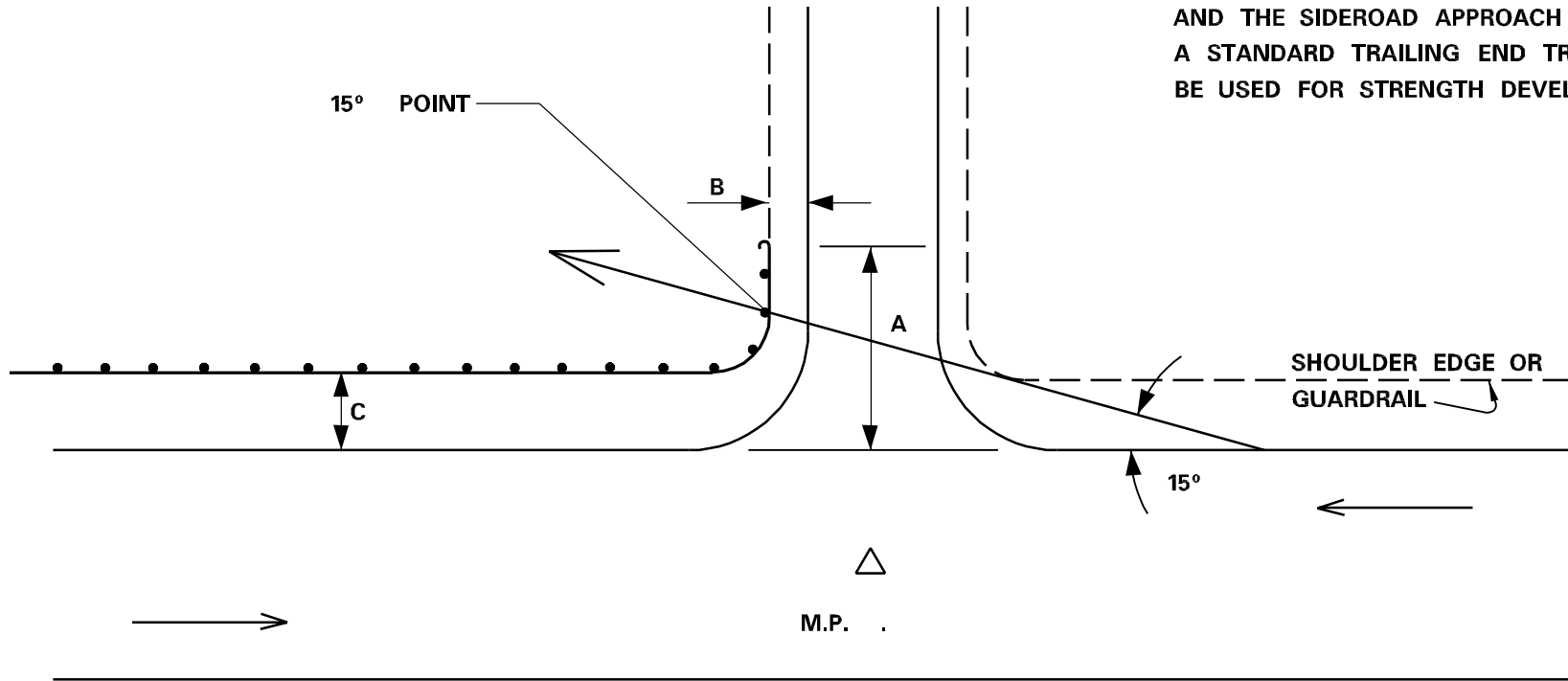
State Project No. \_\_\_\_\_

Federal Project No. \_\_\_\_\_

County \_\_\_\_\_

Sheet \_\_\_\_\_ of \_\_\_\_\_

NOTE:  
 WHEN PROTECTED FROM MAINLINE TRAFFIC  
 AND THE SIDEROAD APPROACH SPEED IS LOW,  
 A STANDARD TRAILING END TREATMENT MAY  
 BE USED FOR STRENGTH DEVELOPMENT.



A	
B	
C	
END TREATMENT	

State Project No. \_\_\_\_\_

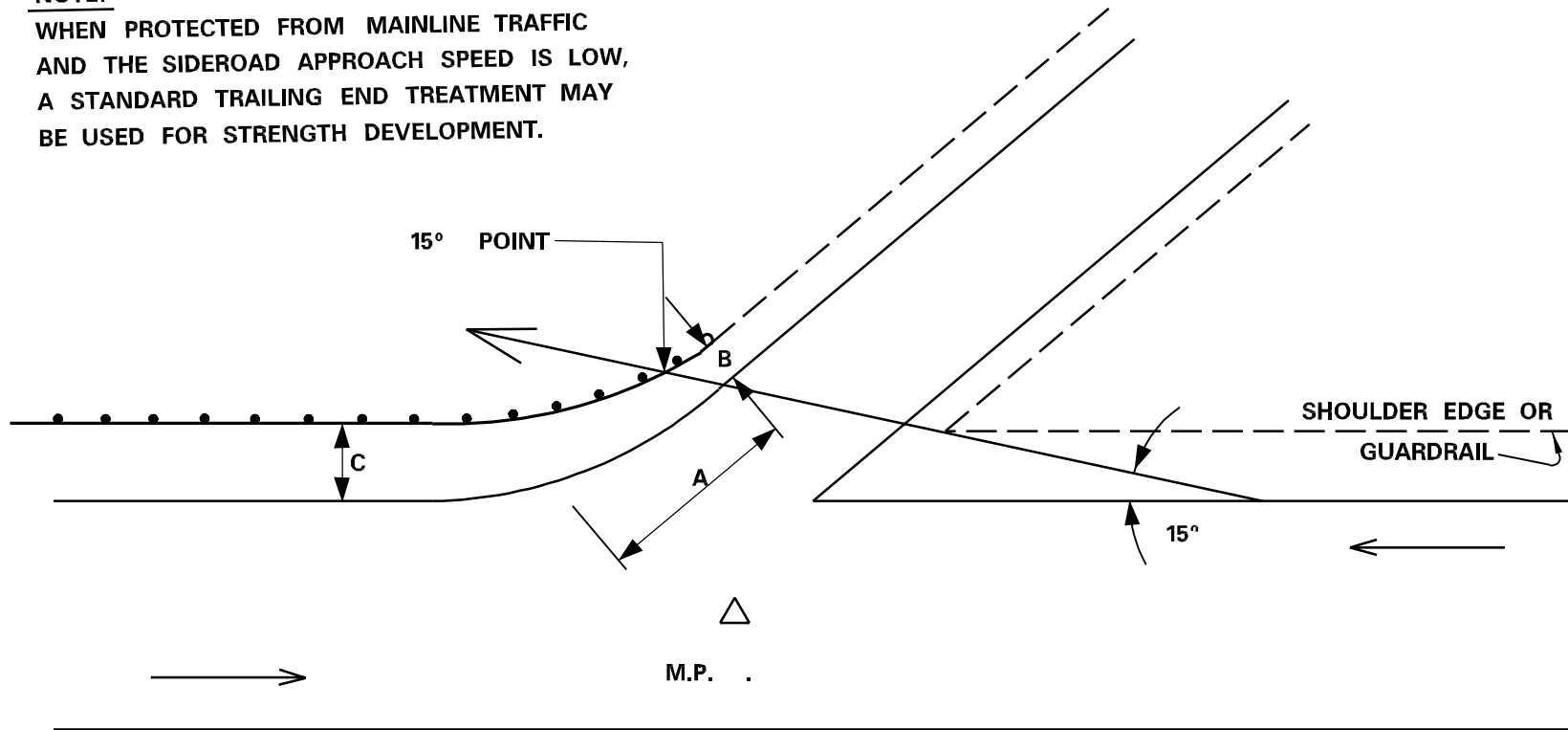
Federal Project No. \_\_\_\_\_

County \_\_\_\_\_

Sheet \_\_\_\_\_ of \_\_\_\_\_

**NOTE:**

WHEN PROTECTED FROM MAINLINE TRAFFIC  
AND THE SIDEROAD APPROACH SPEED IS LOW,  
A STANDARD TRAILING END TREATMENT MAY  
BE USED FOR STRENGTH DEVELOPMENT.



A	
B	
C	
END TREATMENT	

State Project No. \_\_\_\_\_

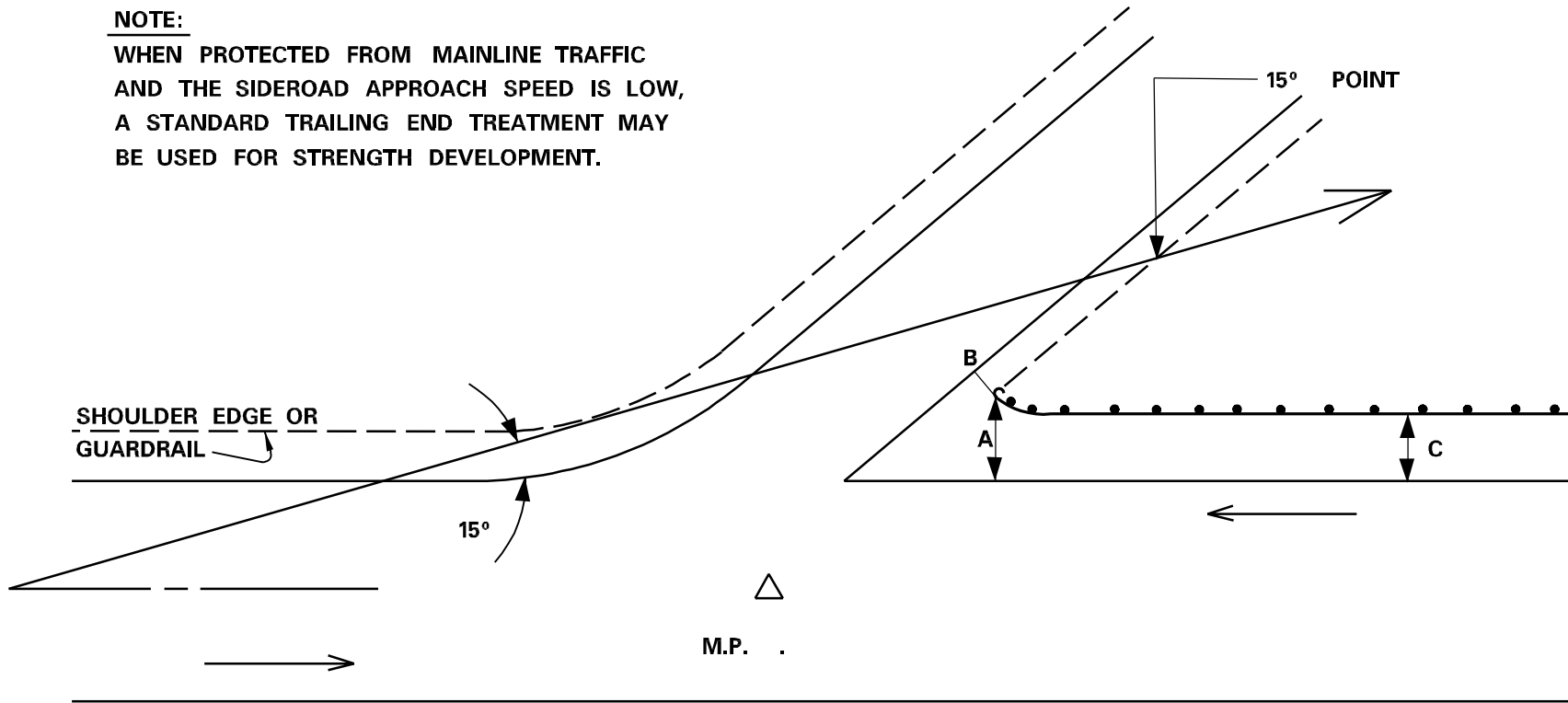
Federal Project No. \_\_\_\_\_

County \_\_\_\_\_

Sheet \_\_\_\_\_ of \_\_\_\_\_

**NOTE:**

WHEN PROTECTED FROM MAINLINE TRAFFIC AND THE SIDEROAD APPROACH SPEED IS LOW, A STANDARD TRAILING END TREATMENT MAY BE USED FOR STRENGTH DEVELOPMENT.

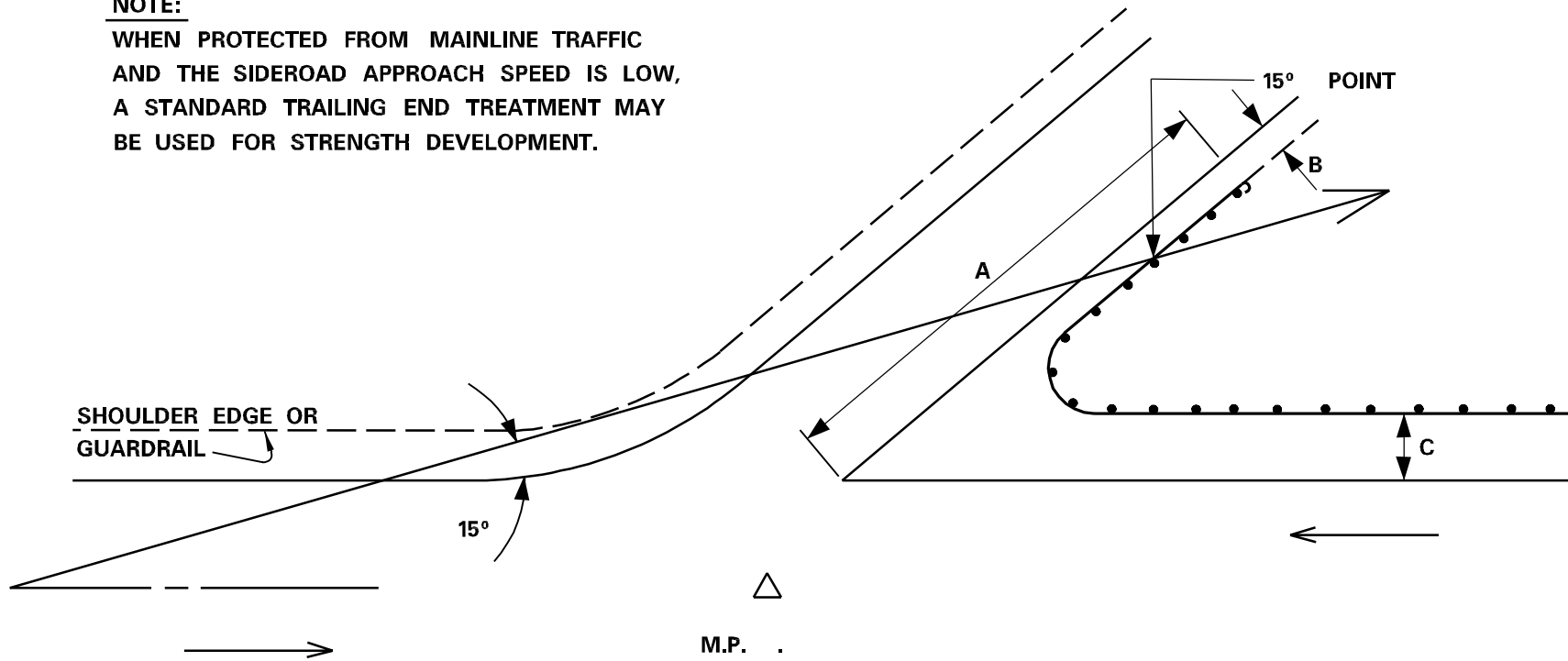


A	
B	
C	
END TREATMENT	

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County
Sheet of

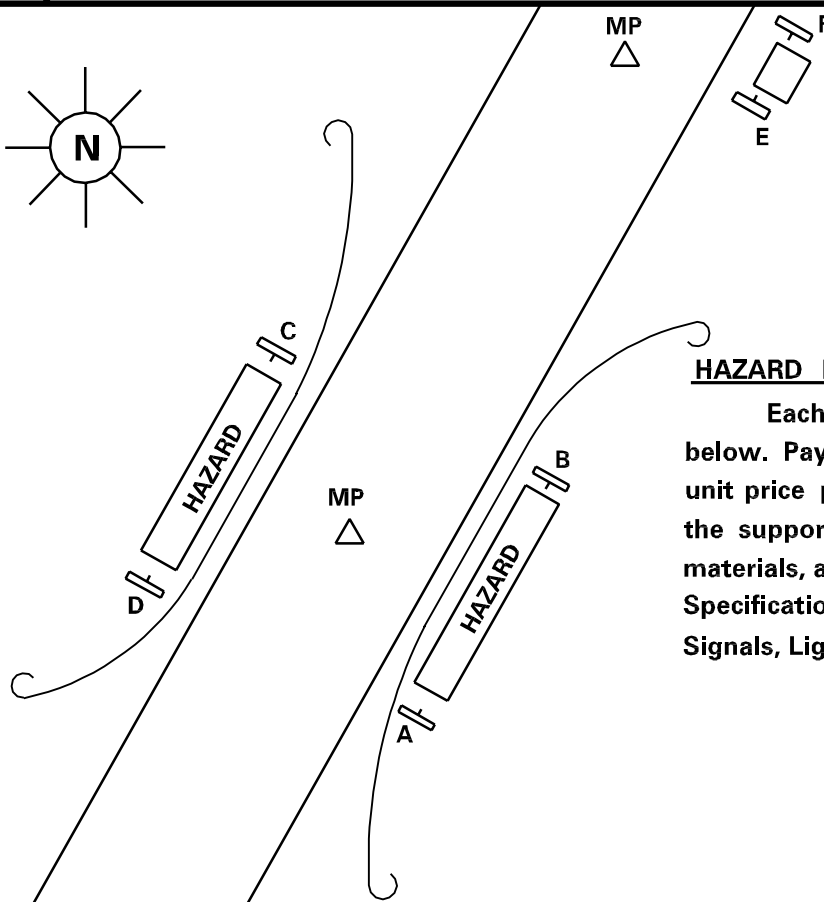
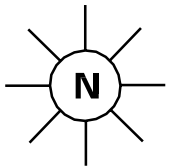
**NOTE:**

WHEN PROTECTED FROM MAINLINE TRAFFIC AND THE SIDEROAD APPROACH SPEED IS LOW, A STANDARD TRAILING END TREATMENT MAY BE USED FOR STRENGTH DEVELOPMENT.



A	
B	
C	
END TREATMENT	

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Sheet of



HAZARD LOCATED WITHIN CONSISTENT CLEAR ZONE.

HAZARD PANELS :

Each unit is to be installed at the location as noted by a checkmark in the table below. Payment for Item 661012- "Hazard Panels", per each, will be made at the contract unit price per installation for the appropriate XS-2R or XS-2L Hazard Panel of 12" x 36", the supporting 2.00 lb. Channel Post, hardware, and labor. The construction details, materials, and labor will be in accordance with the applicable sections of Standard Specifications, Section 657 and 661, and the Standard Details Book, Volume II, Signs, Signals, Lighting, and Marking.

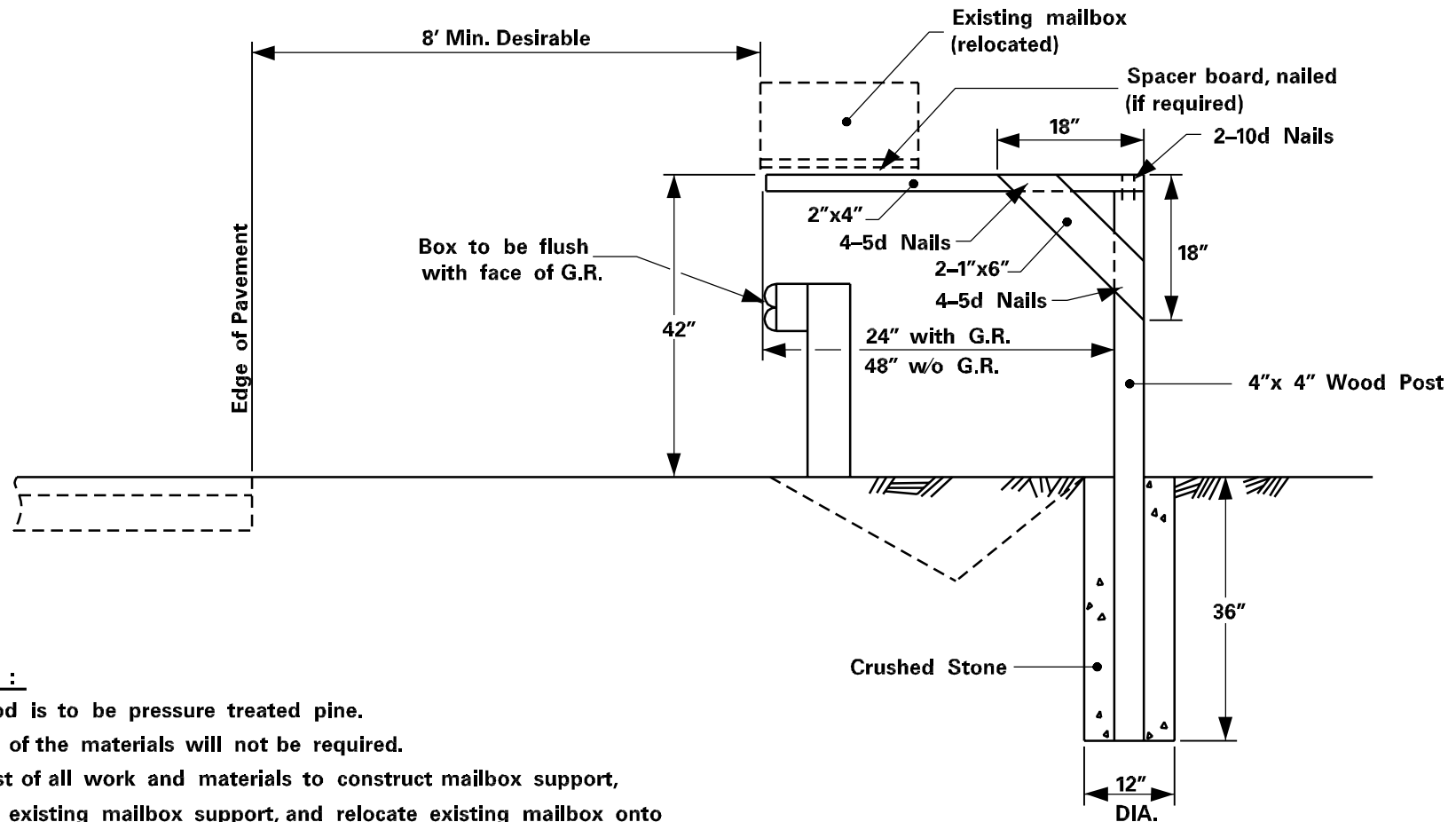
HAZARD PANELS AT LOCATIONS AS NOTED							
MP	A	B	C	D	E	F	UNITS
TOTAL UNITS							

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County \_\_\_\_\_

Sheet \_\_\_\_\_ of \_\_\_\_\_

**NOTES :**

All wood is to be pressure treated pine.

Testing of the materials will not be required.

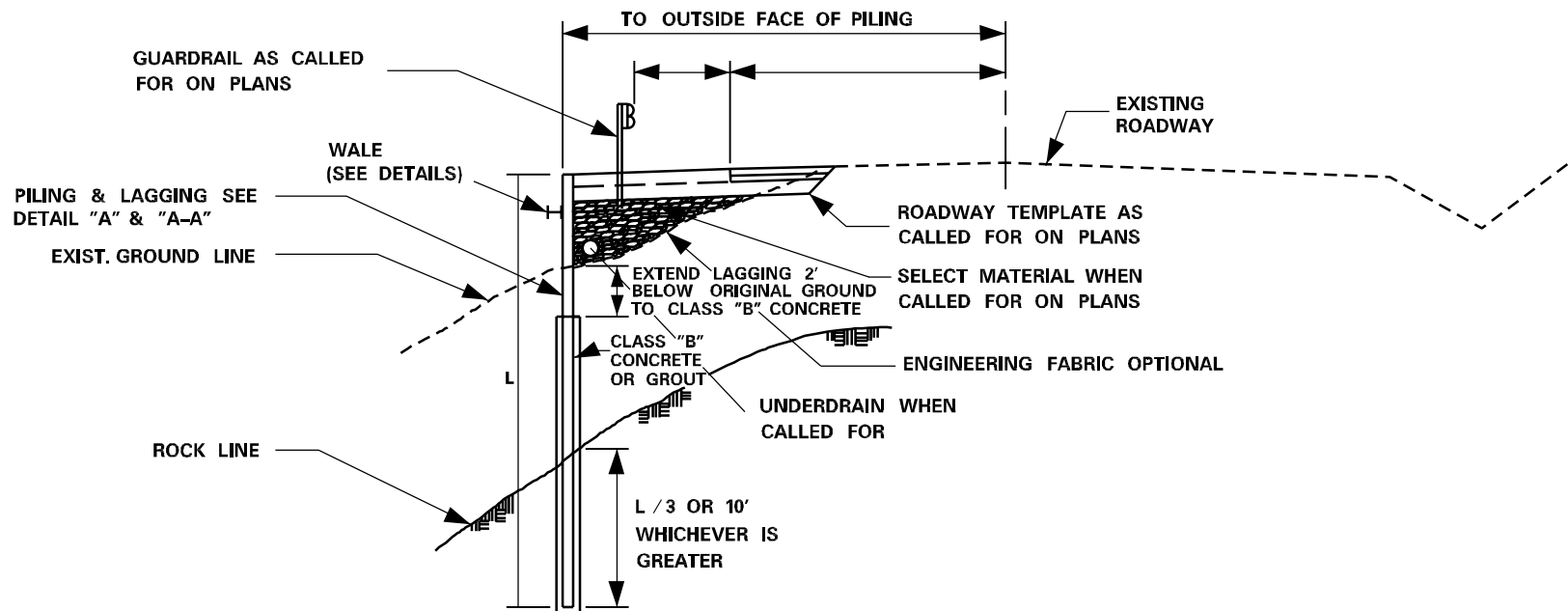
The cost of all work and materials to construct mailbox support, remove existing mailbox support, and relocate existing mailbox onto new support at locations as shown on the plans or as directed by the Engineer, is to be included in the unit bid price for Item 622003-001, Cantilever Mailbox Support, per each.

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STA. TO	STA.	PILE SECTION	PILE SPACING	NO. OF PILES	EST. LIN. FT.	DESIGN SECT MODULUS
TOTAL						

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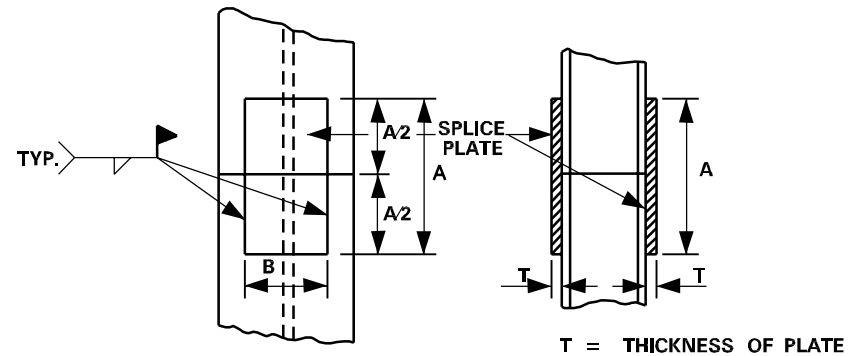
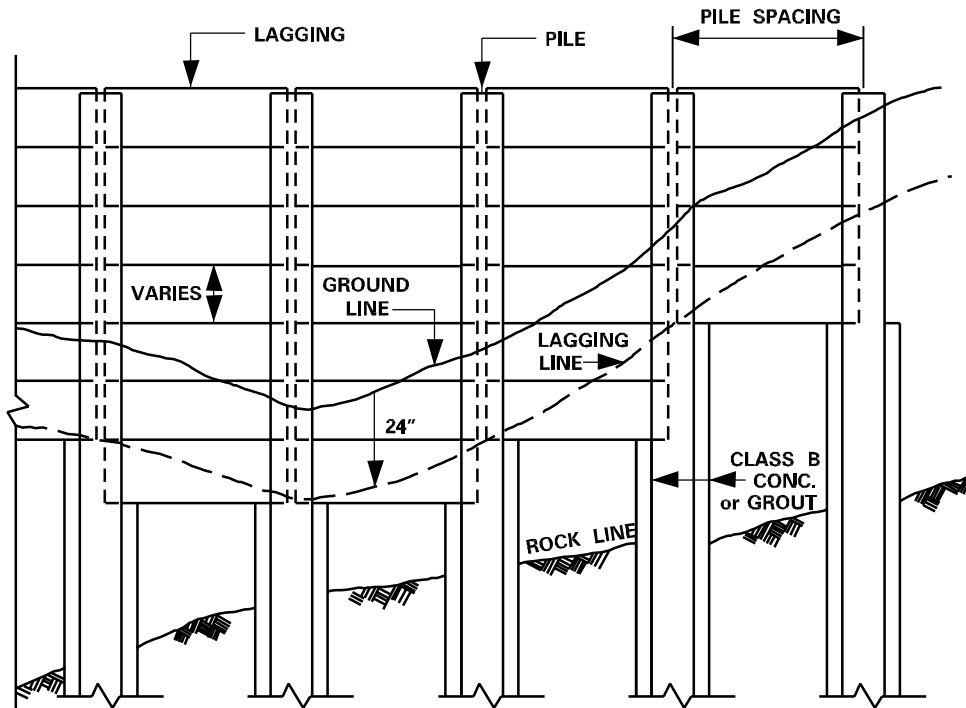
Federal Project No. \_\_\_\_\_

County \_\_\_\_\_

Sheet \_\_\_\_\_ of \_\_\_\_\_



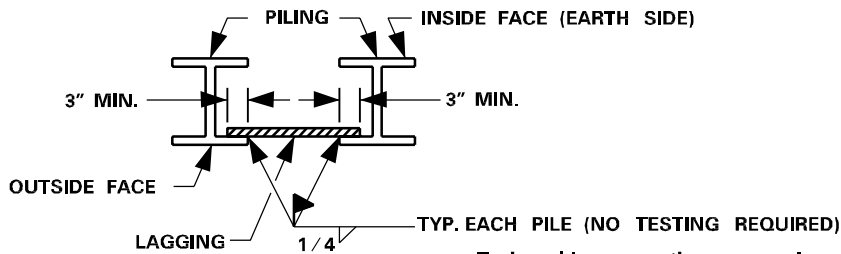
**PILING TYPICAL FRONT ELEVATION VIEW**



T = THICKNESS OF PLATE

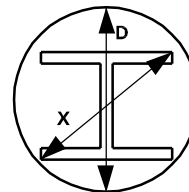
**SPLICE DETAIL**

PILING SIZE	A (INCHES)	B (INCHES)	T (INCHES)	WELD SIZE



**DETAIL "A"**  
**STEEL LAGGING**

Tack weld or use other approved method to hold laggings in place during backfill operation. No requirement for length of weld or spacing.



Diameter (D) of drilled hole shall be Min. 2 inches greater than diagonal (X) measurement of piling.

State Project No.

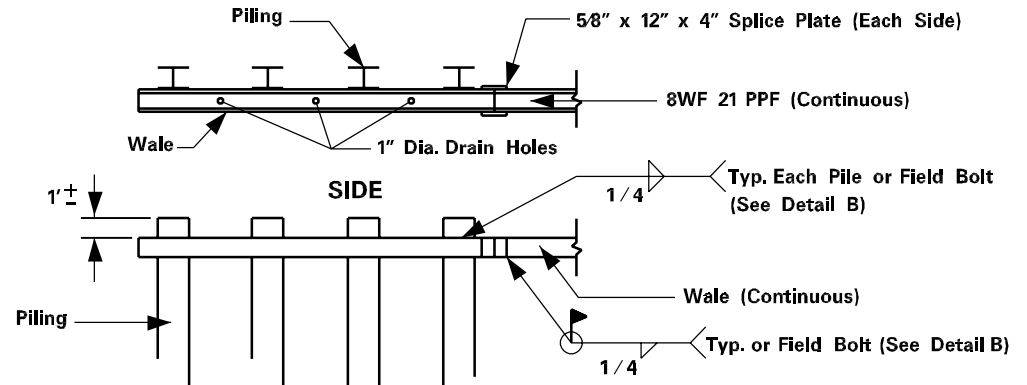
Federal Project No.

County

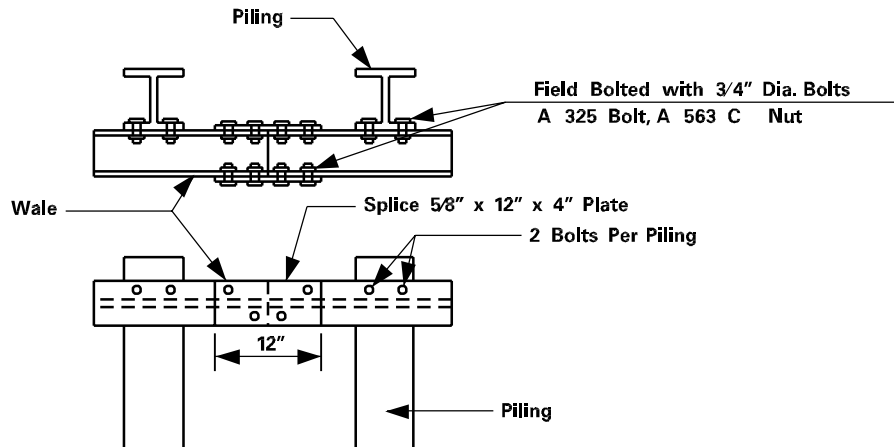
Sheet of

WALE DETAIL

TOP



NOTE : Use 5/8" x 12" x 4" Splice PLate for Welding and  
5/8" x 12" x 5" Splice Plate for Field Bolted



DETAIL 'B'

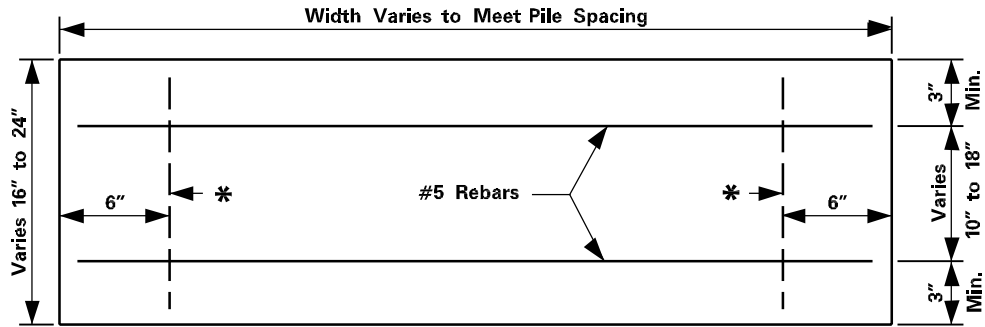
Lagging must be field modified at locations of bolts to allow firm seating of lagging against pile.

State Project No.

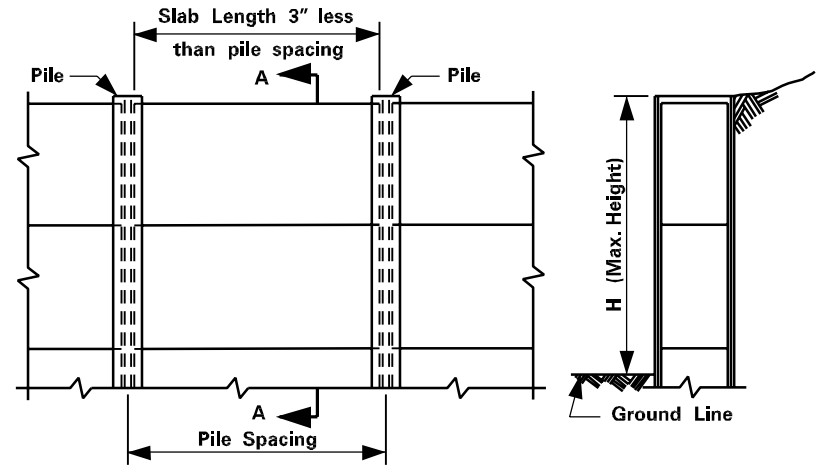
Federal Project No.

County

Sheet of

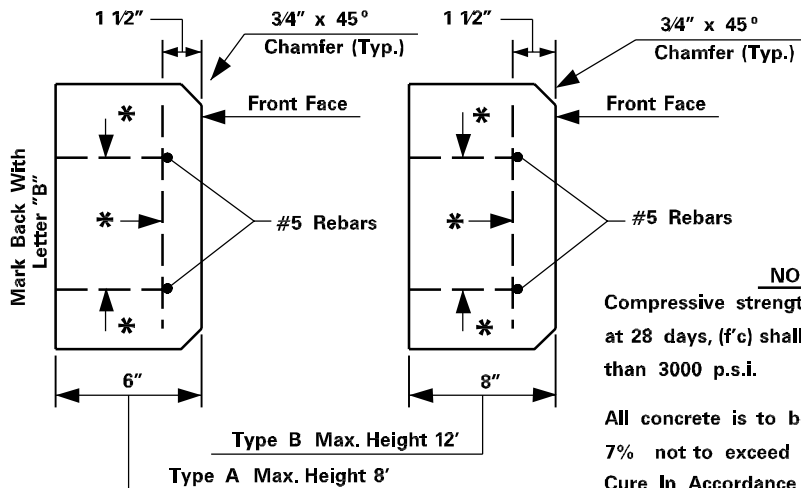


ELEVATION VIEW



ELEVATION OF WALL

SECTION A-A

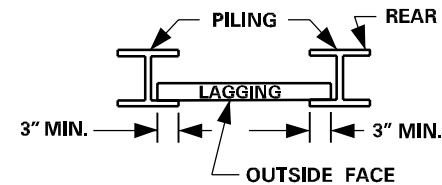


END VIEW

SOLID CONCRETE LAGGING

**NOTES**  
 Compressive strength of concrete, at 28 days, (f'c) shall not be less than 3000 p.s.i.  
 All concrete is to be Air-entrained 7% not to exceed ± 2.5%.  
 Cure In Accordance To M-199.

\* Optional Rebars  
 For Use In Fabrication.



DETAIL 'A-A'

**NOTE :** Lagging shall be in contact with piling at all faces. Method shall be approved to hold lagging in place during backfill operation.

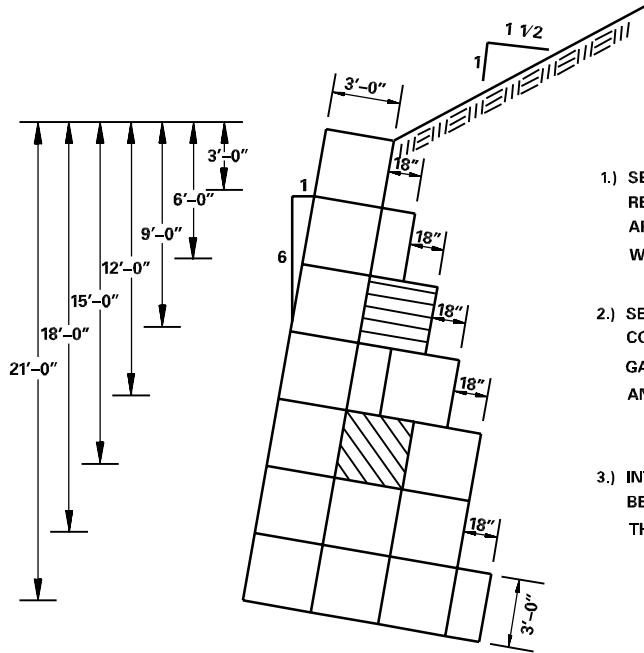
TYPICAL DETAILS FOR CONCRETE LAGGING

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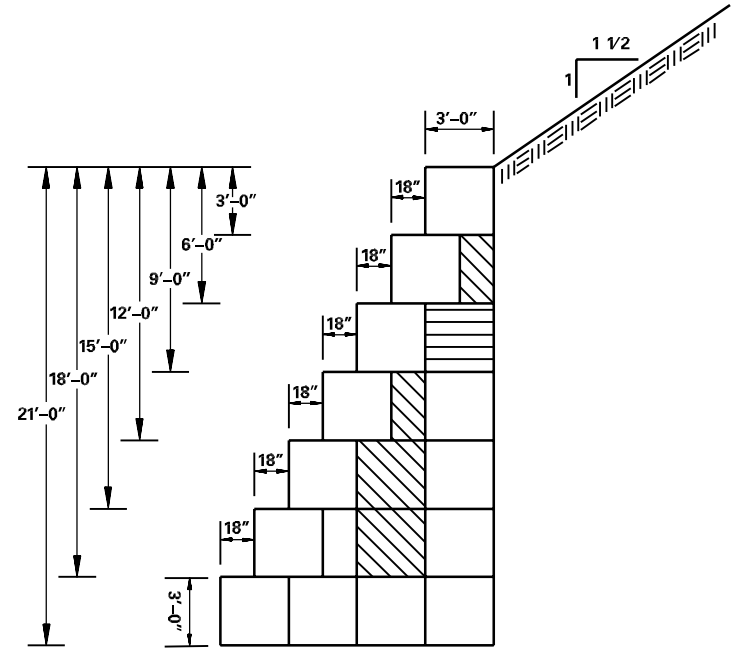
1.) SECTIONS SHOWN HATCHED DO NOT REQUIRE GABION MESH UNLESS THEY ARE IN THE BOTTOM COURSE OF THE WALL.



2.) SECTION SHOWN HATCHED MAY BE COUNTERFORTED BY USING CODE "A" GABIONS ALTERNATELY AS HEADERS AND STRETCHES.



3.) INTERMEDIATE HEIGHTS OF WALL MAY BE OBTAINED BY USING IN ONE OF THE COURSES 18" OR 12" HIGH GABIONS.



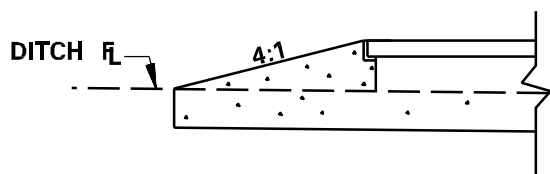
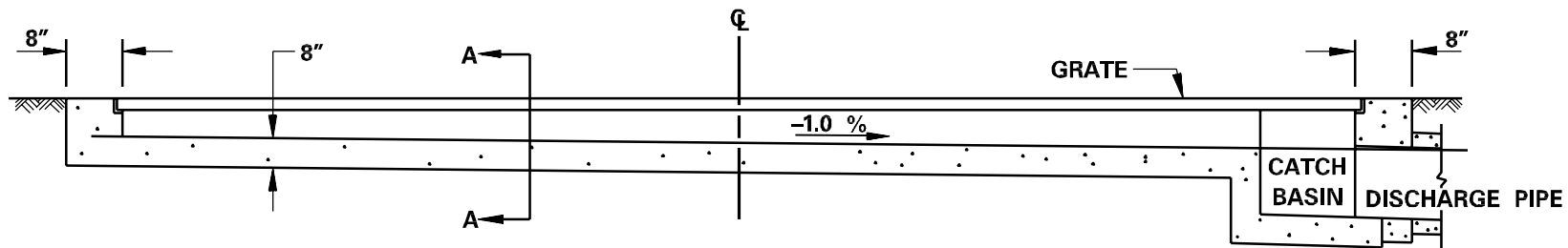
THE COST FOR ALL LABOR, MATERIALS, AND EQUIPMENT NECESSARY TO CONSTRUCT THE GABIONS IN ACCORDANCE WITH THE ATTACHED DETAIL SHALL BE INCLUDED IN THE UNIT BID PRICE OF ITEM 218003-000.

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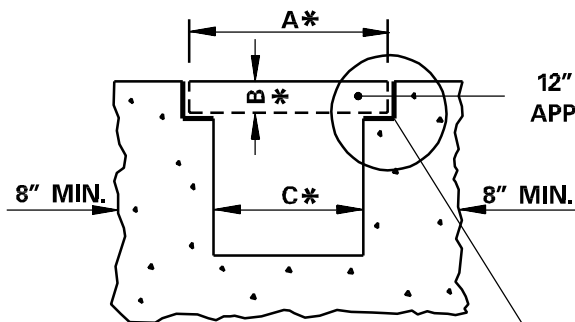
Federal Project No. \_\_\_\_\_

County \_\_\_\_\_

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**FLOW THROUGH  
END DETAIL**

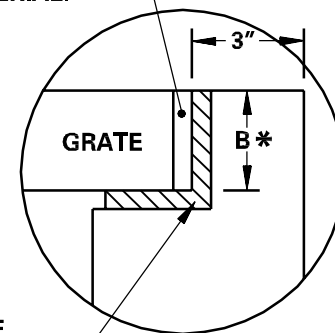


**SECTION A-A**

GAP TO BE FILLED WITH  
BITUMINOUS MATERIAL.

12" x 24" GRATE  
APPROX. WT. 75# EACH

VARIES WITH GRATE  
THICKNESS \*



**DETAIL  
SECTION A-A**

NOTE: ALL CONCRETE SHALL BE CLASS "B".  
THE COST FOR ALL MATERIALS AND  
LABOR NEEDED TO CONSTRUCT THE  
CONCRETE BOX DITCH IN ACCORDANCE  
WITH THE ACCOMPANYING DETAIL IS TO  
BE INCLUDED IN ITEM 605004-005, CONCRETE  
BOX DITCH PER L.F.

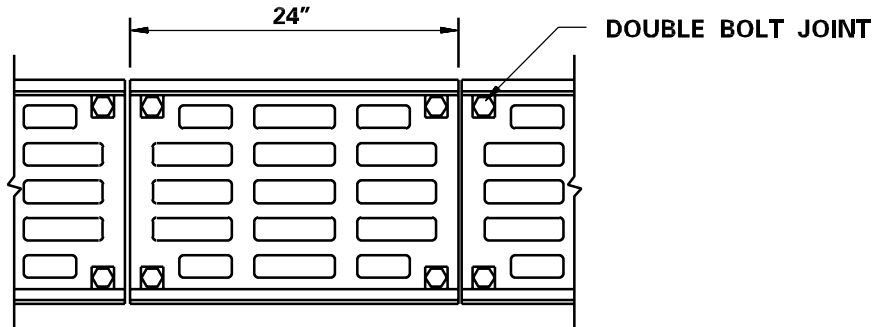
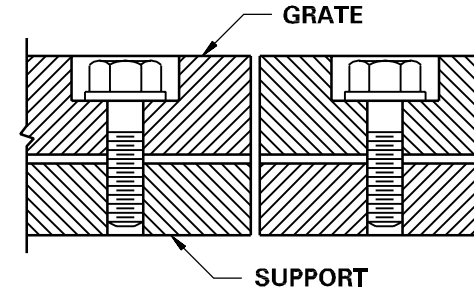
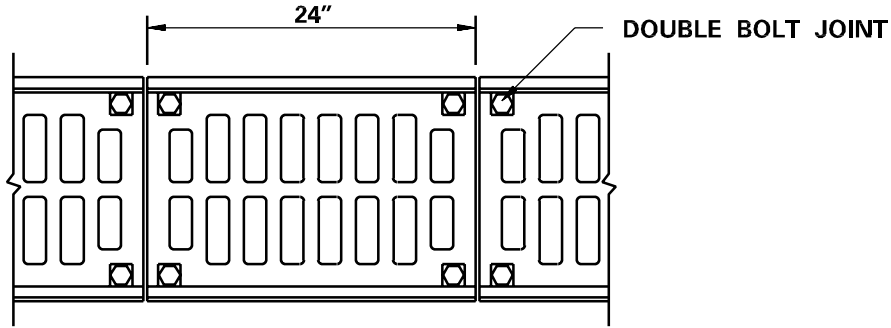
\* SEE TABLE ON SHEET  
2 FOR DIMENSIONS

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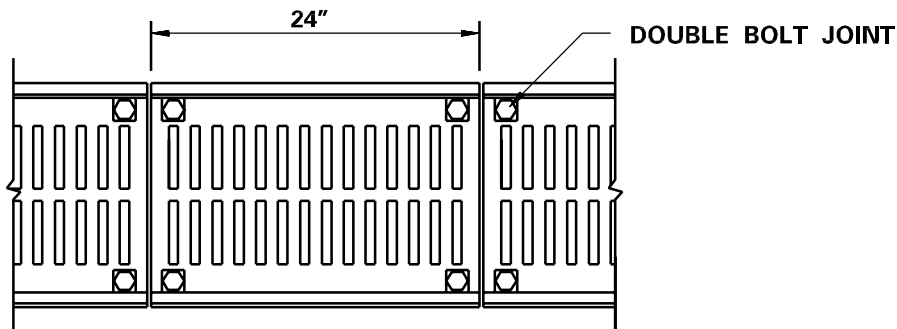
County

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DIMENSIONS IN INCHES			WEIGHT PER LINEAL FOOT			
A	B	C	TYPE A	TYPE C	TYPE P	FRAME
8	1 1/2	6	18	24	19	12
10	1 1/2	8	24	30	22	12
12	1 1/2	10	28	35	26	12
14	1 1/2	12	35	45	31	12
17	1 1/2	15	41	59	--	12
20	1 1/2	18	57	67	--	12
23	1 1/2	21	60	78	--	12
26	1 1/2	24	68	110	--	12
30	2	27	100	130	--	17
33	2	30	120	150	--	17
36	2	33	115	140	--	17
39	2	36	130	210	--	17
45	2	42	150	260	--	17
51	2	48	175	--	--	17

WEIGHT PER FOOT-INCLUDES BOTH SIDES.



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BEGIN		END TERMINAL									END		END TERMINAL									REMARKS	
STATION	Lt./Rt.	BUFFER END 607037	ST/ET 607030	CST 607025 EACH		MOD.CST 607026 EACH	TET 607066 EACH	FET 607065 EACH	THRIE BEAM 607006 EACH	DFET 607067 EACH	STATION	Lt./Rt.	BUFFER END 607037	ST/ET 604030	CST 607025 EACH		MOD.CST 607026 EACH	TET 607066 EACH	FET 607065 EACH	THRIE BEAM 607006 EACH	DFET 607067 EACH		TYPE /GR 607001-001 LF
	A			B	A										B	A						B	
<b>TOTAL</b>																							

NOTES :

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00	TRAFFIC CONTROL DEVICE QUANTITIES			85
DEVICE	DESCRIPTION	VALUE IN UNITS	QUANTITY	TOTAL UNITS
* 1	SIGNS ON PORTABLE MOUNTS AND BARRICADES. (Total Sign Area 16 S.F. or Greater.)	170		
* 2	SIGNS ON PORTABLE MOUNTS AND BARRICADES. (Total Sign Area Less Than 16 S.F.)	80		
* 3	SIGNS ON PERMANENT POSTS. (Total Sign Area 16 S.F. or Greater.)	180		
* 4	SIGNS ON PERMANENT POSTS. (Total Sign Area Less Than 16 S.F.)	90		
* 5	BARRICADES - Type I	35		
* 6	BARRICADES - Type II	60		
* 7	BARRICADES - Type III	90		
* 8	DRUMS	60		
9	CONES	5		
10	VERTICAL PANELS OR GROUND MOUNTED DELINEATORS.	10		
11	BARRIERS OR GUARDRAIL MOUNTED DELINEATORS. (To Be Bid Incidental To The Cost of The Barrier or Guardrail.)	0		
* - REFER TO SECTION 636.23.6 IN STANDARD SPECIFICATIONS		SUBTOTAL		
		15% OF SUBTOTAL (TO BE USED AT THE DIRECTION OF THE ENGINEER.)		
		TOTAL		