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STRaight HEADWALL
(Corrugated Metal Pipe Shown)

DIMENSIONS

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<thead>
<tr>
<th>DIAMETER OF PIPE</th>
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<th>B</th>
<th>C</th>
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QUANTITIES

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<tr>
<td>6.57</td>
<td>3.89 3.38 3.33 2.45</td>
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</table>

NOTES

All concrete shall be Class B Concrete.

Concrete edges and corners shall be 3/4" x 45" chamfer. Chamber or vertical edges shall be constructed minimum of one foot below finished ground line.

When headwalls are placed on the outside of a corrugated metal pipe or seamless concrete pipe, a bevel shall be used at the outside of the pipe shorfest point in the wall. The edge of the pipe shall be set in from the face of the wall, as shown in the "Bevel Detail" and the bevel extended from the end of the pipe to the face of the wall.

When headwalls are placed on the inside of a corrugated pipe, the "bevel or grooves" at the pipe shorfest point in the wall shall be extended up to the new line. Bevels are not required on outlet headwalls.

Reinforcing fabric shall conform to the requirements of 709.3 and 709.4 of the Specifications.

Reinforcing fabric, as detailed herein, shall be used in all walls of all welded structures. The covering for the fabric shall be 2" of concrete, measured from the edge of the wall, unless otherwise specified. The fabric shall be cut as necessary to accommodate the pipe opening in the wall and may be cut or field bent to fit the structure.

In lieu of reinforcing fabric described above, as shown reinforcing steel bars meeting the requirements of 709.1 of the Specifications, may be used in these structures. Covering for the reinforcing steel shall be 1/2" of concrete, measured from the surface of the concrete to the face of the bars, unless otherwise specified. Bars shall be furnished in such lengths or field bent or cut as necessary, to fit the structures and to accommodate the pipe opening in the wall.

Keyed or dowelled type construction joints, acceptable to the Engineer, may be used during construction.

The pay quantity for Straight Headwalls, constructed in accordance with the details herein, shall be included in the unit price and for "Class B Concrete".
### Notes

The "Notes" and the "Construction Detail-Sheet Pipe" on Standard Sheet DR2 (Sheet 1 of 2) shall apply to this sheet.

Anchor bolts shall be used on wingwalls for corrugated metal or structural plate pipe greater than 48" in diameter. Anchor bolts are not required for concrete pipe.

Anchor bolts and nuts shall conform to the requirements for "Headwall Anchorages" hardware as stipulated in AASHTO Specification M-167. Anchor bolts and nuts shall be cleaned after galvanizing to provide a free running fit.

Cost of the anchor bolts and nuts shall be included in the unit price bid for the pipe.

Right-of-way fence hardware inserts shall be installed in the sidewalks during the construction of wingwalls for pipes over 48" in diameter.

Dimensions and location of inserts shall conform to the "Drainage Structure Terminal Installation" detail of the applicable right-of-way fence standard.

Wingwall meeting the requirements of 708.10 shall be placed as shown when concrete gutter is to abut the wingwall.

---

### PIPE CULVERT WINGWALLS

**SHEET 2 OF 4**

---

* Dimensions for inlet wingwalls on corrugated metal or structural plate pipe (to accommodate bevel).
* Dimensions for inlet wingwalls on concrete pipe and all outlet wingwalls.
NOTES

THIS INLET SHOULD ONLY BE SPECIFIED WHEN ADHETING CONCRETE PAVEMENT

THE FINAL INSTALLED TOP SURFACE OF INLET AND GRATE SHALL BE FLUSH WITH ADJACENT FINISHED SURFACES SUCH AS PAVEMENT, CUTTERS, CURBS, AND SIDEWALKS. TOP OF GRATE ELEVATION, IF SHOWN ON THE PLANS, IS FOR INFORMATION ONLY.

CONSTRUCTION MAY BE CAST-IN-PLACE, PRECAST IN ONE OR MULTIPLE SECTIONS, OR ANY COMBINATION OF CAST-IN-PLACE AND PRECAST.

REBARS ARE TO BE INSTALLED AT THE THREE POINTS TO CONNECT CURB TO INLET. REBARS ARE NOT REQUIRED IF CURB IS Poured monolithically with INLET or if TYPE V or VI MEDIAN IS SPECIFIED ON THE PLANS.

FOR DETAILS OF GRATE SUPPORT BAR, SHALLOW FRAME, AND GRATES (TWO REQUIRED), SEE INLET CASTINGS STANDARD SHEET DR6-X. USE OF THE SHALLOW FRAME WILL BE LIMITED TO ROADSIDE CONCRETE PAVEMENTS. IF ADJACENT ROADWAY IS BUILT OF HOT MIX ASPHALT PAVEMENT, THE FRAME AS REQUIRED FOR A TYPE F INLET (STANDARD SHEET DR6) WIL BE REQUIRED.

THE CONTRACTOR MAY, AT HIS OPTION, OMIT USE OF THE LEDGE BY FORMING A LEDGE IN THE CONCRETE.

SPECIAL CARE SHALL BE EXERCISED IN FORMING THE 2" WIDE CONCRETE LEDGE TO PROVIDE A SMOOTH, EVEN SURFACE FOR SUPPORTING THE GRATES IF THE SHALLOW FRAME IS NOT USED. NO PROJECTIONS SHALL EXIST ON THE BEARING SURFACES OF THE LEDGE OR THE GRATES, AND THE GRATES SHALL SEAT ON THE LEDGE WITHOUT ROCKING.

OPTIONAL CONSTRUCTION JOINTS LACED "C" MAY BE ROUNCED CONCRETE, KEPT OR DOWELED AS PER THE WREATIONAL DETAILS SHOWN HEREIN OR AS APPROVED BY THE ENGINEER. NON-SHRINK CEMENT CONCRETE MEETING THE REQUIREMENTS OF SUBSECTION 2155.5 OF THE SPECIFICATIONS MAY BE USED TO A DEPTH OF 1/2" FOR LEVELING BETWEEN PRECAST SECTIONS. THICKER DEPTHS WILL BE ALLOWED AS PER THE MANUFACTURER'S RECOMMENDATIONS.

PC (MINIMUM PIPE COVER) SHALL BE 12" BELOW INLET TOP FOR PIPES PLACED UNDER SIDEWALK OR GRASSED AREA OR 24" BELOW INLET TOP FOR PIPES PLACED UNDER PAVEMENT OR SHOULDER.

CURB, IF SPECIFIED, MAY BE EITHER CONCRETE, PLACED ON THE INLET BACKWALL AS DETAILED HEREIN OR AN APPROVED CURB BOX AS MANUFACTURED WITH THE GRATE AND FRAME. DIMENSIONS OF THE CURB BOX SHOULD REASONABLY CONFORM TO THE STANDARD CURB AS SPECIFIED ON THE PLANS. THE CURB WILL BE PAID FOR PER SECTION 81D, IN OTHER CASES.

THIS INLET SHALL NOT BE PLACED IN A PEDESTRIAN CROSSWALK.

THE MINIMUM DISTANCE FROM THE TOP OF ANY PIPE OPENING TO ANY CONSTRUCTION JOINT ABOVE THE OPENING SHALL BE FOUR (4) INCHES.

THE NUMBER AND LOCATION OF PIPE OPENINGS SHALL BE AS SHOWN ON THE PLANS. THE CONTRACTOR AT NO ADDITIONAL COST SHALL BE RESPONSIBLE FOR ANY TEMPORARY BRACING REQUIRED TO TRANSPORT PRECAST INLET SECTIONS DUE TO MULTIPLE OPENINGS.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

TYPE A INLET

STANDARD SHEET DR6-A
UNLESS OTHERWISE SPECIFIED ON THE PLANS, TYPE B INLETS MAY BE CONSTRUCTED IN ANY OF THE SHAPES SHOWN WHEN THE OUTLET PIPE DIAMETERS IS 21" OR LESS AND THE ADJACENT PAVEMENT IS CONCRETE.

IF THE OUTLET PIPE DIAMETER IS 24" OR THE ADJACENT PAVEMENT IS NOT MIX ASPHALT, ONLY THE SQUARE STYLE WITH THE DEEP FRAME WILL BE USED. THE WIDEST OPENING OF THE INLET WILL BE ADJUSTED TO ACCOMMODATE THE 24" PIPE.

CONSTRUCTION MAY BE CAST-IN-PLACE, PRECAST IN ONE OR MULTIPLE SECTIONS, OR ANY COMBINATION OF CAST-IN-PLACE AND PRECAST.

OPTIONAL CONSTRUCTION JOINTS Labeled "CJ" MAY BE ROUGHENED CONCRETE, KEYED OR DOMED AS PER THE TYPICAL DETAILS SHOWN HEREIN OR AS APPROVED BY THE ENGINEER. NON-SHRINK CEMENT MIXING THE REQUIREMENTS OF SUBSECTION 7.0.5 OF THE SPECIFICATIONS MAY BE USED TO A DEPTH OF 7" FOR LEVELING BETWEEN PRECAST SECTIONS. THICKER DEPTHS WILL BE ALLOWED AS PER THE MANUFACTURER'S RECOMMENDATIONS.

THE FINAL INSTALLED TOP SURFACE OF INLET AND GRATE SHALL BE FLUSH WITH ADJACENT FINISHED SURFACES SUCH AS PAVEMENT, CURBROAD, CURBS, AND SIDEWALK. TOP OF GRATE ELEVATION IS SHOWN ON THE PLANS, FOR INFORMATION ONLY.

REBAR ARE TO BE INSTALLED AT THE QUARTER POINTS TO CONNECT CURB TO INLET. REBAR ARE NOT REQUIRED IF CURB IS POURED MONOLITHICALLY WITH THE INLET OR IF TYPE V OR VIMEDIAN IS SPECIFIED ON THE PLANS.

FOR DETAILS OF GRATES AND FRAMES, SEE INLET CASTING STANDARD SHEET D6-1x.

THE CONTRACTOR MAY, AT HIS OPTION, OMIT USE OF THE SHALLOW FRAME BY FORMING A LEDGE IN THE CONCRETE SPECIAL CARE SHALL BE EXERCISED IN FORMING THE 2" WIDE CONCRETE LEDGE TO PROVIDE A SMOOTH, EVEN SURFACE FOR SUPPORTING THE GRATE, IF A FRAME IS NOT USED. NO PROJECTIONS SHALL EXIST ON THE GRATE AND THE GRATE SHALL SEAT ON THE LEDGE WITHOUT RODDING.

FIBER FORM SHALL BE REMOVED PRIOR TO COMPLETION OF THE PROJECT.

PC MINIMUM PIPE COVER SHALL BE 12" BELOW INLET TOP FOR PIPES PLACED UNDER SIDEWALKS OR GRADED AREA OR 24" BELOW INLET TOP FOR PIPES PLACED UNDER PAVEMENT OR SHOULDERS.

CURB IF SPECIFIED, MAY BE EITHER CONCRETE PLACED ON THE INLET BACKWALL AS DETAILED HEREIN OR AN APPROVED CURB BOX AS MANUFACTURED WITH THE GRATE AND FRAME. DIMENSIONS OF THE CURB BOX SHOULD BE CONFORM TO THE STANDARD CURB AS SPECIFIED ON THE PLANS. THE CURB WILL BE PAID FOR PER SECTION 8.10, IN EITHER CASE.

THIS INLET SHALL NOT BE PLACED IN A PEDESTRIAN CROSSWALK.

THE MAXIMUM DISTANCE FROM THE TOP OF ANY PIPE OPENING TO ANY CONSTRUCTION JOINT ABOVE THE OPENING SHALL BE FOUR (4) INCHES.

THE NUMBER AND LOCATION OF PIPE OPENINGS SHALL BE AS SHOWN IN THE PLANS. THE CONTRACTOR AT NO ADDITIONAL COST, SHALL BE RESPONSIBLE FOR ANY TEMPORARY BRACING REQUIRED TO TRANSPORT PRECAST INLET SECTIONS DUE TO MULTIPLE OPENINGS.
NOTES

THE FINAL INSTALLED TOP SURFACE OF INLET AND GRATE SHALL BE FLUSH WITH ADJACENT FINISHED SURFACES SUCH AS PATIOS, COLUMNS, CURB, AND SCAFFOLD TOP OF GRATE ELEVATION. IF SHOWN ON THE PLANS, IS FOR INFORMATION ONLY.

CONSTRUCTION MAY BE CAST-IN-PLACE, PRECAST IN ONE OR MULTIPLE SECTIONS, OR ANY COMBINATION OF CAST-IN-PLACE AND PRECAST.

REBAR ARE TO BE INSTALLED AT THE QUARTER POINTS TO CONNECT CURB TO INLET. REBAR ARE NOT REQUIRED IF CURB IS POURED MONOLITHICALLY WITH INLET OR IF TYPE V OR VI MEDIAN IS SPECIFIED ON THE PLANS.

FOR DETAILS OF GRATE SUPPORT BAR, SHALLOW FRAME, AND GRATE (TWO REQUIRED), SEE INLET CASTINGS STANDARD SHEET DRI-4.

THE CONTRACTOR MAY, AT HIS OPTION, OMIT USE OF THE FRAME BY FORMING A LEDGE IN THE CONCRETE.

SPECIAL CARE SHALL BE EXERTED IN FORMING THE 1 1/2" WIDE CONCRETE LEDGE TO PROVIDE A SMOOTH, EVEN SURFACE FOR SUPPORT. AT TIMES, MOLD EXTRUSIONS MAY OCCUR, NO PROJECTIONS SHALL EXIST ON THE BEARING SURFACES OF THE LEDGE OR THE GRATES AND THE GRATES SHALL SEAL ON THE LEDGE WITHOUT ROckING.

OPTIONAL CONSTRUCTION JOINTS Labeled "CJ" MAY BE ROUNDED CONCRETE-KEYED OR DWELLED AS PER THE TYPICAL DETAILS SHOWN HEREIN OR AS APPROVED BY THE ENGINEER. NON-SHAPE HAVING THE REQUIREMENTS OF SUBSECTION 715.5 OF THE SPECIFICATIONS MAY BE USED TO A DEPTH OF 5/16" FOR LEVELING BETWEEN PRECAST SECTIONS. THICKER DEPTHS WILL BE ALLOWED AS PER THE MANUFACTURER'S RECOMMENDATIONS.

PC (MINIMUM PIPE COVER) SHALL BE 12" BELOW INLET TOP FOR PIPES PLACED UNDER SIDEWALK OR GRADED AREA OR 24" BELOW INLET TOP FOR PIPES PLACED UNDER PAVEMENT OR SHOULDER.

CURB IF SPECIFIED MAY BE EITHER CONCRETE PLACED ON THE INLET BACKWALL AS DETAILED HEREIN OR AN APPROVED CURB BOX AS MANUFACTURED WITH THE GRATE AND FRAME. DIMENSIONS OF THE CURB BOX SHOULD BE CONFORMAL TO THE STANDARD CURB AS SPECIFIED ON THE PLANS. THE CURB WILL BE PAID FOR PER SECTION 8 0 6 IN EITHER CASE.

THIS INLET SHALL NOT BE PLACED IN A PEDESTRIAN CROSS WALK.

THE MINIMUM DISTANCE FROM THE TOP OF ANY PIPE OPENING TO ANY CONSTRUCTION JOINT ABOVE THE OPENING SHALL BE FOUR (4) INCHES.

THE NUMBER AND LOCATION OF PIPE OPENINGS SHALL BE AS SHOWN ON THE PLANS. THE CONTRACTOR AT NO ADDITIONAL COST SHALL BE RESPONSIBLE FOR ANY TEMPORARY BRACING REQUIRED TO TRANSPORT PRECAST INLET SECTIONS DUE TO MULITPLE OPENINGS.
**NOTES**

The final installed top surface of inlet and grate shall be flush with adjacent finished surfaces such as pavement, gutters, curbs, and sidewalks. Top of grate elevation, as shown on the plans, is for information only.

Construction may be cast-in-place, precast in one or multiple sections, or any combination of cast-in-place and precast.

Optional construction joints (referred to as "C") may be roughened concrete, keyed or dowelled as per the typical details herein or as approved by the Engineer.คอนกรีตที่มีการตัดร่องหรือดัดเนื้อติดต่อกัน (จุด "C") สามารถใช้ได้ตามแบบพื้นที่, หรือตามข้อกำหนดที่อนุมัติโดยนักออกแบบ. ความหนาแน่นของคอนกรีตจะต้องมีค่าที่ต่ำกว่าค่าที่กำหนดไว้ตามหลักเกณฑ์.

The covering for reinforcing steel shall be two inches measured from the face of the concrete to the face of the bar, unless otherwise shown.

For details of grates (if required), see Inlet Coatings Standard Sheet DIN-X.

PC minimum pipe cutout shall be 12" below inlet top for pipes placed under sidewalk or grassed area or 24" below inlet top for pipes placed under pavement or shoulder.

Curbs, if specified, may be either concrete placed on the integral block wall as detailed herein or an approved curb box as manufactured with the grate and frame. Dimensions of the curb should reasonably conform to the standard curb as specified on the plans. The curb will be held for per section 615. In either case.

This inlet shall not be placed in a pedestrian cross walk.

The minimum distance from the top of any pipe opening to any construction joint above the opening shall be four (4) inches.

The number and location of pipe openings shall be as shown in the plans. The contractor at no additional cost, shall be responsible for any temporary bracing required to transport precast inlet sections due to multiple openings.
The final installed top surface of the inlet and grate shall be flush with adjacent finished surfaces such as pavement, gutters, curbs, and sidewalks. Top of grate elevation, if shown on the plans, is for information only.

Construction may be cost-in-place, precast in one or multiple sections, or any combination of cost-in-place and precast.

Type 2 Grate shall be used at locations unless otherwise specified on the plans. Type 1 Urban Grates shall be used only at specially designated locations as shown on the plans.

The Contractor, at his option, may omit use of the frame by forming a ledge in the concrete. Special care shall be exercised in forming the 2" wide concrete ledge to provide a smooth, even surface for supporting the grate if the shallow frame is not used, no projections shall exist on the bearing surfaces of the ledge or the grate, and the grate shall seat on the ledge without rocking.

The Mounding Detail as shown is not required when an inlet is placed in a saw.

Optional construction joints labeled "C" may be roughened concrete, keyed or dowelled as per the typical details shown herein or as approved by the Engineer. Non-shrink grout meeting the requirements of subsection 715.5 of the specifications may be used to a depth of \( \frac{1}{2} \) for leveling between precast sections. Thicker depths will be allowed as per the manufacturer's recommendations.

This inlet is to be installed in roadside or median ditches only. It is not to be placed adjacent to pavement or in the gutter pan of combination curb and gutter.

The minimum distance from the top of any pipe opening to any construction joint above the opening shall be four (4) inches.

The number and location of pipe openings shall be as shown in the plans. The contractor at no additional cost, shall be responsible for any temporary bracing required to transport precast inlet sections due to multiple openings.

### Table Note:
Grate and frame weights are for information only and will increase if larger struts and bars are used. The following substitutions in dimensions are acceptable for fabricating the grate and frame:

- Strap Thickness: 1/2" 
- Strap Depth: 3" 
- Bar Depth: 3"
TYPICAL INSTALLATIONS

SLOT DETAILS

NOTES

The contractor may, at his option but subject to the limitations as noted on this sheet and elsewhere on the plans, install Type 1 or 2 Slots or approved equals.

When specified on the plans, Type 1 slots shall include expanded steel-mesh grating locked to the spacer bars.

Grates shall be omitted from the perforated slot inlet installation when free-draining base is specified and will be placed against the inlets.

When slot heights of 8.5" are specified, the Type 1 slots may be fabricated by stacking a 2.5" slot on top of a 6" slot. The assembly shall then be joined by minimum 3/8" x 1" flat welds at 6" centers along each side of the horizontal joint. The resultant slot height may be slightly less than 8.5".

Slot inlets shall not be placed across a pedestrian walk.

SLOTS NOTES

TYPE 1 SLOT

BEARING BARS AND SPACERS: These elements are to be 3/8" structural steel, suitably welded to form an open slot and hot-dip galvanized as per ASTM A-123. Spacers may be fire-rated sized at approximately 30° from vertical. If the slot is placed on a grade and adjacent to a curb or median, the slot is to be installed to position the spacer to tilt upgrade toward the incoming gutter flow.

TYPE 2 SLOT

GRADE AND CLAMP: These parts are to be hot-dip galvanized mild carbon steel conforming to ASTM A659. Grating, measuring 3/8" deep by 1-3/4" wide, shall extend the full length of each pipe section slot.

REBAR: The rebar shall be serpentined bent to be stocked opening on 6" centers and shall be coated with 7 miles of fusion-bonded epoxy powder.


REMOVABLE FORMS: Forms are to be cellular foam with a wood or plastic cap.

SLOT HEIGHT: 4" minimum slot height acceptable where 2.5" slot height is specified.
NOTES

"Keyed" Or "Doweled" Type Construction Joints, Acceptable To
The Engineer, May Be Used In The Construction Of Concrete Manholes
If Cost-In-Place Manhole Is Over Twelve Feet (12') In Depth.
The Sidewalls Below That Depth Will Be Double Thickness.

Pipe At Elevations Other Than Shown May Be Joined To The
Manhole By Cutting A Hole The Size Of The Connecting Pipe In The
Manhole, Inserting The Pipe The Thickness Of The Manhole Shell
And Closing All Openings Around The Connecting Pipe With Joint
Mortar.

Either This Manhole Or The Precast Manhole On Standard Sheet
DR7-A May Be Furnished When Type B Manhole Is Called For In The
Contract. The Frame And Grate Shall Be As Shown On Standard
Sheet DR5-X INLET CASTINGS, Steps Shall Be As Shown On Standard
Sheet DR7-X.

Minimum Height Of Bench Wall Above Flowline Of Pipe is
25% Of The Diameter Of The Pipe.
The use of brick for manhole construction will not be allowed when a
manhole is located in the roadway.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

TYPE B MANHOLE

STANDARD SHEET DR7-B
Lugs Raised 1/8"  Letters Raised 1/8"

Lugs Raised 1/8"  Letters Raised 1/8"

Top of Step to be Non-Skid
Surface (Rough Diamond Design)
Rounded 3/8" Above Metal Elevation Shown.

PLAN  SEWER

PLAN  SEWER

ELEVATION

INVERTED PLAN

MANHOLE COVER

SECTION A-A

REINFORCED PLASTIC AND REINFORCED CORROSION
RESISTANT RUBBER MANHOLE STEPS

NOTES

Lettering on covers shall denote STORM SEWER or SANITARY SEWER as applicable.
Bottom ribs may be deleted from manhole cover castings.
The 3/8" raised lugs are a skid resistant measure. Alternative measures will require approval by the Engineer.
Shop Drawings shall be submitted if details and dimensions vary.

SECTION MANHOLE FRAME
*Except for structural plate pipe where length of bedding arc need not exceed width of bottom plate. However, if structural plate pipe is first assembled and then placed in the trench, the 0.5:0.5 minimum value will apply.

**Class B Bedding**

(Trench shown is for 18" thru 54" Pipe)

**Class B Bedding**

(Trench shown is for 60" thru 108" flexible pipe in soil cut fill sections)

**Class B Bedding**

(Trench shown is for 60" thru 108" rigid pipe in cut sections)

**Typical Pipe Bedding**

**Median Outlet in High Fill**

To be used where called for on the plans or as shown on the cross sections.

**Section C-C**

Outlet Through Berm

To be used where called for on the plans or as shown on the cross sections.

**Notes**

For pipe without corrugations, a one inch layer of fine aggregate for leveling will normally be adequate to achieve a uniform bearing surface. For corrugated pipe, layers shall be 1" minimum for 1/2" depth corrugations, 2" minimum for 1" depth corrugations, and 3" minimum for 2" or 2-1/2" depth corrugations.
CONCRETE GUTTER

STANDARD CONCRETE GUTTER TYPES

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*(Note: Not shown are gutter slopes inside gutter, unless otherwise specified.)*

CUT-OFF WALL

SECTION A-A

PLAN

PREFABRICATED EDGE DRAIN

CONCRETE GUTTER TREATMENT AT INLETS

PLAN VIEW

TYPICAL WATERSTOP

DUMPED ROCK GUTTER

SELECT EMBANKMENT CHANNEL

MISCELLANEOUS DRAINAGE

(West Virginia Department of Transportation, Division of Highways)

STANDARD SHEET DBS

(See Plans For Free Draining Base outlet on Standard Sheet DBS, 3 of 4 are to be used.)
Payment for the outlet pipe includes drop connections in the free draining base trench and slopewalls or connections to drainage structures as required. Maximum outlet spacing is to be 250’ in embankments. Outlets in cut sections will be made to the nearest drainage structure. Slopewall details will be in accordance with Standard DRB (sheet 3 of 4). At vertical gaps, one outlet shall be constructed at the low point and additional outlets shall be constructed at 25 feet and 50 feet each way from the low point.

Underdrain pipe as detailed to be 6” diameter non-perforated rigid pipe except for the 5’ of pipe placed in the free draining base trench unless otherwise specified in the plans.

At outlets are to be equipped with a Slopewall for Underdrain and Varmint Screen as detailed. Slopewalls will not be paid for separately but shall be included in the cost of the underdrain pipe. Underdrain pipe tied to inlets or fastened to culvert pipe by pipe saddle, grouting, cementing, or other means that will provide a secure attachment satisfactory to the engineer shall be included in the cost of the underdrain pipe.

Commercially available galvanized hardware screen is to be snugly fitted inside each Slopewall. The screen is to have the capability of being removed and reinstalled for maintenance operations. The screen wires shall be welded at a spacing in each direction of 3/8” to 3/4”. The cost of the screen to be included in the cost of the underdrain pipe or edge drain.

Crossovers shall have outlets coordinated with regular roadway outlets to ensure that areas shall be free-draining.

Typical lateral trench sections shown are possible selections; other configurations may be utilized if depth and width are obtained. Spacing shall be 100’ maximum in areas designated as requiring lateral trench.

Lateral trench sections shall be installed at locations as follows:
- Cross Slope = 0.0166: Grade = 4% and above
- Cross Slope = 0.0208: Grade = 5% and above
- Cross Slope = 0.0240: Grade = 8% and above
- Cross Slope = 0.0260 and greater no trench required
NOTES

Filter fabric and aggregate for filter fabric underdrain shall conform to the requirements of Section 606.2 of the Specifications. All costs associated with the 5" perforated underdrain pipe required in the Filter Fabric Underdrain Installation to be included in the contract price bid for Filter Fabric Underdrain.

Underdrain shall generally follow the grade of the pavement where the grade is not less than 1%. A desirable minimum of 1% and an absolute minimum of 0.5% with 18" of cover shall control in the placement of underdrain unless otherwise noted on the plans.

The top of underdrain pipe shall be placed at the same elevation as the top of the outlet pipe at all locations or maintained unless otherwise noted on the plans.

Spring Control shall be used where noted on the Plans or as directed by the Engineer. Cost of excavation, filter fabric and installation shall be included in the contract price bid for "Crushed Stone Crushed Gravel". Dimensions as indicated variable shall be as shown on the plans or determined in the field.

For pipe cap details, see Standard Sheet DRB, Sheet 3 of 4.

All Underdrain outlets are to be equipped with a Spigotwell for Underdrain and Verinte Screen as detailed on Standard Sheet DRB, 3 of 4 or tied to existing lines or culvert pipes. Spigotwell for underdrain will not be paid for separately but shall be included in the cost of the Underdrain pipes. Filter Fabric Underdrain, underdrain pipe tied to lines or fastened to culvert pipe by pipe sockets, grouting, cementing, or other means that will provide a secure attachment satisfactory to engineer shall be included in the cost of the underdrain pipes or Filter Fabric Underdrain.

FILTER FABRIC UNDERDRAIN
(Typical Installations)
GENERAL:
Only one type of block, steel or wood, shall be used throughout any project, unless otherwise specified. Blocks for block rail shall be used on all posts except when otherwise noted in Plans. When blocks are not provided, the post details will be as shown herein, except the 5⁄8" bolt minimum length will be reduced as required. The 1⁄4" minimum notch for the wood guardrail post (round) will not be used, and note for block stability will not be needed. For steel posts without blocks, details of the posts shall conform to the "Steel Guardrail Post (Wood Block)" specifications, with the additional holes to facilitate erection being optional.

The circular washers shall be made of steel and galvanized in accordance with the in accordance with the requirements of AASHTO M232.

WOOD POSTS:
Wood posts and blocks shall be the same type (species).
Wood posts shall be pressure-treated after notching, in accordance with Section 705.5 of the specifications.
The 1⁄4" (minimum) notch dimension as shown for round wooden posts shall be located along the vertical centerline for the entire upper 14" of the post and shall apply to either whether the post is notched (as shown) or otherwise cut or sawed to form a vertical flat plane and then, at some location below the top 14", is partially sloped out to the surface of the post.
Post length will be 6' 1⁄2" unless otherwise noted.

STEEL POSTS:
Blocks shall be centered on their posts and the center of the blocks holes, for bolts connecting rail to blocks, shall be horizontally offset 1-1⁄4" from the center of the steel posts toward the post edge facing approaching traffic for both steel and wood blocks, as shown for wood blocks on the Plan view of the Block Stop Detail. Post length will be 6' 1⁄2" unless otherwise noted.

WOOD BLOCKS:
The type (species) of wood for blocks is to be one of the types (species) permitted by specifications for wood posts. Wood blocks shall be pressure-treated in conformance with the requirements for wood posts. However, creosote oil is not permitted as a preservative in the pressure treatment of wood blocks to be erected on steel posts. 8" x 6" wood blocks shall be positioned so that the 8" x 14" faces of the blocks are the contact faces for the rails, and in order to achieve the blockout dimension shown. When wood block is used adjacent to a wood post, the block shall be noted to the post with a galvanized steel 10D common nail.

The nails to be driven into the center of the top or bottom of the block.
The blocks shall be nailed to the steel posts in the same manner when the beams are at the same elevation as they would when the beams are at different elevations.

The standard bolts shall be used for wood guardrail posts when possible.

The applicable details and notes of Standard Sheet GR2 shall apply to this sheet.

The 1" (minimum) notch dimension as shown for round Wooden Posts shall be located along the vertical centerline for the entire upper 14" of the post and apply regardless of whether the Post is notched as shown or otherwise cut or sawed to form a vertical flat plane and then, at some location below the top 14", is angularly sliced out to the surface of the post.

When a wood block is used adjacent to a wood post, the block shall be nailed to the post with a galvanized steel 1/4" common nail. The nail is to be driven in the center of the top or bottom of the block.
NOTES

For fill-to-void guardrail terminal (retaining end, two-lane highways, and all approach ends) where anchored ends are specified, the details and requirements herein shall be applicable.

Prior to placing guardrail, a final check of existing conditions will be made by the engineer and any adjustments necessary to insure the proper functioning of the guardrail for the purpose for which it is intended will be made accordingly.

Type A (Soft Shale or Soil) Cut Slope Terminal guardrail shall be that guardrail which H11 is to extend a minimum of 6-3/4" into the cut slope from the first point beyond the toe of the cut slope, as detailed herein, and 121 is to terminate a minimum of 1-1/2" below the ground elevation of the top slope, as detailed herein, except in areas of heavy rock outcropping where the minimum depth may be six inches.

Posts, blocks, and roll elements shall be the same types used in the normal guardrail installation, unless otherwise noted. All posts shall be of standard length except underground posts may be #4½ or #6½, 2-3/4" in length, in areas of heavy rock outcropping, guardrail looks shall not be used on any posts completely underground.

A trench no greater than 1/8" in width shall be excavated into the cut slope to accommodate the Type A Terminal installation. The contractor shall so arrange his work sequence to provide that each Type A Cut Slope Terminal installation shall be succeeded pasts driven roll elements and guardrail components assembled the trench backfilled and disturbed stone shaped, seeded and mulched all in one continuous operation.

Type B (Shale or Rock) Cut Slope Terminal installation shall consist of anchoring the guardrail against the face of the cut slope utilizing guardrail and posts and rod bolts, as detailed herein.

The final decision as to the type of Cut Slope Terminal installation Type A or Type B at each location will be based on the actual materials encountered during construction.

The cost of furnishing and installing Cut Slope Terminals shall include excavating and backfilling the trench, and reshaping, seeding, and mulching of the cut slope for Type A Cut Slope Terminals. The contractor shall include drilling holes into the cut slope for furnishing and installing posts, bolts, and hardware for Type B Cut Slope Terminals, and shall be paid for as "Cut Slope Terminal." Type A or #5 per each, 160 ft, normal guardrail components, i.e., posts, blocks, roll elements, hardware, etc., including special length guardrail posts in heavy rock outcropping shall be paid for as guardrail per linear foot.

Cut Slope Terminal installation can interfere with normal drainage in a cut section. When this occurs, details for estimating positive drainage will be shown on the project plans.
NOTES

For details of Flared End Terminals see approved shop drawings.

All materials used shall meet the applicable requirements of Section 607 of the Standard Specifications for Roads and Bridges.

The post offset dimensions are given to the center of the traffic face of the backwall; except at the first post, where the dimension is to the center of the traffic face of the post. Offset points are to be located by measurements at the back of rail equal to the nominal post spacings shown on the pre-approved shop drawings. Posts are to be set approximately radial to the rail at each location.

When a wood block is used adjacent to a wood post, the block shall be nailed to the post with a galvanized steel 10d common nail. The nails to be driven into the center of the top or bottom of the block.

The cost of furnishing and installing the Flared End Terminal, complete with all miscellaneous hardware and parts as detailed on the pre-approved shop drawings, is to be included in the unit price bid for "Flared End Terminal".

Yellow reflective sheathing shall cover the entire nose of those terminals with a flat impact head. Those terminals with a rounded impact head shall be covered with a 1'-0" x 3'-0" yellow reflective sheet.
NOTES

For details of Flared End Terminalsee pre approved shop drawings.

All materials used shall meet the applicable requirements of Section 607 of the
Standard Specifications Road and Bridges.

The post offset dimensions are given to the center of the traffic face of
the blockouts except at the first post, where the dimension is to the center
of the traffic face of the post. Offset points are to be located by
measurements at the back of rail equal to the nominal post spacings shown on
pre-approved shop drawings. Posts are to be set approximately radial to the
rail line at each location.

- When a wood block is used adjacent to a wood post, the block shall be nailed
to the post with a galvanized steel 10d common nail. The nails to be driven
into the center of the top or bottom of the block.

The cost of furnishing and installing the Flared End Terminal, complete with all
miscellaneous hardware and parts as detailed on the pre-approved shop
drawings, is to be included in the unit price bid for "Flared End Terminal".

Yellow reflective sheathing shall cover the entire nose of those terminals
with a flat impact head. Those terminals with a rounded impact head shall
be covered with a 1" x 3" yellow reflective sheet.
TANGENT END TERMINAL PLAN

ELEVATION

FLARE DETAIL

NOTE:

For details of Tangent End Terminal, see pre-approved shop drawings.

All materials used shall meet the applicable requirements of Section 607 of the Standard Specifications for Highways and Bridges.

The web block shall be 300mm wide w/ a galvanized steel 10d common nail. The nails are to be driven into the center of the top edge of the block.

The Tangent End Terminal Inclination shall maintain a 2° minimum, or a 1° minimum from the edge of the impact head to the edge of the traveled way. For narrow existing shoulders that have an offset of 2° or less from the face of the roll element to the edge of the traveled way, the roll and terminal may be flared from the normal face (roll). The flared offset distance shall be 1° at a taper rate of 25‰, for a total flap length of 25° or a taper rate of 50‰, for a total flap length of 50° (see Flange Detail).

Roll element panel lengths shall be 25° only. Shorter lengths shall not be used.

The cost of furnishing and installing the Tangent End Terminal, complete with all necessary hardware and parts as detailed on the pre-approved shop drawings, is to be included in the unit price bid for "Tangent End Terminal".

Yellow reflective striping shall cover the entire nose of these terminals with a flat impact head. These terminals with a rounded impact head shall be covered with a 7"x3"x3" yellow reflective sheet.
THIS SHEET WAS LEFT BLANK INTENTIONALLY
These guardrail transitions are appropriate for connection to a vertical-concrete shape and should not be connected directly to a concrete shoe shape. Concrete shoe shape bridge rails or barriers shall be transitioned to a vertical-shape at the guardrail connection in a manner detailed elsewhere in the Project Plans.

Although these details may appear to guardrail-to-bridge transitions and connections, they actually apply to guardrail-transitions and connections to concrete barriers, concrete rigid walls, or other structures as specified and detailed in the Project Plans.

These details are not required for transitioning guardrail to a bridge when the guardrail is located on the trailing end of a divided highway bridge. Normal guardrail details shall apply.

Installation shall be performed in such a manner as to maintain the rollover elements (top w-beams) parallel to the roadway centerline throughout the length of the 10'-6" transition for both designs.

Posts A, B, C, and D require an additional bolt to attach bottom blocks and bottom beams. For wood post design, the bottom beam wood blocks shall be center-drilled and attached with 3/4" diameter bolts. For steel post design, the bottom beam wood blocks shall be offset drilled to allow for the post flange and attached with 3/4" diameter bolts.

For both transitions, the ninth post from the vertical-concrete wall shall require an additional bolt on the back face of the post to attach the bottom w-beam with 3/4" diameter bolts.

The rail-to-bottom w-beam shall be shop bent for approximately the last three feet to facilitate installation.

A, B, C, and D posts and blocks shall be bolted to the top rollover elements, however, posts and blocks shall be bolted and carefully erected to provide firm contact of the blocks against the top rails of these posts.

All bolt holes in all sections shall be shop fabricated.

These details are for transitioning 6'3" post spacing guardrail to a vertical concrete shape. When transitioning 12'-6" post spacing guardrail to a vertical concrete shape, the 25" rail prior to this 18'-6" transition shall have 6'3" post spacing.

There is no separate pay item for this connection and all components as ordered herein shall be included in the contract price for guardrail.
NOTES

1. This guardrail transition is appropriate for connection to a concrete safety shape.

2. Bridge rail ends and bridge parapets must be of adequate strength to accept full impact loading.

3. Rubrail wood blocks, located on posts 1 through 4 are center drilled and secured with 5/8" carriage bolts.

4. Posts 1 through 5 require an additional hole to attach lower blocks and/or lower rubrail.

5. W-beam is not bolted to posts and blocks at posts 2, 3, 4, 6, and 8. Blocks are bolted directly to posts.

6. Steel spacer tube, schedule 40 galvanized pipe, 6" O.D., 1" x 8", attached by a 5/8" carriage bolt and rectangular plate washer.

7. See Sheet 3 of 3 for detail. Block is attached by a 3/4" x 3" bolt.

8. There is no separate pay item for this connection and all components as detailed herein shall be included in the contract price for guardrail.

GUARDRAIL END SHOE DETAIL

ELEVATION
NOTES

1. Rubber end must be attached flush with slope toe of safety shape. Installation can be greatly simplified by lubricating or shop twisting the rubber end to be consistent with the slope of safety shape. Rubbers twisted both clockwise and counterclockwise may be required in most situations.

2. The rubber end attachment to the concrete safety shape requires three closely driven holes. Appropriately sized bolt anchors should be used to reduce the risk of splitting the concrete.

3. There is no separate pay item for this connection and all components as detailed herein shall be included in the contract price for quadrants.

C6X8.2 RUBRAIL DETAIL

WOOD BLOCKOUT FOR RUBRAIL DETAIL

BEARING PLATE DETAIL
This guardrail transition is appropriate for connection to a vertical concrete shape and should not be connected directly to a concrete safety shape. Concrete safety shape bridge rail or barrier shapes transitioned to a verticallinear at the guardrail connection in a manner detailed elsewhere in the Project Plan.

The two sections of 12½' thrie beam require additional holes in order to mount the beam to the post nearest to the concrete wall.

See sheet 2 of 2 for details not shown on this sheet.
**NOTES**

The median and footer can be poured monolithically. When the median is poured on an existing concrete pavement, the median section shall be secured with dowel bars and grouted in the existing concrete pavement, as shown.

When the median and footer are to be poured separately, a median construction joint shall be used.

Where the median is placed over existing pavement contraction joints, median sections shall be separated by open joints having the same width as the pavement joints for the full median height. At mid-pavement construction joints, a 1⁄2" wide and 2" deep groove shall be sawed or formed across the top and along the sides for the entire length (including footer depth) of the median, or a full-depth butt joint shall be used if the existing joint spacing is not greater than 20'-0" intervals along the length of the median. In addition, these grooved or butt joints shall be transversely aligned within a plus or minus one-foot tolerance with the contraction joints in the underlying concrete pavement.

Expansion joints shall be placed in the median at structures where no indications of expansion joints in underlying concrete pavement, over expansion joints in underlying concrete pavement, and at locations as shown on the Plans or directed by the Engineer. At expansion joints, median sections shall be 1⁄2" apart and the opening filled for the entire depth of the median with a Type I preformed joint filler which complies with the requirements of section 610 of the Standard Specifications for Roads and Bridges. The filler shall be recessed 1⁄2" from the sides and the top of the median and the completed joint shall receive no further treatment, e.g., sealing with a waterproof sealer is prohibited.

The median shall be adequately terminated at each end of median installations as shown or specified elsewhere in the Plans.

Drainage openings shall be provided in the medians where indicated on the Plans or directed by the Engineer.

Unless otherwise specified, bidirectional delineators meeting the requirements of section 610 of the Standard Specifications for Roads and Bridges and mounted on suitable supports, shall be secured to, and spaced along the length of the median as shown and specified on Standard Sheet TE 11'-5 of the Standard Details Book, Volume II. The cost of concrete, steel dowel bars, preformed joint filler, delineators, and delineator mountings shall be included in the cost of the median.

Type of surface adjacent to the median, whether normal-width or widened pavement, offset lane, median shoulder, etc., shall be specified in the Plans and shall not be included in the cost of the median but shall be paid for separately.

The contractor shall have the option to install either the "H"-Shape or the F-Shape median unless otherwise specified in the Plans.

For additional requirements, notes, and details see sheet 2 and 3.
N-J SHAPE

(Adjacent to Bituminous Paving)

N-J SHAPE

(Adjacent to Concrete Paving)

NOTES

Height of the median, dimension "D", shall be included in the plans.

Additional height of median, dimension "D", shall be vertical.

The contractor shall have the option to install either the N-J Shape or the F-Shape median unless otherwise specified in the plans.

For additional dimensions, notes and details, see Sheet 1 and 3.

N-J SHAPE MEDIAN DIMENSIONS

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<td>&quot;C&quot;</td>
<td>0' 4' 10'</td>
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<tr>
<td>&quot;D&quot;</td>
<td>32' 36' 42'</td>
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NOTES

The contractor shall have the option to install either the N-J Shape or the F-Shape median unless otherwise specified on the Plans.

For additional dimensions, notes and details see Sheet 1 and 2.

For additional notes and details of the guardrail bolt pattern, see Standard Detail Sheet GR12.
NOTES

Cost-in-place concrete barrier medians shall be constructed in sections as shown herein and shall be constructed in accordance with the applicable provisions of Section 610 of the Specifications.

At barrier median construction joints over existing pavement construction joints, median sections shall be separated by open joints. Pouring the same width as the pavement joints, for the full exposed depth of the median. At all other barrier median construction joints, grooves 3/16" wide and 2" deep, shall be sawed or formed across the top and along the sides for the entire depth of the median or a full-depth butt joint shall be formed, at approximately 15'-20' intervals along the length of the median. In addition, these grooved or butt joints shall be transversely aligned, with a plus or minus one-foot tolerance, with the contraction joints in adjacent concrete pavement.

Expansion joints shall be placed in the barrier median of structures which are indicated, opposite expansion joints in adjacent concrete pavement, over existing expansion joints in underlying concrete pavement, and at all locations as shown on the Plans or directed by the Engineer. At expansion joint sections, barrier median sections shall be 3/4" apart and the opening filled, for the entire depth of the median, with FR preformed joint filler which complies with the requirements of section 610 of the Specifications. The filler shall be recessed 1/4" in from the sides and the top of the median and the completed joint shall receive no further treatment, e.g., sealing with a waterproof sealer is prohibited.

The finished surface of the barrier median shall be smooth, dense, uniform, and free from all rough spots, depressions, and voids. It is deemed necessary by the Engineer, the above mentioned finished surface shall be obtained by the use of water and 6-wood stack or sandblasting brick.

At each and all barrier median installations, the median shall be adequately terminated as shown or specified elsewhere in the Project Plans.

Drainage openings shall be provided in the barrier medians where indicated on the Plans or directed by the Engineer.

Unless otherwise specified, bi-directional dekebars, meeting the requirements of 661 of the Specifications and mounted on subbase supports, shall be secured to, and spaced along the length of, the barrier median as shown and specified on Standard Sheet 1C 11-5 of the Standard Details Book, Volume II.

The cost of median concrete streetdown bars, preformed joint filler, dekebars and dekebar mountings shall be included in the cost of the median. Type of surface adjacent to the barrier median, whether normalwidth or widened pavement, offset berm, median shoulder, etc., shall be specified in the Plans and shall not be included in the cost of barrier median but shall be paid for separately.

SECTION A-A (40' Joint Spacing)

SECTION A-A (61'-6" Joint Spacing)

SECTION A-A (15' Joint Spacing)
NOTES

The materials used in manufacturing temporary concrete barriers are to provide without strength
of 3000 psi.

The cost of all materials detailed herein are to
be included in the unit bid price for temporary
concrete barriers.

The finished surface of the barrier shall be
smooth, dense, unsplit and free from air bubble
pockets, depressions, and honeycombs.

The materials utilized for detail 'A' shall provide
a minimum safe working load of 4000 lbs.

An approved equal pin and eye detail, as approved
by the engineer, may be substituted for this
detail. Shop drawings will be required.

All corners to have 1" radius unless otherwise
specified.

For additional guardrail details see the CR
series of Standard Details.

TEMPORARY CONCRETE
BARRIER

GUARDRAIL TIE TO TEMPORARY
CONCRETE BARRIER
Rumble strip placement will be continuous on hot mix asphalt shoulders and intermittent on portland cement concrete shoulders, except as noted below. Spacing on portland cement shoulders will be 30’ centers except for ramps where spacing will be 15’ centers.

Rumble strips shall not be placed at the following areas for non-freeway projects only: on shoulders of narrow climbing lanes that are 5’ or less in width, right of traffic flow in the shoulder transition area, right of traffic flow between a full paved shoulder width of 10’ and narrow bridge width of 4’.

Rumble strip width is to be 2”.

Rumble strips may be formed or sawed unless otherwise indicated. The top of the rumble strips will be no higher than the top surface of the pavement. Any fault or incorrectly installed rumble strips will be corrected by the contractor at his expense. Payment for rumble strip placement is to be incidental to the applicable paved shoulder bid item.

Other alternate rumble strip details may be approved by the Engineer.

The longitudinal joint as shown on the plan view of the Rumble Strip Detail is to be Type E on new construction, unless otherwise indicated. It is to be sawed and sealed as per Standard Sheet PVT1. The transverse contraction joint, as shown in the Rumble Strip Detail, is to line up with the transverse joint in the traveled way pavement. This joint is to be sawed and sealed as per the Transverse Contraction Joint detail on Standard Sheet PVT1. Dowel basket assemblies will not be required for the shoulder transverse contraction joint unless otherwise specified.

The Modified Type E Joint as detailed is not to be used in lieu of the Longitudinal Joint as detailed on Standard Sheet PVT1. It is to be used when tying new concrete pavement to existing pavement (pavement placed prior to the project in which new pavement is placed) unless otherwise specified. The expansion anchor and the 1” x 1” hook bolt are to meet the requirements of Section 709.1 of the Specifications. The joint is to be sealed per the longitudinal joint sealant details on Standard Sheet PVT1.

Expansion Anchor / Hook Bolt assemblies are to be placed on 30” centers unless otherwise specified. All costs involved in the Modified Type E Joint is to be included in the unit price bid for the new concrete.

The Type H Joint is to be used for connecting portland cement concrete pavement to hot mix asphalt pavement. The standard coated dowel bars are to meet the applicable requirements of Standard Sheet PVT1.

All tie bars and J or Hook Bolt assemblies shall be epoxy coated in accordance with section 709.1 of the Standard Specifications.

**NOTES**

**TRANVERSE**

**CONTRACTION JOINT**

**RUMBLE STRIPS FOR PORTLAND CEMENT CONCRETE SHOULDERS**

1” x 3” or 7/8” x 2 2/3” Corrugations

**ALTERNATE SECTION A-A**

**RUMBLE STRIPS FOR PAVED SHOULDERS**

FORMED OR ROLLED IN

**ALTERNATE SECTION A-A**

**RUMBLE STRIPS FOR PAVED SHOULDERS**

FORMED OR ROLLED IN

**CONSTRUCTION AND PAY LIMIT FOR PCPP**

**TYPE H JOINT**

**MODIFIED TYPE E JOINT**

**EXISTING CONCRETE**

**NEW CONCRETE**

**DRILL HOLE FOR EXPANSION ANCHOR**

5/8” DIAM. HOOK BOLT

**EXTRUDED HOOK BOLT**

**MODIFIED TYPE E JOINT**

**TYPE H JOINT**

**STANDARD DETAIL SHEET PVT1**

**SHOULDER RUMBLE STRIPS,**

**TYPE H JOINT,**

**MODIFIED E JOINT**
TYPICAL HOOK BOLT DETAILS

PAVEMENT SECTION

ALTERNATE HOOK BOLT

45° Countersink 1/16" Deep
6" min.

J Bolt Channel
Dimensions shown apply to this detail.

Bolt to be used for forming only.

Channel to be used for forming key only.

Alternate Hook Bolt for Slip-Form Paving

TRAPEZOIDAL KEY

(J Bolt Shown)

ALTERNATE (HALF-ROUND) KEY

(Alternate Hook Bolt Shown)

PAVEMENT SECTION

NOTES

Tie bolts shall meet the requirements of Section 709.7 of the Specifications.

Tie bolts shall be placed on 30" centers max.

Tie bolts shall be placed 15" from end of form.

Metal channel shall run the full length of form.

5/8" diameter tie bar is long placed longitudinally on 30" centers max., and centered across the joint or pavement edge may be used in place of the bolt assemblies.

The longitudinal tie bolt assembly for slip-form paving shall consist of one sleeve nut, one 8" long hook bolt or J bolt, and 12" long alternate hook bolt. As an initial step in installing this assembly, the 12" long alternate hook bolt, with sleeve nut attached, shall be positioned in the proper location in the pavement by appropriate slip-form paving equipment.

Typical tie bolt assemblies are shown herein. Minor variations in details and dimensional tolerances are permitted; however, minimum values specified herein shall be complied with.

All tie bars and J or Hook Bolt Assemblies shall be epoxied coated in accordance with section 709.1 of the Standard Specifications.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
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STANDARD DETAIL

LONGITUDINAL TIE BOLT ASSEMBLY

STANDARD SHEET 9733
NOTES

All dowel bars shall have a Department approved coating and shall meet the requirements of Section 709.15 of the Specifications. Dowel bar uncoated diameter to be 1/4 of the pavement thickness with minimum diameter of 1/4". Dowel bars to be 16" long and spaced on 12" centerlines.

The units are to be shop assembled as to dowels, side frames, and center frames, and shipped nested.

The units are to be fabricated to fit the crown of the base course.

Wire used in the expansion and contraction joint load transfer units shall have a minimum ultimate tensile strength of 50,000 P.S.I.

The expansion joint load transfer unit detailed herein shall be used at specially designated locations only.

Anchor pins are to be 5/8" round bars and 16" minimum length to hold the unit rigid in place. A minimum of 8 pins per unit shall be used.

The units as detailed are shown as examples only. Initial approval of load transfer units shall be by submission of shop drawings. Approval will be valid until the standard drawing is revised or the supplier changes his design. All notes as shown above are to apply.
The appropriate details and notes of Standard Sheet PVTS (Sheet 1 of 2) apply to the Standard Sheet.

The cost of the expansion joints through concrete shoulders, concrete medians, curbs, and gutters shall be included in the cost of the joints per each.

The cost of forming the 15 ft. tapers/toruses in the median barrier shall be included in the unit price list for the median barrier.

Concrete paved shoulders, adjacent to bridge transition pavement and receiving the 2" bluminous overlay, shall be built in accordance with normal concrete shoulder construction, except, as with the bridge transition pavement, the final finish requirements are waived. The concrete paved shoulder joints need not be sealed. The bluminous curbing used and/or lock cost requirements - and alternate curbing materials/epoxies - are applicable as needed. The 10" wide strip of shoulder at the joint shall be included in the cost of the bridge approach expansion joint. Also, where the concrete shoulders are overlaid, the rumble strip (figs. b. & c.) requirements are waived.

2" Hot-Laid Bluminous Concrete Skid Resistant Overlay
2" Hot-Laid Bluminous Concrete Course (Base 2, Wearing, or Skid Resistant Course)
**CONCRETE CURBING AND SIDEWALK**

SPECIFICATION SHEET PV76

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
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STANDARD DETAIL

**NOTES**

For all Concrete Curbing, the face of the curbing shall be offset a minimum of two feet from the edge of traffic lane, unless otherwise shown on the Plans.

Construction of Concrete Curbing shall be by the "Separate Method" when sawed joints are constructed in the pavement.

All curb joints shall be made by acceptable forming methods.

For Combination Concrete Curbs And Gutters, the slope of the 2'-0" wide concrete gutter shall conform to the pavement slope or as otherwise specified on the Plans. For Integral and Plain Concrete Curbing, the slope of the concrete or bituminous surface abutting the raised portion of the curb shall be as specified on the plans.
The Standard Curb Taper: Class I shall be used at the ends of all Plain Concrete Curbings, unless otherwise called for on the Plans.

The Standard Curb Taper: Class II shall be used at the ends of all Combination Curb and Gutter, and all Integral Concrete Curbings, unless otherwise called for on the Plans.

The details as shown for Sidewalk and Curb Treatment at Driveways are to be utilized unless otherwise called for on the Plans.

Section A-A details a 6" transition length in the height of the curb where driveways and Type IV curbing are encountered.

Section B-B details additional depth of sidewalk at driveways and section C-C details standard depth sidewalk. Payment for the extra depth of the sidewalk in section B-B will be 1.5 times the standard depth price.
NOTES

Ramp and flare slopes shall not be steeper than 12:1 unless otherwise shown or specified. Ramp concrete shall meet the requirements of Section 609 of the Specifications. A coarse brown finish, transverse to ramp slopes and flare slopes, or equal non-skid finish shall be provided. Normal gutter line floor and profile shall be maintained through the ramp area, unless otherwise shown or specified. 1/8" preformed expansion joint filler, meeting the requirements of Section 609 of the Specifications, shall be placed at all locations where curb contacts the ramp, the gutter line between the sidewalk ramp and concrete pavement for Type VI ramps. In addition, when the ramp is poured separately from the sidewalk, the expansion joint shall be placed at all locations where the normal sidewalk and the ramp abut. Drainage structures shall not be placed in line with ramps.

Location of the ramp shall normally take precedence over location of the drainage structure, except where existing structures are being utilized in the new construction.

Payment for the construction of sidewalk ramps shall be included in the cost of the sidewalk per square yard.

The type of ramp to be used shall be specified on the plans. The following can be considered guidelines in selecting ramp types, but are included here for information only:

- If the 12:1 slope cannot be obtained due to grade of the adjacent roadway the sloped portion of the ramp shall extend to a maximum length of 8'-0".

NORMAL RAMPS

TYPE I
Ramp is for general use at intersections or anywhere in the place where the sidewalk extends to the curb side.

TYPE II
Ramp is for general use at intersections, especially where pedestrian access is allowed to cross diagonally.

SPECIALTY RAMPS

TYPE III
Ramp is for use where a narrow sidewalk exists or is necessary, and widening of the sidewalk is not feasible.

TYPE IV
Ramp is for use with wheelchair access can occur from only one side of the ramp.

TYPE V
Ramp is for use where features of Ramp Types III and IV must be combined.

TYPE VI
Ramp is for use in areas where the sidewalk is set back from the street, and wheelchair access from either side of the ramp is not likely to occur because the side approach area is unpaved or covered by grass, gravel, etc. Also ramp is for use where area for providing ramp is very limited due to obstructions on both sides of the ramp.

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SIDEWALK RAMPS

(SHEET 1 OF 2)
**PEDESTRIAN GATE DETAIL**

- For Types and Sizes, see Fence Members Table herein.

- Similar designs meeting the approval of the Engineer may be used.

- PEDESTRIAN & VEHICULAR GATE CORNER ATTACHMENT

- Pressed Steel

- PEDESTRIAN GATE FRAME

- Post Bases

- Post Caps

- Pedestrian Gate Frame

- Tension Wire

**PEDESTRIAN GATE DETAIL (Galvanized Weight = 1.35 lbs./ft.)**

**VENICULAR GATE DETAIL**

- Vehicular Gate Frame and Vertical Brace

- Post Bases

- Post Caps

- No. 7 Gate Tension Wire

- No. 8 Gate Tension Wire

- 2" No. 8 Gate diamond mesh knitted on both sides and galvanized, Class B, diamond knitted when galvanized, Class D, diamond knitted when used.

- Post Caps shall not be used on roll formed posts. Gate frames and gate vertical braces shall be galvanized pipe members. Gate fabric shall have the same coating as the fence fabric. All other metal components of gates shall be galvanized, with the exception of low-cost aluminum corner fittings, or pressed steel corner fittings.

**NOTES**

- The applicable details and notes of Standard Sheet F1, F1 Sheet 1 of 2 shall apply to this Standard Sheet.

- Except for "normal length" line posts, all other posts and braces shall be galvanized steel pipe members or galvanized steel rolled members as shown in the "Fence Members Table" herein. When galvanized pipe posts are used, galvanized post braces shall be used. When roll formed posts are used, rolled formed post braces shall be employed.

- Rail formed posts and braces shall meet the requirements of 712.8 of the Specifications.

- Stretchers, bars, and their accompanying post bases shall not be used with the roll formed posts. Instead, the fence fabric shall be integrally woven into the lock loops of the posts.

- Roll formed posts and braces shall not be used on roll formed posts.

**FENCE MEMBERS TABLE**

- Fabric to be woven into the lock loops for the entire height of fence.

- Roll Formed Members (Galvanized Weight = 5.14 lbs./ft.)

- WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

- DIVISION OF HIGHWAYS

- STANDARD SHEET F1

- STANDARD SHEET F1
PROJECT MARKER

PLAN

TYPICAL SIGNING DETAILS

NOTES

Survey markers shall conform to the requirements of the Standard Specifications.
Sufficient reinforcement will be included in precast survey markers to resist handling stresses.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
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PROJECT MARKER

SURVEY MARKER