

**ARIZONA DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING GROUP
OFFICE MEMO**

October 13, 1998

TO: All Users of Construction Standards

FROM: *THO* Terry H. Otterness, Design Program Manager, Roadway Engineering Group

RE: Revisions to Construction Standards - English Version

Several changes are being made to the Construction Standard Drawings and the Construction Standards Index.

The revised Standards C-05.20, C-05.50, C-06.10, C-07.01 (Sheet 1 of 2), C-07.04, C-07.05, C-07.10, C-10.22, C-10.31 (Sheet 2 of 3), C-10.66, C-13.10, C-13.15, C-13.25, C-13.30, C-13.60 contain minor modifications. A new detail for single curb joints and a note on B joints were added to Standard C-07.01 (Sheet 2 of 2). In Standards C-10.21, C-10.30, C-10.31 (Sheet 3 of 3) and C-10.32, steel block was replaced by wood block to comply with NCHRP Report 350 test requirements. Standards C-10.40, C-10.41 and C-10.44 are deleted since we are now utilizing manufacturer's approved drawings for hardware details.

Standard C-10.45, reflects a replacement of concrete footings with steel tubes. In Standard C-10.62, New Jersey barrier was changed to Type F configuration and a lower steel reinforcement was added.

Design Personnel should review the revised drawings and incorporate into their design plans as appropriate. The updated 1A sheet (List of Standards) is available at the Roadway Support Desk 255-8667 or 8671. Also, please support any requests from field to implement changes on current construction projects.

Please distribute to all users within your Group or District. Additional copies may be obtained from ADOT Engineering Records at 255-8216. Questions regarding the Drawings may be directed to Tom Scheck (255-8674), Jeri Kasemsant (255-7735) or me (255-7341).

c:	Roadway Group	Statewide Project Mgmt. Group
	Valley Freeway Group	Traffic Group
	Bridge Group	Contracts & Specifications Section
	Construction Group	Central Maintenance Group
	Local Government Section	Districts (10)
	FHWA	Engineering Consultant Services

8/98


SCANNED
8/02/01

EXTRA

**ARIZONA DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING GROUP
OFFICE MEMO**

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FROM:  Terry H. Otterness, Design Program Manager, Roadway Engineering Group

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	FHWA	Engineering Consultant Services

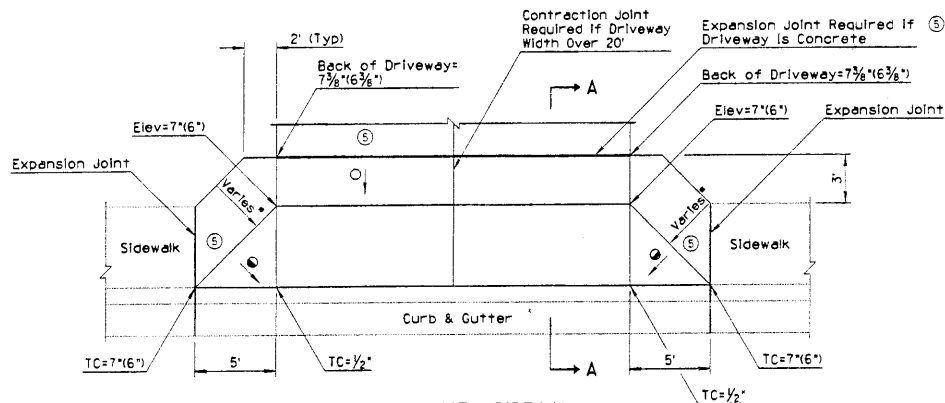
CONSTRUCTION STANDARD - INDEX

DRAWING NO.	TITLE	DRAWING NO.	TITLE
C-01.10	SYMBOL LEGEND	C-10.01	TYPE A GUARD RAIL INSTALLATION, REFLECTOR TAB
C-01.11	SYMBOL LEGEND	C-10.02	TYPE B GUARD RAIL INSTALLATION, REFLECTOR TAB
C-01.12	SYMBOL LEGEND	C-10.03	MEASUREMENT LIMITS FOR W BEAM AND THRIE BEAM SYSTEM (2 SHEETS)
C-01.13	SYMBOL LEGEND	C-10.06	HALF BARRIER TERMINAL W/TYPE B OR C CURB & GUTTER
C-01.30	GENERAL ABBREVIATIONS	C-10.15	BARRIER DETAILS AT PIERS
C-01.31	GENERAL ABBREVIATIONS	C-10.20	G4(1W) AND G4(2W) BLOCKED OUT W BEAM (TIMBER POST)
C-01.32	GENERAL ABBREVIATIONS	C-10.21	G4(1S) AND G4(2S) BLOCKED OUT W BEAM (STEEL POST)
C-02.10	SLOPES, INTERSTATE	C-10.22	G4(MODIFIED) BLOCKED OUT W BEAM WITH SPECIAL CURB AND GUTTER (2 SHEETS)
C-02.20	SLOPES, PRIMARY ROADWAYS	C-10.23	G9(A) AND G9(B) BLOCKED OUT THRIE BEAM (STEEL POST)
C-02.30	SLOPES, SECONDARY/MISC ROADWAYS	C-10.24	G9(C) BLOCKED OUT THRIE BEAM (STEEL POST)
C-02.50	SUPERELEVATION DISTRIBUTION	C-10.28	NESTED STEEL W BEAM (2 SHEETS)
C-03.10	DITCHES, CHANNELS, DIKES AND BERMS (5 SHEETS)	C-10.29	BOLTED ANCHOR GUARD RAIL (2 SHEETS)
C-04.10	SPILLWAY, EMBANKMENT	C-10.30	GUARD RAIL TRANSITION, W BEAM TO CONCRETE HALF BARRIER (APPROACH) (3 SHEETS)
C-04.20	DOWNDRAIN, EMBANKMENT	C-10.31	GUARD RAIL TRANSITION, W BEAM TO CONCRETE HALF BARRIER (APPROACH) (WITH CURB) (3 SHEETS)
C-04.30	SPILLWAY LENGTH TABLE	C-10.32	GUARD RAIL TRANSITION, W BEAM TO CONCRETE HALF BARRIER (DEPARTURE) (3 SHEETS)
C-04.40	DOWNDRAIN LENGTH TABLE	C-10.39	HARDWARE FOR W BEAM TRANSITION TO CONCRETE BARRIER
C-04.50	DOWNDRAIN ENERGY DISSIPATOR	C-10.45	GUARD RAIL ANCHOR ASSEMBLY STEEL TERMINAL POST
C-05.10	SINGLE CURB, CURB & GUTTER EMBANKMENT CURB	C-10.60	HALF BARRIER, CAST IN PLACE, SLIP FORM & FIXED FORM
C-05.11	RAMP CURB & GUTTER LAYOUT (2 SHEETS)	C-10.61	HALF BARRIER, PRECAST
C-05.12	CURB & GUTTER TRANSITIONS (3 SHEETS)	C-10.62	CONCRETE HALF BARRIER WITH GUTTER
C-05.20	CONCRETE DRIVEWAYS & SIDEWALKS (2 SHEETS)	C-10.64	HALF BARRIER (AT PIERS) (2 SHEETS)
C-05.30	SIDEWALK RAMP (4 SHEETS)	C-10.65	HALF BARRIER WITH SIDEWALK
C-05.40	MEDIAN PAVING AND NOSE TRANSITION	C-10.66	MEDIAN BARRIER, CAST IN PLACE, SLIP FORM & FIXED FORM
C-05.50	CONCRETE BUS BAY	C-10.67	CONCRETE MEDIAN BARRIER, TALL TYPE 'F', CAST IN PLACE
C-06.10	DRIVEWAY & TURNOUT LAYOUTS (2 SHEETS)	C-10.68	MEDIAN BARRIER, PRECAST
C-07.01	PCCP JOINTS (2 SHEETS)	C-10.70	CONCRETE HALF BARRIER TRANSITION (4 SHEETS)
C-07.02	LOAD TRANSFER DOWEL ASSEMBLY	C-10.71	CONCRETE HALF BARRIER TRANSITION (3 SHEETS)
C-07.03	MAINLINE PCCP JOINT LOCATIONS (8 SHEETS)	C-10.74	HARDWARE FOR CONCRETE BARRIER TRANSITIONS
C-07.04	ENTRANCE RAMP PCCP JOINTS	C-10.75	BARRIER TRANSITION-TANGENT-DEPARTURE TYPES 1, 2, AND 3 (3 SHEETS)
C-07.05	EXIT RAMP PCCP JOINTS	C-10.76	BARRIER TRANSITION-CURVE
C-07.06	TRENCH BACKFILL AND PAVEMENT REPLACEMENT	C-10.80	RUB RAIL (2 SHEETS)
C-07.10	CROSSROAD PCCP JOINTS	C-10.83	HARDWARE FOR RUB RAIL
C-08.10	RAMP GEOMETRICS	C-10.97	GLARE SCREEN, CONCRETE MEDIAN BARRIER (3 SHEETS)
C-08.20	PAVED GORE AREA	C-11.10	ROADWAY CATTLE GUARD (3 SHEETS)
C-09.10	GROOVING FOR BITUMINOUS SHOULDERS	C-11.20	CATTLE GUARD, DRAINAGE
		C-11.30	CATTLE GUARD, RAILROAD
		C-12.10	FENCE, WOVEN AND BARBED WIRE WITH GATES (5 SHEETS)
		C-12.20	FENCE, CHAIN LINK TYPES 1 AND 2 WITH GATES (3 SHEETS)
		C-12.30	CHAIN LINK CABLE BARRIER (3 SHEETS)

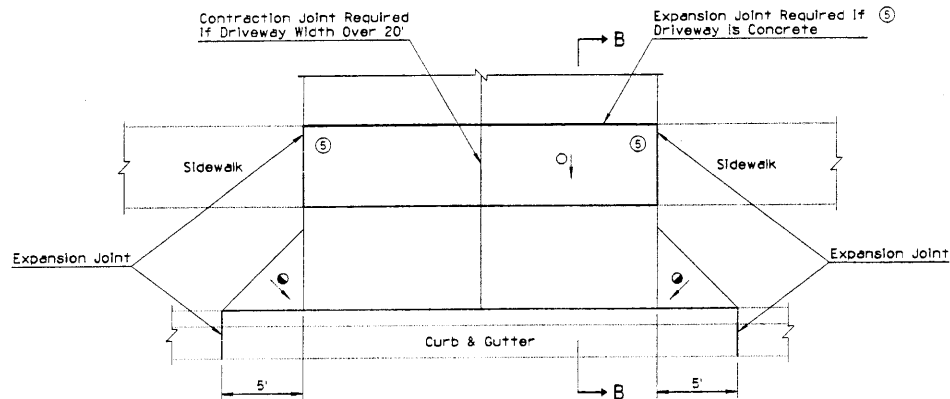
CONSTRUCTION STANDARD - INDEX

DRAWING NO.	TITLE	DRAWING NO.	TITLE
C-13.10	PIPE CULVERT INSTALLATION (2 SHEETS)	C-18.10	MANHOLE DETAILS
C-13.15	TYPICAL PIPE INSTALLATION	C-18.20	MANHOLE FRAME & COVER DETAILS
C-13.20	PIPE, REINFORCED CONCRETE END SECTION	C-18.30	MISCELLANEOUS MANHOLE DETAILS
C-13.25	PIPE, CORRUGATED METAL, END SECTION	C-18.40	MANHOLE RISER DETAILS
C-13.30	PIPE & PIPE ARCH, CORRUGATED METAL CONCRETE INVERT PAVING		
C-13.55	PIPE, CATTLE-VEHICLE PASS, MITERED END TREATMENT	C-19.10	FORD - CONCRETE WALLS
C-13.60	SLOTTED DRAIN DETAILS	C-19.20	FORDS - TYPES 1 & 2
C-13.65	SLOTTED DRAIN INSTALLATION DETAILS		
C-13.70	STORM DRAIN CONNECTION DETAILS	C-21.10	SURVEY MONUMENT, FRAME AND COVER, RIGHT OF WAY MARKER
C-13.75	STORM DRAIN OUTLET DETAILS (2 SHEETS)	C-21.20	STANDARD MARKER
C-13.80	PIPE COLLAR DETAILS		
C-15.10	CATCH BASIN, TYPE 1	C-22.10	UTILITY LINE, PROTECTIVE CONCRETE SLAB
C-15.20	CATCH BASIN, TYPE 3 (2 SHEETS)	C-22.15	SANITARY SEWER ENCASEMENT
C-15.30	CATCH BASIN, TYPE 4	C-22.20	PIPE SUPPORT ACROSS TRENCHES (3 SHEETS)
C-15.40	CATCH BASIN, TYPE 5 (2 SHEETS)	C-22.25	PRECAST SANITARY SEWER MANHOLES
C-15.50	CATCH BASIN, GRATES	C-22.30	STUB OUT AND PLUG
C-15.65	CATCH BASIN ACCESS, FRAME AND COVER DETAILS	C-22.35	DROP SEWER CONNECTIONS
C-15.70	CATCH BASIN MISC. DETAILS (2 SHEETS)	C-22.40	SEWER CLEANOUT
C-15.75	CATCH BASIN, DROP INLET		
C-15.80	CATCH BASIN, MEDIAN FLUSH	C-23.10	THRUST BLOCKS FOR WATER LINES
C-15.81	CATCH BASIN, MEDIAN, SIDE SLOPE	C-23.15	BLOCKING FOR WATER VALVES GATE AND BUTTERFLY
C-15.90	CATCH BASIN, MEDIAN DIKE, PRECAST	C-23.20	ANCHOR BLOCK FOR VERTICAL BENDS
C-15.91	FREEWAY CATCH BASIN DETAILS (2 SHEETS)	C-23.25	VERTICAL REALIGNMENT FOR WATER MAINS
C-15.92	SPECIAL CATCH BASIN WITH HALF BARRIER	C-23.30	VALVE BOX INSTALLATION (2 SHEETS)
C-16.10	IRRIGATION HEADWALLS 18" TO 60" DIAMETER PIPES	C-23.35	TAPPING SLEEVE AND VALVE INSTALLATION
C-16.20	IRRIGATION STANDPIPES	C-23.40	JOINT RESTRAINT WITH TIE RODS
C-16.30	IRRIGATION VALVE AND GATE	C-23.45	CONCRETE WATER METER BOX
C-16.40	IRRIGATION SLEEVES	C-23.50	STEEL COVER FOR WATER METER BOX
C-17.10	BANK PROTECTION, RAIL TYPES 1, 2 & 3	C-23.55	WATERLINE-CUT AND PLUG 12" DIA. MAIN AND SMALLER
C-17.20	BANK PROTECTION, RAIL TYPES 4, 5 & 6	C-23.60	HYDRANT INSTALLATION
		C-23.65	FIRE HYDRANT LOCATIONS

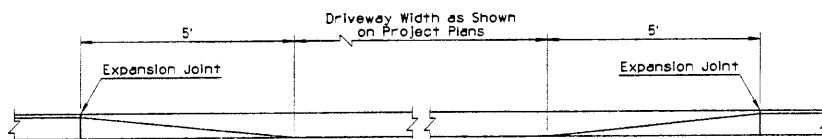
NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE	NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	REVISED NOTE	PMS	7/94	1	ALTERED EXPANSION JOINT PLACEMENT AND NOTE	SM	7/97
2	REVISED SECTION	PMS	7/94	2			
3	REVISED DETAIL	PMS	7/94	3			
4	ADDED NOTE	PMS	7/94	4			



③ DRIVEWAY WITH SIDEWALK ADJACENT TO CURB



DRIVEWAY WITH SIDEWALK SETBACK



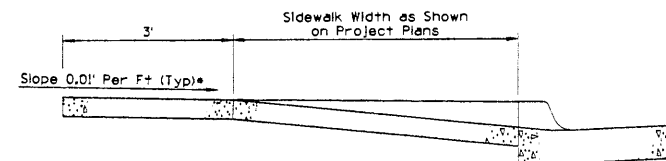
DEPRESSED CURB AT DRIVEWAY ENTRANCE

GENERAL NOTES

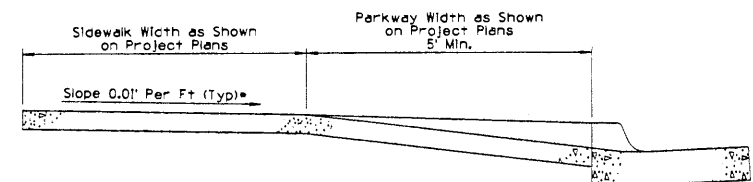
1. Unless otherwise specified, driveways shall be 6 inches in depth.
- ① 2. Two inch deep transverse contraction joints shall be placed in driveways if the driveway width is over 20 feet. If the driveway thickness is greater than 6 inches, then the contraction joint depth shall be $T/3$, where T is the thickness of the driveway. Joints shall be either formed or sawed. Formed joints shall be finished with a tool having a $1/4'$ radius. See sheet 2 of 2 for the Contraction Joint Detail.
- ① 3. Expansion joints shall be located between driveways and sidewalks and all abutting structures. The one-half inch joint filler shall extend the full depth of the concrete. See sheet 2 of 2 for the Expansion Joint Detail.
4. Concrete shall be finished by means of a float, then steel trowelled and then broomed with a fine brush in a transverse direction.
- ④ 5. Top of curb (TC) and driveway elevations shown are in relation to the gutter. Gutter=0'.
- ④ 6. When curb heights of 6' or less are shown on plans, use dimensions shown in (1) 5.
- ④ 7. When curb heights of 7' or more are shown on plans, see plans.

LEGEND

- Cross slope (0.01' Per Ft (Typ))•
- Straight grade with downward slope.
- Maximum slope = 0.02' Per Ft.

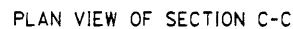


② SECTION A-A



② SECTION B-B

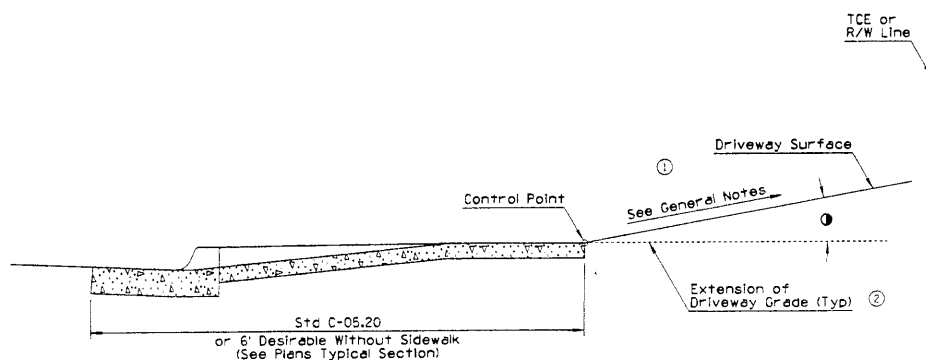
DESIGN APPROVED <i>Sam H. Ottum</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR CONSTRUCTION <i>Ronald Williams</i>	CONCRETE DRIVEWAYS & SIDEWALKS DRIVEWAYS	DRAWING NO. C-05.20 Sheet 1 of 2

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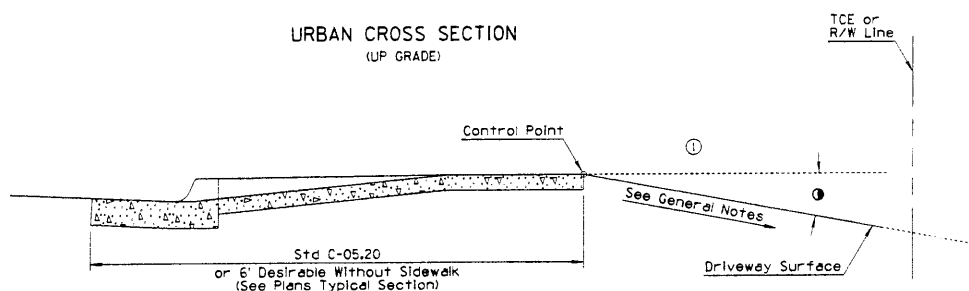
1. The PCGP surfaces within the bus bay area shall be textured transversely. Surface texturing to conform to Section 401.
2. Transverse weakened plane joints shall be constructed at a maximum spacing of 15' and shall align with joints in the concrete curb and gutter.
3. For additional data on slotted drains, See slotted drain Sds C-13.60.
4. For $\frac{1}{2}$ " expansion joint with preformed joint fillers, See Detail A.
5. Concrete pad to be poured separately from concrete bus bay pavement.
6. For sidewalk construction details, see Sd. C-05.20.

DESIGN APPROVED: <i>Jeff H. Ottomano</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Ronald Swadlow</i>	CONCRETE BUS BAY	DRAWING NO. C-05.50

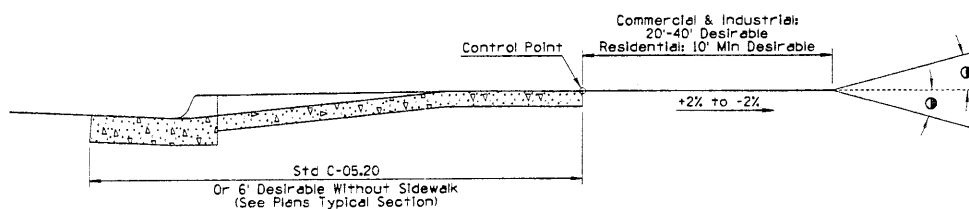
REV	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	ROTATED DRIVEWAY BEYOND SIDEWALK	PHB	10/95
2	ADDED NOTE	PHB	10/95
3	MODIFIED TITLE	BAF	8/98



URBAN CROSS SECTION
(UP GRADE)



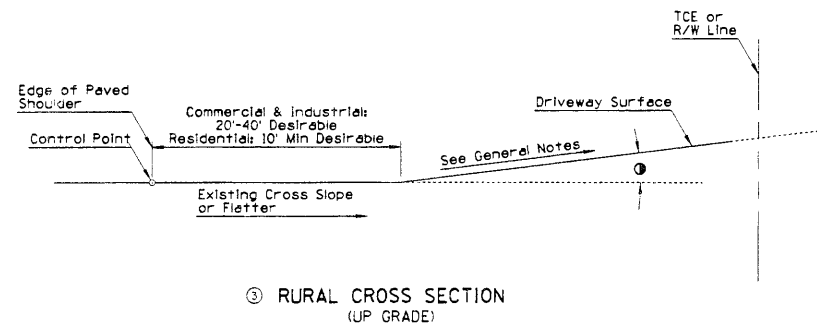
URBAN CROSS SECTION
(DOWN GRADE)



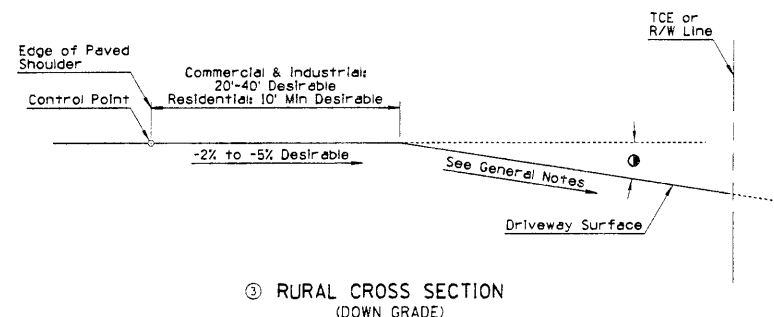
DESIRABLE URBAN CROSS SECTION

GENERAL NOTES

- Grade as shown on plans or as negotiated between Property Owner and Engineer.
 - When field conditions require modifications to plans, contact Design Engineer for assistance.
 - See Sheet 1 of 2 for all other General Notes.
- ① Breakangle greater than 6% requires a vertical curve, L=(10' Min). Vertical curve shall not encroach on roadway or sidewalk.



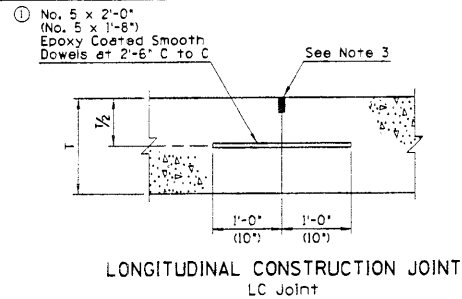
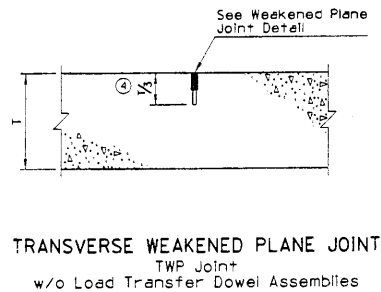
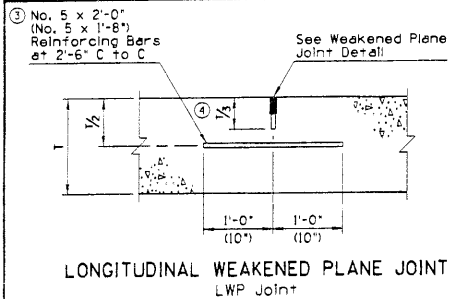
③ RURAL CROSS SECTION
(UP GRADE)



③ RURAL CROSS SECTION
(DOWN GRADE)

DESIGN APPROVED <i>Joseph H. Ottensmeyer</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Ronald Chellman</i>	DRIVEWAY & TURNOUT LAYOUTS	DRAWING NO. C-06J10 Sheet 2 of 2

NO.	DESCRIPTION OF REVISION	MADE BY	DATE	NO.	DESCRIPTION OF REVISION	MADE BY	DATE
1	CHANGED TO EPOXY COATED SMOOTH DOWELS/MODIFIED NOTE	DCS	1/93	10	MODIFIED RECESS OF JOINT SEALANT	TC	1/93
2	MODIFIED JOINT WIDTH	DCS	1/93	11	MODIFIED DETAIL	TC	1/93
3	MODIFIED NOTE	TC	1/93	12	MODIFIED DIMENSION	TC	1/93
4	MODIFIED JOINT DEPTH	TC	1/93	13	MODIFIED SUB-TITLE	BAF	6/98

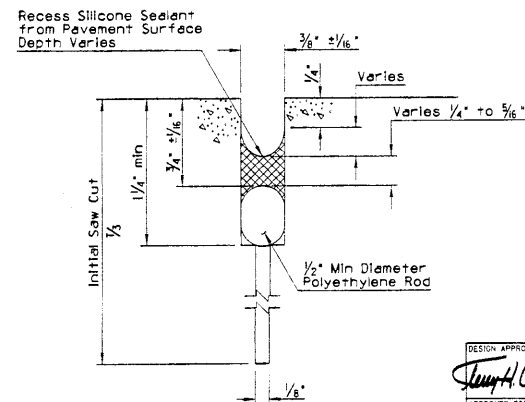
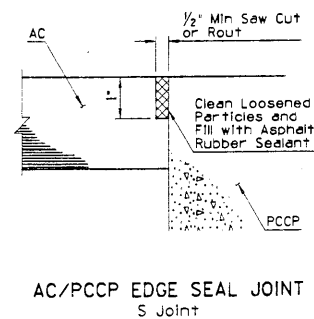
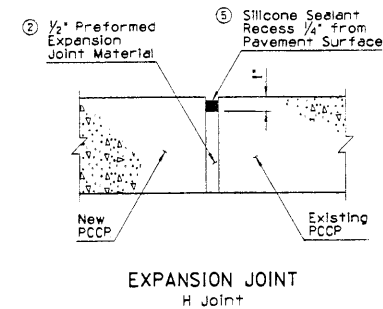
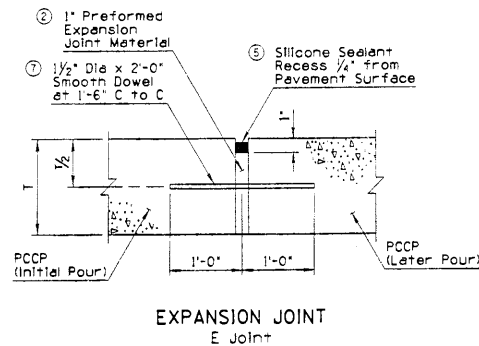
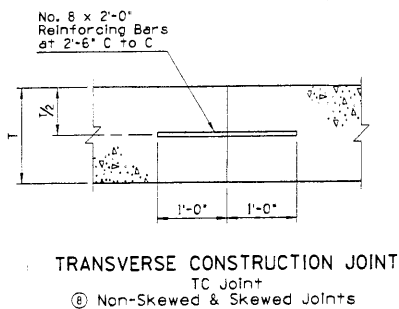


GENERAL NOTES

- When load transfer dowel assemblies are required, use dimensions shown in 1's. See Assembly Placement and Edge Clearance Detail, Std C-07.02.
- In slip form type pavement construction, LWP joints shall be used. In fixed form construction either LWP or LC joints may be used.
- Same as weakened plane joint detail, except initial saw cut will not be required.

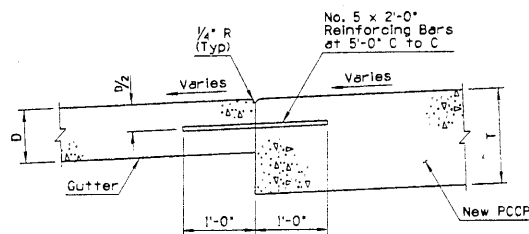
JOINT ABBREVIATIONS

- LWP - Longitudinal Weakened Plane Joint
TWP - Transverse Weakened Plane Joint
LC - Longitudinal Construction Joint
TC - Transverse Construction Joint
E, H - Expansion Joints
S - AC/PCC Pavement Edge Seal Joint
T - PCCP Thickness

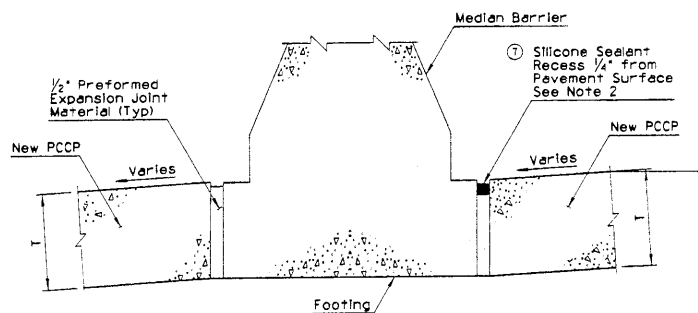


DESIGN APPROVED <i>Joseph H. Ottomano</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Ronald Williams</i>	PCCP JOINTS	DRAWING NO. C-07.01 Sheet 1 of 2

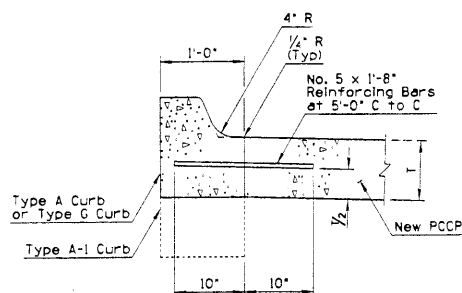
NO.	DESCRIPTION OF REVISION	MADE BY	DATE	NO.	DESCRIPTION OF REVISION	MADE BY	DATE
1	REVISED DETAIL TO SHOW ALL PCCP	PHB	3/94	5	ADDED DETAIL	BAT	8/98
2	REVISED DETAIL TO SHOW AC & PCCP	PHB	3/94	6	ADDED NOTE	BAT	8/98
3	DELETED EXPANSION MATERIAL	PHB	3/94	7	MODIFIED NOTE	BAT	8/98
4	ADDED NOTE ON PAVEMENT SLOPE	PHB	3/94	8			



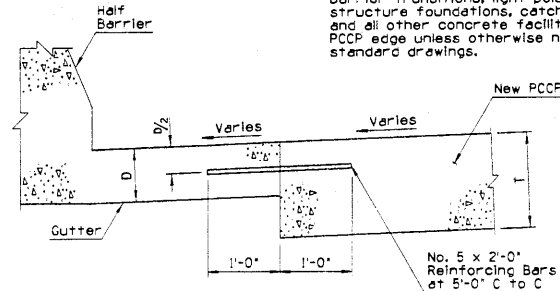
CURB & GUTTER JOINT
G Joint



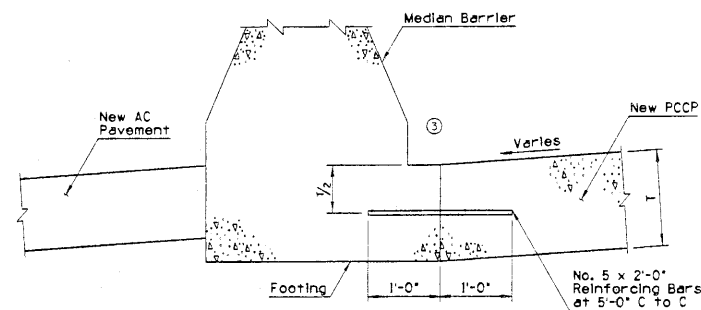
① MEDIAN BARRIER JOINT
B Joint
PCCP On Both Sides of Barrier



⑤ SINGLE CURB JOINT
A Joint



HALF BARRIER JOINT
B Joint



② MEDIAN BARRIER JOINT
B Joint
AC Pavement On Back Side of Barrier

GENERAL NOTES

- ④ 1. Joints are generally shown with pavement sloping toward the joint. Joints are similar with pavement sloping away from the joint.
- ⑤ 2. A 'B' Joint shall be placed where piers, abutments, barrier transitions, light pole foundations, sign structure foundations, catch basins, slotted drains and all other concrete facilities abut up against the PCCP edge unless otherwise noted in the plans or the standard drawings.

JOINT ABBREVIATIONS

G - Gutter Joint
T - PCCP Thickness
D - Gutter Thickness
B - Barrier Joint

DESIGN APPROVED <i>Henry H. Ottens</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	8/98
APPROVED FOR DISTRIBUTION <i>Ronald Williams</i>	PCCP JOINTS	DRAWING NO. C-07.01 Sheet 2 of 2

RAMP TERMINAL AT CROSSROAD

② TC or TWP Joint

G Joint

Joint Control Point

LC or LWP Joint

Ramp LC Joints

LWP Joints

G Joint

② See Plans for Crossroad Paving Type E or H Joint If PCC Paving S Joint If AC Paving

② Ramp Joint spacing sequence See Ramp Terminal At Crossroad Detail Std. C-07.04 and C-07.05

Joint spacing in Ramp taper varies to match mainline joint spacing

GENERAL NOTES

- Dimensions with a tolerance may be adjusted to align to the nearest transverse weakened plane construction joint as directed.
- See Std C-07.01 for Joint Information.
- See plans for ramp dimensions.
- See Std C-07.05 for Sections A-A and B-B.
- The ratio of transverse to longitudinal joint spacing shall be greater than $\frac{2}{3}$ but not more than $1\frac{1}{2}$.
- Ramp transverse joints shall be perpendicular (90°) to the ramp longitudinal joints, except as shown at the ramp terminal.

- ▲ 6' Minimum
- Varies - 18' Maximum ④ 11' Minimum
- Transition, See Std C-05.12
- Without Curb & Gutter

① ① 12' Face of Curb to Face of Curb

① Mainline Structure Section, See Plans

② Ramp Structure Section, See Plans

③ Gore Structure Section, See Std C-08.20

TYPICAL TRANSVERSE WEAKENED PLANE JOINT LAYOUT AT GORE AREAS

RAMP WITHOUT CURB AND GUTTER

① LC Joint

③ Gore Area

② Edge of Mainline Pvm LC Joint

① LC or LWP Joint

② 2'±

② 2'±

② 2'±

② 14'

② 14'

② Taper 50:1

RAMP WITH CURB AND GUTTER

① G Joint

③ Gore Area

② Edge of Mainline Pvm LC Joint

① LC or LWP Joint

② 2'±

② 2'±

② 11.5'

② 5.5'

② Taper 50:1

DESIGN APPROVED: *Shawn H. Ottum*

APPROVED FOR DISTRIBUTION: *Ronald Williams*

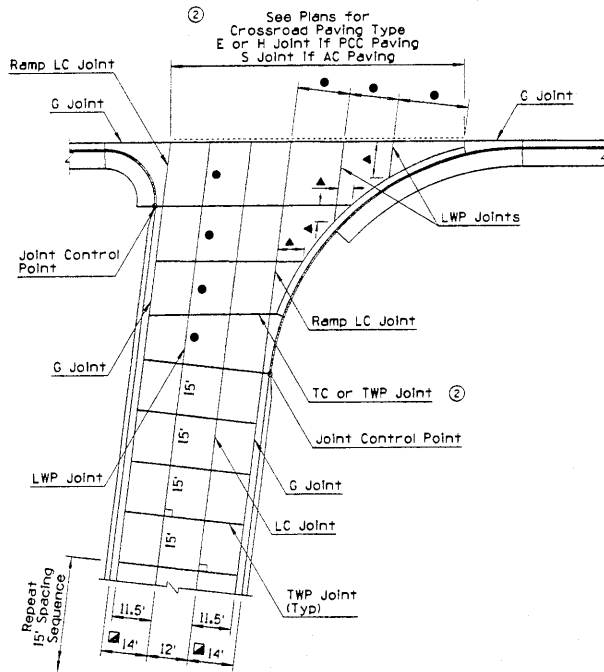
STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

ENTRANCE RAMP
PCC JOINTS

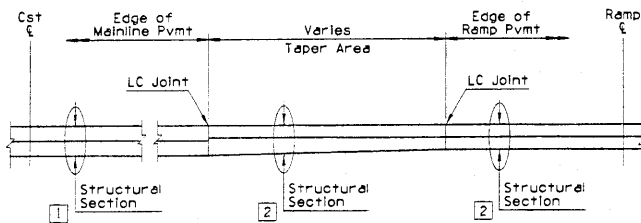
DRAWING NO. C-07.04

REV. 8/98

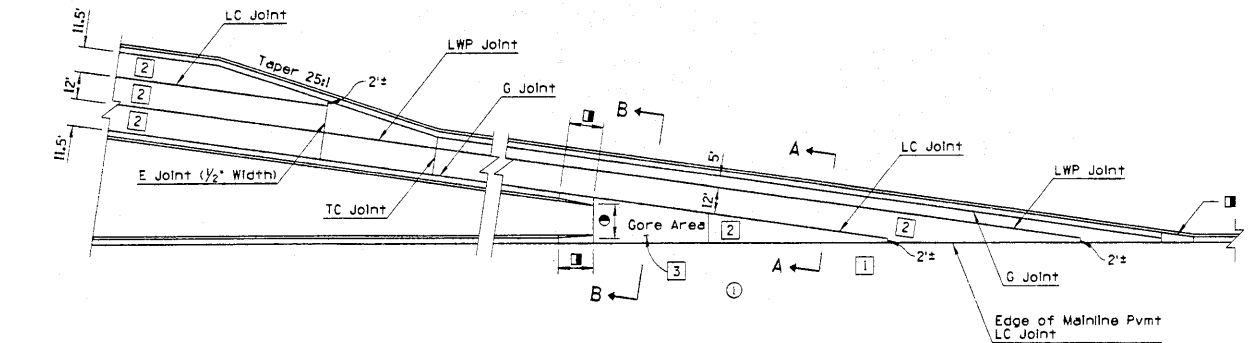
NO.	DESCRIPTION OF REVISION	MADE BY	DATE
1	DELETED REFERENCE TO RAMP CONTROL POINT	PHB	10/95
2	MODIFIED NOTE	PHB	10/95
3	MODIFIED NOTE	BAF	1/97
4			



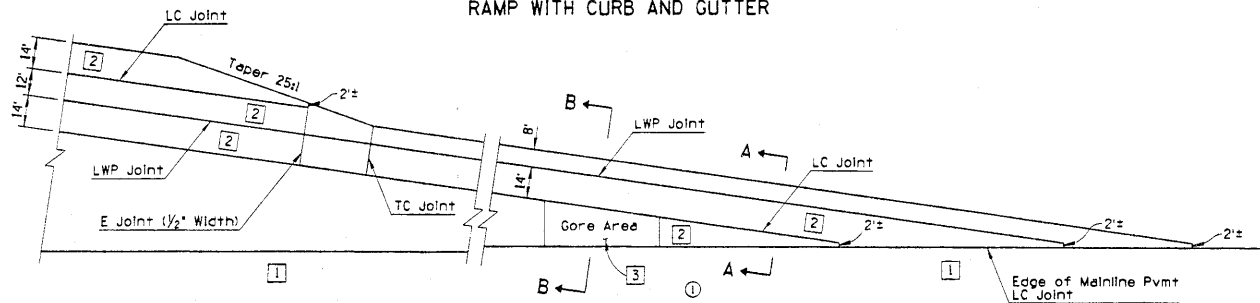
RAMP TERMINAL AT CROSSROAD



SECTION A-A
RAMP TAPER



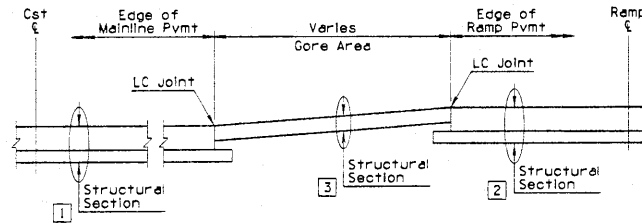
RAMP WITH CURB AND GUTTER



RAMP WITHOUT CURB AND GUTTER

GENERAL NOTES

- See Std C-07.04 for General Notes and Transverse Joint Layout at Gore Areas.
- Without Curb & Gutter
- 6' Minimum
- Varies - 18' Maximum ③ 11' Minimum
- 20' Face of Curb to Face of Curb
- Transition, See Std C-05.12
- Mainline Structure Section, See Plans
- Ramp Structure Section, See Plans
- Gore Structure Section, See Std C-08.20



SECTION B-B
GORE AREA

DESIGN APPROVED <i>Joseph Ottomano</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR CONSTRUCTION <i>Ronald Wallman</i>	EXIT RAMP PCCP JOINTS	DRAWING NO. C-07.05

The diagram illustrates a crossroad at a ramp terminal. It shows a grid of joints with various types labeled: G Joint, LWP Joint, LC Joint, and S Joint. Dimensions of 12' are indicated for the spacing between joints. Specific notes are placed on the drawing: 'See Note 3' appears twice, pointing to curved ramp sections, and a circled '1' is located in the upper central area. The drawing is oriented with the ramp terminal at the top and the crossroad extending horizontally.

CROSSROAD AT RAMP TERMINAL

GENERAL NOTES

1. See Std C-07.01 for joint information.
2. See plans for crossroad dimensions.
3. See Std C-07.04 and C-07.05 for ramp joints.
4. The ratio of transverse to longitudinal joint spacing shall be greater than $\frac{2}{3}$ but not more than $1\frac{1}{2}$.
5. Transverse joints shall be perpendicular (90°) to the longitudinal joints, except as shown at the ramp terminal.

- ▲ 6' Minimum
- Varies - 18' Maximum
8' Minimum
- Varies - 12' when adjacent gutter widths are 2' or less.
- 15' when adjacent gutter widths are greater than 2'.

DESIGN APPROVED <i>James H. Otterman</i> APPROVED FOR DISTRIBUTION <i>Ronald A. Williams</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	8/98
	CROSSROAD PCCP JOINTS	DRAWING NO. C-07.10

1. See Std C-07.01 for joint Information.
2. See plans for crossroad dimensions.
3. See Std C-07.04 and C-07.05 for ramp joints.
4. The ratio of transverse to longitudinal joint spacing shall be greater than $\frac{2}{3}$ but not more than $1\frac{1}{2}$.
5. Transverse joints shall be perpendicular (90°) to the longitudinal joints, except as shown at the ramp terminal.

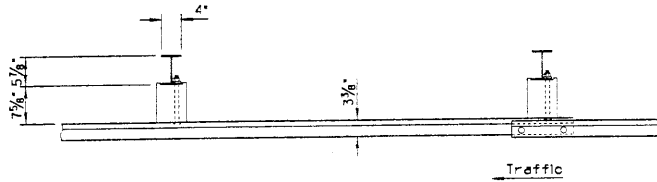
- ▲ 6' Minimum
- Varies - 18' Maximum
8' Minimum
- Varies - 12' when adjacent gutter widths are 2' or less.
 - 15' when adjacent gutter widths are greater than 2'.



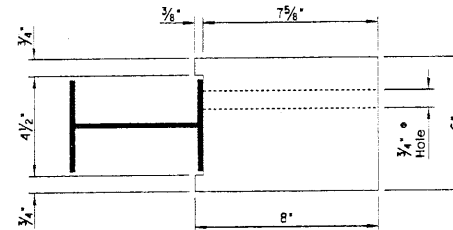
DESIGN APPROVED <i>Lucy H. Otterson</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	8/98
APPROVED FOR DISTRIBUTION <i>Ronald Williams</i>	CROSSROAD PC/P JOINTS	DRAWING NO. C-07.10

NO.	DESCRIPTION OF REVISION	MADE BY	DATE
1	REPLACED STEEL BLOCK WITH WOOD BLOCK	BAI	5/96
2			
3			
4			

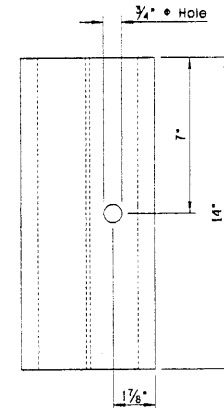
G4(1S) SYSTEM



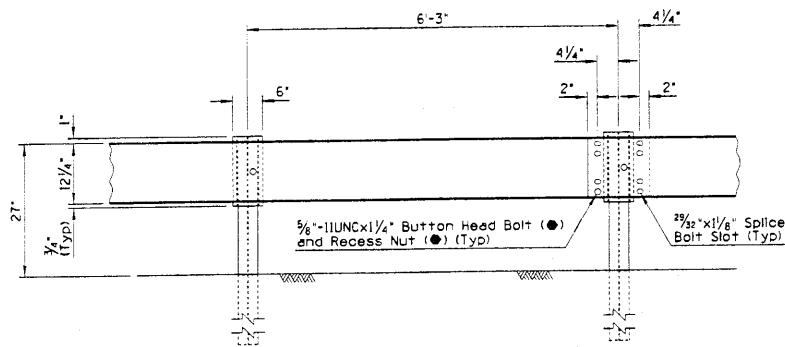
PLAN



TOP VIEW

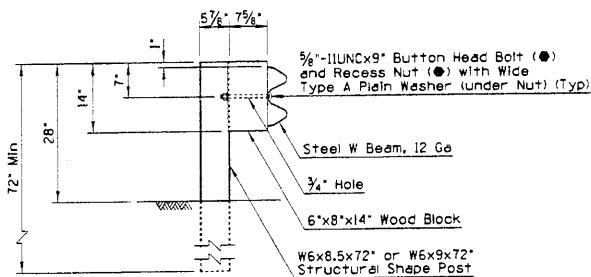


FRONT VIEW

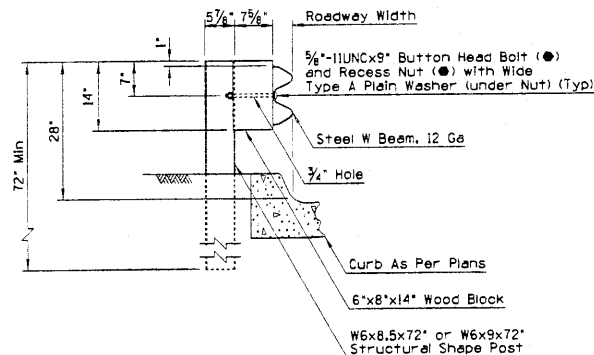


ELEVATION
G4(1S) SYSTEM

① WOODEN BLOCK DETAIL



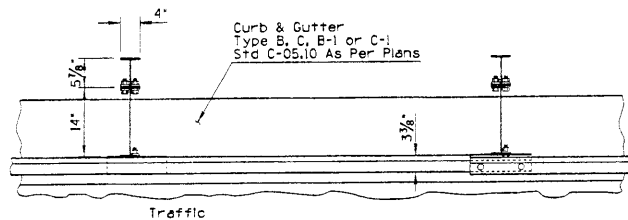
SECTION G4(1S)
SHOWN WITHOUT CURB



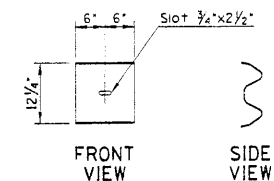
SECTION G4(1S)
SHOWN WITH CURB

DESIGN APPROVED <i>James H. Ottomano</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Ronald Williams</i>	G4(1S) BLOCKED OUT W BEAM (STEEL POST)	DRAWING NO. C-10.21

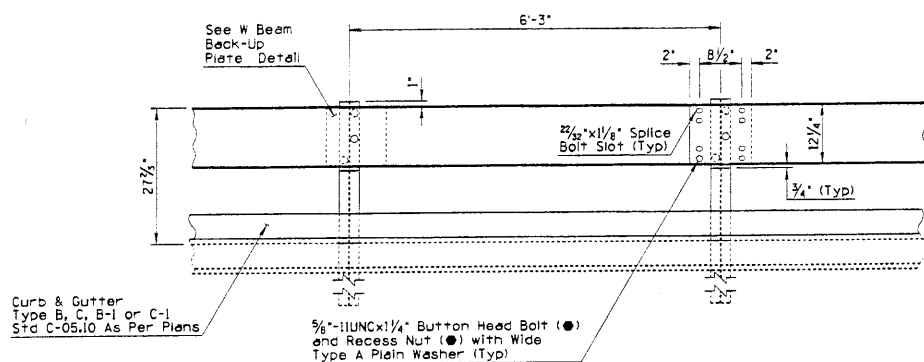
NO.	DESCRIPTION OF REVISION	MADE BY	DATE
1	ADDED TIMBER POST OPTION ON SHEET 2	PMB	10/95
2	DELETED REFERENCES TO CURB CROSS SLOPE	PMB	10/95
3	MODIFIED NOTE	JAT	7/97



PLAN

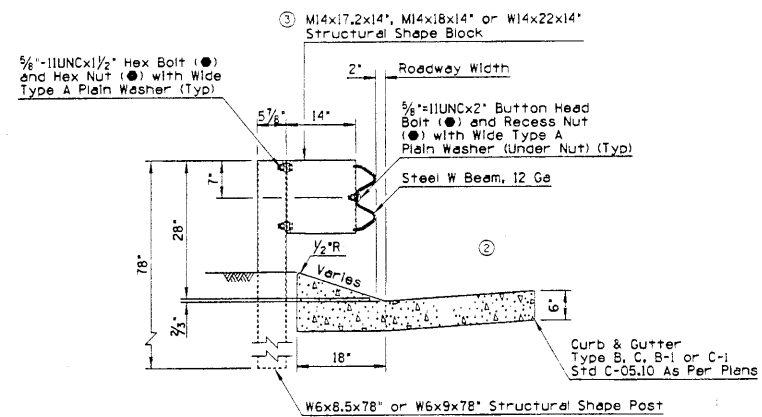


W BEAM BACK-UP PLATE DETAIL



ELEVATION

G4(1S-MODIFIED)



SECTION

GENERAL NOTES

1. Height of curb shall not exceed 4 inches.

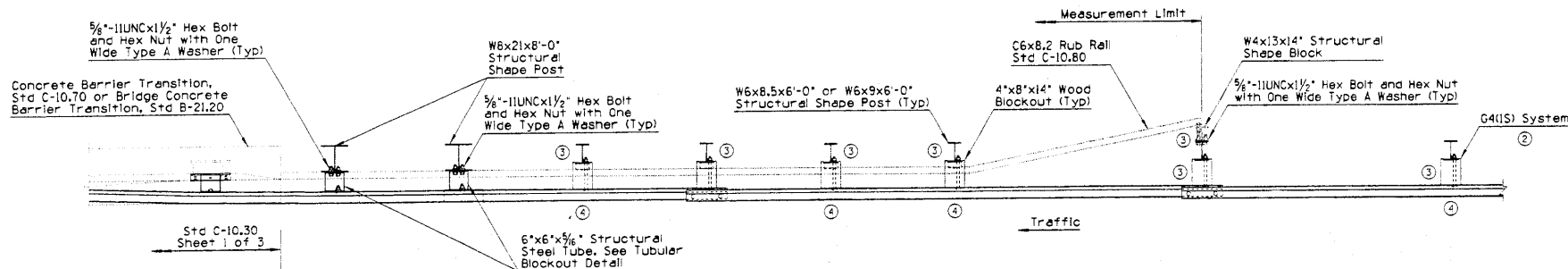
● - Indicates ARTBA designation

DESIGN APPROVED <i>Joseph H. Ottum</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Ronald Williams</i>	G4(MODIFIED) BLOCKED OUT W BEAM WITH SPECIAL CURB AND GUTTER G4(1S-MODIFIED) (STEEL POST)	DRAWING NO. C-10,22 Sheet 1 of 2

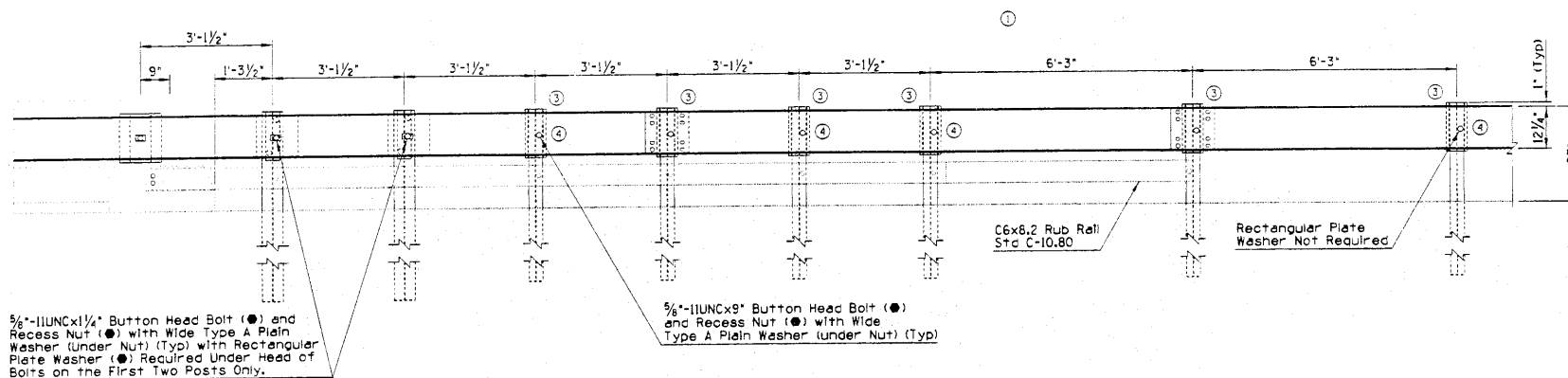
NO.	DESCRIPTION OF REVISION	MADE BY	DATE
1	DELETED NOTE	BAF	7/98
2	MODIFIED NOTE	BAF	7/98
3	CHANGED BLOCK-OUT	BAF	7/98
4	DELETED BACK-UP PLATE	BAF	7/98

GENERAL NOTES

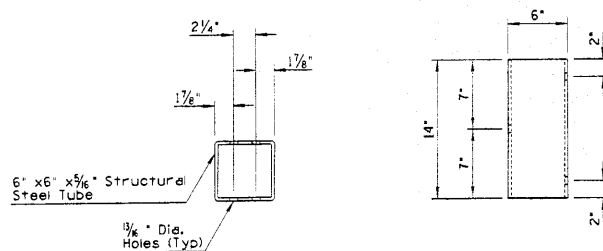
● - Indicates ARTBA designation



PLAN



ELEVATION



TUBULAR BLOCKOUT DETAIL

Guard Rail Transition
(Steel Post)

DESIGN APPROVED <i>Joseph Ottum</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	8/98
APPROVED FOR DISTRIBUTION <i>Ronald Williams</i>	GUARD RAIL TRANSITION, W BEAM TO CONCRETE HALF BARRIER (APPROACH)	DRAWING NO. C-10.30 Sheet 3 of 3

NO.	DESCRIPTION OF REVISION	MADE BY	DATE
1	ADDED REFERENCE TO STD C-10.11	BAF	10/95
2	DELETED PLATE WASHER NOTE	BAF	5/96
3	DELETED PLATE WASHER NOTE	BAF	5/95

- ① Concrete Barrier Transition, Std C-10.70, C-10.71 or Bridge Concrete Barrier Transition, Std B-21.19

10"x10"x6"-6" Wood Post

8"x8"x5'-4" Wood Post (Typ)

C6x8.2 Rub Rail
Std C-10.80

G4(IW) System
Or G4(2W) System

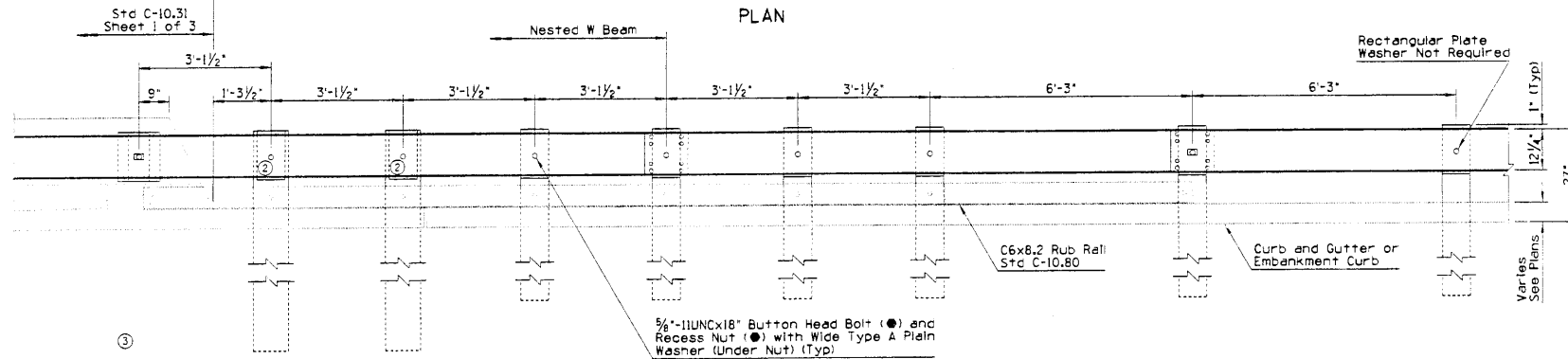
6"x8"x4" Wood Block (Typ)

Traffic

GENERAL NOTES

- - Indicates ARTBA designation

PLAN

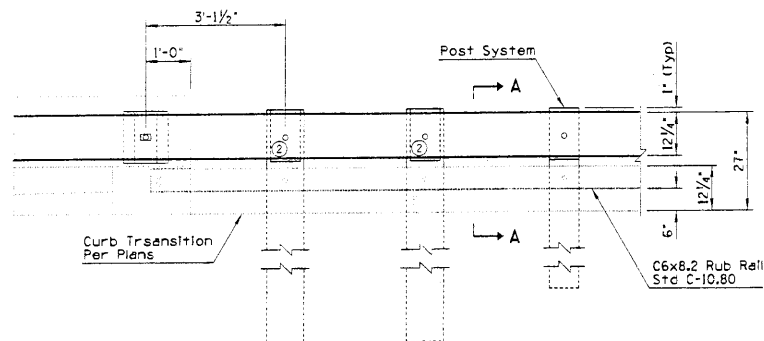


Guard Rail Transition
(Timber Post)

ELEVATION

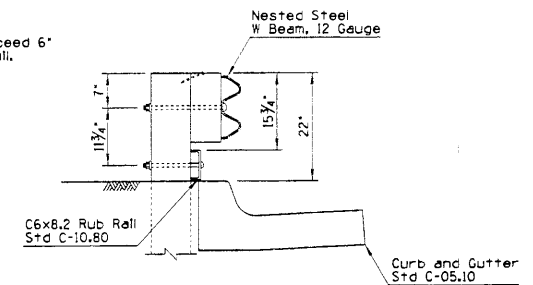
Notes:
For Notes and Dimensions Not Shown,
See Guard Rail Transition Above.

Notes:
Curb Height Shall Not Exceed 6"
When Adjacent to Rub Rail.



ELEVATION

Guard Rail Transition
To Existing Concrete
Barrier Transition



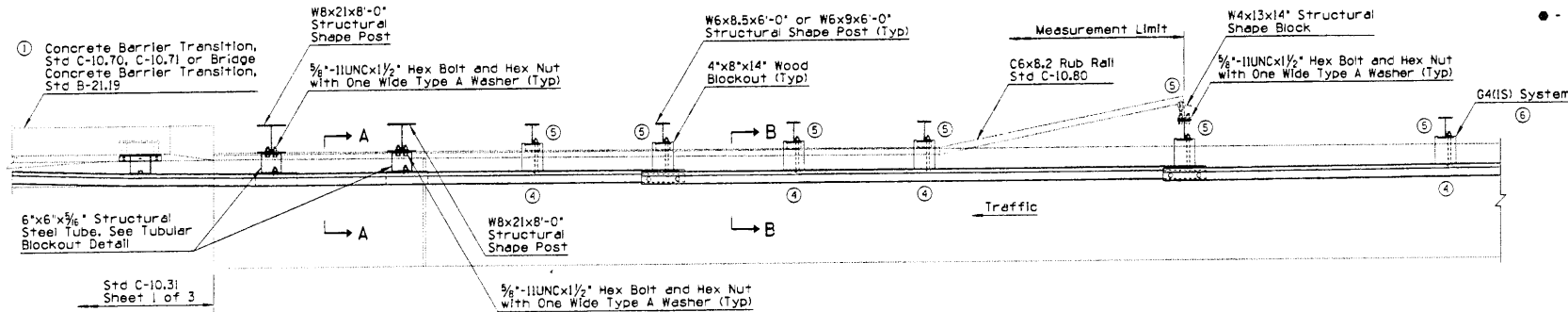
SECTION A-A

DESIGN APPROVED <i>Joseph H. Ottensm</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Ronald C. Williams</i>	GUARD RAIL TRANSITION W BEAM TO CONCRETE HALF BARRIER (APPROACH) (WITH CURB)	DRAWING NO. C-10.31 Sheet 2 of 3

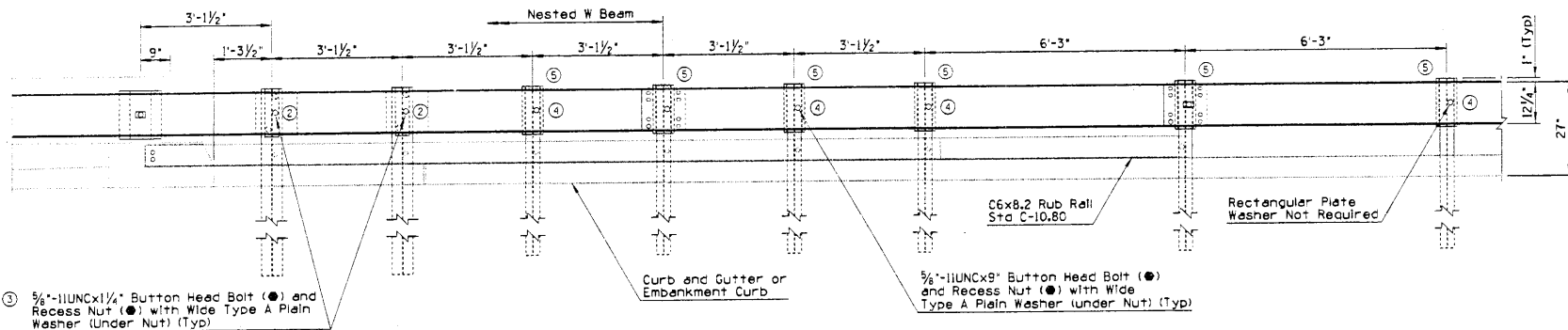
DESCRIPTION OF REVISION	MADE BY	DATE	DESCRIPTION OF REVISION	MADE BY	DATE
1. ADDED REFERENCE TO STD C-10.71	PME	10/78	1. CHANGED BLOCKOUT DETAIL	BAF	06/79
2. DELETED PLATE WASHER	BAF	05/79	2. MODIFIED NOTE	BAF	06/79
3. DELETED REFERENCE TO PLATE WASHER	BAF	05/79	3. ADDED SECTION	BAF	06/79
4. DELETED BACK-UP PLATE	BAF	06/79			

GENERAL NOTES

● - Indicates ARTBA designation

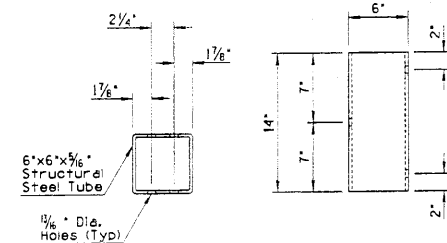


PLAN

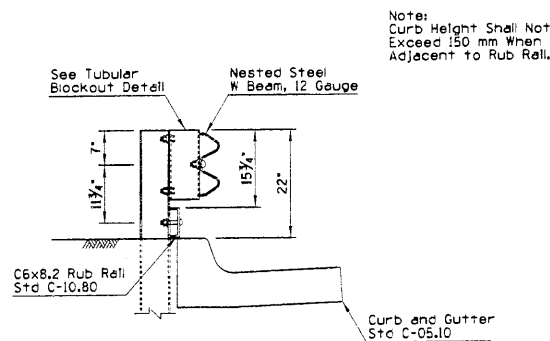


ELEVATION

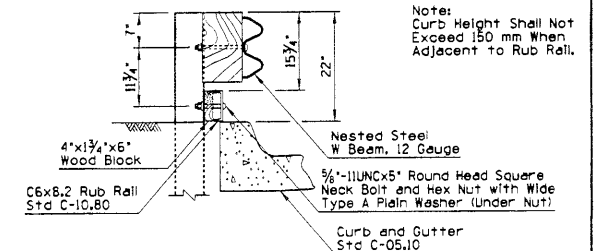
Guard Rail Transition (Steel Post)



TUBULAR BLOCKOUT DETAIL



SECTION A-A



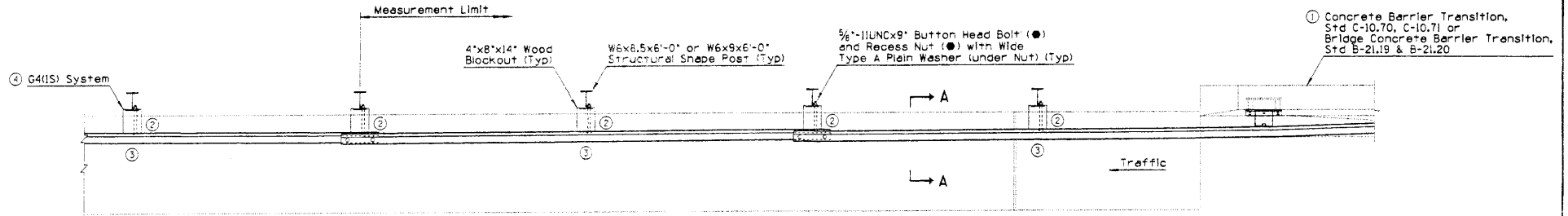
SECTION B-B ⑦

DESIGN APPROVED <i>Henry H. Ottum</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR CONSTRUCTION <i>Ronald Williams</i>	GUARD RAIL TRANSITION, W BEAM TO CONCRETE, HALF BARRIER (APPROACH) (WITH CURB)	DRAWING NO. C-10.31 Sheet 3 of 3

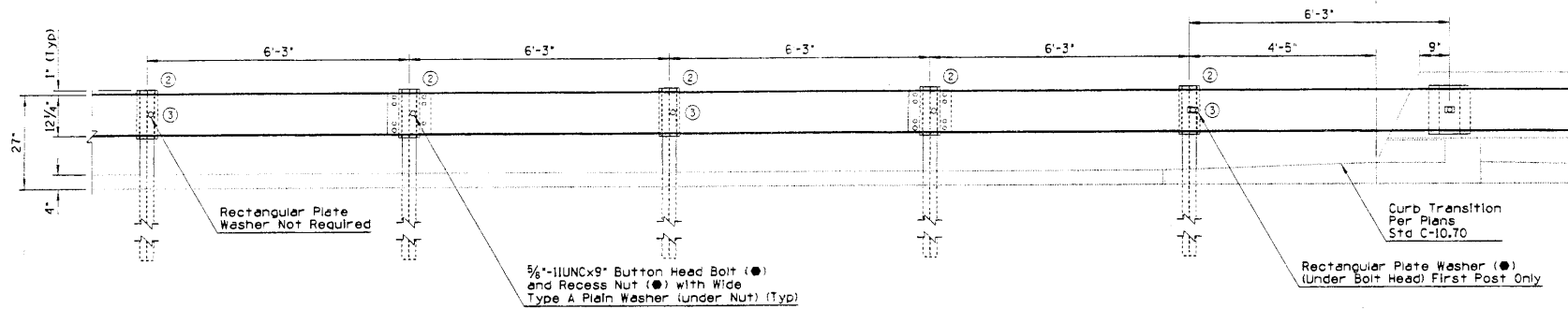
NO.	DESCRIPTION OF REVISION	DATE	BY
1	ADDED REFERENCE TO STD C-10.71	10/98	PAJ
2	CHANGED BLOCK-OUT	07/98	BAF
3	DELETED BACK-UP PLATE	07/98	BAF
4	MODIFIED NOTE	07/98	BAF

GENERAL NOTES

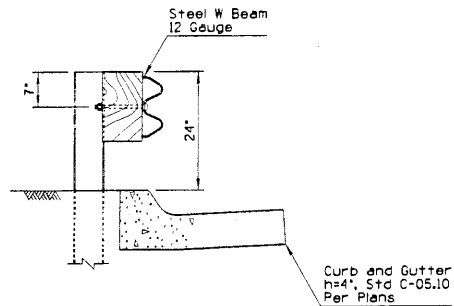
• - Indicates ARTBA designation



PLAN



ELEVATION



SECTION A-A

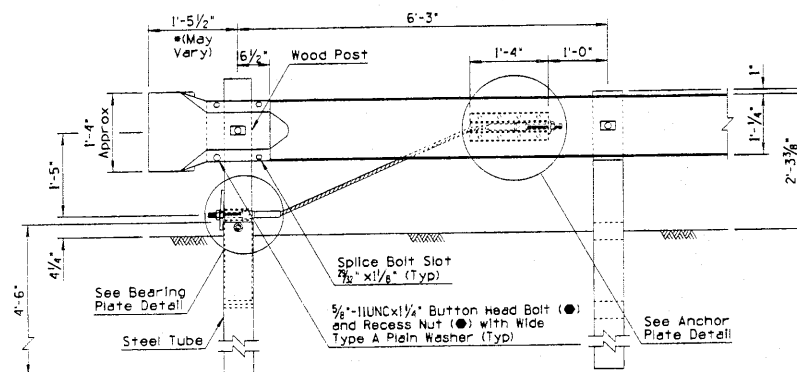
Guard Rail Transition
(Steel Post)

DESIGN APPROVED <i>Joseph H. Ottum</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Road</i>	GUARD RAIL TRANSITION, W BEAM TO CONCRETE HALF BARRIER (DEPARTURE)	DRAWING NO. C-10.32 Sheet 3 of 3

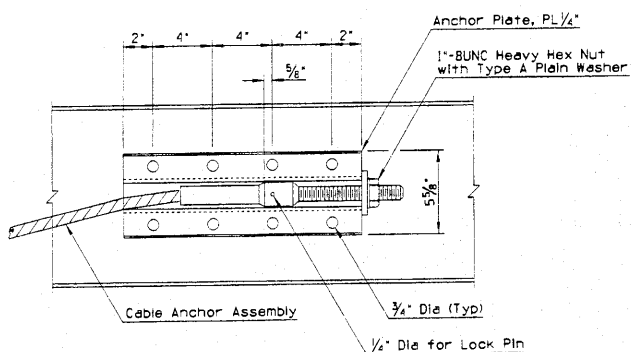
GENERAL NOTES

-
- Technical drawing of a W-beam end section showing dimensions and components:
- W-Beam End Section (Rounded)**: The left end of the beam is rounded with a radius of $6\frac{1}{4}" R$.
 - Dimensions**:
 - Overall height: $6"$
 - Flange thickness: $6"$
 - End flange width: $3\frac{1}{2}"$
 - Components**:
 - $\frac{5}{8}" \times 11 \text{UNC} \times 9\frac{1}{2}"$ Button Head Bolt (●) and Recess Nut (●) with Rectangular Plate Washer (●) Under Head and Wide Type A Plain Washer Under Nut.
 - 16 Penny Galvanized Common Nails, 2 Per Block.
 - Directionality**: One-Way Only TRAFFIC.
 - System Options**:
 - G4(1S) System
 - G4(2S) System
 - G4(1W) System
 - G4(2W) System

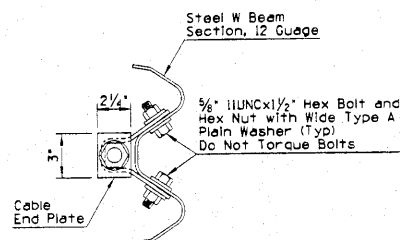
PLAN



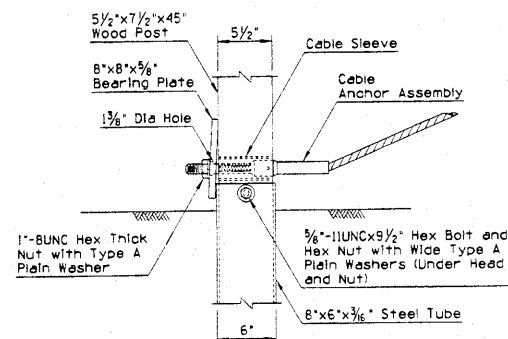
ELEVATION



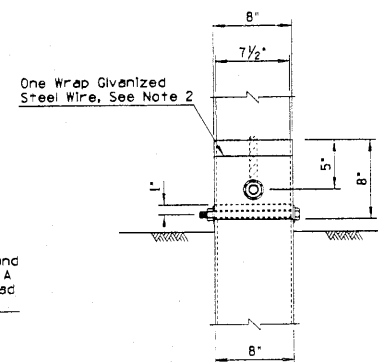
FRONT VIEW



SIDE VIEW



FRONT VIEW



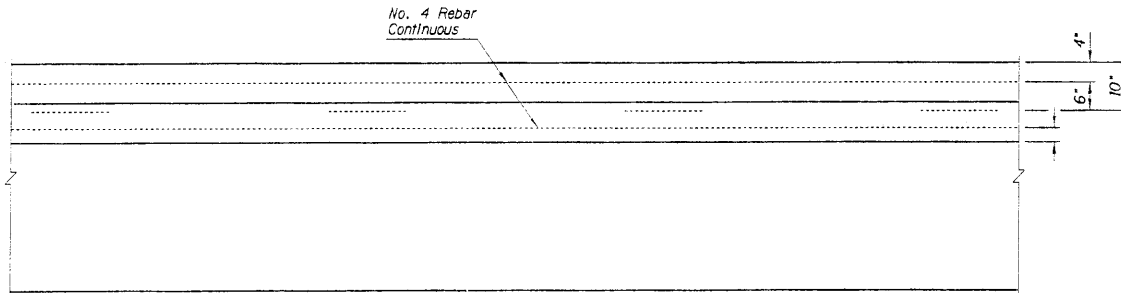
SIDE VIEW

BEARING PLATE DETAIL

ANCHOR PLATE DETAIL

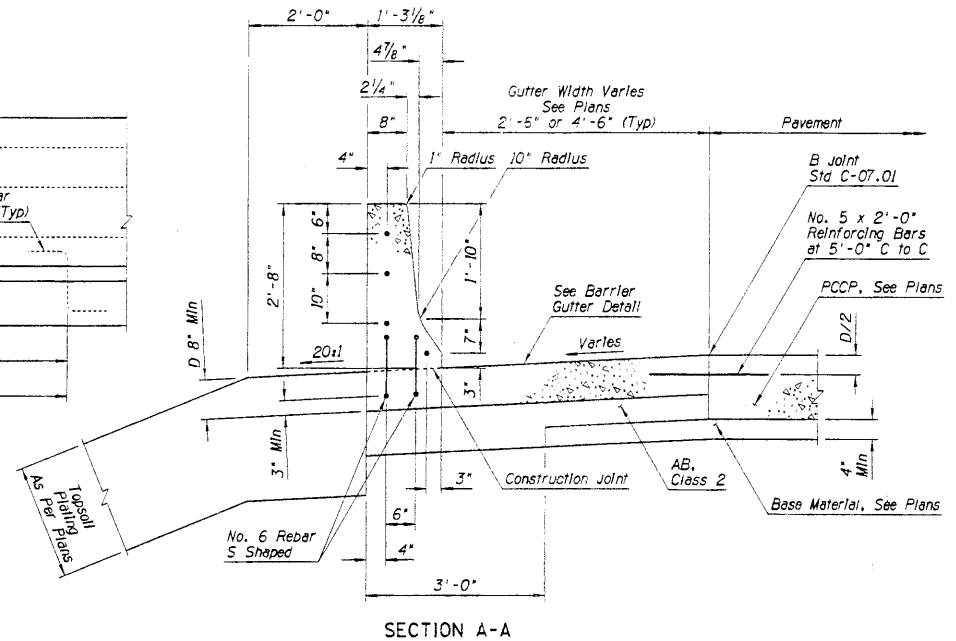
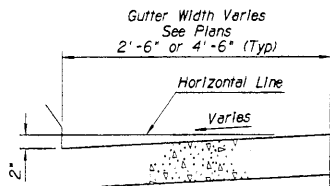
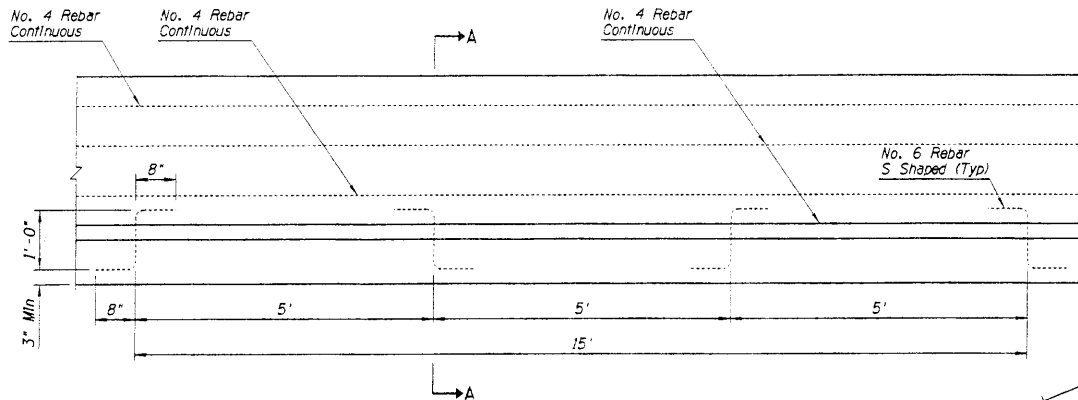
DESIGN APPROVED <i>Sam H. Ottman</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR CONSTRUCTION <i>Paul Williams</i>	GUARD RAIL END TERMINAL FOUNDATION TUBE	DRAWING NO. C-10.45

NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE
1			
2			
3			
4			



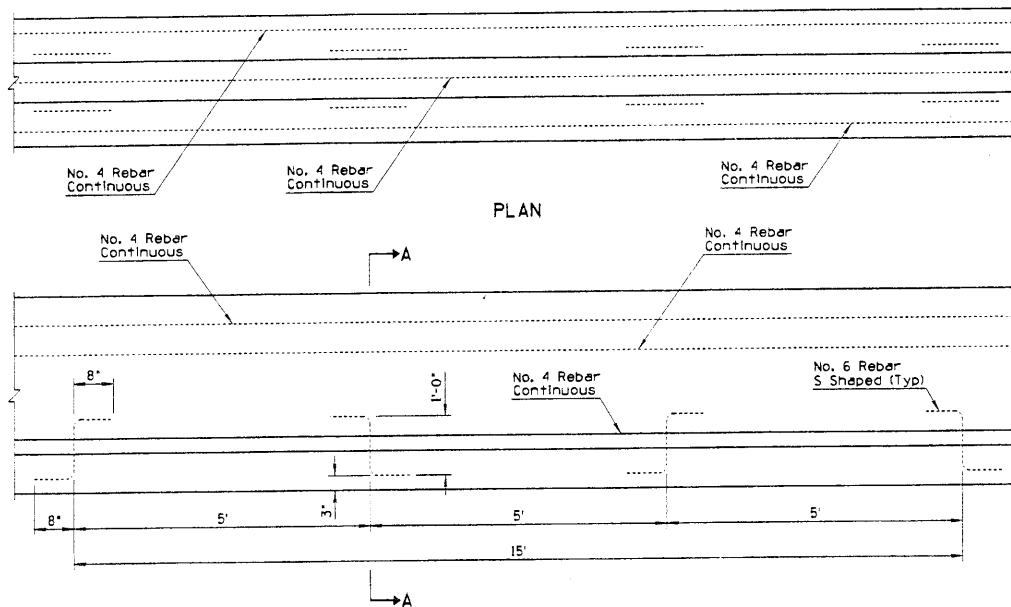
GENERAL NOTES

1. Half Barrier shall be constructed by the slip form or formed Cast-In-Place method.
2. When obstacles are encountered which prevents the use of slip form equipment, the closure shall be accomplished by the use of stationary forms.
3. Concrete shall be Class S, design strength $f'_c = 3000$ PSI.
4. No. 4 Rebar shall extend 12" past the construction joint at the completion of the day's pour.
5. Thickness of footing, "D" can be adjusted to match the PCCP thickness, as approved by the Engineer.
6. When the pavement section slopes away from the gutter, the slope of the gutter shall match the pavement cross slope. Therefore, the 2" gutter depression is not applicable.
7. When bridges are encountered, the cross slope of the gutter shall be transitioned to match the cross slope of the bridge. Length of the transition is 15 feet.

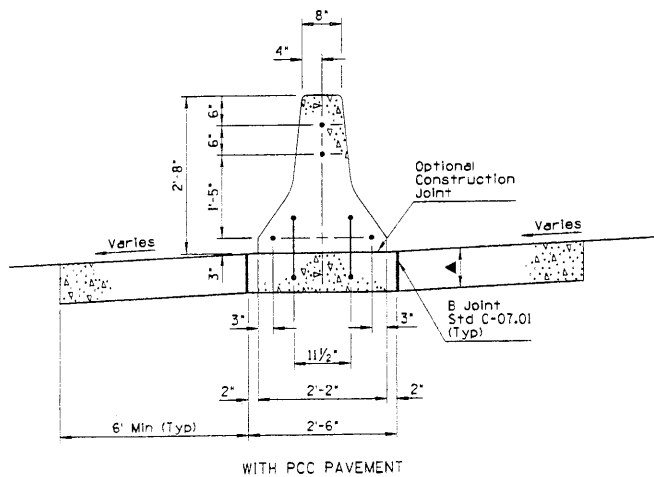


DESIGN APPROVED <i>Joseph H. Ottomano</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	8/98
APPROVED FOR DISTRIBUTION <i>Ronald A. Smith</i>	CONCRETE HALF BARRIER TYPE 'F' WITH GUTTER	DRAWING NO. C-10.62

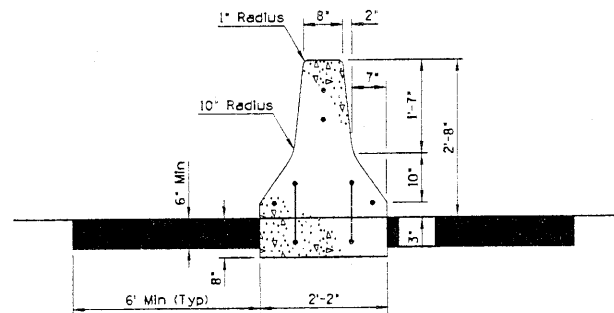
NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	REVISED NUMBER FROM C-10.12	PHB	7/94
2	CHANGED TO BOTH SLIP & FIXED FORM	PHB	7/94
3	MODIFIED NOTE	BAF	7/97



ELEVATION



WITH PCC PAVEMENT



WITH AC PAVEMENT

SECTION A-A

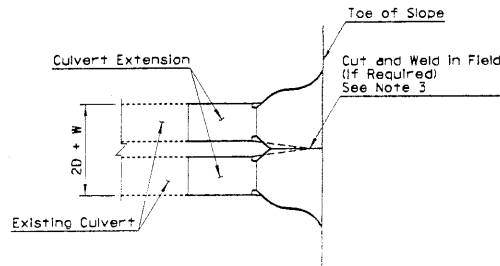
GENERAL NOTES

- Median Barrier shall be constructed by the slip form or formed Cast-In-Place method.
- When obstacles are encountered which prevent the use of slip form equipment, the closure shall be accomplished by the use of stationary forms.
- Concrete shall be Class S, design strength $f'_c = 3000$ PSI.
- If the footing and barrier are cast monolithically, No. 6 S shaped rebars will not be required.
- In no case shall the width of barrier exceed the width of the barrier footing or overhang the adjacent pavement.
- No. 4 Rebar shall extend 12' past the construction joint at the completion of the day's pour.

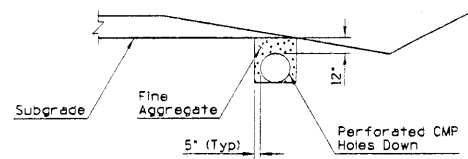
▲ Depth to match adjacent PCCP thickness (8" Min).

DESIGN APPROVED <i>Joseph H. Ottensm</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Ronald Williams</i>	MEDIAN BARRIER CAST IN PLACE SLIP FORM & FIXED FORM	DRAWING NO. C-10.66

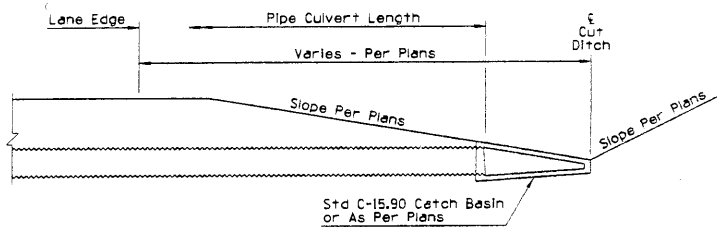
NO.	DESCRIPTION OF REVISION	WORK BY	DATE
1	MODIFIED DETAIL	PHD	7/94
2	ADDED DETAIL	PHD	7/94
3	ADDED NOTE	PHD	7/94
4	MODIFIED NOTE	BAF	7/97



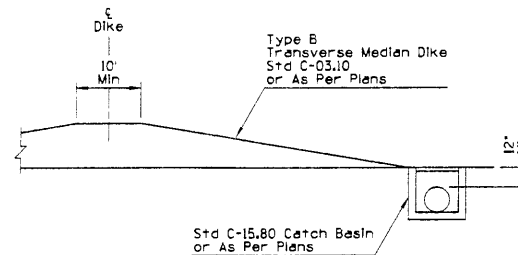
② SPECIAL MULTIPLE PIPE END SECTION DETAIL FOR PIPE CULVERT EXTENSIONS ONLY



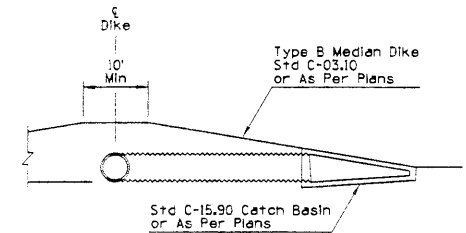
① PERFORATED CMP INSTALLATION



① PIPE AND CATCH BASIN INSTALLATION AT SAG CONDITION OF CUT DITCH



① PIPE AND CATCH BASIN INSTALLATION AT BASE OF TRANSVERSE DIKE



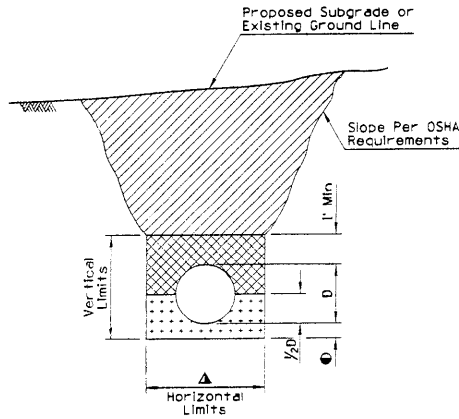
① PIPE AND CATCH BASIN INSTALLATION AT FACE OF TRANSVERSE DIKE

GENERAL NOTES

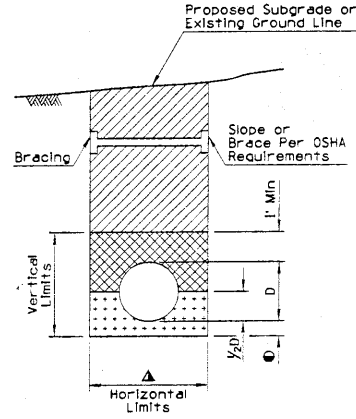
- ④ 1. Minimum cover over pipe culverts shall be 12", measured from the top of pipe.
2. See remaining C-13 Series standards for other pipe details.
- ③ 3. After welding, the damaged coating shall be cleaned by a wire brush and painted with at least one full coat of Paint No. 4, or given two coats of an approved hot asphalt paint, as directed by the Engineer.

DESIGN APPROVED <i>James H. Ottum</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Ronald C. Williams</i>	PIPE CULVERT INSTALLATION	DRAWING NO. C-13.10 Sheet 2 of 2

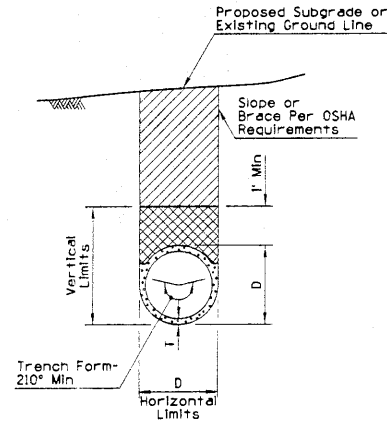
NO.	DESCRIPTION OF REVISION	MADE BY	DATE
1	ADDED NOTE	PMG	7/94
2	REARRANGED STD	PMG	7/94
3	MODIFIED NOTE	BAT	8/98



TRENCH CONDITION
IN NATURAL GROUND OR IN EMBANKMENT
WITHOUT BRACING



TRENCH CONDITION
IN NATURAL GROUND OR IN EMBANKMENT
WITH BRACING SHOWN

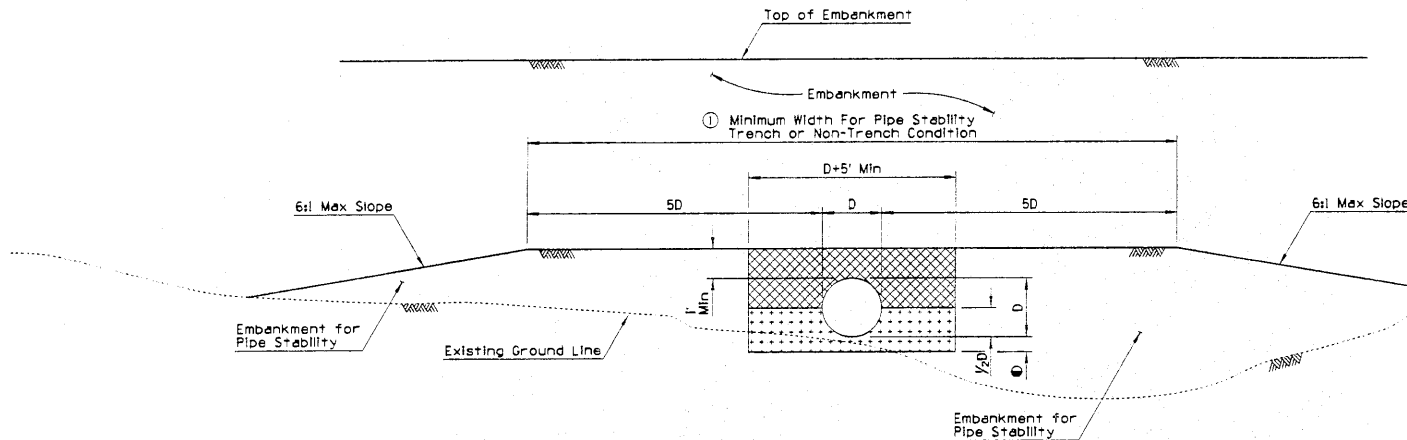


TRENCH CONDITION
NRCICP IN NATURAL GROUND
OR IN EMBANKMENT

GENERAL NOTES

- Pipes shall be installed either in a trench condition or in a non-trench condition in natural ground or in embankment.
- In a trench condition, the vertical and horizontal limits shall be maintained. If horizontal limits are exceeded or the vertical limits are not maintained, a non-trench condition exists.
- Bracing and sloping shall conform to OSHA requirements.
- Pipe backfill may be bedding material.
- In a non-trench condition, the embankment for pipe stability shall be constructed in lifts to the limits shown in the detail simultaneously with the bedding material and pipe backfill. If the contractor chooses to construct it as a trench condition, the embankment shall be constructed before excavating the trench.
- Outside diameter of full circle pipe or outside dimension (span or rise) of arch, arch pipe, elliptical pipe.
- Minimum wall thickness for NRCICP. See Plans.
- Δ - 6 inches each side minimum for diameters less than 4 feet.
 Δ - 2 feet maximum for diameters up to 4 feet.
 Δ - 1 foot each side minimum for diameters equal to or over 4 feet.
 Δ - 3 feet maximum for diameters 4 feet or over.
- 6 inches except when on unyielding or unstable material. See standard specifications.

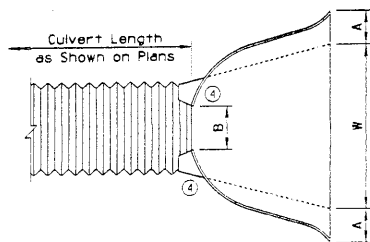
- TRENCH BACKFILL
- PIPE BACKFILL
- BEDDING



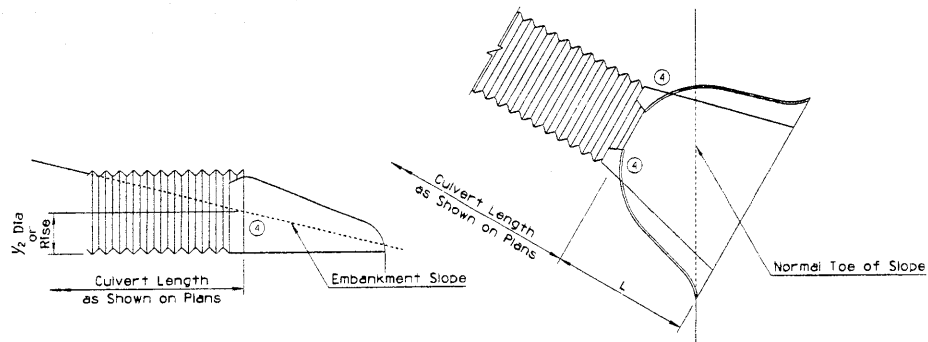
NON-TRENCH CONDITION

DESIGN APPROVED	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV.
APPROVED FOR DISTRIBUTION	② TYPICAL PIPE INSTALLATION	8/98
		DRAWING NO. C-13.15

NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE	NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	CORRECTED SPELLING OF "EMBANKMENT"	PHB	10/95	5	MODIFIED DATA TABLE	BAF	8/96
2	DELETED DETAILS	BAF	7/97				
3	DELETED TITLE AND SUBTITLE	BAF	7/97				
4	DELETED RIVETS	BAF	7/97				



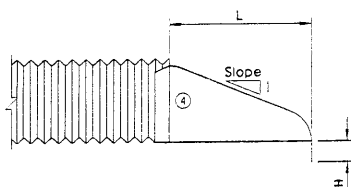
RIGHT ANGLE CULVERT



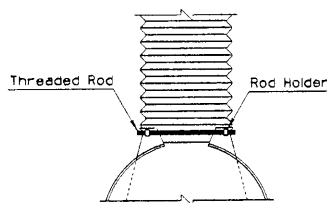
SKewed CULVERT

GENERAL NOTES

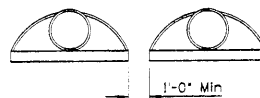
1. The end section may be jointed to the pipe or connector section by bolts, rivets, dimpled bands, slip-seam bands or threaded rod type fasteners. For allowable connector types, see table.
2. The type 1 connector is by means of bolts or rivets. Maximum circumferential fastener spacing shall be 12" and with a minimum of 8 fasteners per joint. The type 1 joint may be used with either annular or helical corrugations.
3. Type 2 and 3 connectors shall be used only with annular or helical pipe with a requisite number of annular corrugations.
4. Type 4 and 5 connectors shall be only used with helical pipe.
5. All steel end section components shall be galvanized.
6. Toe of embankment shall be warped to match toe of skewed end section.
7. A berm shall be added to abnormal projections per Std C-13.10.
8. The foregoing applies to all cross section configurations.



③

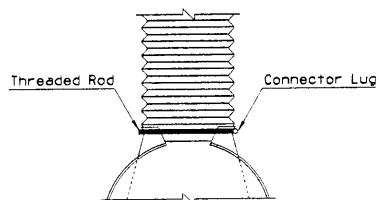


TYPE 2
THREADED ROD CONNECTIONS

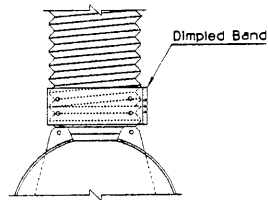


SPACING FOR MULTIPLE
INSTALLATION

		Dimensions - Inches							
Pipe Dia	Ga	A ±1	B Max	H ±1	L ±1/2	W ±2	Approx Slope	Connection Type	
18"	16	8	8	6	31	36	2 1/2	2, 3, 4	⑤
24"	16	10	13	6	41	48	2 1/2	2, 3, 4	⑤
30"	14	12 1/4	12 1/2	8	51	57	2 1/2	2, 4	⑤
36"	14	14 1/2	12	9	60	72	2 1/2	2, 4	⑤
42"	12	17	11	10 1/2	69	84	2 1/2	3	⑤



TYPE 3
THREADED ROD CONNECTIONS



TYPE 4
DIMPLED BAND CONNECTIONS

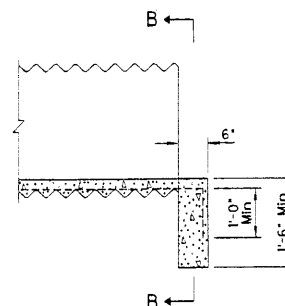
		Dimensions - Inches							
Pipe Arch		Ga	A ±1	B Max	H ±1	L ±1½	W ±2	Approx Slope	Connection Type
Span	Rise								
21"	15"	16	7½	11	6	24	36	2½	2, 3, 4
28"	20"	16	8	16	6	32	48	2½	2, 3, 4
35"	24"	14	10	16	6	39	60	2½	2, 4
42"	29"	14	12	12	7½	46	75	2½	2, 4
49"	33"	12	13½	20	9	53	84	2½	3

DESIGN APPROVED <i>Samuel H. Ottum</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/96
APPROVED FOR DISTRIBUTION <i>Ronald Williams</i>	PIPE, CORRUGATED METAL END SECTION	DRAWING NO. C-13.25

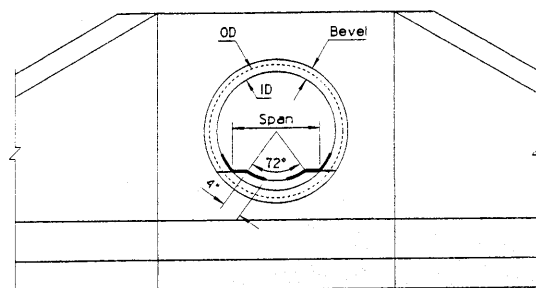
GENERAL NOTES

-

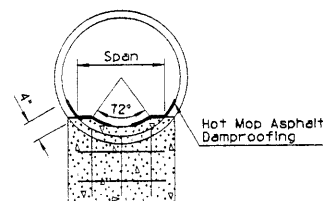
HEADWALL INSTALLATION



PROJECTING INSTALLATION



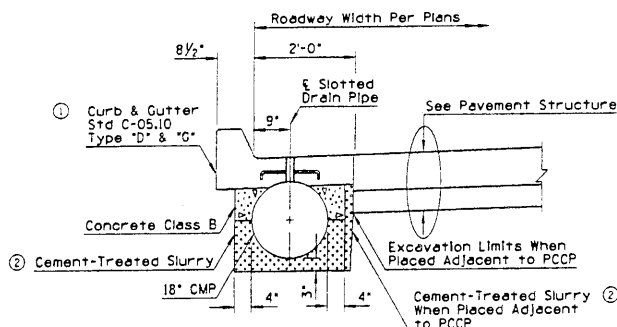
SECTION A-A



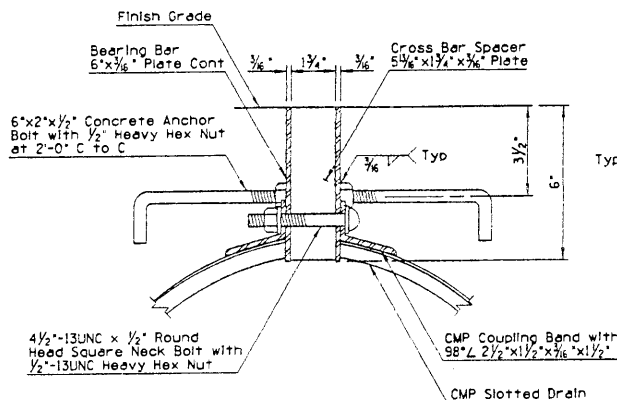
SECTION B-B

DESIGN APPROVED	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV.
<i>Joseph H. Ottensm</i>		8/96
APPROVED FOR DISTRIBUTION	PIPE AND PIPE ARCH, CORRUGATED METAL CONCRETE INVERT PAVING	DRAWING NO. C-13.30
<i>P. M. Sullivan</i>		

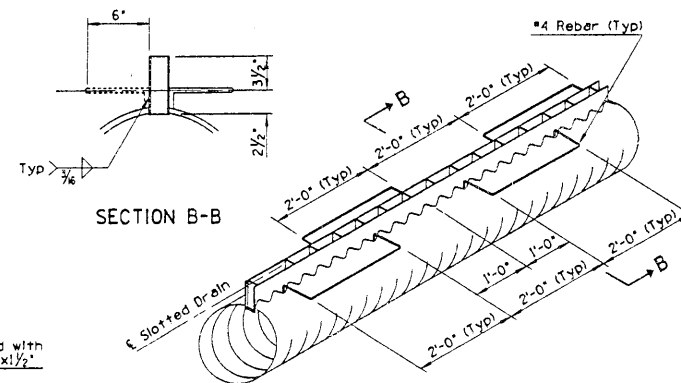
NO.	DESCRIPTION OF REVISION	MADE BY	DATE
1	DELETED TYPE A CURB AND GUTTER	PME	10/99
2	REVISED NOTE	EM	7/97
3			
4			



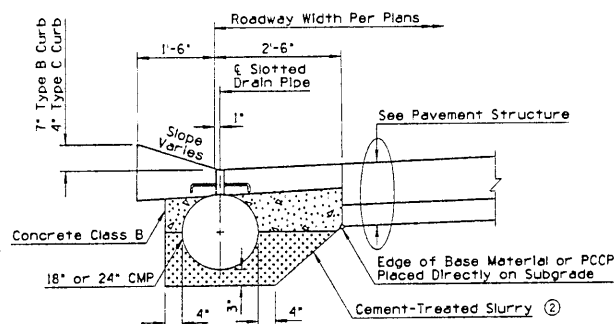
① TYPE D & G CURB AND GUTTER WITH SLOTTED DRAIN



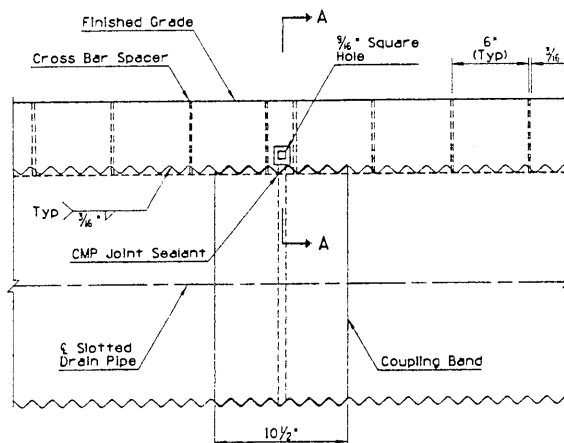
SECTION A-A



SECTION B-B

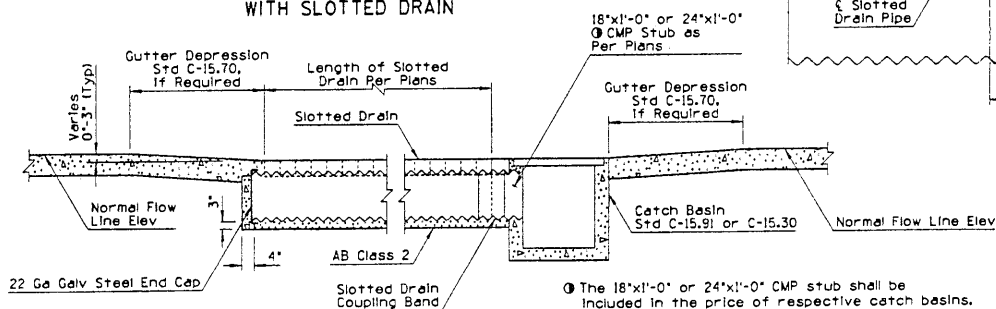


TYPE B OR C CURB AND GUTTER WITH SLOTTED DRAIN



GENERAL NOTES

1. Slotted drain pipe shall be 2 1/2"x1/2" corrugated steel pipe with a minimum wall thickness of 0.064" and shall conform to the requirements of AASHTO M36.
2. All concrete shall be Class B.
3. Reinforcing steel shall conform to 1003-1, 2, Grade 40.
4. Structural steel shall conform to ASTM A36.
5. Concrete anchors shall conform to ASTM A307 and hex nuts shall conform to ASTM A563 Grade A.
6. All slotted drain pipe hardware except anchor bolts and reinforcing steel shall be given two coats of #1 paint.
7. When annular pipe is used, apply water proof sealer before attaching coupling band.
8. When helical pipe is used, it shall be formed with at least one annular corrugation at each end of each pipe section. Water proof sealer shall be applied to the annular corrugation prior to attachment of coupling band.
9. Cover slot during construction with removable tape or other acceptable substitute.
10. Slotted drain pipe shall be clean at the time of final acceptance.
11. Concrete curb and gutter thru the slotted drains shall be paid for under the respective curb and gutter items.
12. Refer to curb and gutter details for dimensions and details not shown.
13. Joints in concrete curb & gutter shall match adjoining PCCP and slotted drain bands.



CONNECTION OF SLOTTED DRAIN TO CATCH BASIN AND SLOTTED DRAIN END CAP

① The 18"x1'-0" or 24"x1'-0" CMP stub shall be included in the price of respective catch basins.

DESIGN APPROVED <i>Stanley H. Ottum</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 8/98
APPROVED FOR DISTRIBUTION <i>Ronald...</i>	SLOTTED DRAIN DETAILS	DRAWING NO. C-13.60