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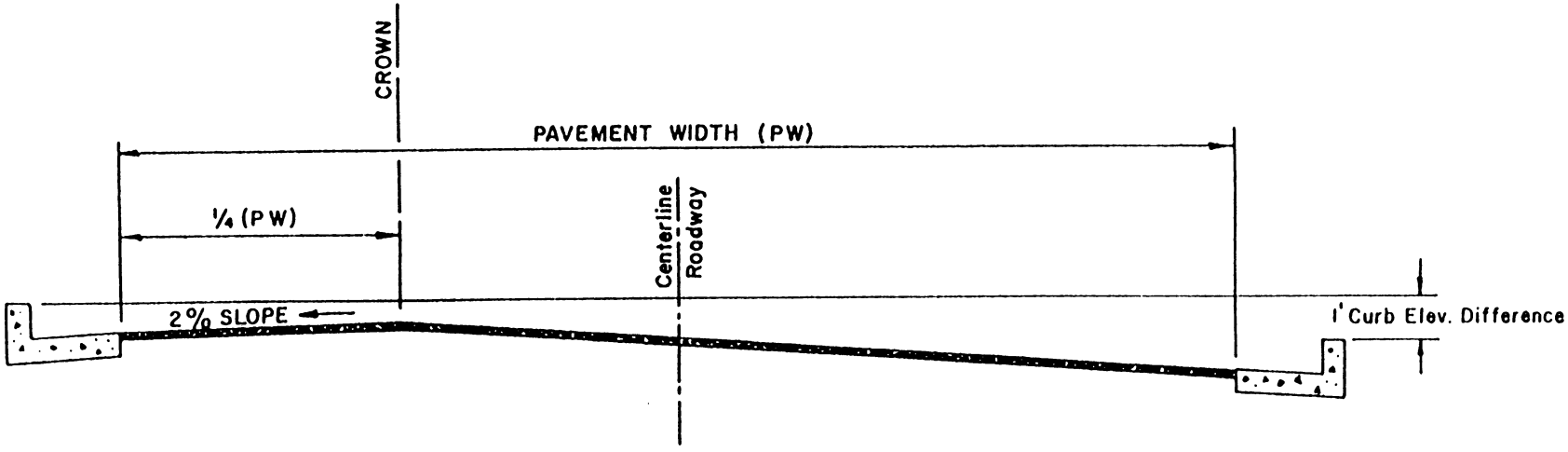
630	D-36	Wingwalls for Pipe or Box Culverts

NOTE:

* ***Not to be used unless prior approval is obtained from the City Engineer on a site-by-site basis.***
(Ref. Drawing No. D-19)

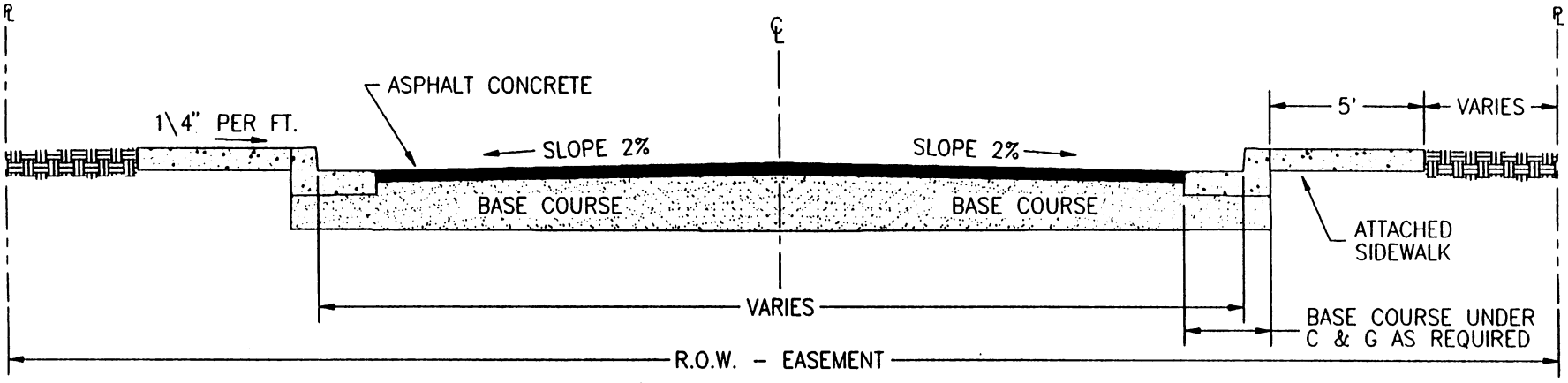


TYPICAL STREET CROSS SECTION

AT ONE (1) FOOT CURB ELEVATION DIFFERENCE

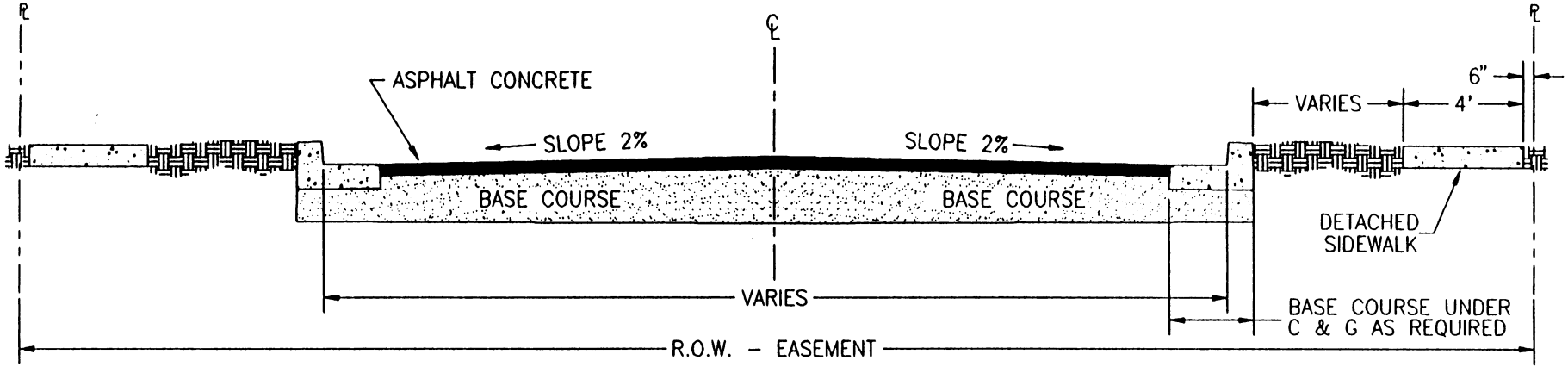
NO SCALE

CITY OF COLORADO SPRINGS	
Typical Street Section	
Approved by: Gary R. Hayes Engineer	
Drawn by: KLM Date: 07/94	STD. D-1



TYPICAL SECTION A

NO SCALE



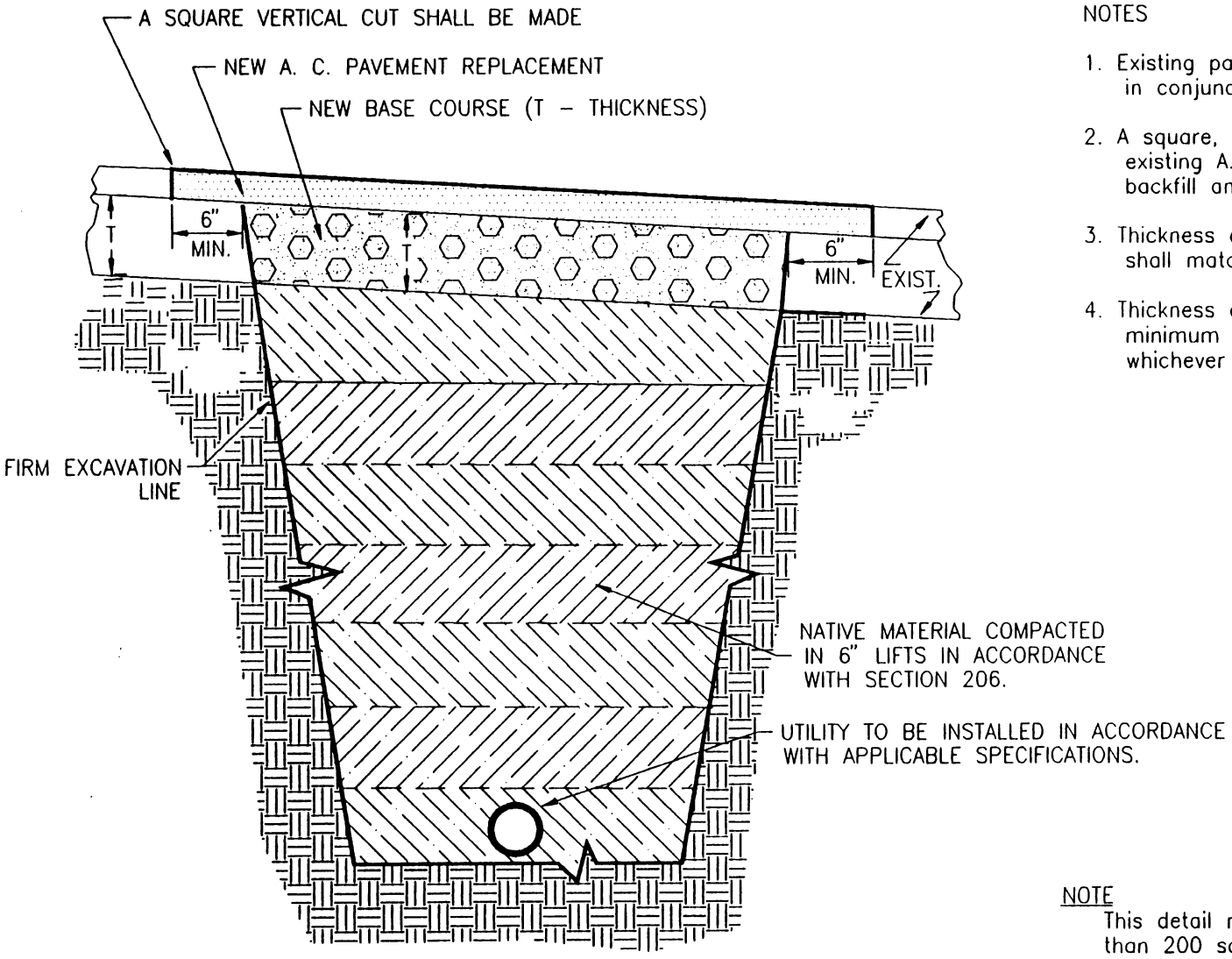
TYPICAL SECTION B

NO SCALE

NOTES

1. City Standard Base Course – refer to City Standard Specifications.
2. Subgrade (Compacted in accordance with City Standard Specifications, Section 205)
3. Refer to City Subdivision Policy Manual for required R.O.W. and Street widths and other street sections.
4. Refer to Standard Detail for Curb and Gutter (Type 1 and Type 2).

CITY OF COLORADO SPRINGS	
Standard Street Sections	
approved by: Larry R. Hayner, City Engineer	
Drawn BY: J2	DATE: 06/93 STD. D-2



NOTES

1. Existing pavement may be rough cut initially in conjunction with trenching.
2. A square, vertical cut shall be made in the existing A.C. pavement after placement of backfill and prior to pavement replacement.
3. Thickness of new a.c. pavement replacement shall match existing (4" min.).
4. Thickness of new base course shall be a minimum of 6" or equal to existing, whichever is greater.

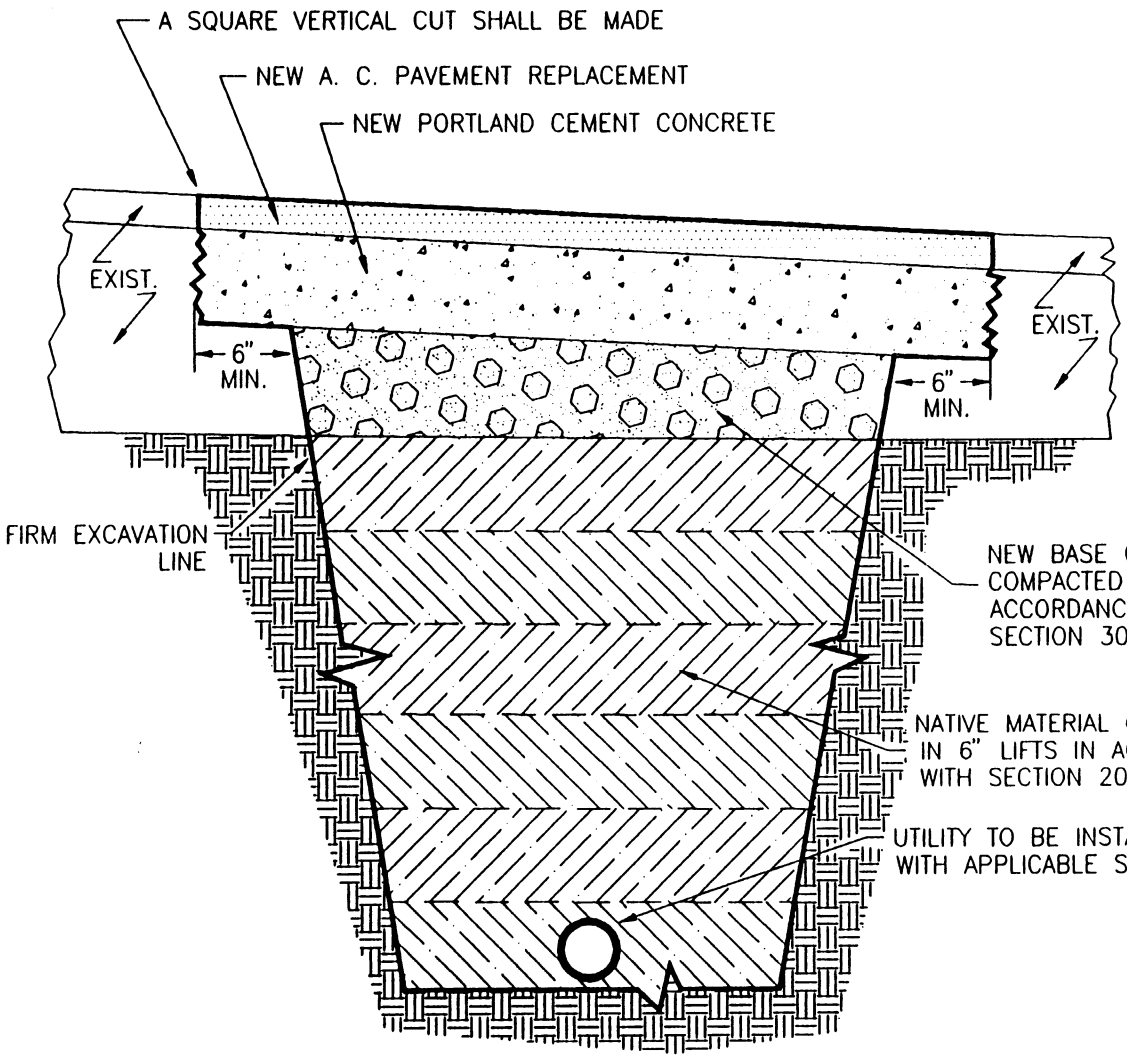
NOTE

This detail may be used for pavement cut less than 200 sq. ft. Cuts greater than 200 sq. ft. shall be in conformance with the engineered design.

PAVEMENT REPLACEMENT & BACKFILL DETAIL

TRENCHES IN TYPICAL STREET NOT NEWLY CONSTRUCTED OR RECENTLY OVERLAYED

CITY OF COLORADO SPRINGS		
Pavement Replacement Detail For Typical Streets		
approved by: Kelly R. Hayes City Engineer		
Drawn BY: JZ	DATE 04/93	STD. D-3



NOTES

1. Existing pavement may be rough cut initially in conjunction with trenching.
2. A square, vertical cut shall be made in the existing A.C. pavement after placement of backfill and prior to pavement replacement.
3. Thickness of new a.c. pavement replacement shall match existing.
4. Thickness of Portland cement concrete shall be a minimum of 6" with a 4000 psi compressive strength at 28 days.
5. Thickness of new base course shall be a minimum of 6" when the existing base course exceeds 12" in depth. Streets with less than 12" of existing base course require no new base course.

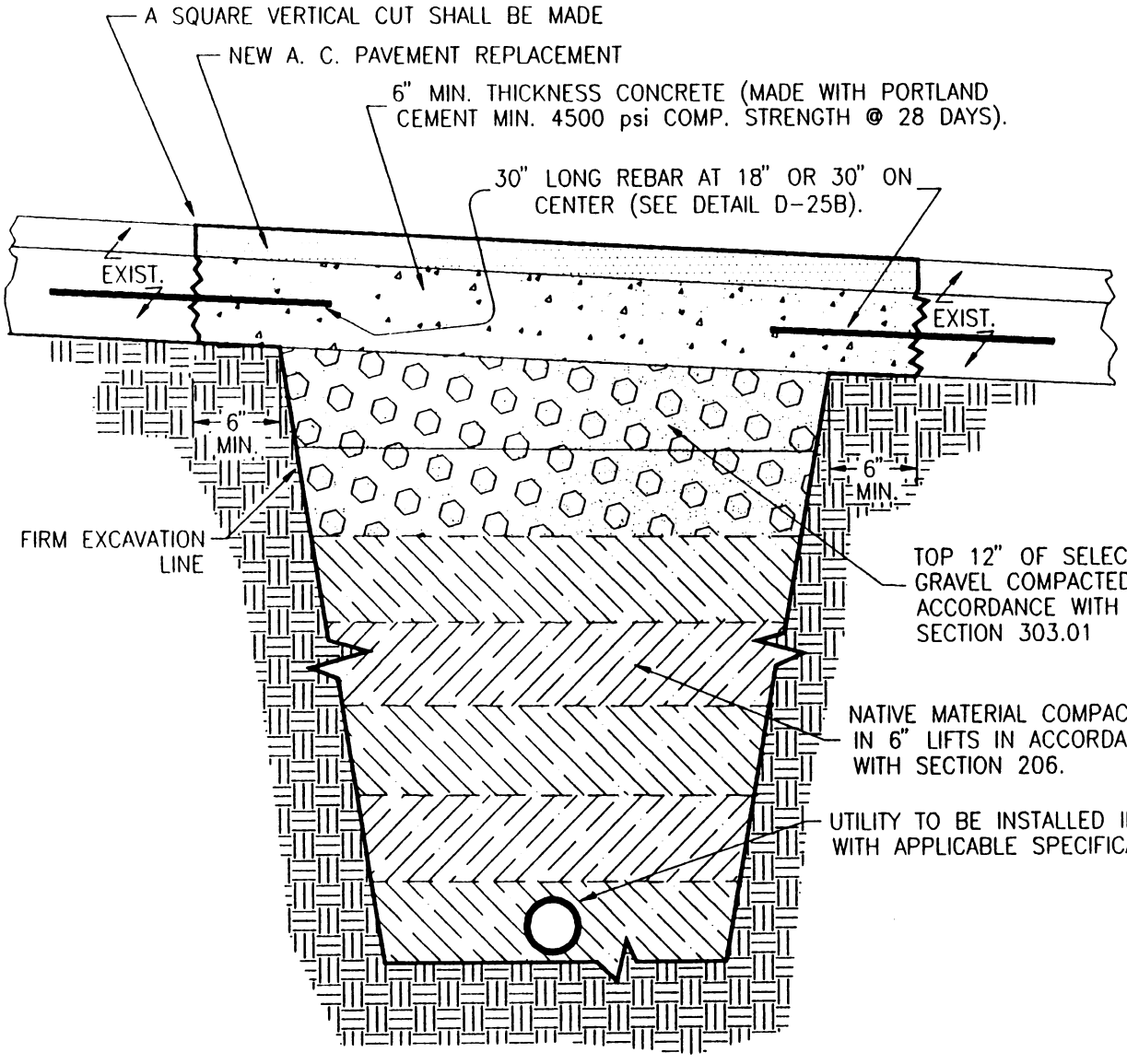
NOTE

This detail may be used for pavement cut less than 200 sq. ft. Cuts greater than 200 sq. ft. shall be in conformance with the engineered design.

PAVEMENT REPLACEMENT & BACKFILL DETAIL

TRENCHES IN NEW STREETS OR RECENTLY OVERLAYED STREET (LESS THAN 3 YEARS OLD)

CITY OF COLORADO SPRINGS		
Pavement Replacement Detail New or Recently Overlayed St.		
approved by: Kay R. Haynes		City Engineer
Drawn BY: JZ	DATE: 04/93	STD. D-4



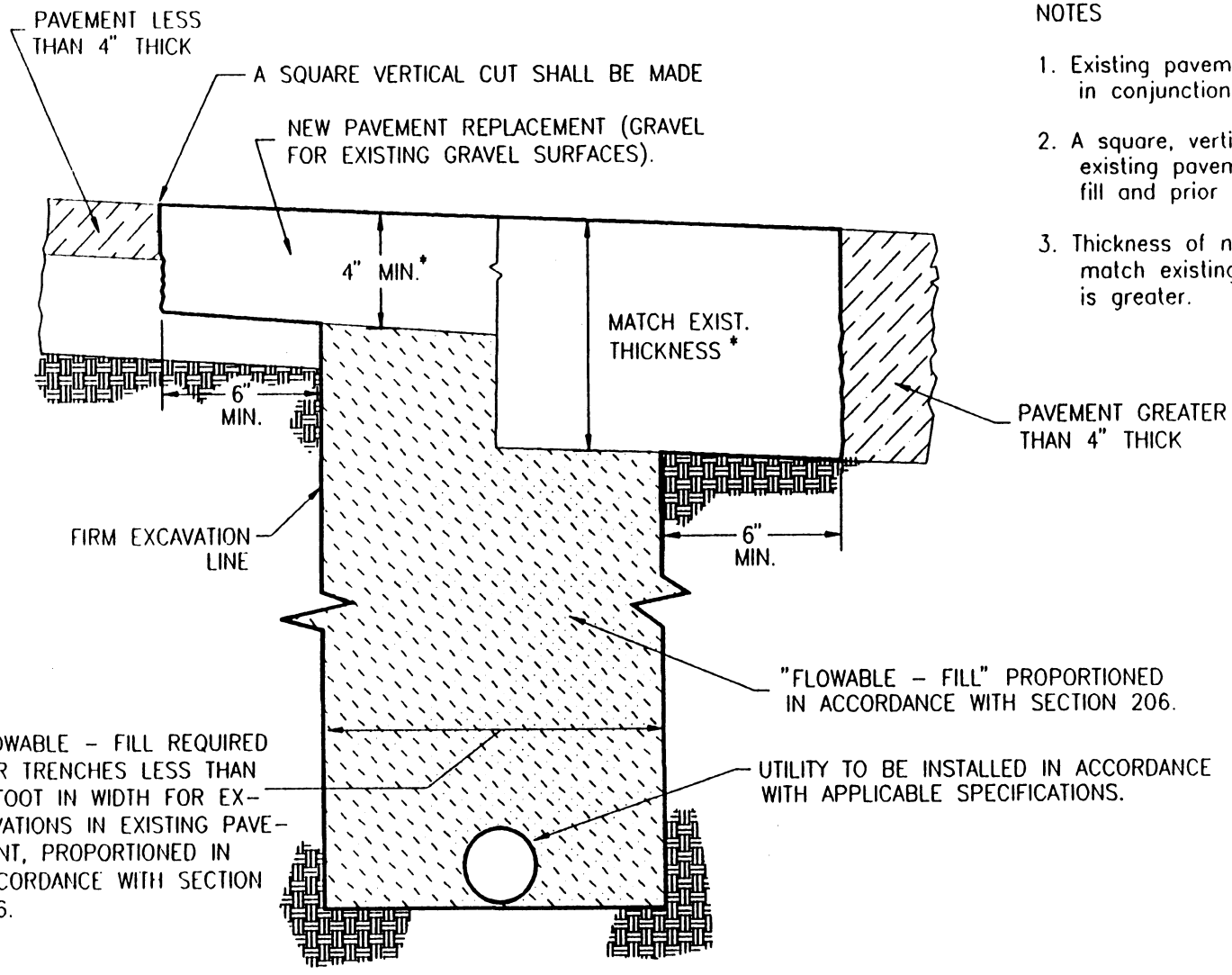
NOTES

1. Existing pavement may be rough cut initially in conjunction with trenching.
2. A square, vertical cut shall be made in the existing A.C. pavement after placement of backfill and prior to pavement replacement.
3. Thickness of Concrete and A.C. shall be equal to existing concrete and A.C. Thickness with minimum as shown.
4. Drill and expoxy 30" long rebars 15" deep into existing Concrete Pavement in accordance with detail D-25B for Transverse and Longitudinal Joints.

PAVEMENT REPLACEMENT & BACKFILL DETAIL

TRENCHES IN STREETS WITH EXISTING PORTLAND CEMENT CONCRETE AND ASPHALTIC CONCRETE SURFACE COURSE

CITY OF COLORADO SPRINGS			
Pavement Replacement Detail Existing Concrete Subsurface			
approved by: Gary R. Haynes City Engineer			
Drawn BY: JZ	DATE: 08/93	STD. D-5A	



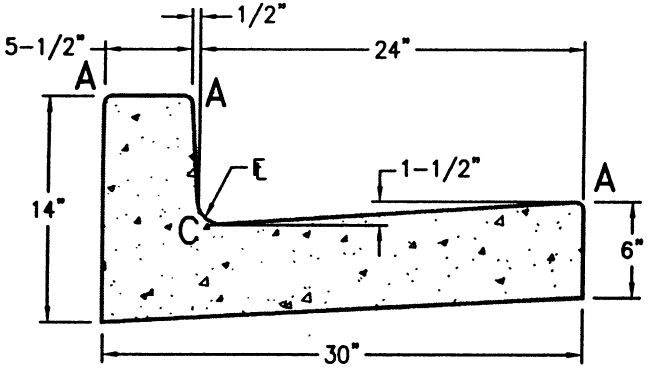
NOTES

1. Existing pavement may be rough cut initially in conjunction with trenching.
2. A square, vertical cut shall be made in the existing pavement after placement of flowable fill and prior to pavement replacement.
3. Thickness of new pavement replacement shall match existing, or 4" minimum, whichever is greater.

PAVEMENT REPLACEMENT & BACKFILL DETAIL

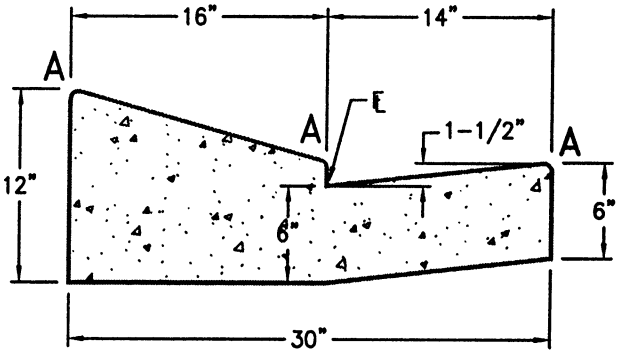
* FLOWABLE - SHALL NOT EXTEND ABOVE THE APPLICABLE PAVEMENT THICKNESS SHOWN ABOVE

CITY OF COLORADO SPRINGS	
Pavement Replacement Detail Flowable Fill	
approved by: Shay R. Haynes	City Engineer
Drawn BY: JZ	DATE 01/93 STD. D-58



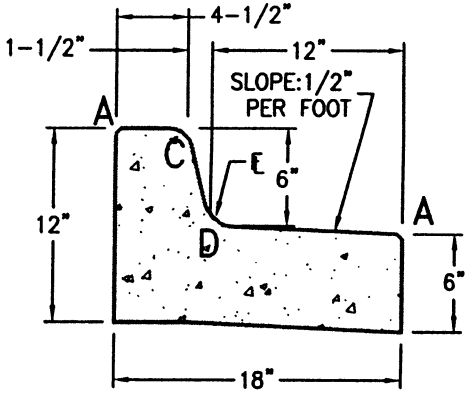
TYPE 1

VERTICAL
CURB AND GUTTER
SCALE: 1" = 1'-0"



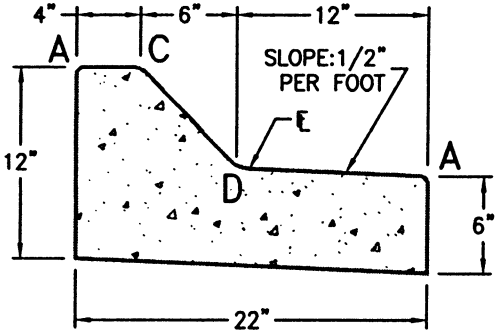
TYPE 2

RAMP
CURB AND GUTTER
SCALE: 1" = 1'-0"



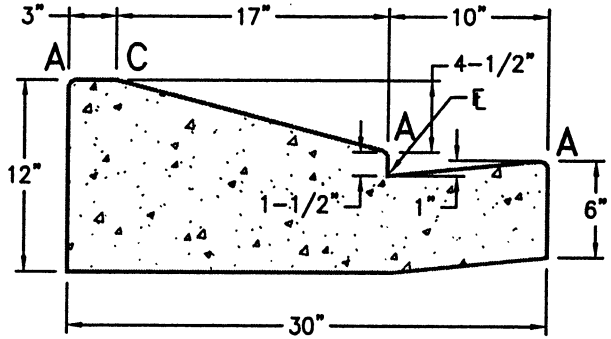
TYPE 3

STANDARD MEDIAN
CURB AND GUTTER
SCALE: 1" = 1'-0"



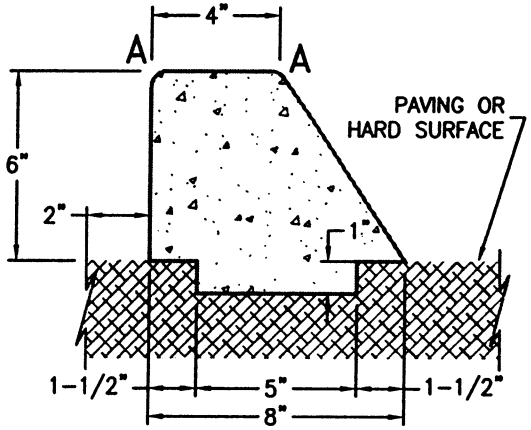
TYPE 4

MOUNTABLE MEDIAN
CURB AND GUTTER
SCALE: 1" = 1'-0"



TYPE 5

MODIFIED TYPE 2
CURB AND GUTTER
SCALE: 1" = 1'-0"



TYPE 6

ALTERNATE MOUNTABLE MEDIAN
CURB AND GUTTER
SCALE: 1" = 0'-6"

LENGTH FOR RADII
A = 1/2"
C = 1-1/2"
D = 1-1/2" TO 2"

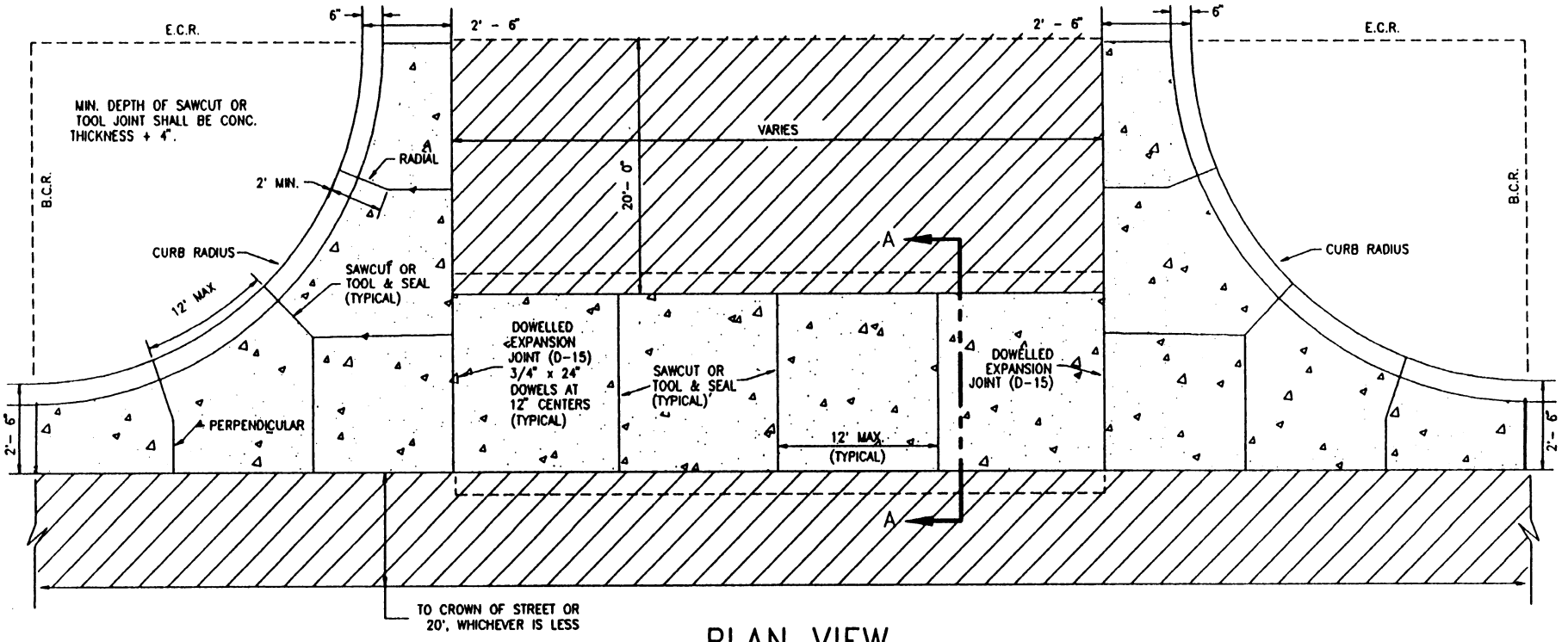
NOTES FOR TYPE 6 CURB:

1. 4000 P.S.I. concrete mix design shall be modified to include 0.5 bags of fiber mesh per cubic foot.
2. 1" deep tool joints shall be installed at 6' (six foot) spacing.
3. Type 6 median curb will only be allowed where street section falls away from curb, "spill" condition.

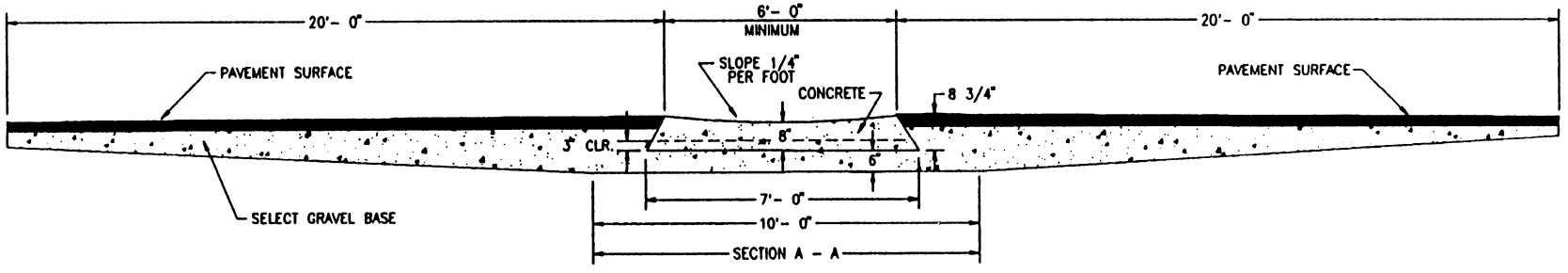
Standard Curb & Gutter
Type 1, 2, 3, 4, 5 & 6

Approved By: Gary K. Hoyt, City Engineer

Drawn By: J. Niño | Date: Aug.,00 | STD. D-6



PLAN VIEW



SECTION A-A

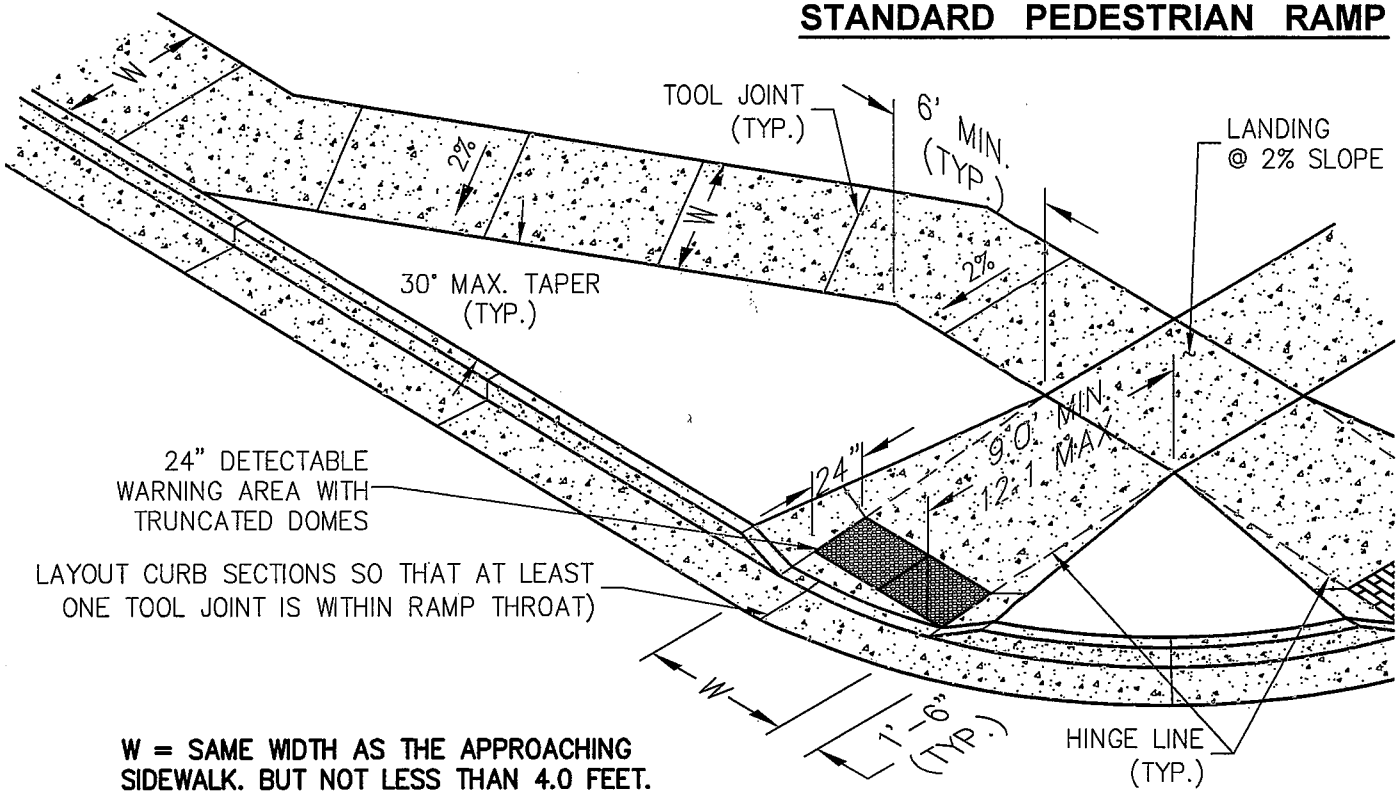
NO SCALE

NOTES

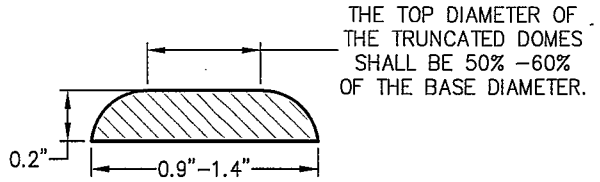
1. SQUARED-OFF RETURN TO BE POURED MONOLITHIC 8" P.C.C. MINIMUM WITH 6x6 – 4,4 W.W.F. OR #4 @ 18" E.W.
2. ▨ = 3" MINIMUM ASPHALT DEPTH (2 LIFTS).

CITY OF COLORADO SPRINGS	
Cross Pan	
approved by: Larry R. Haynes	City Engineer
Drawn BY: JZ	DATE: 03/93 STD. D-7

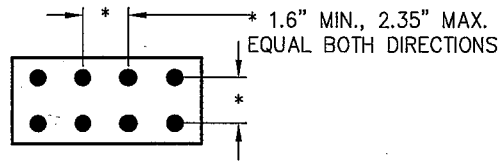
STANDARD PEDESTRIAN RAMP



W = SAME WIDTH AS THE APPROACHING SIDEWALK. BUT NOT LESS THAN 4.0 FEET.

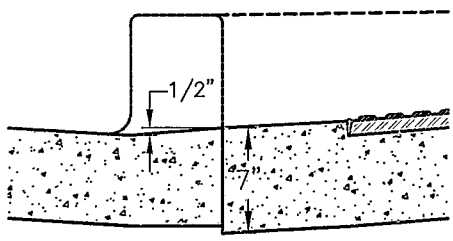


ELEVATION VIEW



DOME SPACING

TRUNCATED DOME DETAILS



FLOWLINE TO RAMP RISE

GENERAL NOTES

1. All work shall be done in accordance with current City of Colorado Springs Engineering Division Standard Specifications.
2. Contractor to obtain required Concrete Permits prior to construction.
3. Contractor to notify Engineering Division Inspection Office at least 24 hours prior to placement of any concrete.
4. Pedestrian ramps with 24" detectable warning area shall be 4000 psi, plain concrete, with a coarse broom finish perpendicular to direction of travel.
5. Contractor shall stamp their company name and construction date within the pedestrian ramp area.
6. Ramp location and length may require modification to maintain the 12:1 maximum running slope due to intersection street grades and/or alignment.
7. Where the 1'–6" flared side(s) of a perpendicular curb ramp is (are) contiguous with a pedestrian or hard surface area, the flare width shall be increased to 8' minimum and the maximum flare slope shall not exceed 10:1.
8. Pedestrian walkway and/or location of existing or future pedestrian ramps on opposite corners shall be reviewed before constructing new ramps. New ramps shall align with existing ramps and pedestrian walkway.
9. At marked pedestrian crossings, the bottom of the ramps, exclusive of the flare sides, shall be totally contained within the markings.
10. Detectable warning area shall be prefabricated reddish integrally colored truncated–dome surfaced concrete pavers or the pre–cast panels from the City's approved product list.

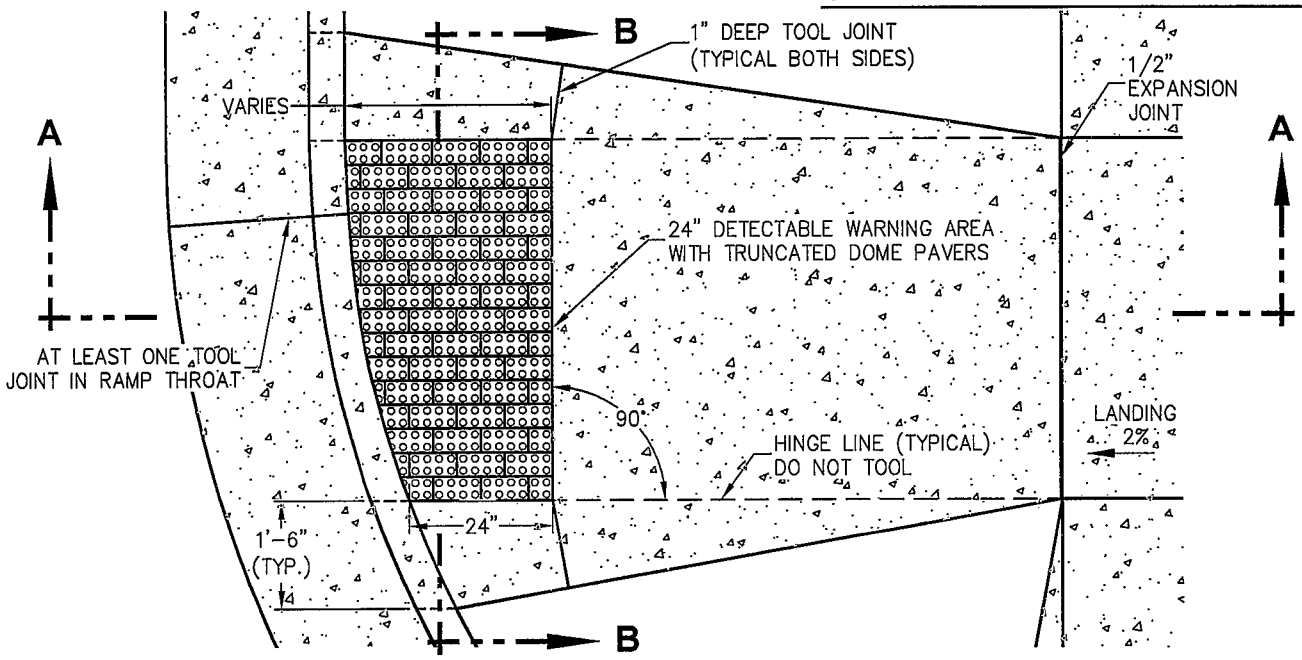
CITY OF COLORADO SPRINGS

PEDESTRIAN RAMP GENERAL DETAILS

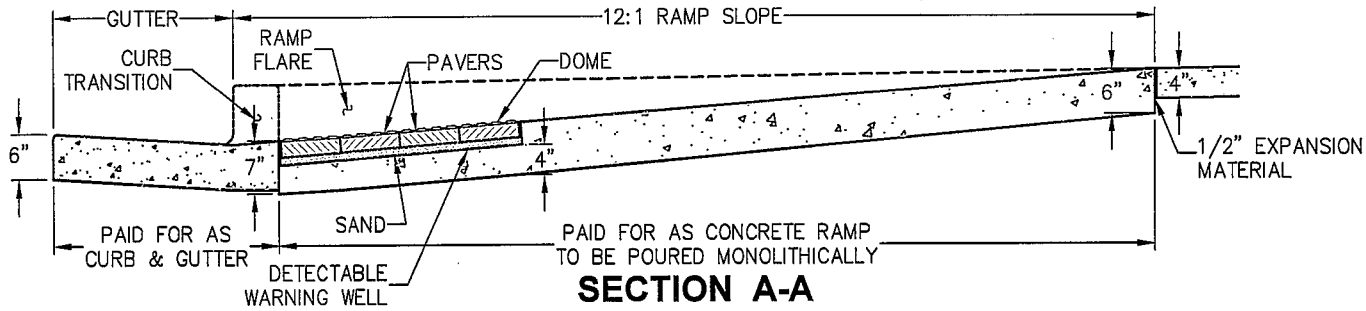
Approved By: Gary R. Hayes City Engineer

Drawn By: J.Nino Date: Jan., 2005 STD. D–8A

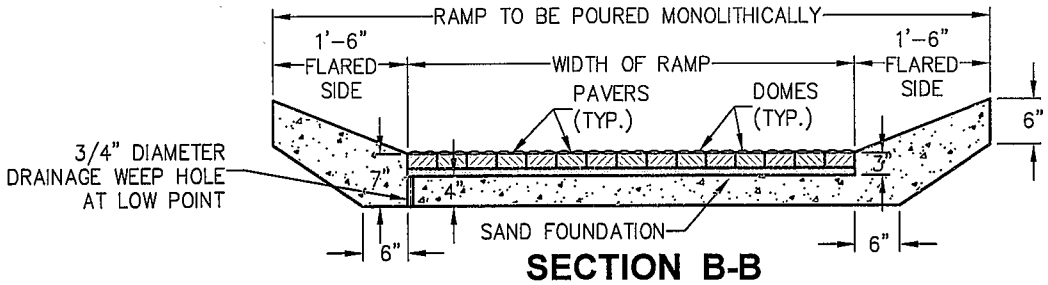
STANDARD PEDESTRIAN RAMP



RAMP WITH DETECTABLE PAVERS



SECTION A-A



SECTION B-B

NOTES

1. Detectable warning pavers shall be prefabricated reddish integrally colored truncated domes surfaced concrete or masonry pavers. Pavers shall meet the requirements of ASTM C 902 or ASTM C 936 and comply with ADA requirements.
2. Prior to start of work, Contractor shall submit, to City Engineering for approval, a sample paver and documentation from the manufacturer. Pavers surface shall have a minimum of 70% light reflectivity contrast with the adjoining surface.
3. Well for pavers shall be accurately blocked out to ensure proper depth, alignment, and uniform grade. Only full width pavers shall be used to obtain specified ramp throat width.
4. Pavers shall be placed in the running pattern shown, domes placed in a square grid and aligned in the direction of travel. Pavers shall be installed so that the bases of the truncated domes are at the same elevation as the adjoining ramp surface.
5. Sand for bedding material shall conform to ASTM C 33. Sand to be placed between joints shall conform to ASTM C 144.
6. Bedding sand shall be screed to the appropriate depth ahead of the pavers installation. A plate vibrator shall be used to embed the pavers into the sand. Any pavers that are damaged during transport or installation will be rejected and shall be replaced at the Contractor's expense.
7. When cut pavers are required, cut sections shall not significantly impact overall truncated domes pattern and cut domes shall be beveled at a 45-degree angle to create a smooth transition.
8. Joint spacing shall be in accordance with the manufacturer's recommendations, but shall not be more than 1/8". Joints shall be filled completely with joint sand. Excess sand shall be removed by sweeping.

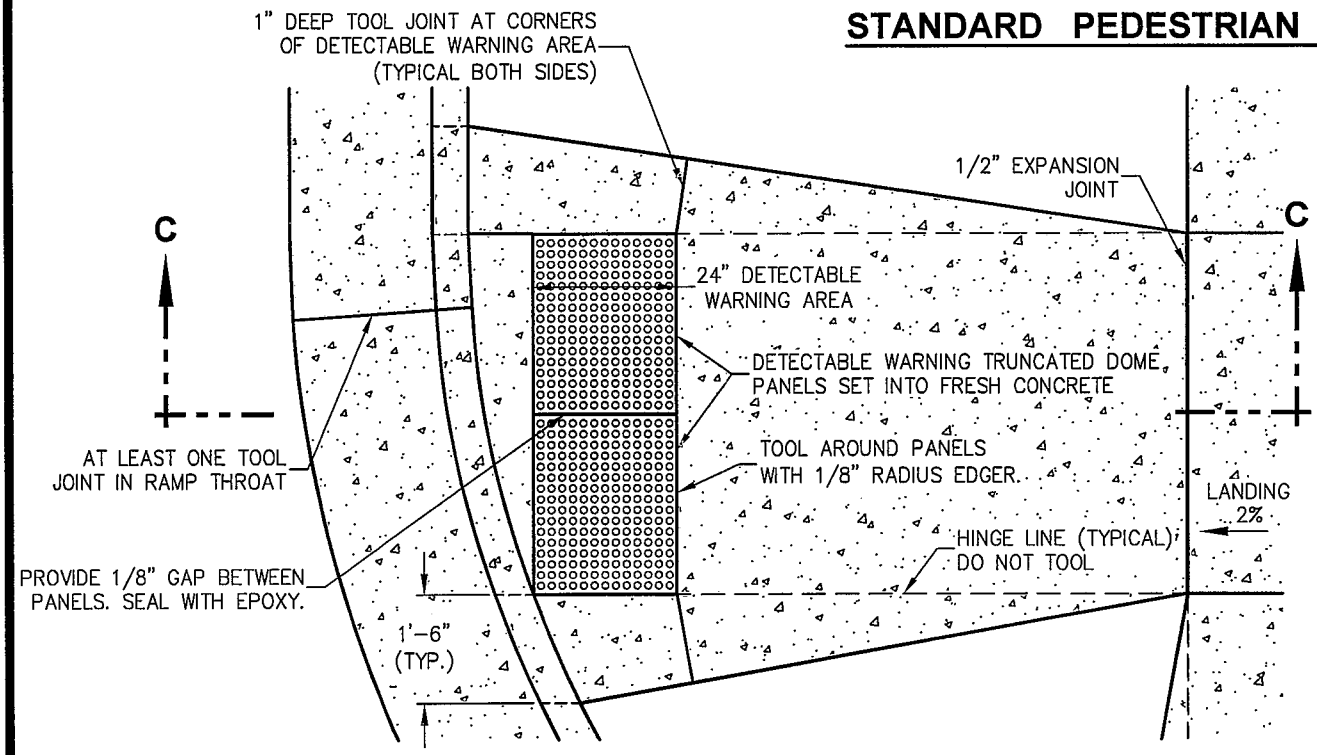
CITY OF COLORADO SPRINGS

PEDESTRIAN RAMP DETAILS FOR DETECTABLE PAVERS

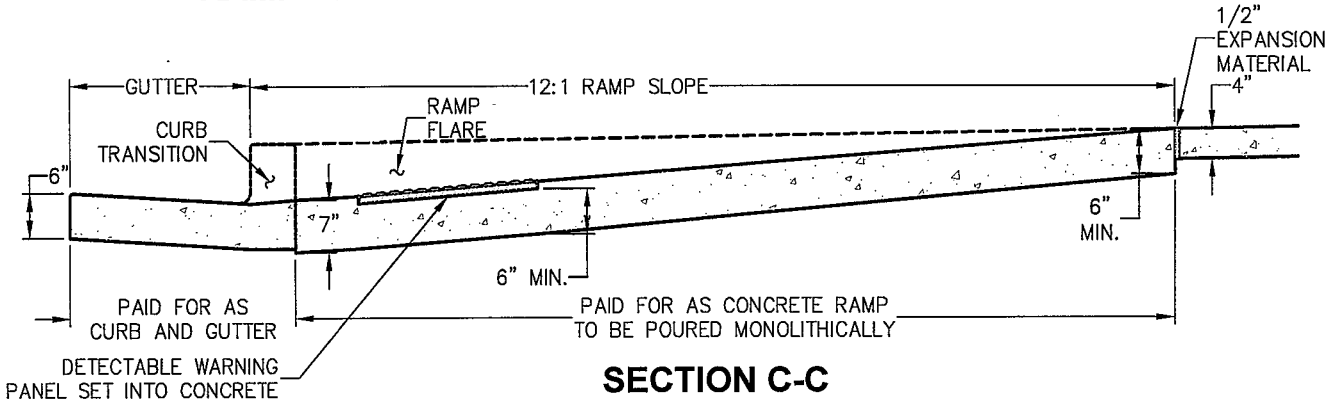
Approved By: _____ City Engineer

Drawn By: J.Niño Date: Jan., 2005 STD. D-88

STANDARD PEDESTRIAN RAMP



RAMP WITH DETECTABLE WARNING PANELS



SECTION C-C

NOTES

1. Detectable warning panels, 24" x 24" or 24" x 30" in size, shall be prefabricated reddish integrally colored concrete with truncated domes and comply with ADA requirements. Only full panels shall be used to obtain specified ramp throat width, (i.e. two 24" panels for a 4' ramp, two 30" panels for a 5' ramp, etc.)
2. Prior to start of work, Contractor shall submit, to City Engineering for approval, a sample panel and documentation from the manufacturer. Panel surface shall have a minimum of 70% light reflectivity contrast with the adjoining surface.
3. Panels shall be placed as shown, with dome pattern in a square grid and aligned in the direction of travel. A steel template shall be used to ensure proper alignment and uniform grade.
4. Remove the proper amount of concrete within the template for an accurate installation. Once to the proper depth, float the area to receive the panels until a smooth paste has developed.
5. Wet the back side of each panel and trowel some concrete paste over the wet surface for better adherence.
6. Set the first panel on the freshly prepared surface. Do not press down hard on the panel, but preferably twist from side to side. Set panel with rubber mallet to proper depth so that the base of the truncated dome is at the same elevation as the adjoining ramp surface.
7. Set successive panels with a tight butt joint against the previously set panel. Provide a 1/8" gap between panels.
8. Float fresh concrete around panels. Finish and broom surrounding concrete as specified. Clean any concrete off panels with a sponge.
9. Provide 1"deep tool joints at corners of detectable warning area, and tool around panels with 1/8" radius edger.
10. When cut panels are required, cut sections shall not significantly impact overall truncated domes pattern and cut domes shall be beveled at a 45-degree angle to create a smooth transition.
11. Any panels that are damaged during transport or installation will be rejected and shall not be installed.
12. Clean out 1/8" joint(s) between panels and seal with epoxy.

CITY OF COLORADO SPRINGS

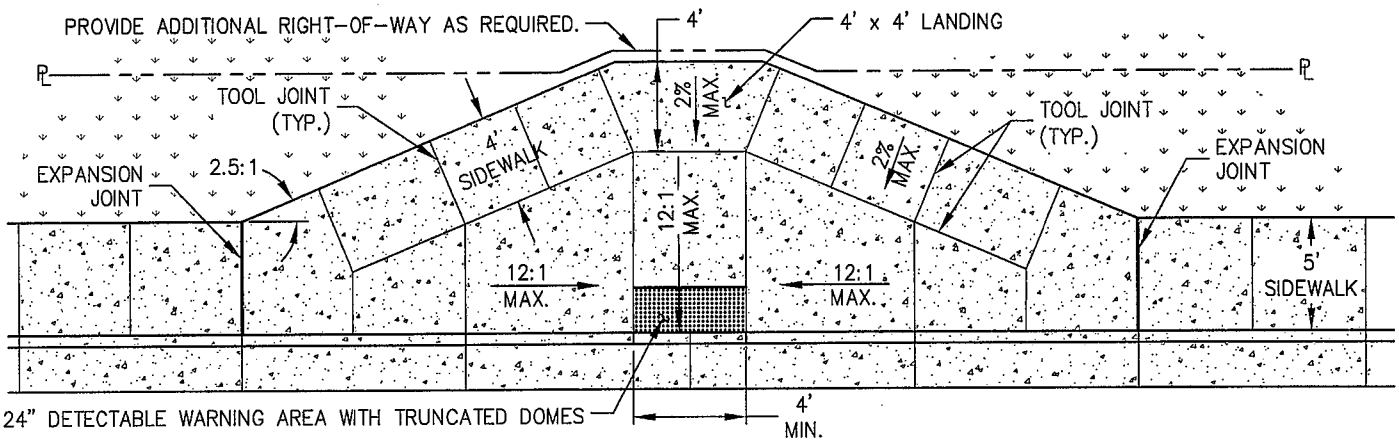
PEDESTRIAN RAMP DETAILS FOR DETECTABLE PANELS

Approved By: Gary R. Reynolds City Engineer

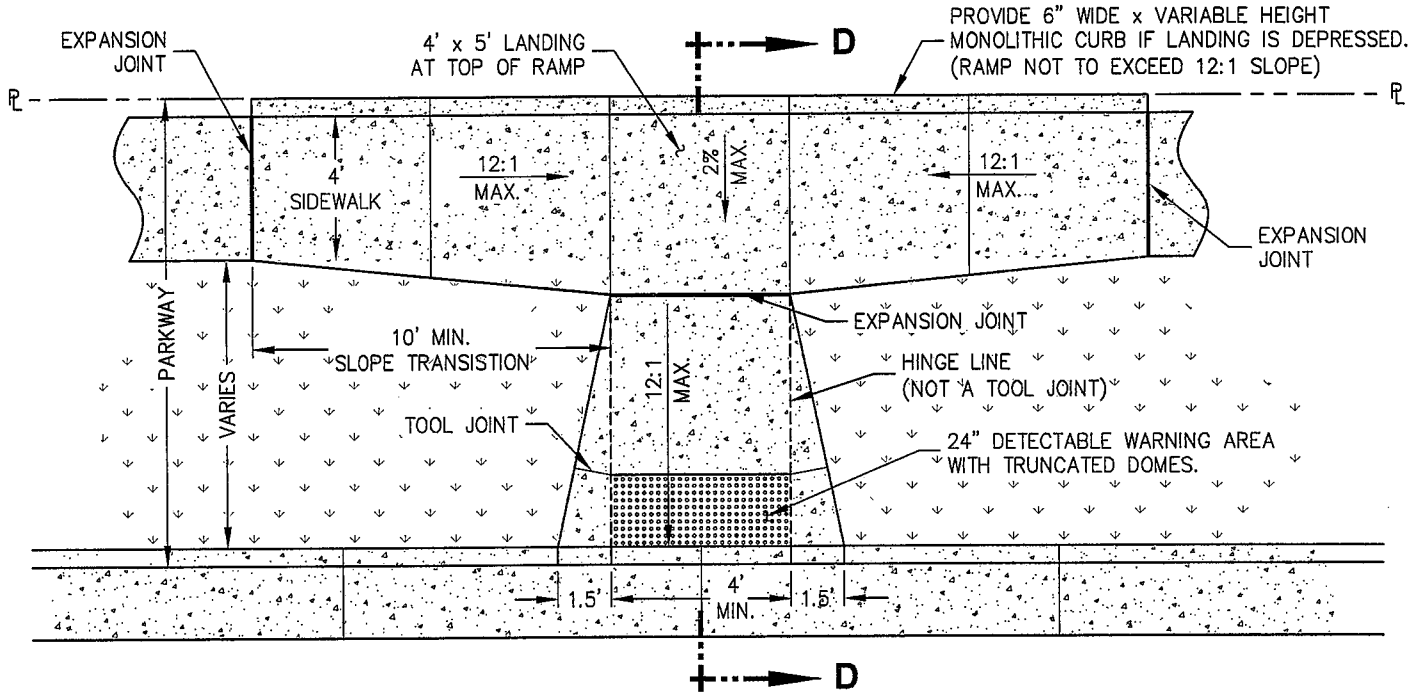
Drawn By: J.Nifo | Date: Jan. 2005 | STD. D-8C

STANDARD PEDESTRIAN RAMP FOR "T" INTERSECTION

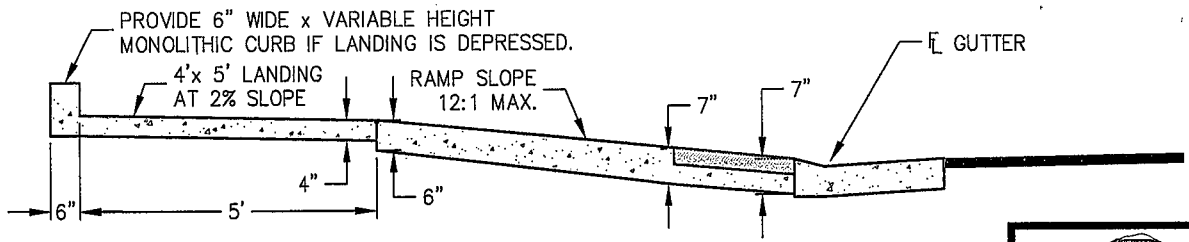
FOR NEW CONSTRUCTION



ATTACHED SIDEWALK



DETACHED SIDEWALK



SECTION D-D

NOTES

1. See General Notes and Standard Ramp Details
2. Ramps shall align with each other across the street.
3. Monolithic curb height at depressed landing shall be equal to the amount the landing is lowered. i.e if landing is lowered 4" the curb height would be 4".
4. If the landing is lowered 2" or less the monolithic curb at the back of walk may be deleted.
5. If no curb is constructed at the back of walk the landing depth may reduced from 5' to 4'.

CITY OF COLORADO SPRINGS

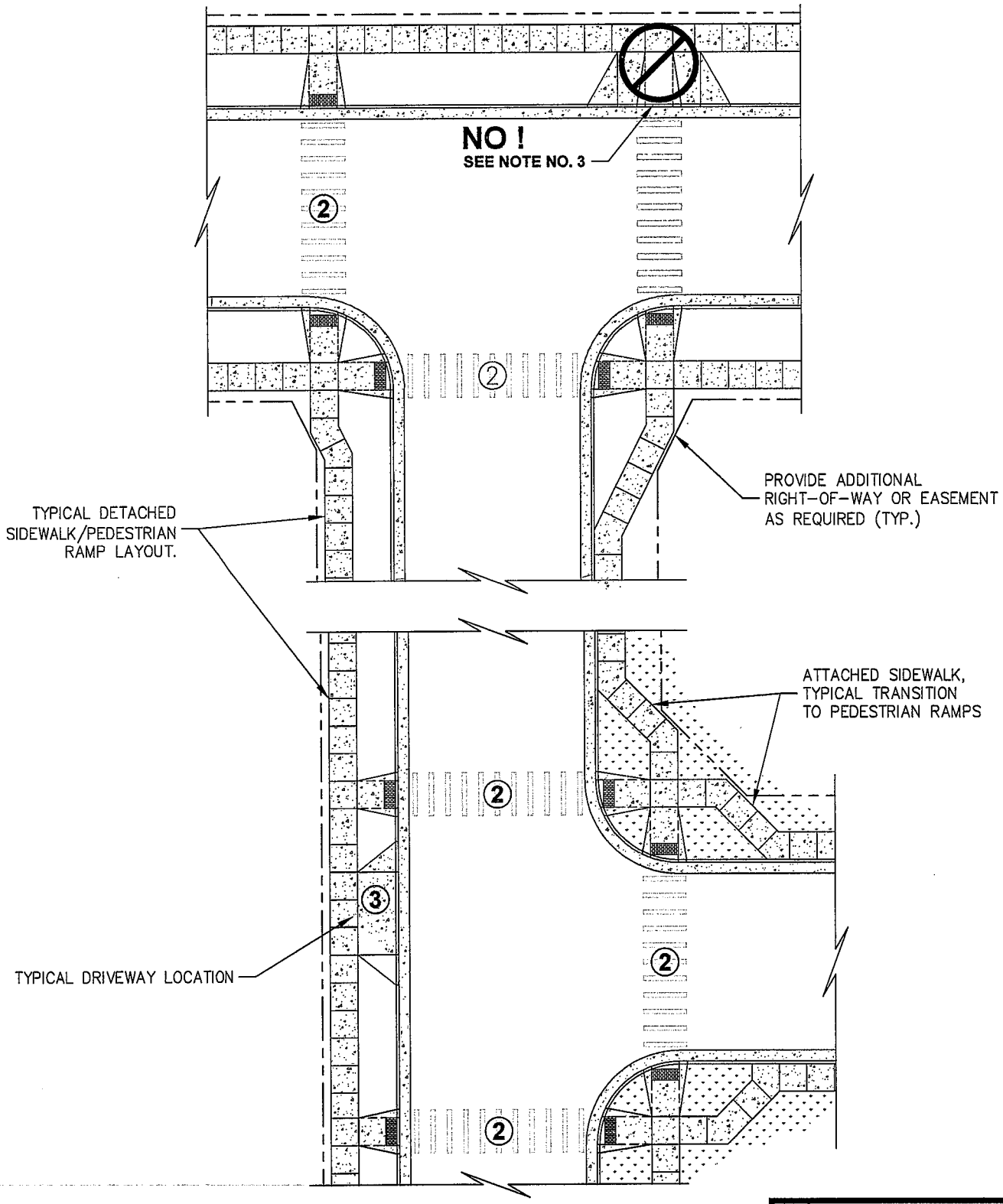
PEDESTRIAN RAMP DETAILS FOR "T" INTERSECTION

Approved By:	City Engineer		
Drawn By: J.Nino	Date: Mar., 2005	STD. D-8D	

C:\Juan\PROJECTS\2005\Ped Ramp Stds\STD D-8D.dwg, 3/15/2005 3:12:06 PM, Proj. Eng.: Jerry Banks, Eng. Tech.: J Nino

TYPICAL RAMP LAYOUT FOR "T" INTERSECTIONS

FOR NEW CONSTRUCTION



NOTES

1. See General Notes and Standard Ramp Details.
2. Ramps shall align with each other across the street.
3. Driveway can not be used as pedestrian ramps. Driveways shall be separated from, and not conflict with pedestrian ramps across the street.

CITY OF COLORADO SPRINGS

PEDESTRIAN RAMP LAYOUT FOR "T" INTERSECTIONS

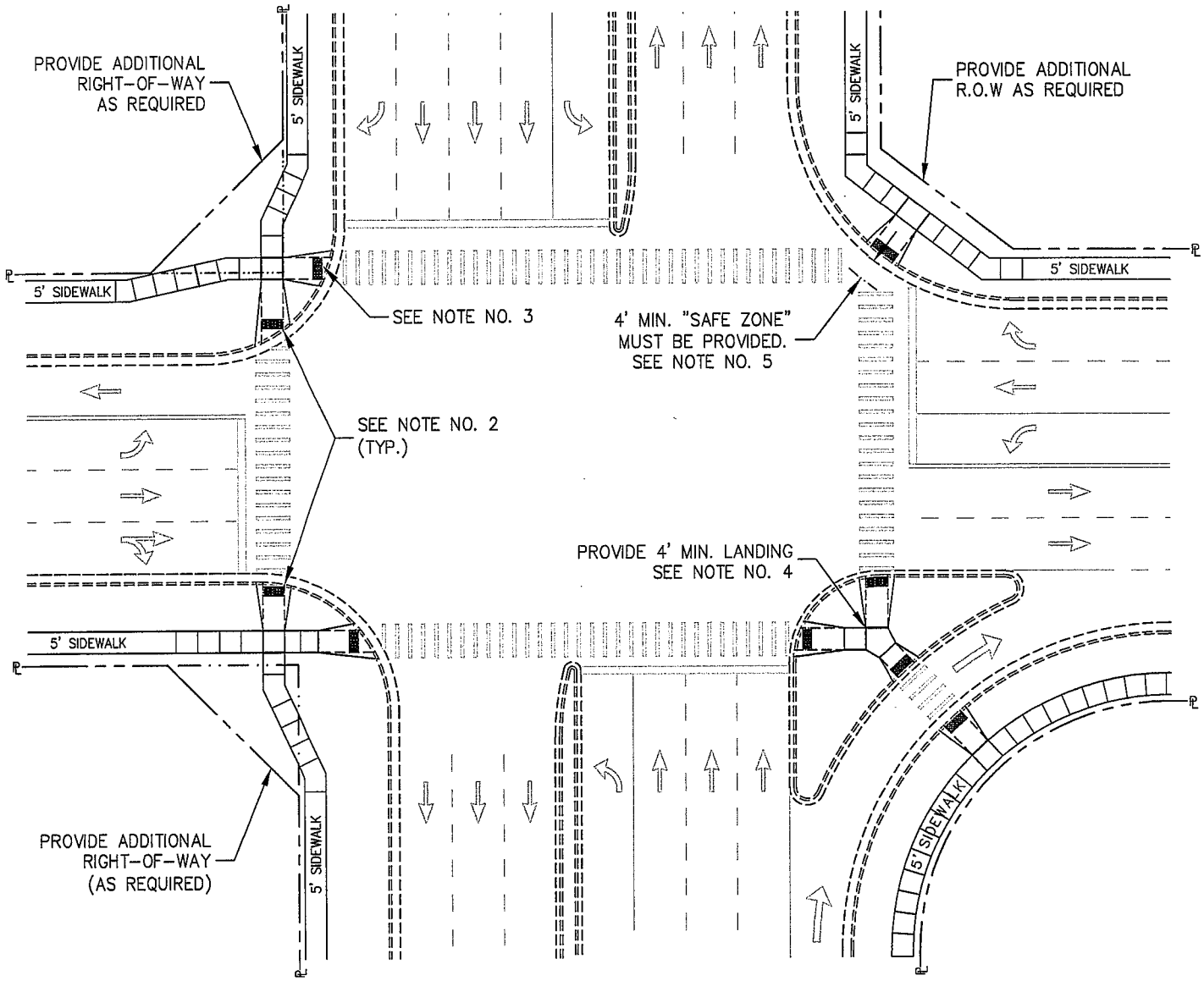
Approved By: _____ City Engineer

Drawn By: J.Niño | Date: Mar., 2005 | STD. D-8E

C:\Juan\PROJECTS\2005\Ped Ramp Stds\STD D-8E.dwg, 3/15/2005 3:20:15 PM, Proj. Eng.: Jerry Banks, Eng. Tech.: J Nino

TYPICAL RAMP LAYOUT AT A MAJOR INTERSECTION WITH A DECELERATION LANE OR RIGHT TURN ISLAND

FOR NEW CONSTRUCTION



NOTES

1. See General Notes and Standard Ramp Details.
2. Ramps shall align with each other across street. Ramp locations shown may need to be modified to maintain a perpendicular crossing.
3. The entire ramp throat must be contained within the marked crossings.
4. Ramps with a minimum 4' landing or a curbed cut-through shall be provided at islands and medians (See Standard Specifications "D-8G").
5. If approved for a specific intersection a radial ramp may be used if it provides the best crosswalk location/alignment, and 4' minimum "Safe Zone". The Safe Zone shall be beyond the lip of the gutter within the marked crossings and outside the through traffic lanes.

CITY OF COLORADO SPRINGS

PEDESTRIAN RAMP DETAILS FOR MAJOR INTERSECTIONS

Approved By:	City Engineer		
Drawn By: J.Nino	Date: Mar., 2005	STD. D-8F	

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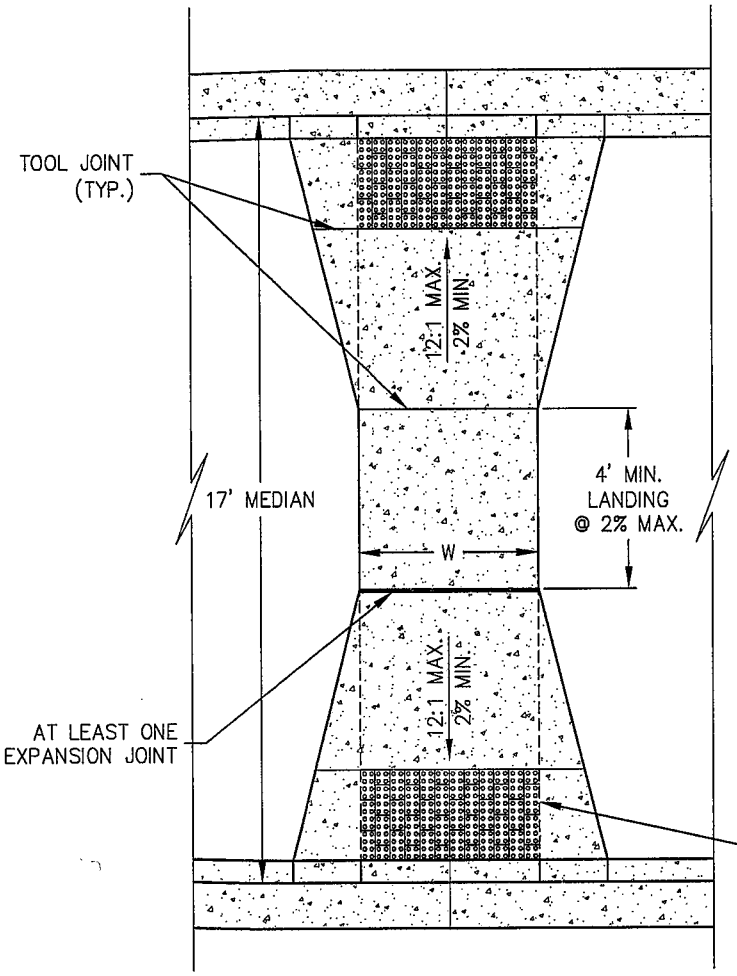
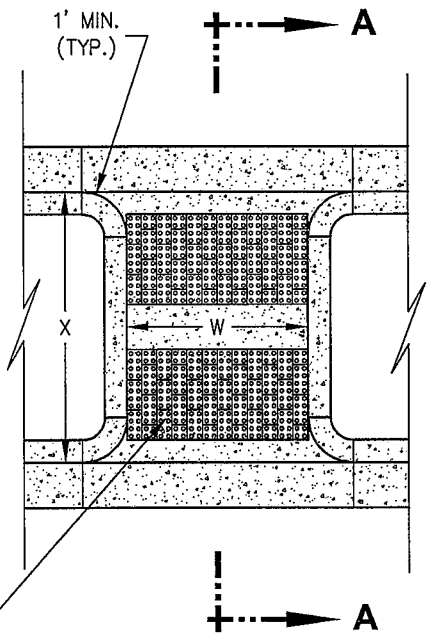
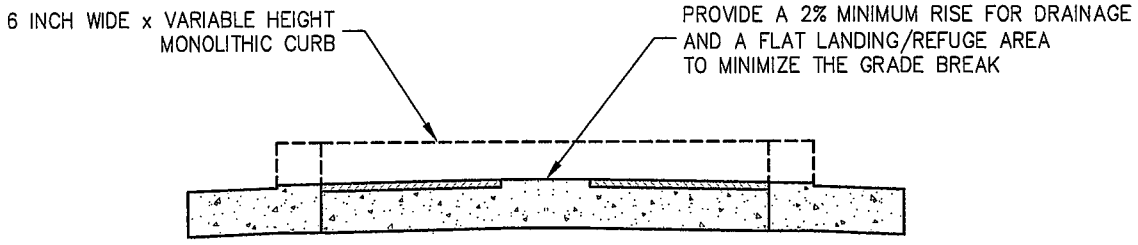
PEDESTRIAN CROSSING FOR MEDIANS & ISLANDS



PEDESTRIAN CROSSING WITH CURB RAMPS



PEDESTRIAN CROSSING WITH CUT THROUGH & CURBS



SECTION A - A

NOTES

1. See General Notes and Standard Ramp Details.
2. Median pedestrian crossing/refuge area shall be in line with crosswalk and ramps at the outside curbs.
3. "W" shall be equal to the width of the ramps at the outside curb, but not less than 4 feet.
4. No storm water shall drain through pedestrian crossing.

CITY OF COLORADO SPRINGS

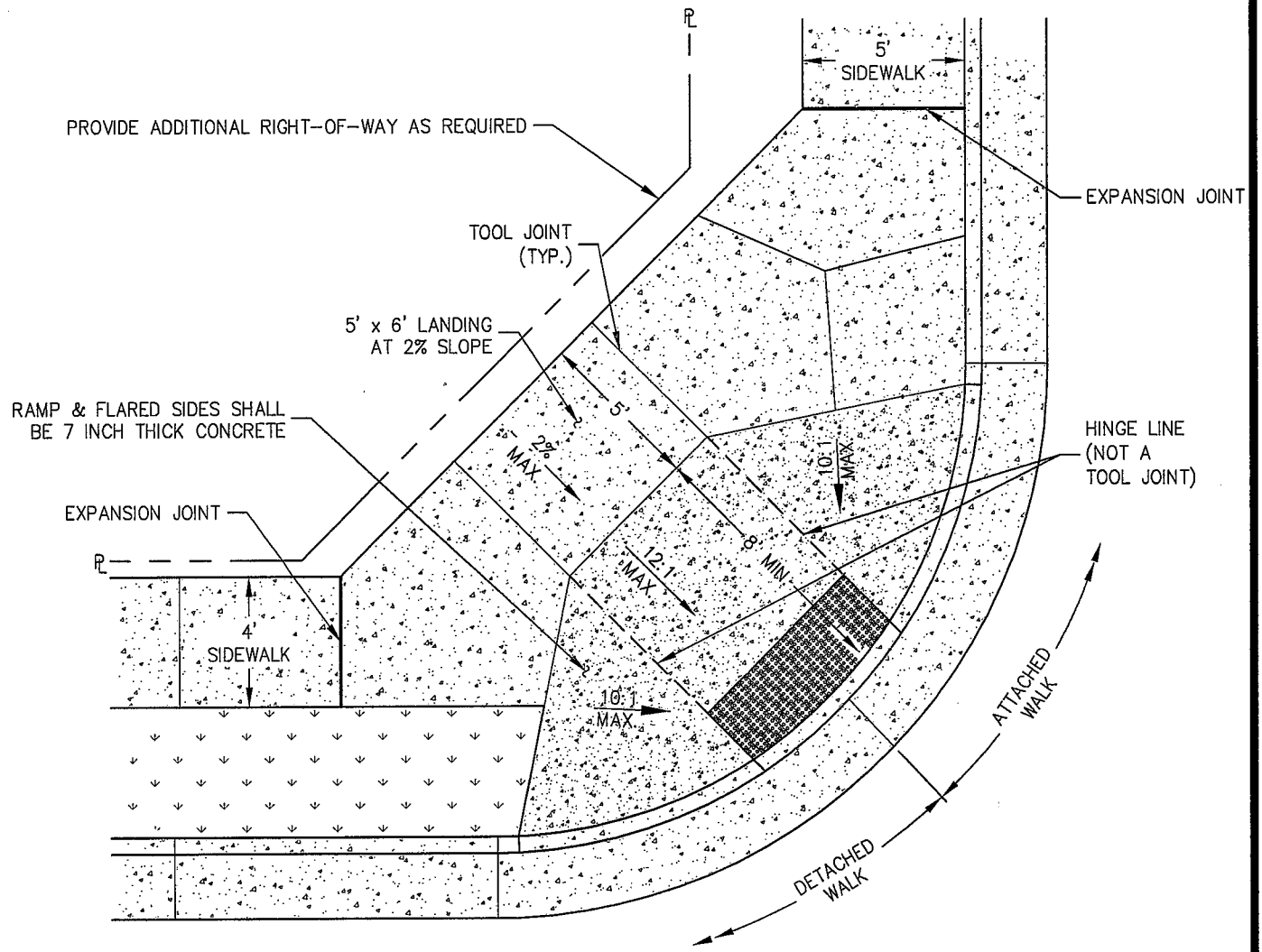
PEDESTRIAN CROSSING DETAILS FOR MEDIANS & ISLANDS

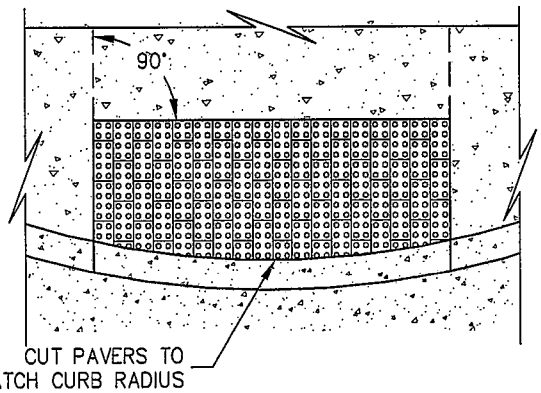
Approved By: _____ City Engineer

Drawn By: J.Niño | Date: Mar., 2005 | STD. D-8G

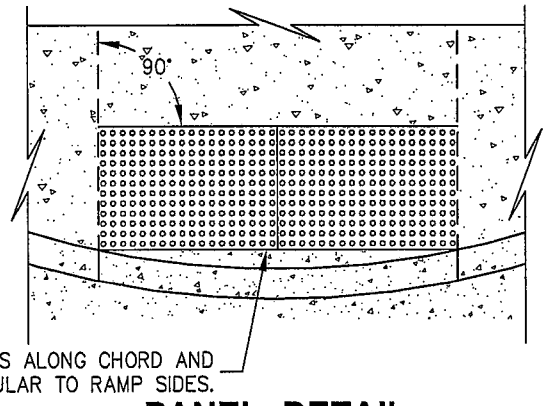
ALTERNATE RADIAL PEDESTRIAN RAMP

FOR RETROFIT APPLICATIONS





PAVER DETAIL



PANEL DETAIL

NOTES

1. See General Notes and Standard Ramp Details.
2. Ramps shall align with each other across the street.
3. For retrofit applications only.
4. Not for new construction.

CITY OF COLORADO SPRINGS

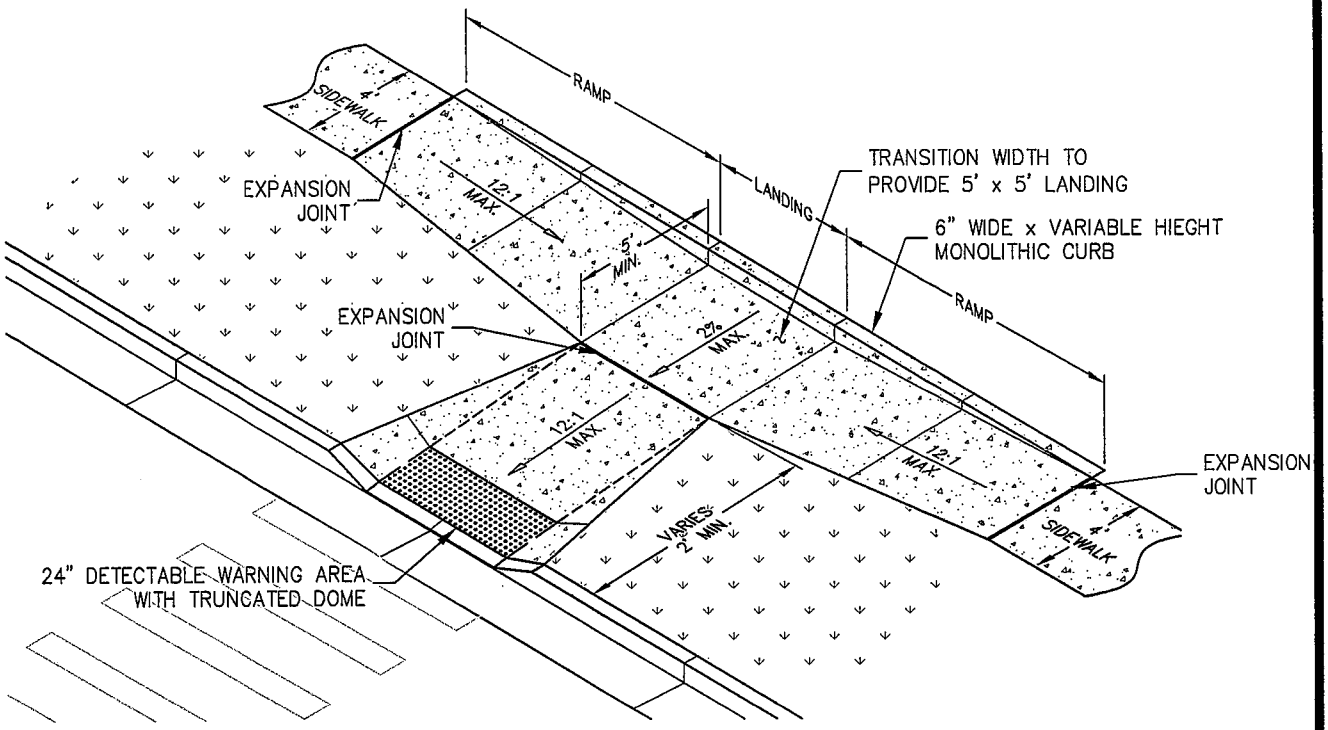
ALTERNATE RADIAL PEDESTRIAN RAMP DETAILS

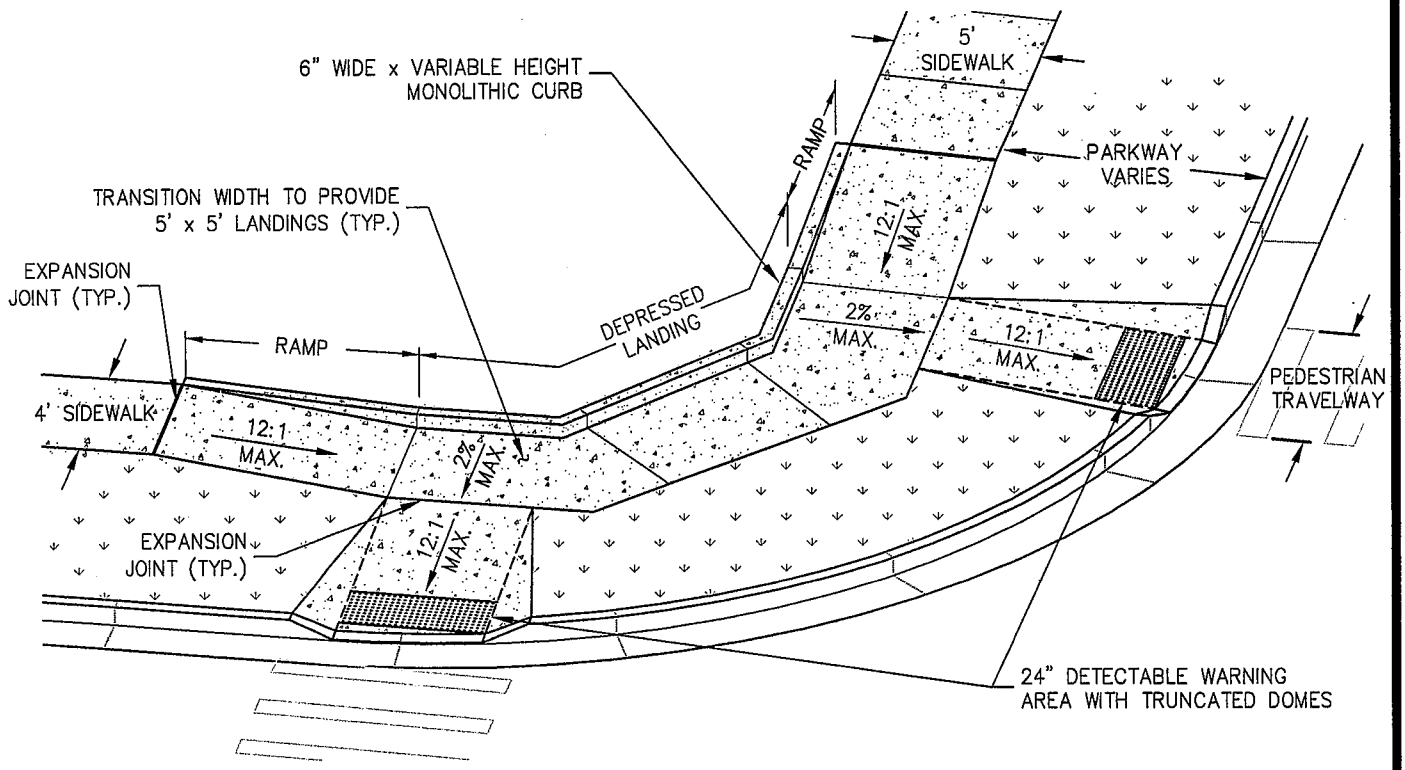
Approved By: _____ City Engineer

Drawn By: J.Niño	Date: Mar., 2005	STD. D-8H

ALTERNATE COMBINATION PEDESTRIAN RAMPS

FOR RETROFIT APPLICATIONS





NOTES

1. See General Notes and Standard Ramp Details.
2. Ramps shall align with each other across the street.
3. For retrofit applications only, where parkway width is too narrow to provide standard ramp length.
4. Not for new construction.
5. Design shall provide positive drainage of depressed landing.

CITY OF COLORADO SPRINGS

ALTERNATE COMBINATION PEDESTRIAN RAMP DETAILS

Approved By:	City Engineer	
Drawn By: J.Nino	Date: Mar., 2005	STD. D-81

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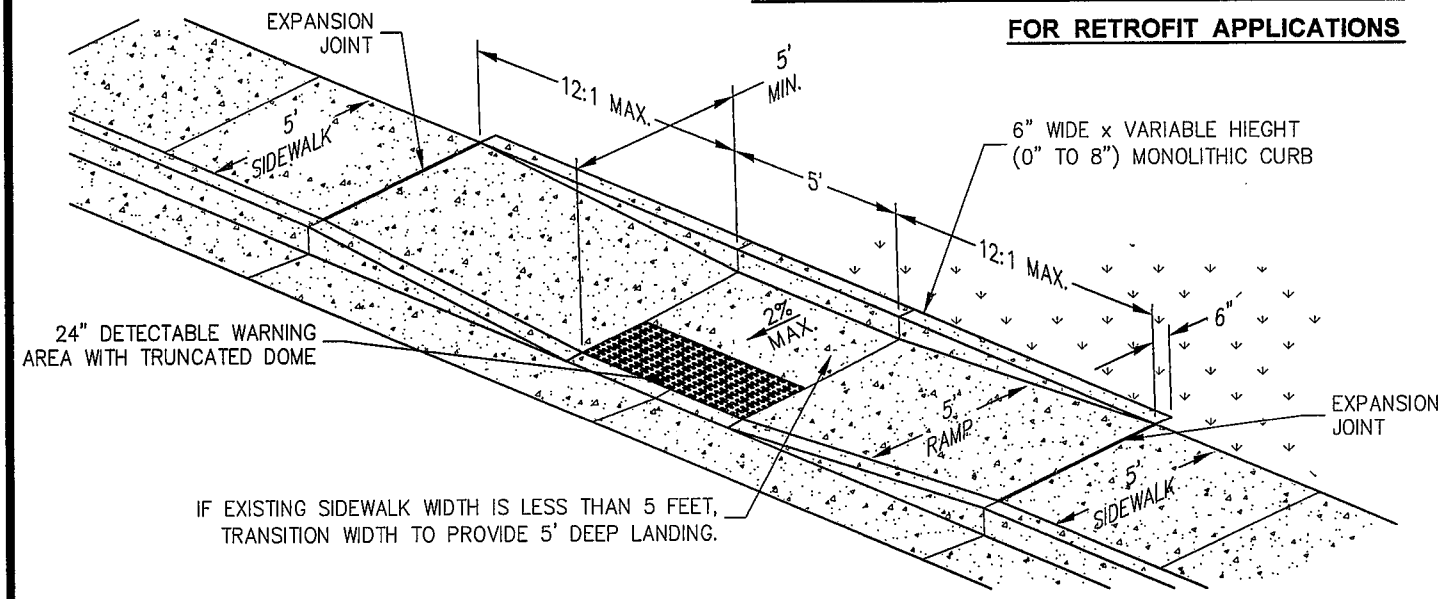
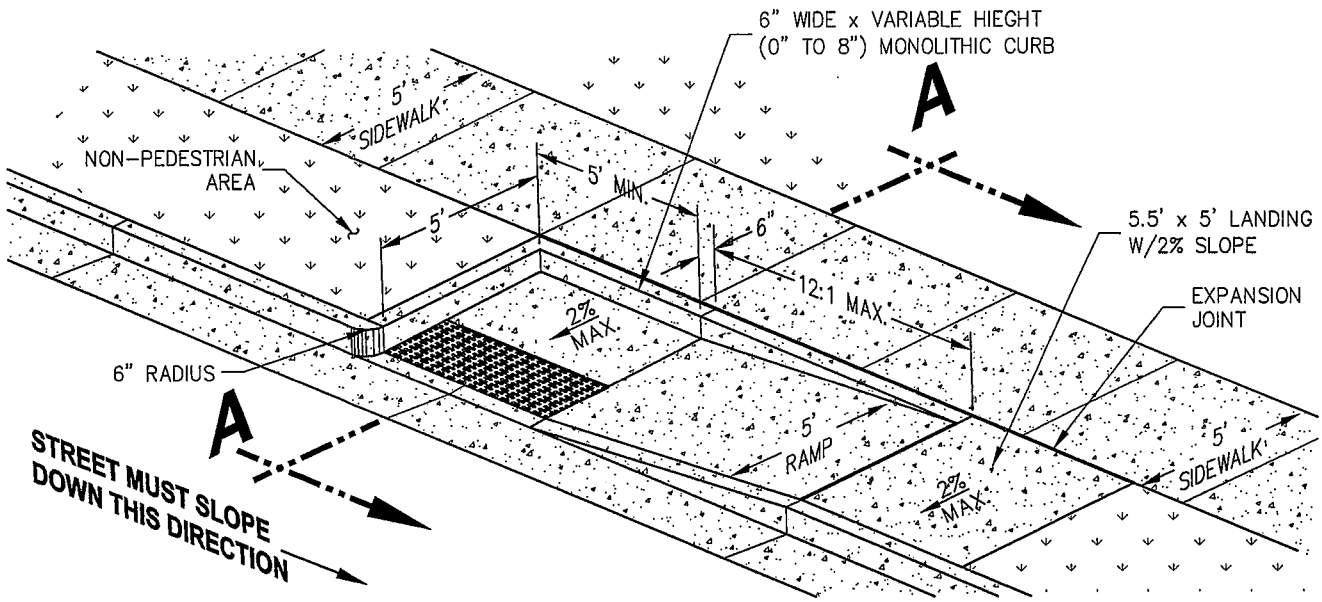
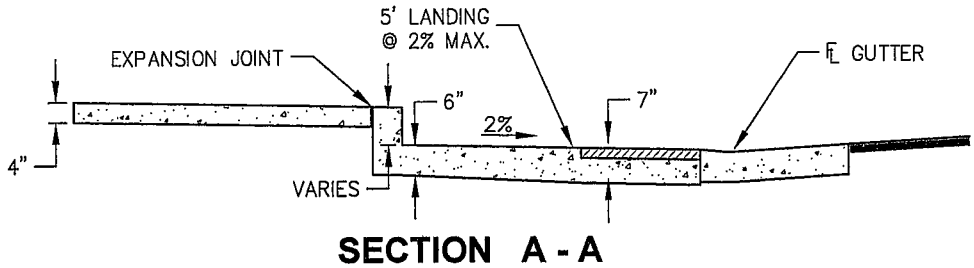
ALTERNATE PARALLEL RAMPS FOR MID-BLOCK OR "T" INTERSECTION

FOR RETROFIT APPLICATIONS







SECTION A - A

NOTES

1. See General Notes and Standard Ramp Details.
2. Ramp shall align with the ramp across the street.
3. For retrofit applications only, where combined ramps can not be constructed due to limited Right-of-Way, existing buildings, etc.
4. A single ramp may only be used if drainage is not a concern and the opposite side of the landing is protected by a non-pedestrian area (i.e. landscaping, tree well, etc.). Ramp drop-offs may also need to be protected with a railing or barrier.
5. Not for new construction.

CITY OF COLORADO SPRINGS

ALTERNATE PARALLEL PEDESTRIAN RAMP DETAILS MID-BLOCK OR "T" INTERSECTION

Approved By: _____ City Engineer

Drawn By: J.Niño	Date: Mar., 2005	STD. D-8J

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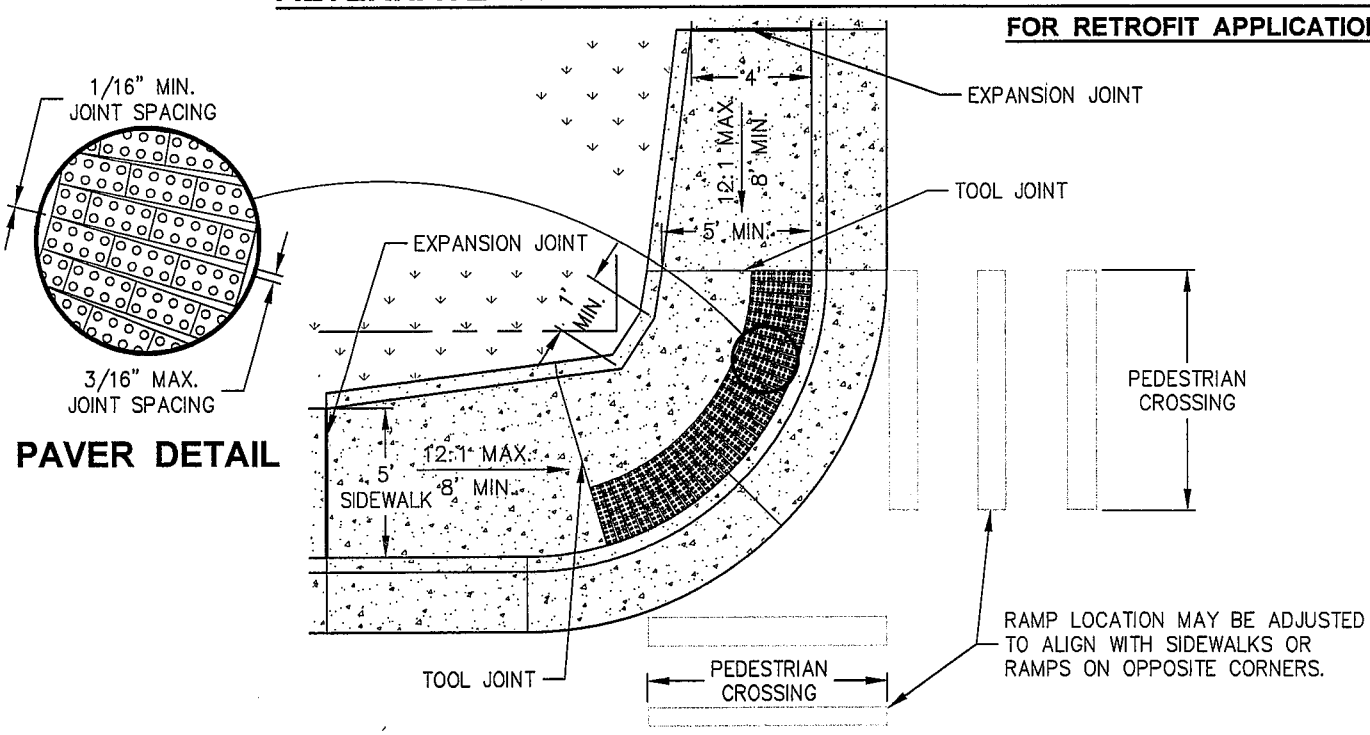
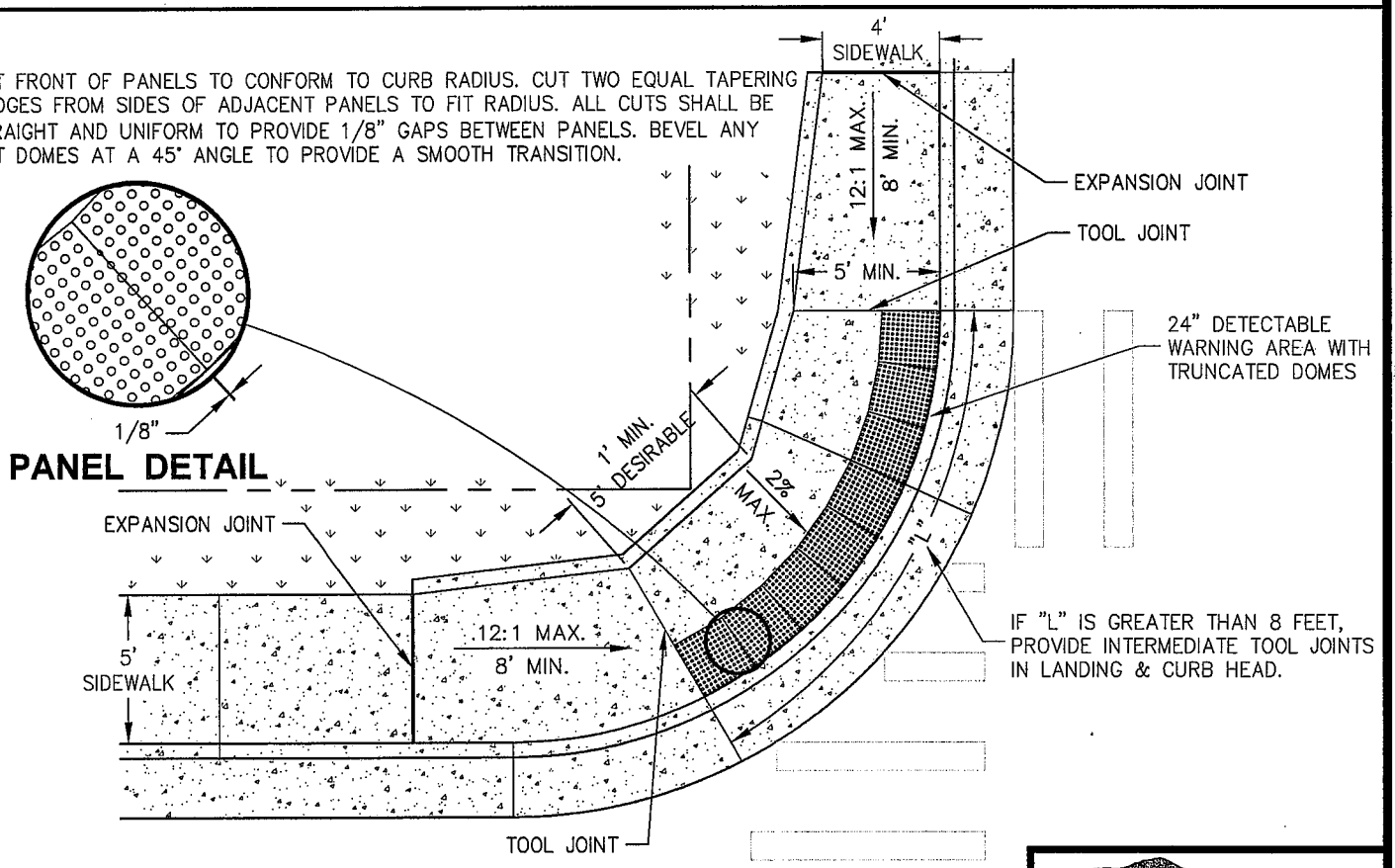
ALTERNATE PARALLEL PEDESTRIAN RAMP FOR CORNERS

FOR RETROFIT APPLICATIONS



RAMPS WITH DETECTABLE PAVERS

CUT FRONT OF PANELS TO CONFORM TO CURB RADIUS. CUT TWO EQUAL TAPERING WEDGES FROM SIDES OF ADJACENT PANELS TO FIT RADIUS. ALL CUTS SHALL BE STRAIGHT AND UNIFORM TO PROVIDE 1/8" GAPS BETWEEN PANELS. BEVEL ANY CUT DOMES AT A 45° ANGLE TO PROVIDE A SMOOTH TRANSITION.



RAMPS WITH DETECTABLE PANELS

NOTES

1. See General Notes and Standard Ramp Details.
2. Ramp shall align with the ramps across the street.
3. For retrofit applications only, where combined ramps can not be constructed due to limited Right-of-Way, existing buildings, etc.
4. Not for new construction.

CITY OF COLORADO SPRINGS

ALTERNATE PARALLEL PEDESTRIAN RAMP DETAILS FOR CORNERS

Approved By: _____ City Engineer

Drawn By: J.Niño | Date: Mar., 2005 | STD. D-8K

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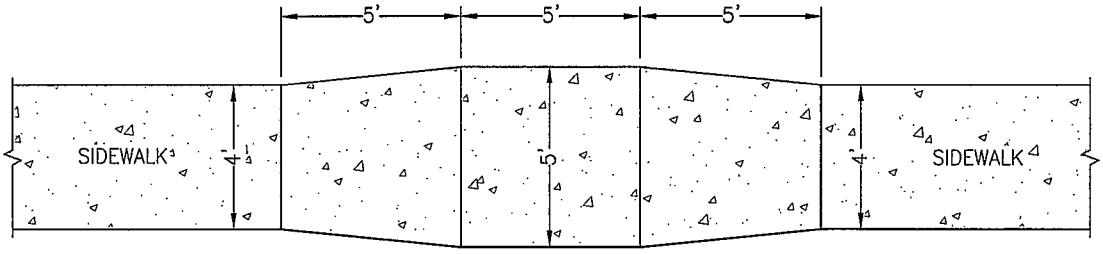
SIDEWALK PASSING SPACE

FOR NEW CONSTRUCTION

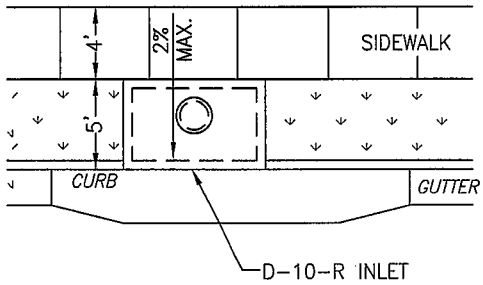


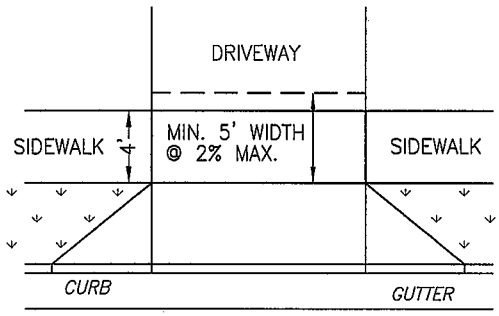
GENERAL NOTES:

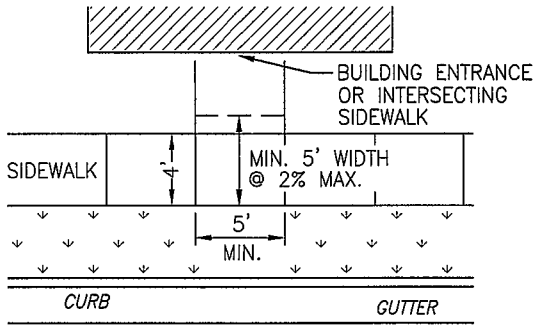
1. Where public sidewalk width is less than 5 feet continuously, passing spaces as shown shall be provided at intervals that do not exceed 200 feet.

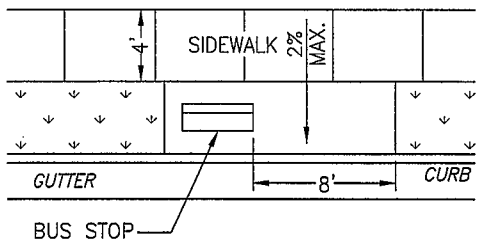
2. Building entrances, other intersecting sidewalks, driveways, bus stops, or other structural surfaces such as storm drainage inlets, utility vaults, etc. which are at the sidewalk grade and do not exceed 2% cross-slope, can provide the required passing spaces.

STANDARD SIDEWALK PASSING SPACE









ALTERNATE PASSING SPACES

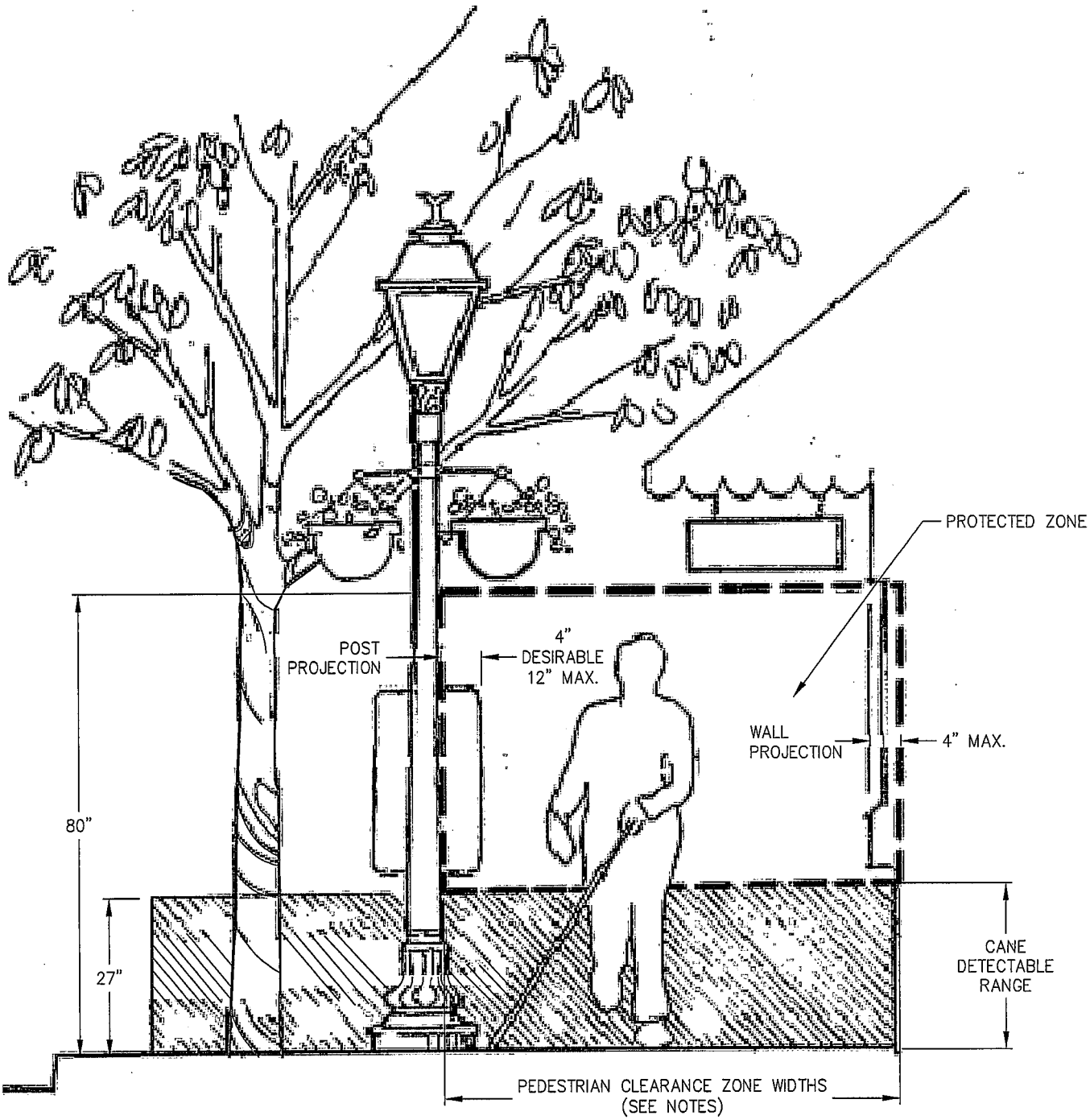
CITY OF COLORADO SPRINGS

SIDEWALK PASSING SPACE

Approved By: _____ City Engineer

Drawn By: J.Niño | Date: Mar., 2005 | STD. D-8L

SIDEWALK PEDESTRIAN CLEARANCE ZONES



Public Right-of-Way Access Advisory Committee Final Report "Building a True Community" January 2001, Figure X02.2C

NOTES

1. Pedestrian clearance zone width for downtown or other business districts is 6' minimum and 8' desirable.
2. Pedestrian clearance zone width for residential areas is 4' minimum.

CITY OF COLORADO SPRINGS

SIDEWALK PEDESTRIAN CLEARANCE ZONES

Approved By: City Engineer

Drawn By: J.Niño | Date: Mar., 2005 | STD. D-8M

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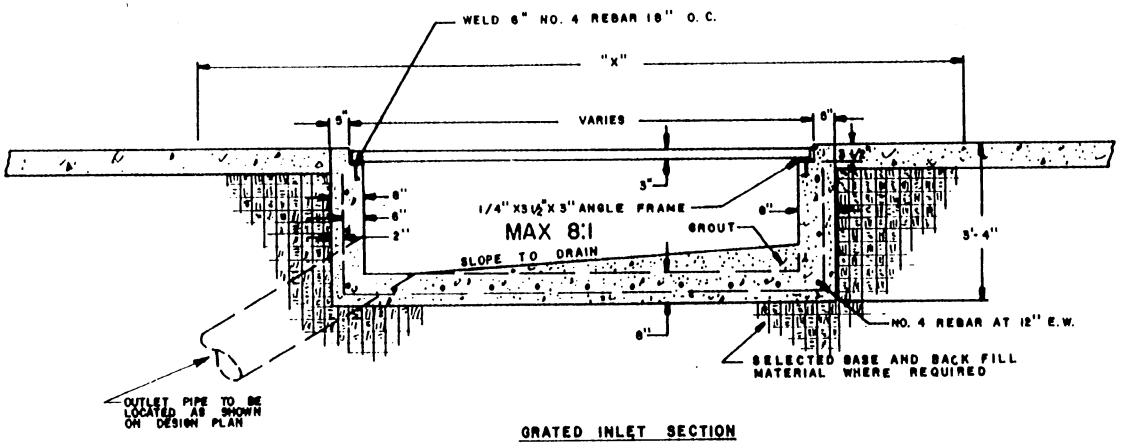
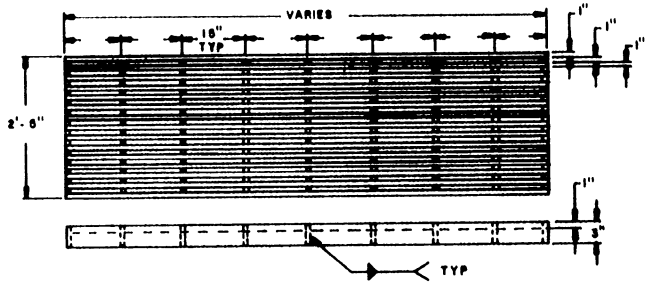
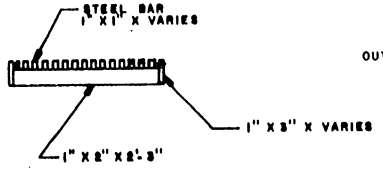


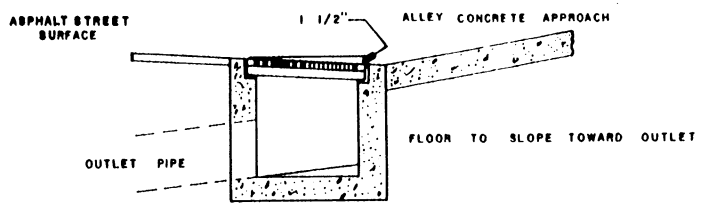
GRATED INLET SECTION

LENGTH TO BE SPECIFIED			
BOX LENGTH	5'- 10 1/2"	8'- 4 1/2"	10'- 10 1/2"
GRATE LENGTH	5'- 0"	7'- 6"	10'- 0"

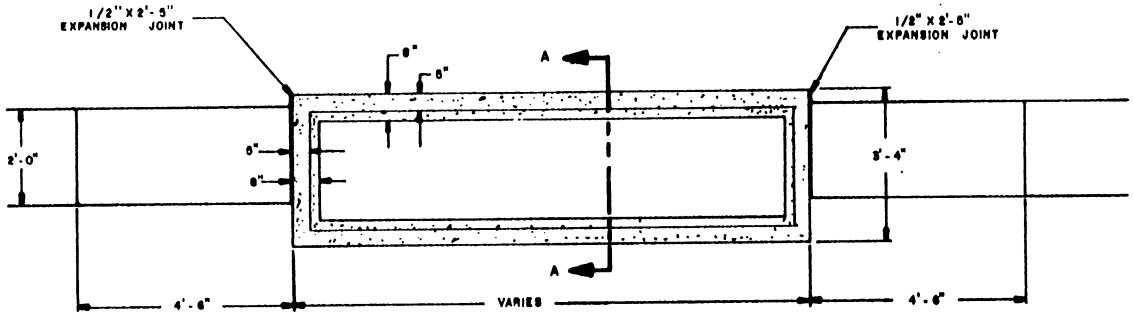


GRATE DETAIL





SECTION A-A

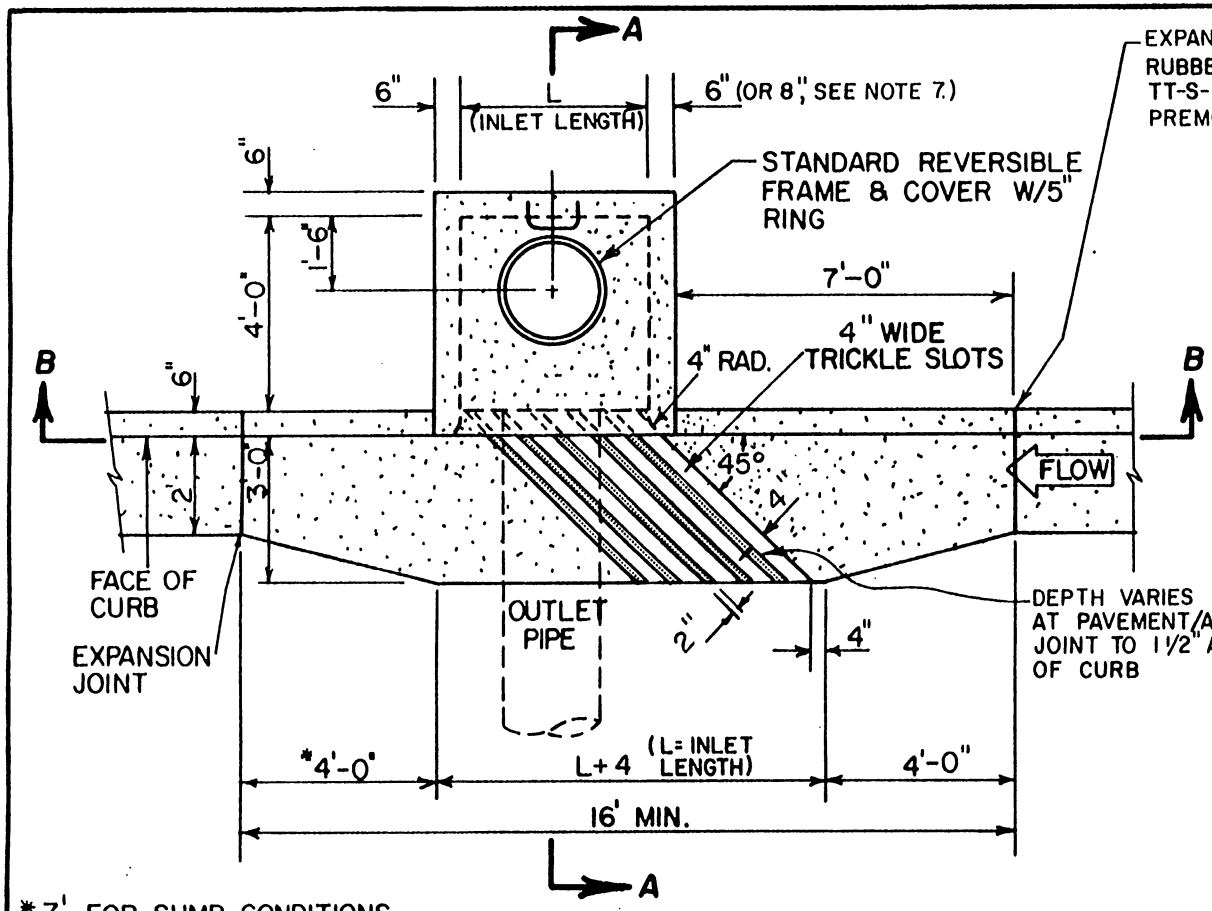


GRATED INLET CATCH BASIN
GRATE NOT SHOWN IN PLACE

NOTES

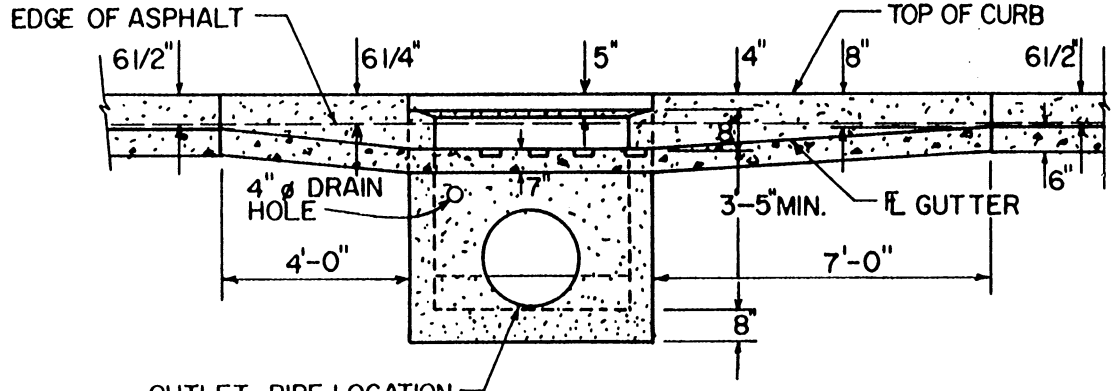
1. GRATES TO BE PAINTED TO COLORADO STATE HIGHWAY DEPTS SPECIFICATIONS FOR PAINTING STRUCTURAL STEEL.
2. "X" EQUALS BOX LENGTH PLUS 9'
3. REFER TO PLANS AND SPECIFICATIONS FOR LOCATION AND DIMENSIONS OF STRUCTURE.
4. OUTLET PIPE SHALL BE CUT OFF EVEN WITH INSIDE WALL.

CITY OF COLORADO SPRINGS			
GRATED INLET			
APPROVED BY CITY ENGINEER			
SCALE NONE	DATE DEC. 19, 1977	DRAWN BY K. CUNHA	DWG NO. D-9

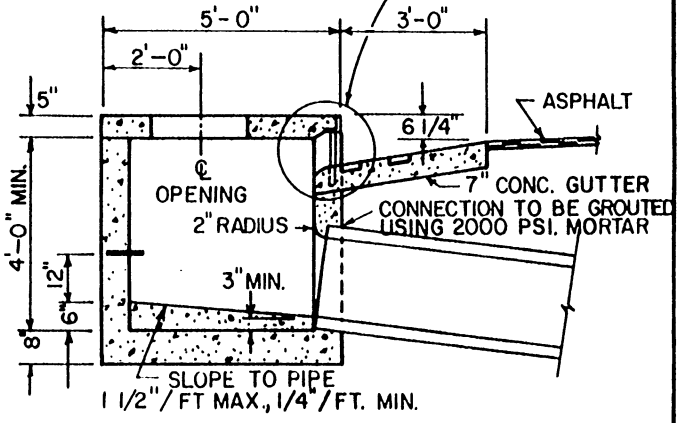


*7' FOR SUMP CONDITIONS (CENTERED ON INLET) (TRICKLE SLOTS MAY BE OMITTED FOR TRUE SUMP CONDITIONS)

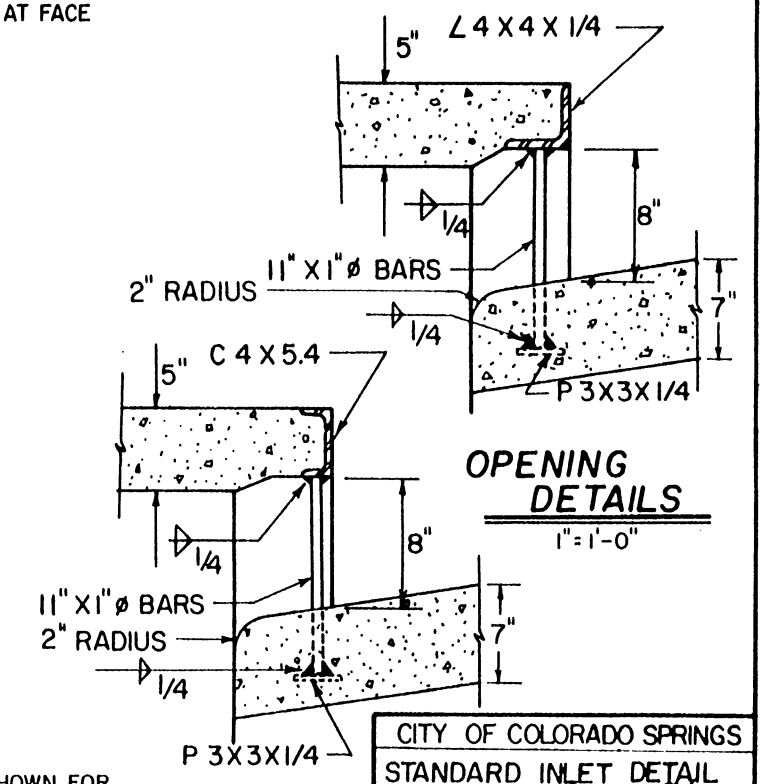
PLAN VIEW



SECTION B-B



SECTION A-A



OPENING DETAILS

1" = 1'-0"

NOTE: REINFORCING NOT SHOWN FOR CLARITY. SEE SHT. 2 OF 3 FOR REINFORCING DETAILS.

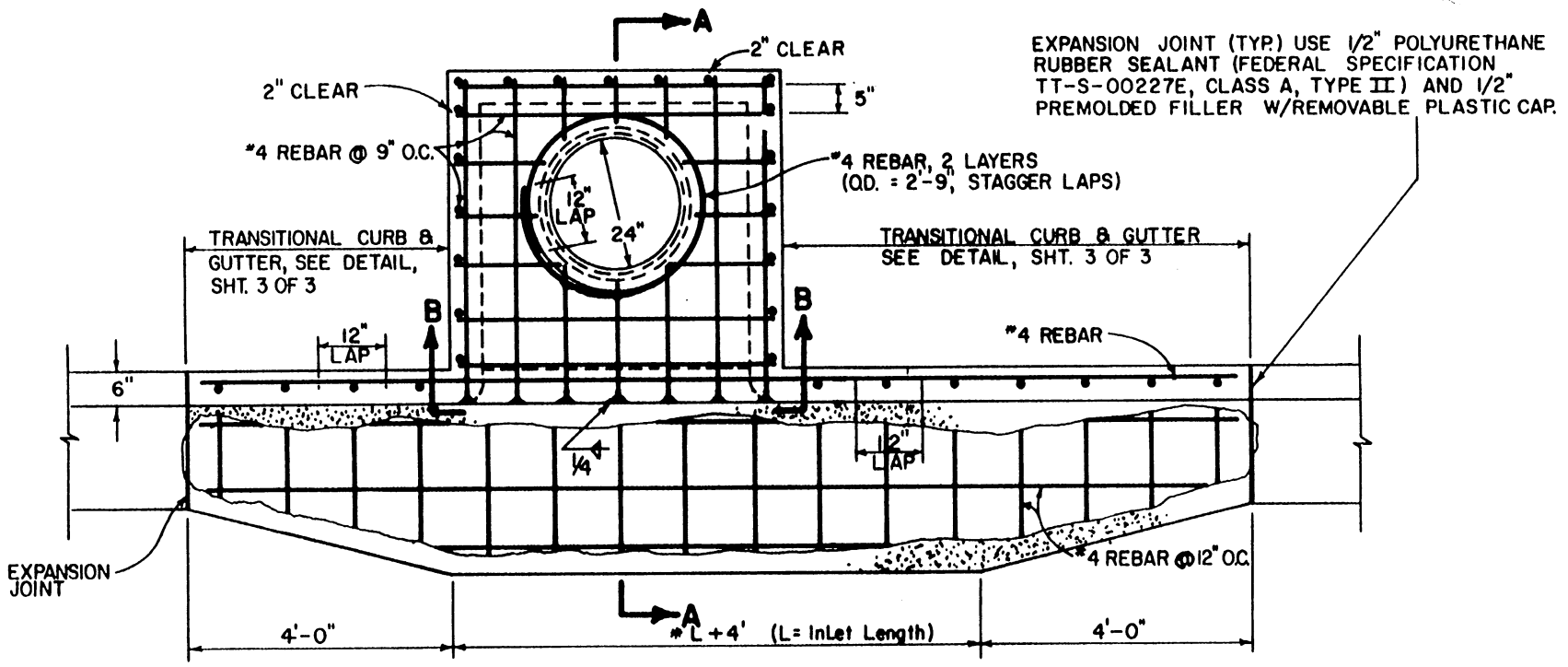
CITY OF COLORADO SPRINGS

STANDARD INLET DETAIL

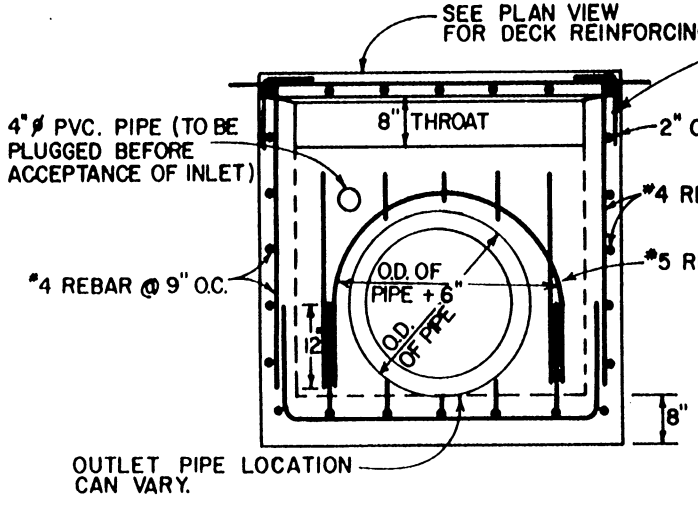
APPROVED BY: _____ CITY ENGINEER

SCALE: 1/4" = 1'-0" | DATE: 10-84 | DRW | D-10-R | SHT. 1 OF 3

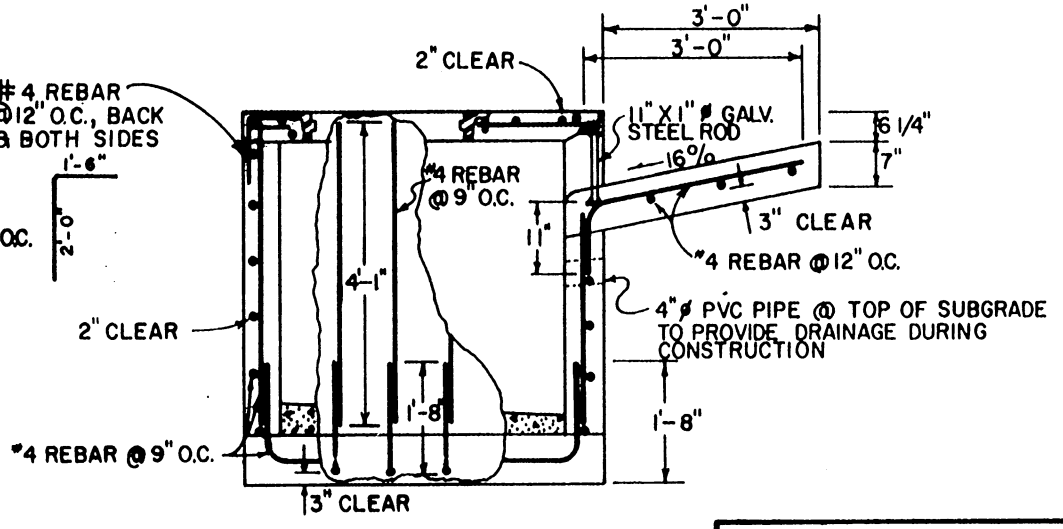
REVISED 3/93 J2 AP



PLAN VIEW



SECTION B-B



SECTION A-A

CITY OF COLORADO SPRINGS

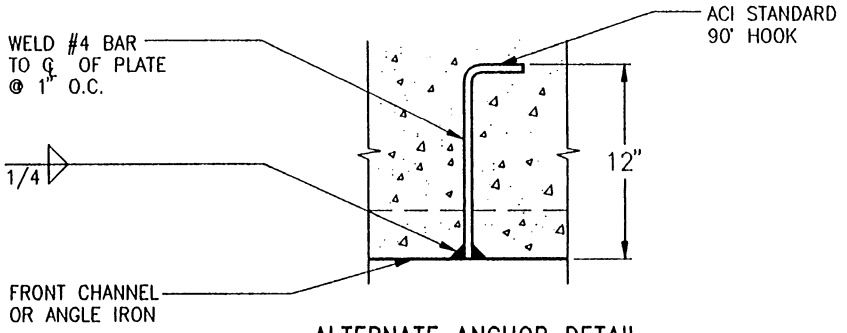
INLET REINFORCING

APPROVED BY: Gary R. Hayes
CITY ENGINEER

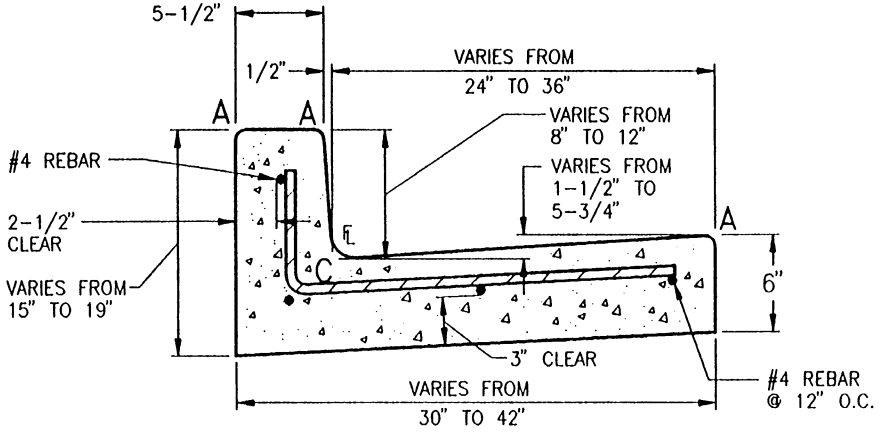
SCALE:	DATE:	DRW:	D-10-R
3/8"=1'-0"	12-84	TG	SHT. 2 OF 3

NOTES:

1. All work shall be done in accordance with the standard and supplemental specifications applicable to the project.
2. Curb face assembly shall be painted yellow. One coat of shop primer and two coats of industrial enamel.
3. Steel on curb face assembly shall be ASTM A36 and shall be free of rust and dirt.
4. Reinforcing bars shall be ASTM A615, Grade 40, billet steel (deformed) and shall be marked with bar designation, grade and mill marking.
5. Inlet or outlet pipe locations may vary within the curb inlet. Reinforcing details shown are typical.
6. Curvature of lip at gutter and side openings shall be made with curved forms.
7. Depth and length of inlet may vary. Length should vary by 2' increments. Wall thickness should increase to 8" if depth is greater than 4'. For depths greater than 8', wall thickness and reinforcing shall be approved by the City Engineering Division.
8. Floor of inlet shall be trowelled to a smooth, hard surface and shall slope towards the outlet (12.5% max., 2.0% min.).
9. Storm sewer lid/frame assembly should be located as shown along back wall of curb inlet.
10. Outlet pipe to be trimmed to final shape and set in place before curb inlet is poured.
11. When curb inlet depth is greater than 4', steps are to be installed @ 16" c/c with top step located 6" below inside cover.
12. Steps shall be cast iron or extruded aluminum, 1000 lb. capacity, 12" wide with non-skid grooves and drop front on safety noses, in accordance with approved OSHA requirements.
13. Top deck slab shall have a min. 1/4" per foot slope toward the street.
14. If curb face opening is greater than 4', vertical support bars will be required at 3' intervals.
15. Top of curb inlet to be constructed to match curb and gutter design grades at each location.
16. Minimum concrete strength = 4000 PSI at 28 days, unless otherwise approved, and shall contain ASTM C150, Type IA or IIA cement.
17. All reinforcing bars shall have a minimum 1-1/2" clear, except as noted.
18. Weld reinforcing to steel on curb face assembly, or use alternate anchor detail.
19. Pre-cast curb inlets will be accepted upon annual approval of shop drawings.
20. When pre-cast curb inlets are used, they must be bedded in a minimum 6" layer of minus 3/8" clean gravel.



ALTERNATE ANCHOR DETAIL
NO SCALE



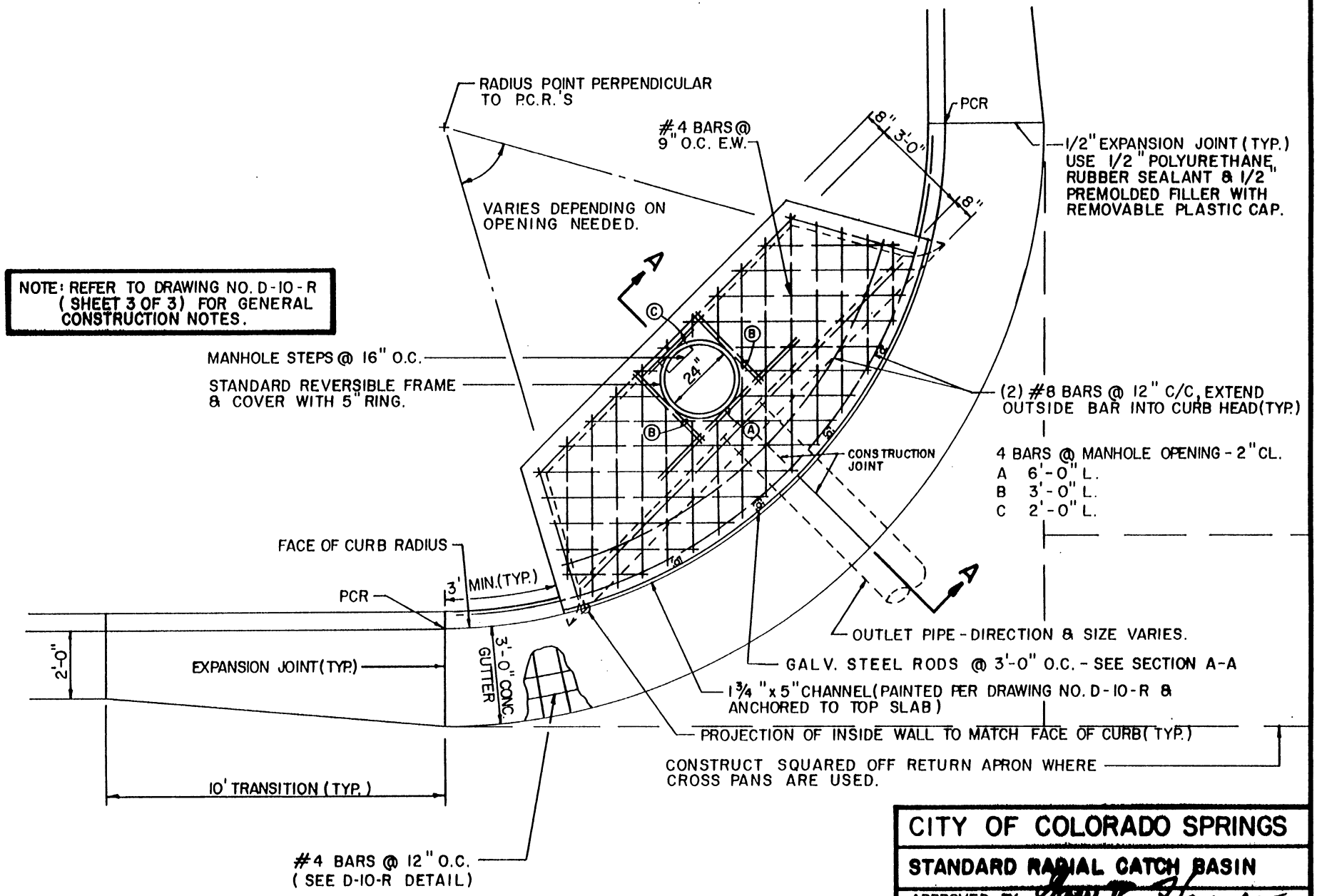
TRANSITIONAL CURB AND GUTTER
SCALE: 1" = 1'-0"

LENGTH FOR RADII
A = 1/2"
C = 1-1/2"

CITY OF COLORADO SPRINGS

Inlet Details and Notes

Approved by: Gary R. Haynes City Engineer
Drawn by: KLM
Date: 04/94
STD. D-10-R
SHEET 3 OF 3

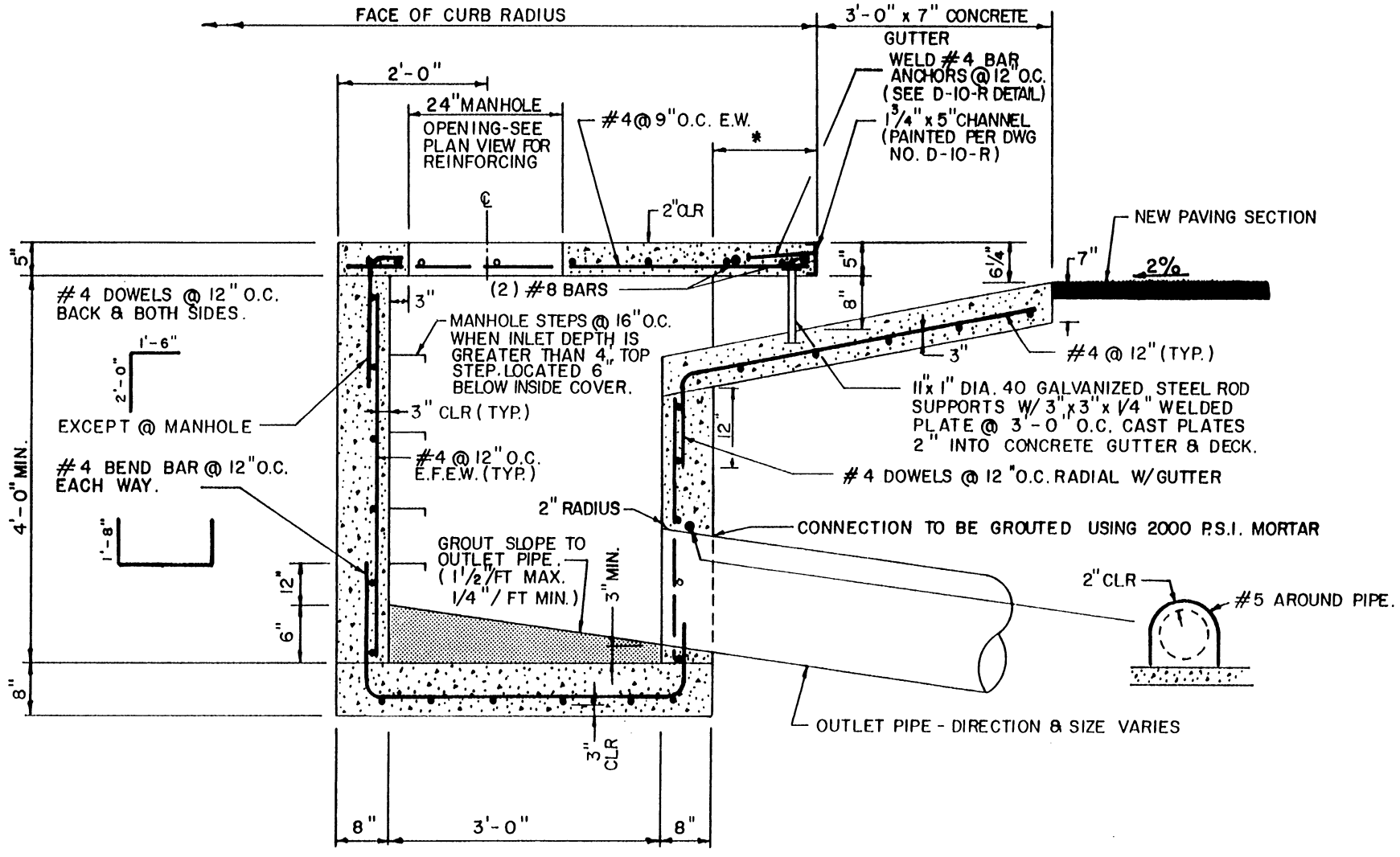


CITY OF COLORADO SPRINGS

STANDARD RADIAL CATCH BASIN

APPROVED BY _____ CITY ENGINEER

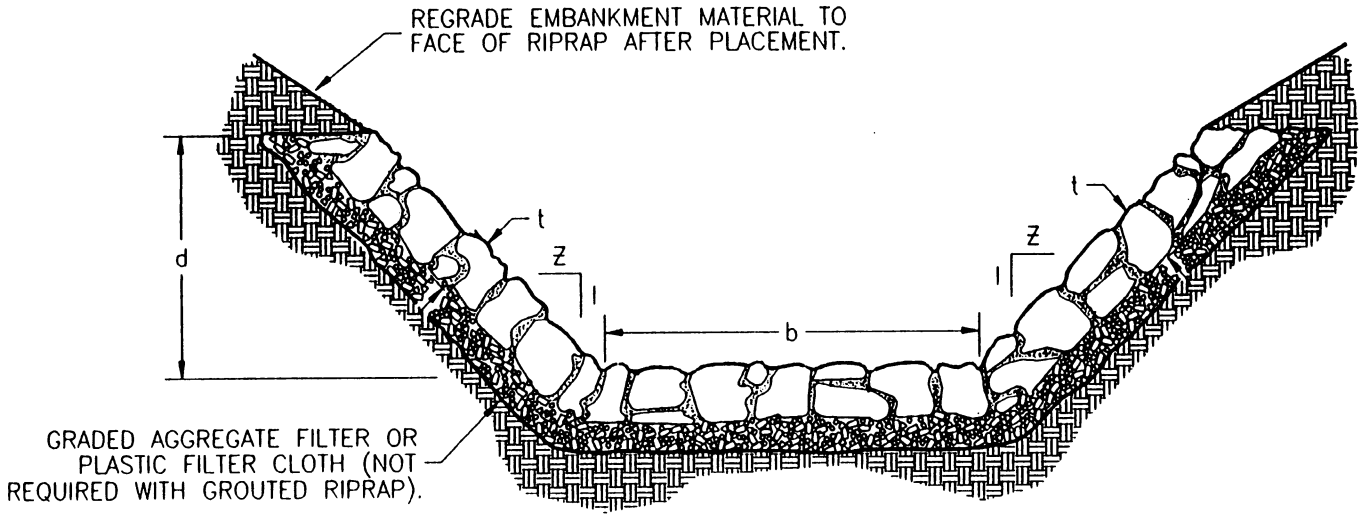
SCALE:	DATE:	DRAWN:	SHEET: D-11A
NO SCALE	MAR. 89	P.L.B.	1 OF 2



* DIMENSION VARIES FROM 0" TO MAX. @ MIDPOINT OF CURB RADIUS.

SECTION A-A

CITY OF COLORADO SPRINGS			
STANDARD RADIAL CATCH BASIN			
APPROVED BY Roy R. Hayes CITY ENGINEER			
SCALE: NO SCALE	DATE: MAR. 89	DRAWN: P.L.B.	SHEET: D-11 B 2 OF 2

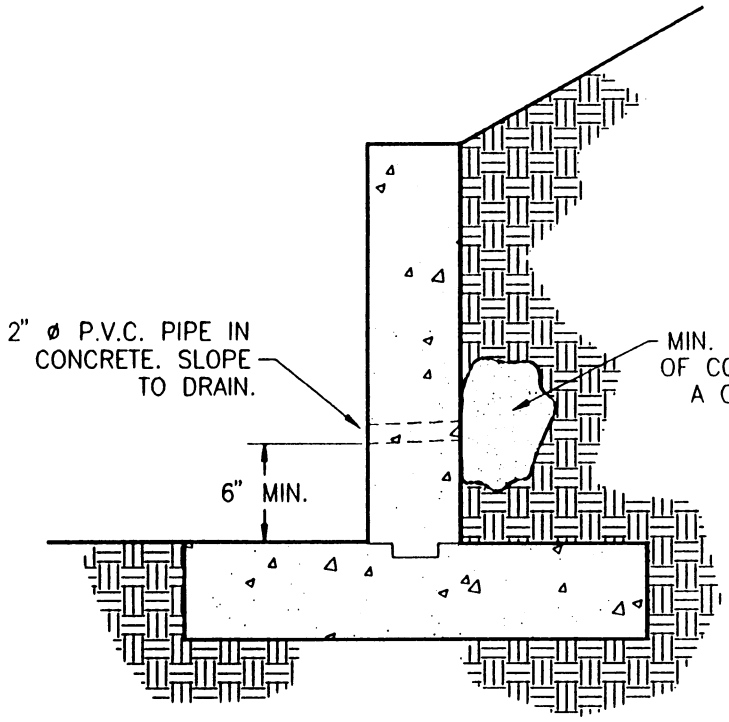


NOTES

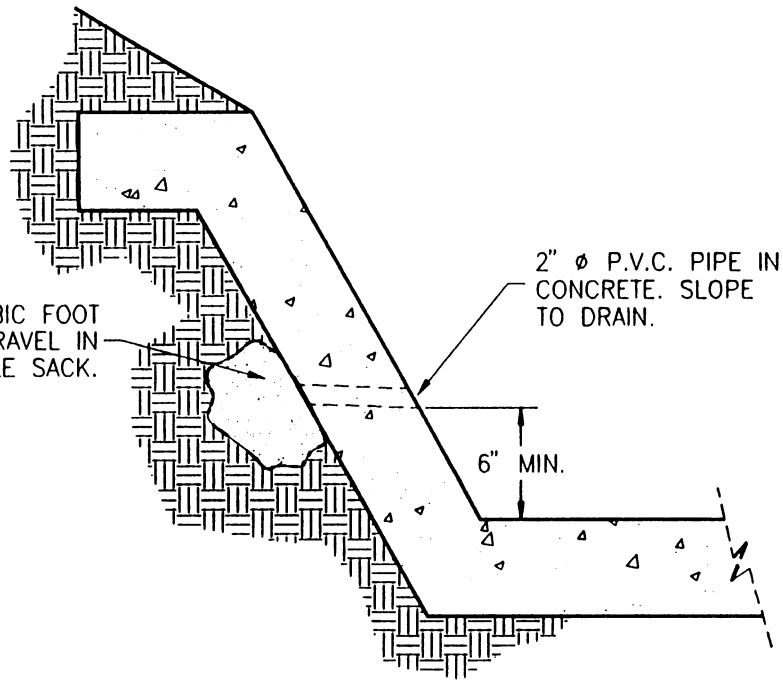
1. All Riprap channels to be grouted unless otherwise approved by the City Engineer.
2. Riprap shall have a specific gravity of 2.50 or 156 lbs./cu.ft.
3. Size 't' = 2.0 x (specified stone diameter).
4. Z = not less than 2.5.
5. The above are minimum requirements only and are not to be considered as a substitute for a complete hydraulic design reflecting local parameters.

NOTE
ALL RIPRAP CHANNEL DESIGN SHALL BE IN ACCORDANCE WITH THE CITY OF COLORADO SPRINGS / EL PASO COUNTY DRAINAGE CRITERIA MANUAL.

CITY OF COLORADO SPRINGS		
Riprap Channel Detail		
approved by: Lucy R. Haynes	City Engineer	
Drawn BY: JZ	DATE: 04/93	STD. D-12



WINGWALL / RETAINING WALL

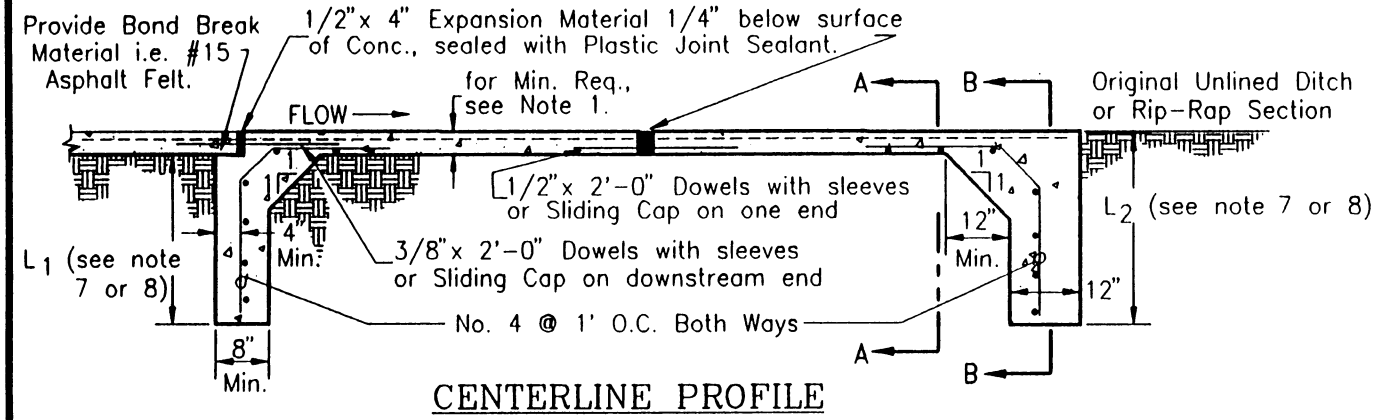


CONCRETE CHANNEL

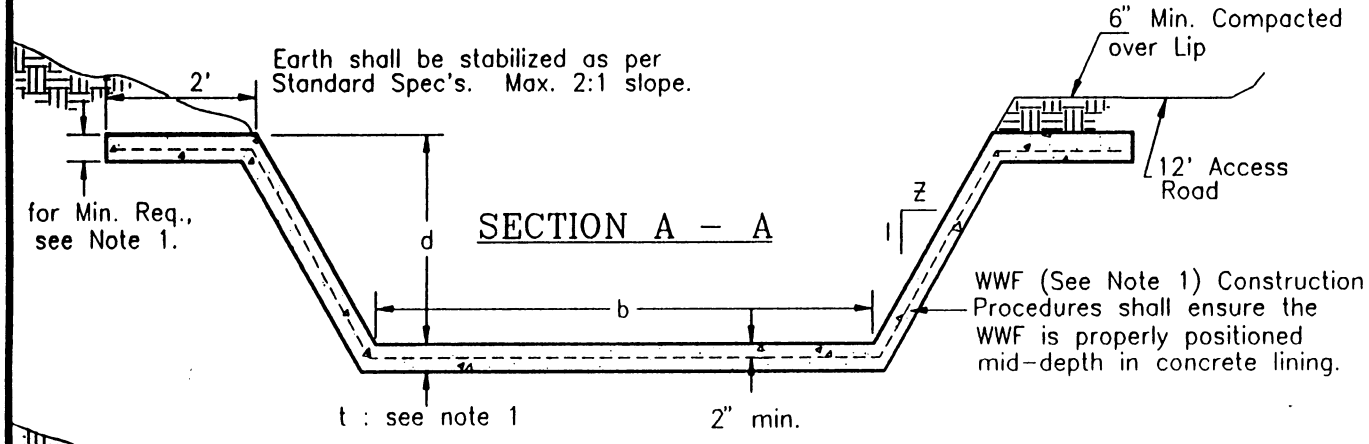
NOTES

1. NO. 40 galvanized steel screen and filter fabric to be used with weep holes >2"
2. Miter P.V.C. Pipe flush with concrete.
3. Additional volume of coarse gravel or a complete rock underdrain system may be required if local groundwater and/or soil conditions dictate.
4. Spacing to be determined by the engineer upon final design.

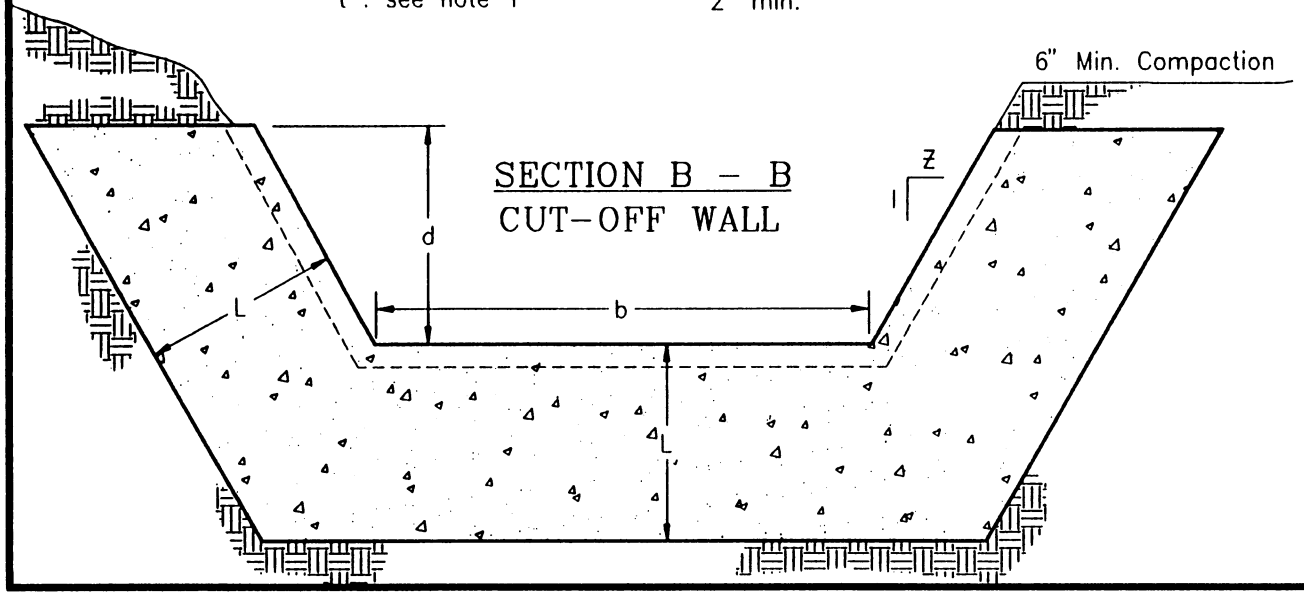
CITY OF COLORADO SPRINGS		
Weep Hole Detail		
approved by: Kay L. Haynes	City Engineer	
Drawn BY: JJ	DATE: 03/97	STD. D-13



CENTERLINE PROFILE



SECTION A – A



SECTION B – B
CUT-OFF WALL

NOTES

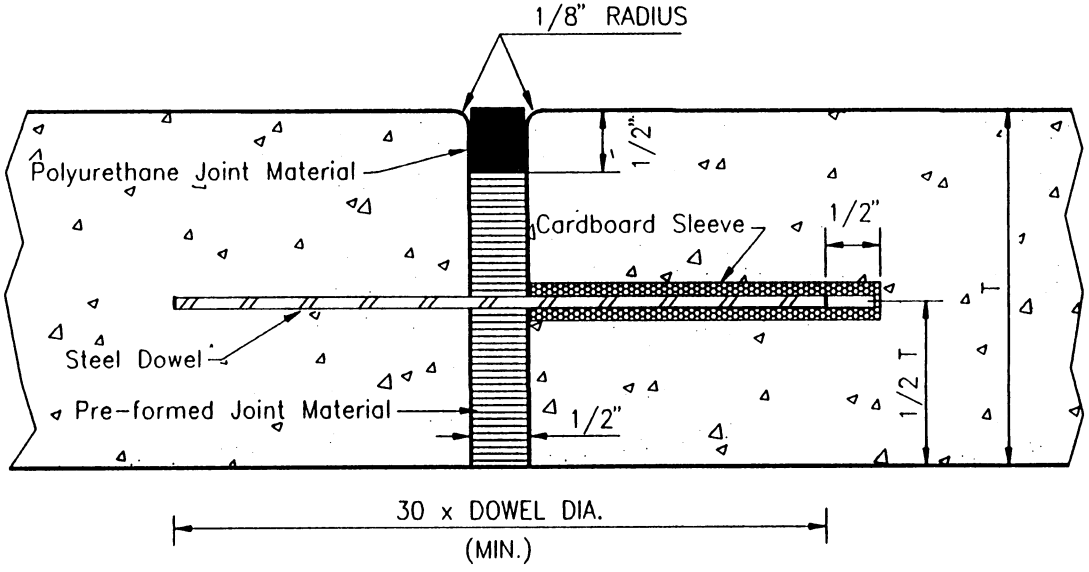
1. 4" Concrete Channel with 6x6, 4.4 Welded Wire Fabric (WWF). If 'b' is greater than 4', floor thickness shall be minimum 6" with #4 @18" E.W. This is a minimum design. Soil investigations or detailed hydraulic or structural analysis may determine that greater Concrete thickness and/or reinforcing steel is required.
2. 1/2" Contraction Joints shall be a minimum of 20' spacing unless specified otherwise by the Engineer.
3. Expansion Joints shall be a maximum of 100' spacing unless specified otherwise by the Engineer (see D-15).
4. Concrete shall be Type II, 4000 psi, with air entrainment @ 6% (+1,-2) in accordance with Sections 612 and 613.
5. The Surface shall be that of a Broom Finish.
6. Z = not less than 1.0
7. L_1 = 3'- 6" and L_2 = 6'- 0" min. if Design Flow is Supercritical.
8. L_1 = 2'- 6" and L_2 = 4'- 0" min. if Design Flow is Subcritical.
9. See D-13 Weep Hole Detail.
10. Cut-off Wall spacing to be Max. 200 – 250 feet, typ.

CITY OF COLORADO SPRINGS

Concrete Channel Detail

approved by: Larry L. Hayes City Engineer

Drawn BY: J2 DATE: 05/93 STD. D-14



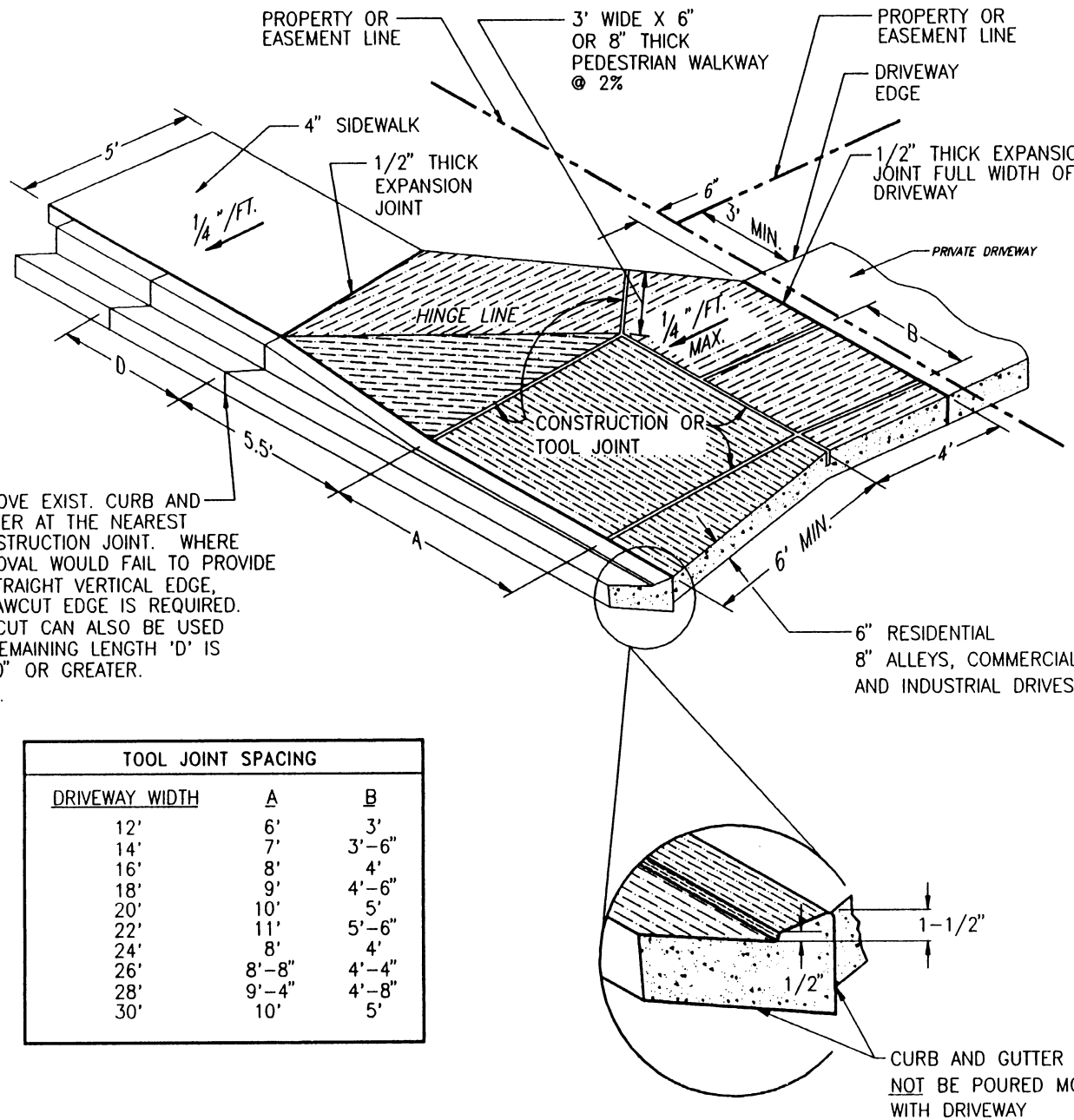
NOTES

1. Size and Spacing of Dowels to be determined by the detail design.
2. Individual requirements may demand greater dowel lengths.
3. Minimum T = 6" ; Transition will be required if Channel Floor is less than 6".

FOR CONCRETE LINED CHANNELS

NO SCALE

CITY OF COLORADO SPRINGS		
Expansion Joint Detail		
approved by: Gary R. Haynes	City Engineer	
Drawn BY: JZ	DATE: 08/93	STD. D-15



TOOL JOINT SPACING		
DRIVEWAY WIDTH	A	B
12'	6'	3'
14'	7'	3'-6"
16'	8'	4'
18'	9'	4'-6"
20'	10'	5'
22'	11'	5'-6"
24'	8'	4'
26'	8'-8"	4'-4"
28'	9'-4"	4'-8"
30'	10'	5'

NOTES:

1. Provide centerline construction or tool joint when driveway width (edge to edge) is 14' or greater.
2. All tool joints shall be a minimum of 1-1/2" deep.
3. When replacing existing curb and gutter with new driveway, entire curb and gutter section shall be removed and replaced with curb and gutter (variable-curb-height) as shown. Do NOT break curb from gutter section. Machine sawcut is allowable; see D-16C.
4. Flared portion of driveway shall be poured monolithic with main rectangular portion of driveway.
5. Where there is more than one driveway on a lot, 30' of full curb shall be provided between driveways.
6. Where an existing sidewalk is in place, and its thickness is less than 6" (residential) or 8"(commercial, industrial, or alley) the the sidewalk through the driveway shall be removed and replaced with Portland Cement Concrete, 6" (residential) or 8" (commercial) in thickness.
7. All excavation, embankment and concrete shall be in accordance with City Standard Specifications.
8. All provisions of Section 14-15-104 of the City Code shall be met, with regard to minimum setback from intersection and side property lines, minimum spacing, maximum width, etc.
9. When a driveway is to be taken out of service, the entire length of curb and gutter (variable-curb-height) shall be removed and replaced with new curb and gutter. Do NOT place new curb head on existing variable-curb-height curb and gutter.

ATTACHED SIDEWALK

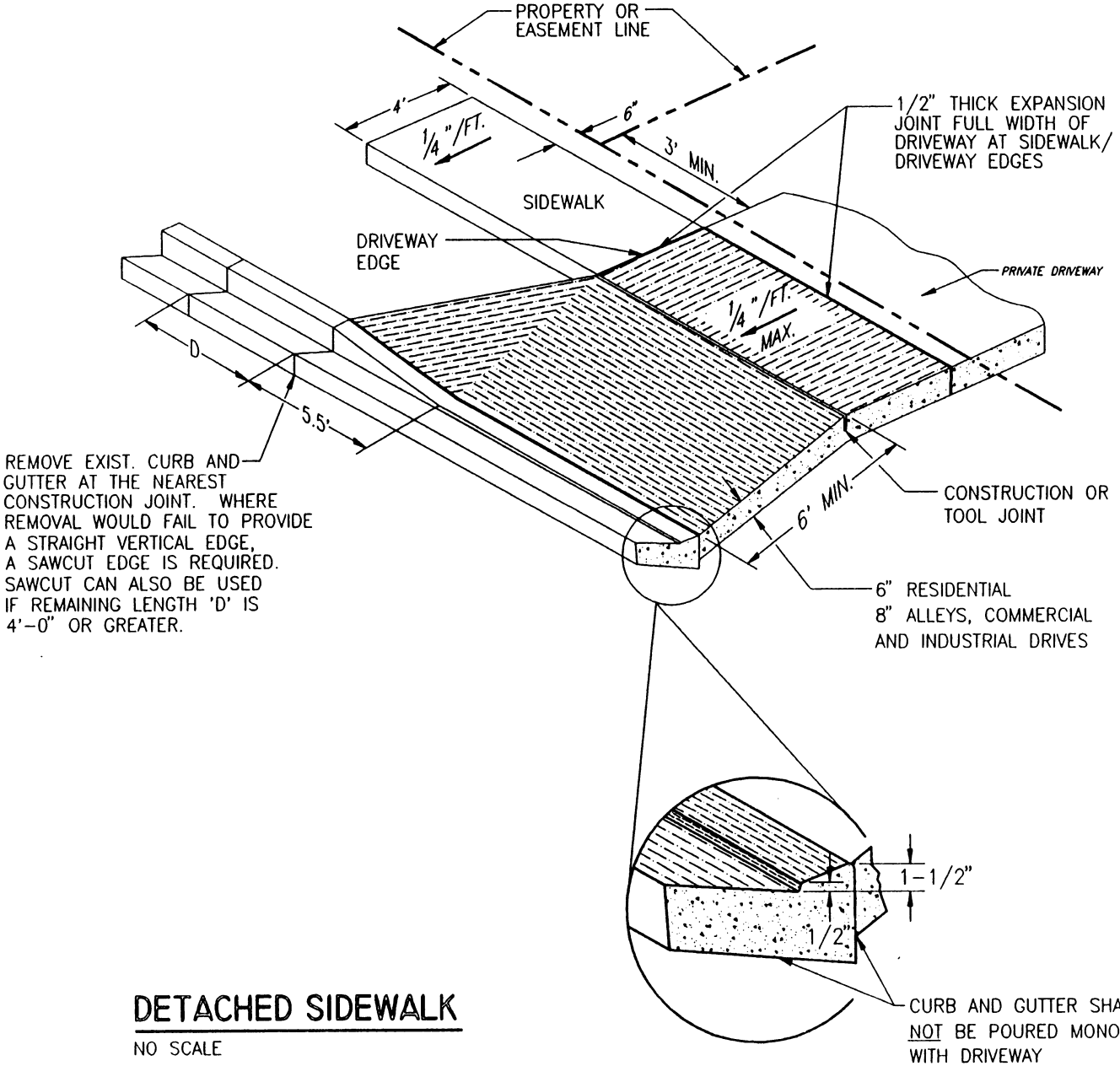
NO SCALE

CITY OF COLORADO SPRINGS

Standard Driveway with Detached Walk

Approved by: Gary R. Hayes City Engineer

Drawn by: KLM Date: 07/94 STD. D-16A



DETACHED SIDEWALK

NO SCALE

NOTES:

1. Provide centerline construction or tool joint when driveway width (edge to edge) is 14' or greater.
2. All tool joints shall be a minimum of 1-1/2" deep.
3. When replacing existing curb and gutter with new driveway, entire curb and gutter section shall be removed and replaced with curb and gutter (variable-curb-height) as shown. Do NOT break curb from gutter section. Machine sawcut is allowable; see D-16C.
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CITY OF COLORADO SPRINGS

Standard Driveway with Detached Walk

Approved by: Gary R. Haynes City Engineer

Drawn by: KLW Date: 01/94 STD. D-16B

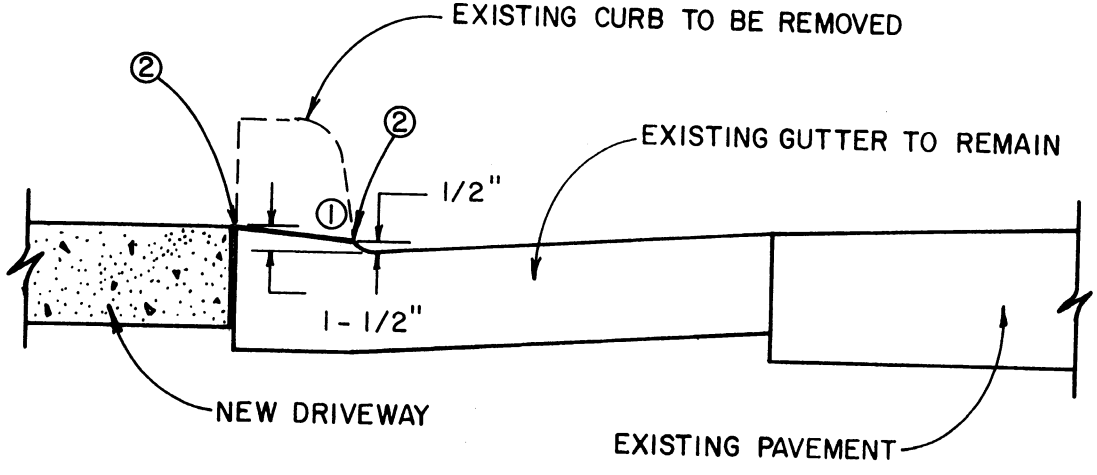
NOTES:

TO BE USED IN CONJUNCTION WITH CITY STANDARD D-16A or D-16B

① MUST BE SAW CUT FROM THE BACKSIDE OF CURB TO FLOWLINE OF GUTTER

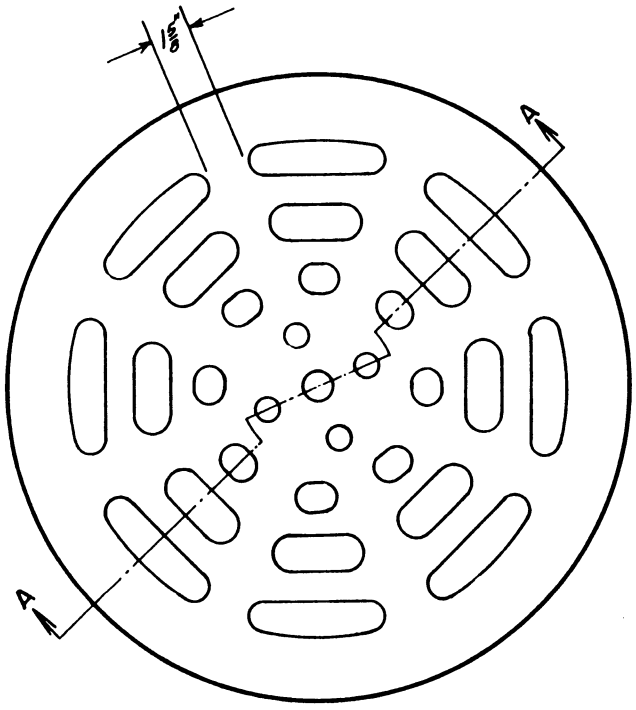
② CUT EDGE TO BE GROUND SMOOTH (ROUNDED TO REMOVE SHARP EDGE)

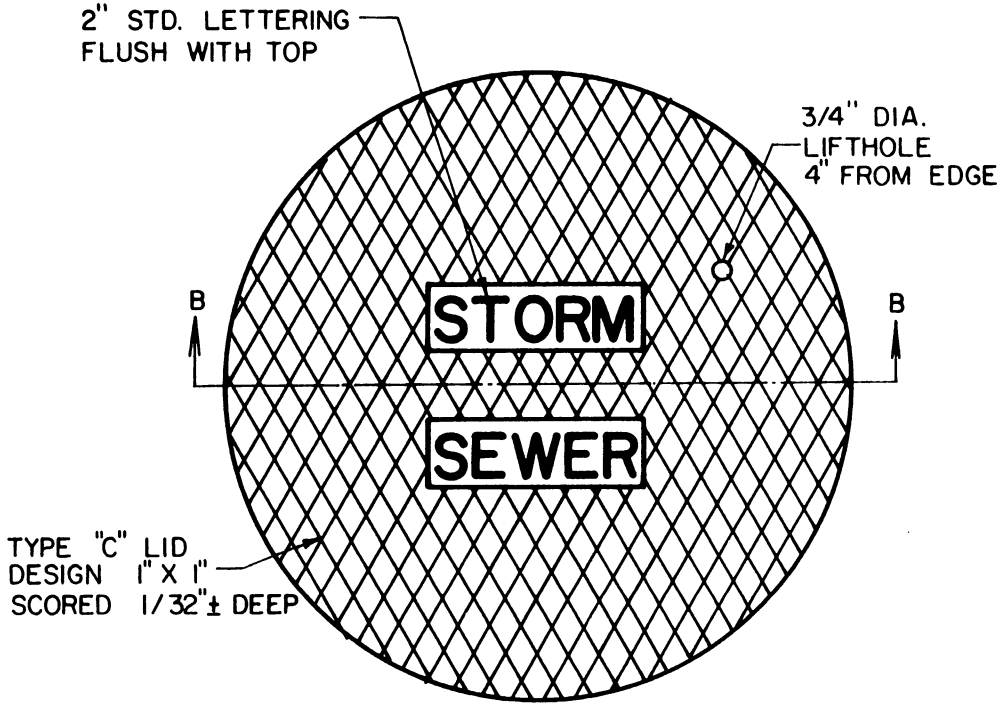
③ THE 5'-6" TAPERED CURB HEAD SHALL BE CUT IN EXISTING CURB

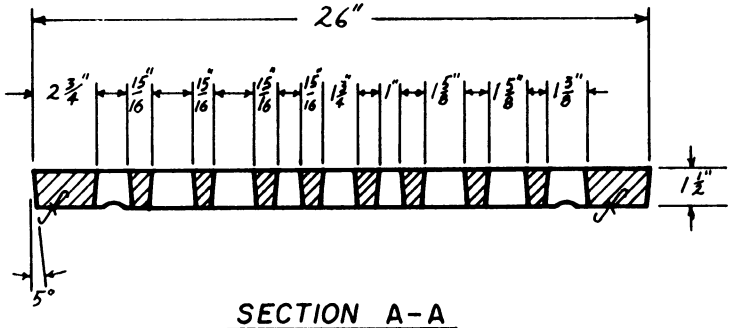


NO SCALE

CITY OF COLORADO SPRINGS, COLORADO.			
CURB CUT BY MACHINE SAW			
APPROVED BY: Gary R. Haynes CITY ENGINEER			
SCALE AS SHOWN	DATE AUG. 94	DWN BY AW	DWG D-16C

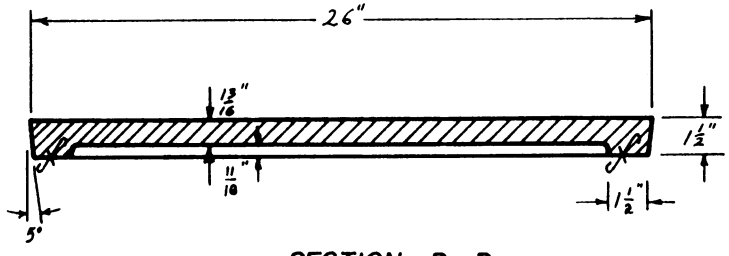






SECTION A-A

(APPROX. 175 lbs)



SECTION B-B

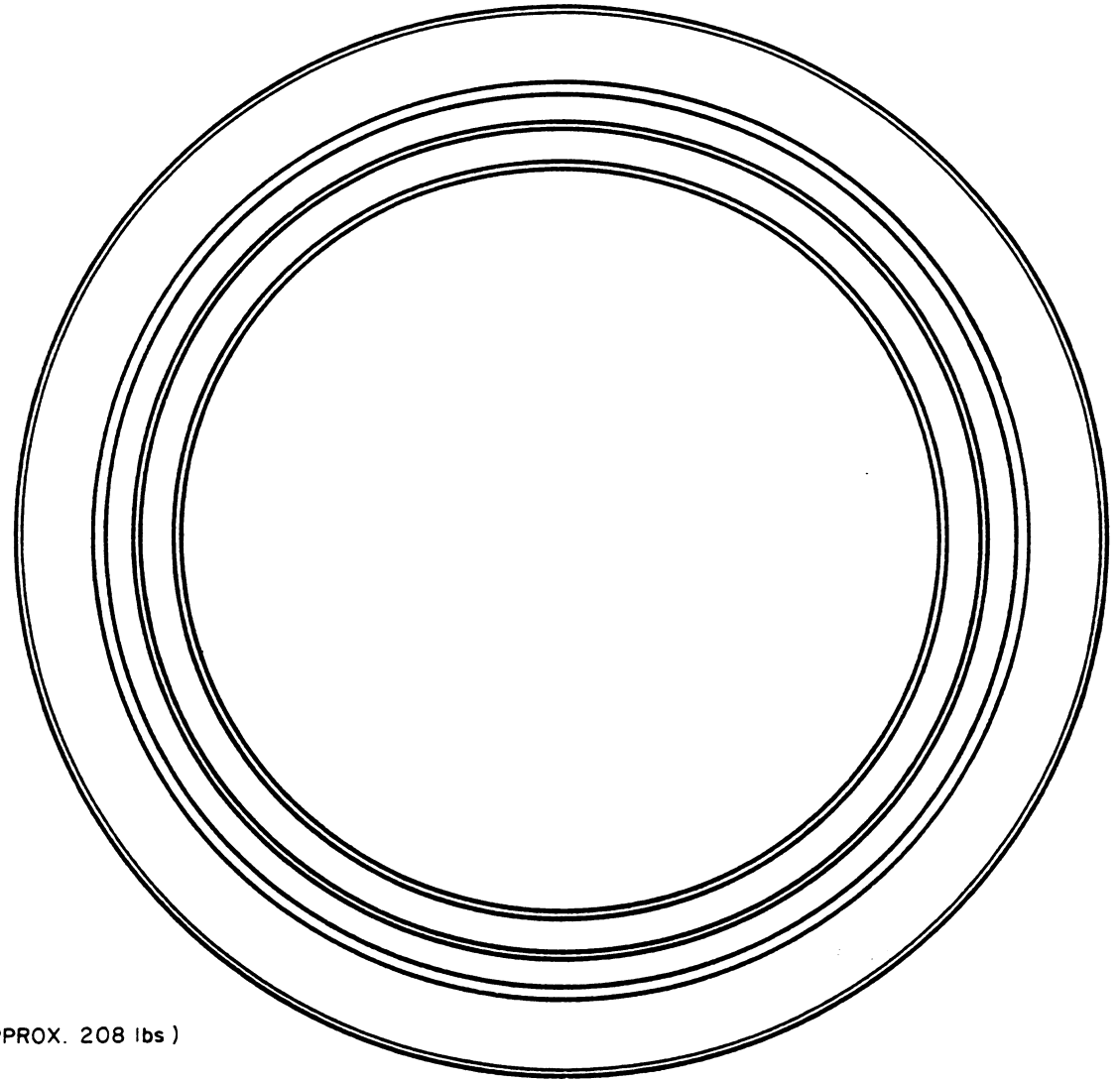
(APPROX. 144 lbs)

STORM SEWER GRATE & LID

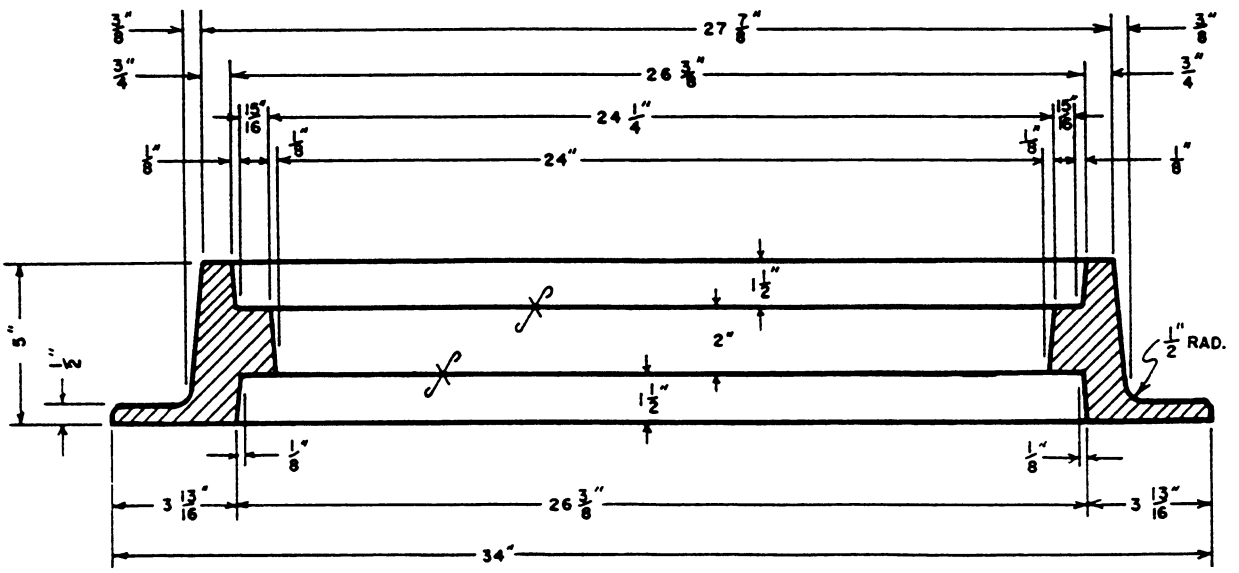
1 1/2" = 1'-0"

CITY OF COLORADO SPRINGS			
STORM SEWER GRATE & LID			
APPROVED BY: Gary R. Haynes CITY ENGINEER			
SCALE: SHOWN	DATE: 10-84	DRW: 75	D-17A SHT. 1 OF 2

REVISED JAN. '89 PLB HTS ADDED



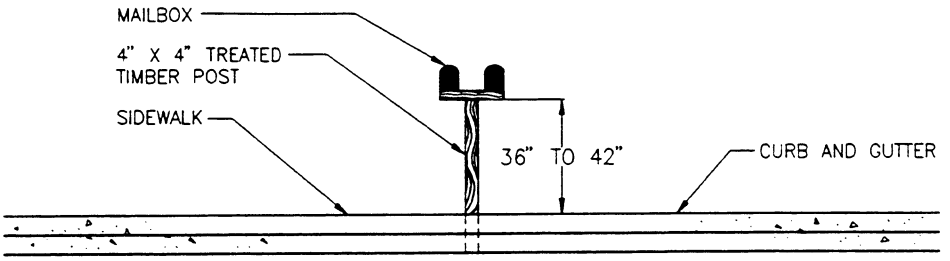
(APPROX. 208 lbs)



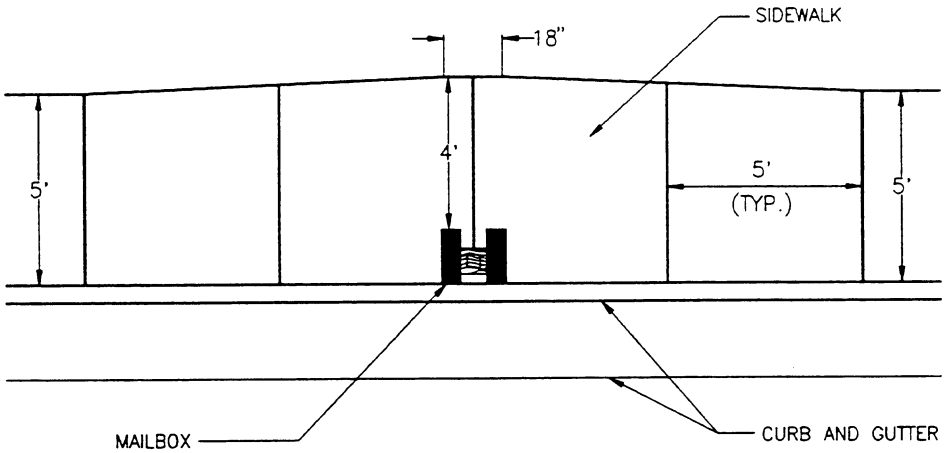
STORM SEWER REVERSIBLE FRAME

CITY OF COLORADO SPRINGS			
STORM SEWER REVERSIBLE FRAME			
APPROVED BY: Gary E. Hayward CITY ENGINEER			
SCALE: 2" = 1'	DATE: 10-84	DRW: 25	D-17.8 SHT. 2 OF 2

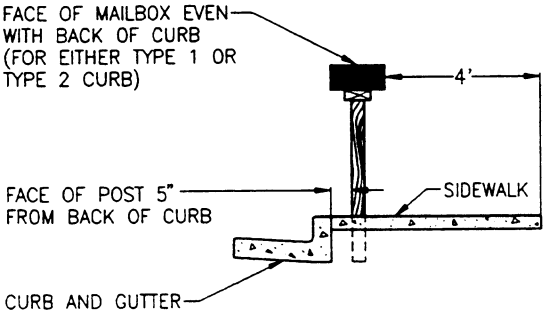
REVISED JAN '89 PLB WEIGHT ADDED



ELEVATION
SCALE: 1" = 5'



PLAN VIEW
SCALE: 1" = 5'

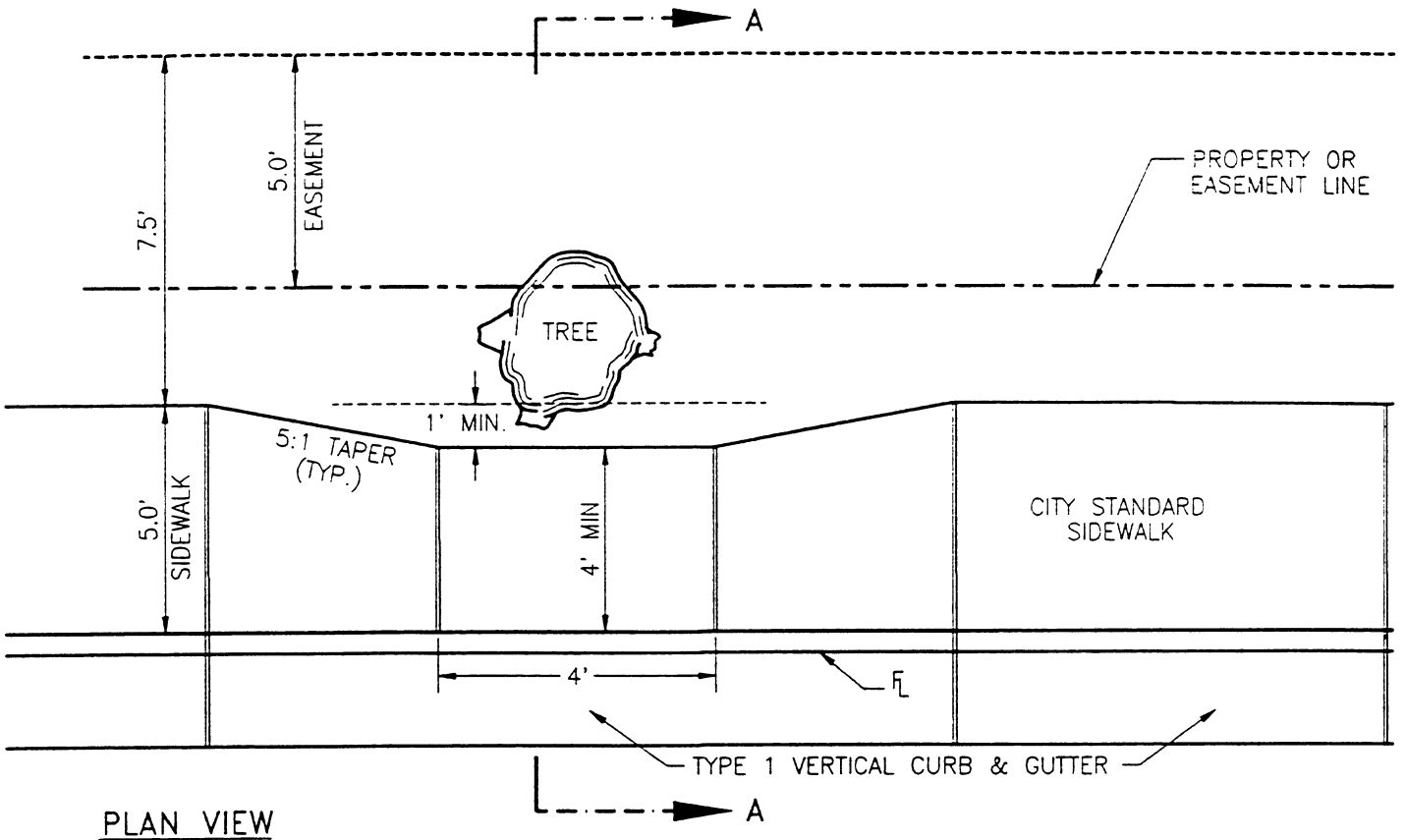


SIDE VIEW
SCALE: 1" = 5'

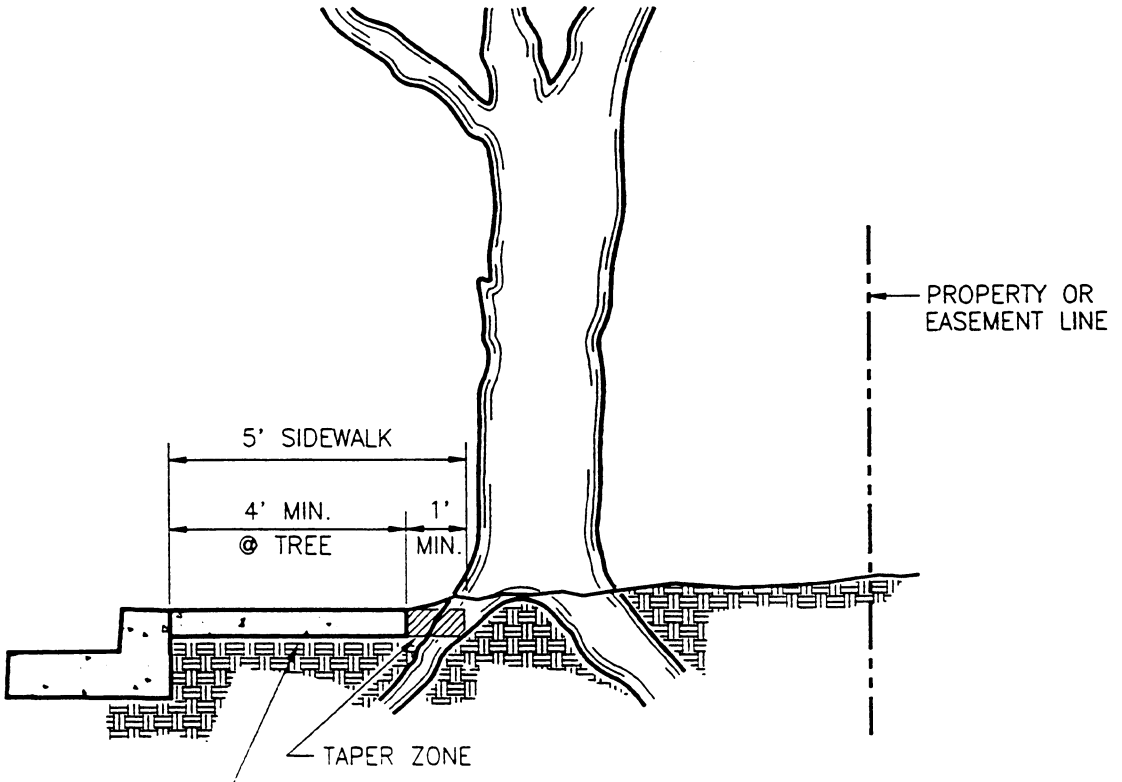
NOTES:

1. MAILBOX & POST DIMENSIONS AS REQUIRED BY U. S. POSTAL SERVICE.
2. MAILBOX LOCATION SUBJECT TO U. S. POSTAL SERVICE APPROVAL.

CITY OF COLORADO SPRINGS			
Sidewalk Taper Section at Mailbox			
Approved by: Gary R. Haynes City Engineer			
Drawn by: KLM	Date: 07/94	STD. D-18A	



PLAN VIEW



SECTION A – A

NOTE: PRIOR TO CONSTRUCTION OF NEW SIDEWALK, CLEAR & GRUB ALL ROOTS WITHIN 4" OF BOTTOM & SIDES OF NEW SIDEWALK, UNLESS DIRECTED OTHERWISE.

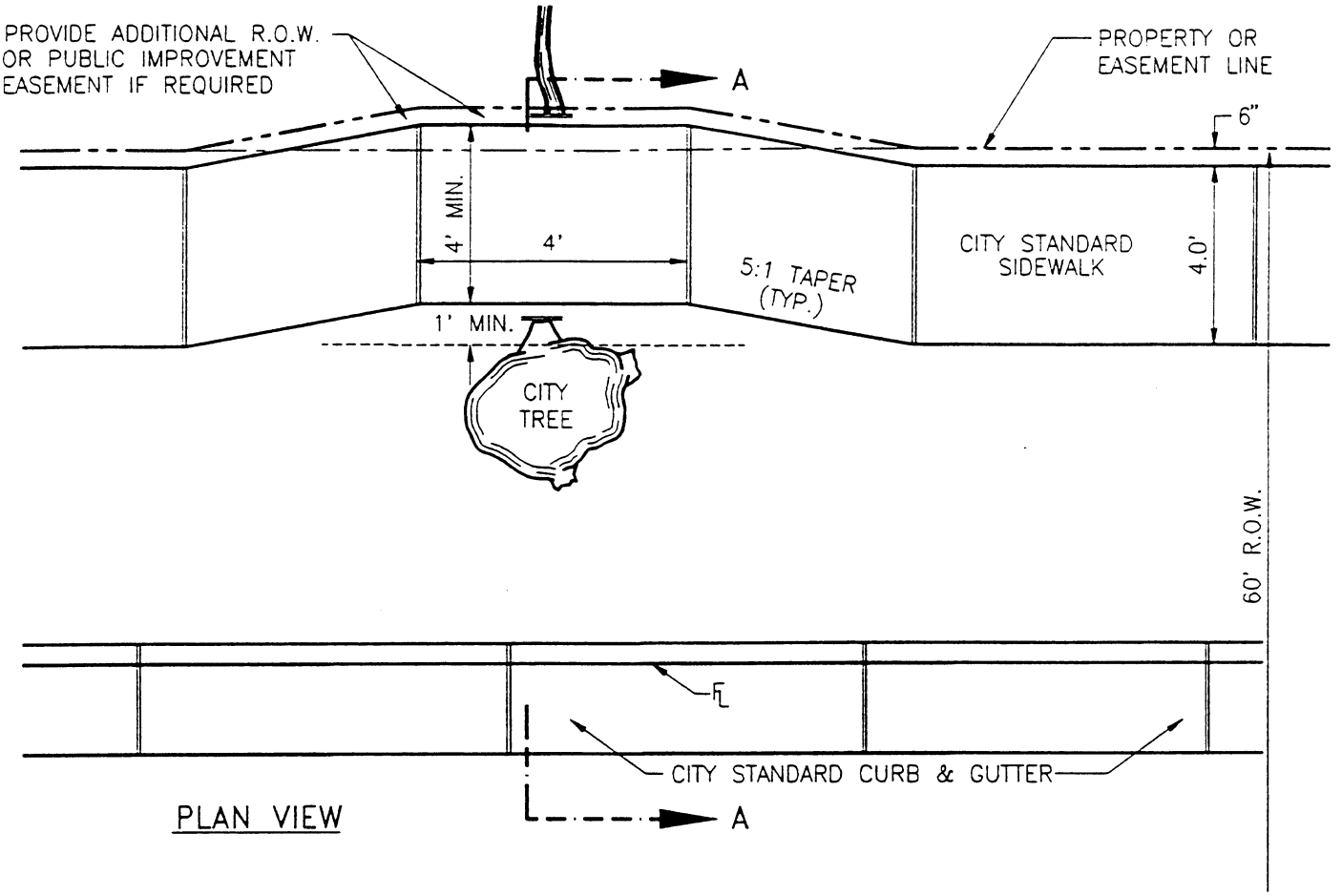
50' RESIDENTIAL STREET

(5' EASEMENT)
NO SCALE

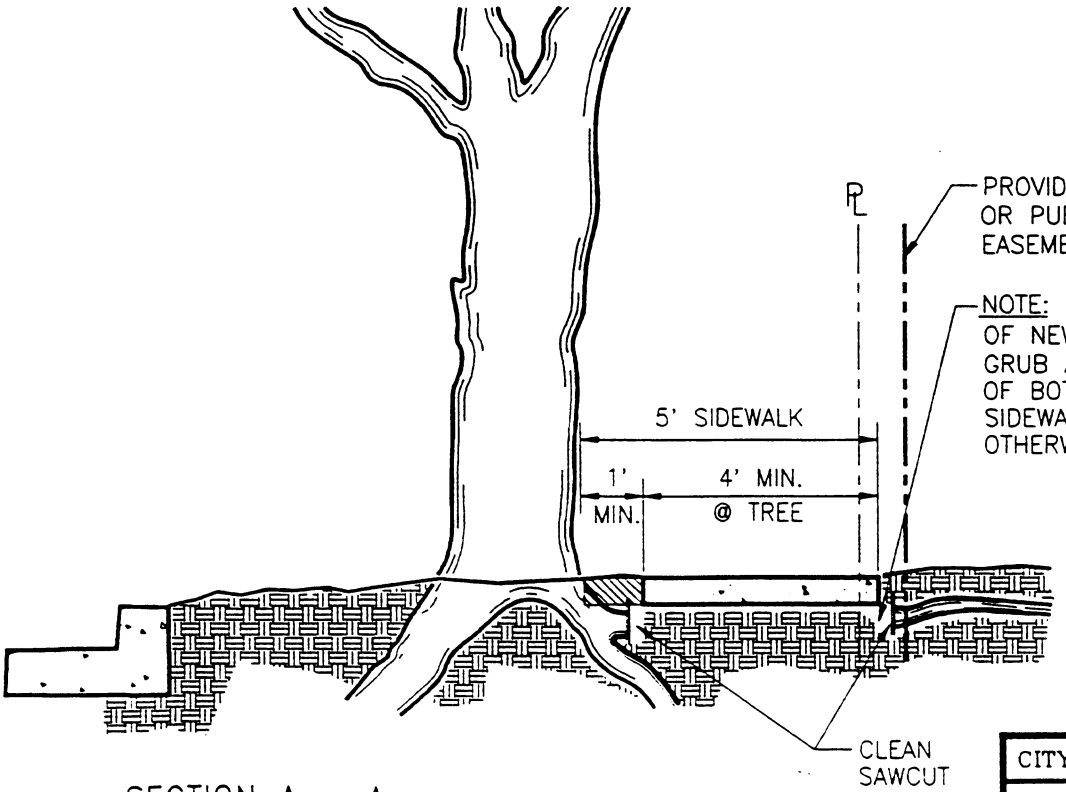
CITY OF COLORADO SPRINGS

Tree Root Protection

Approved by:			City Forestry
Approved by:			City Engineer
Drawn by:	KLM	Date: 07/94	STD. D-188



PLAN VIEW



SECTION A – A

STANDARD 60' R.O.W.

NO SCALE

CITY OF COLORADO SPRINGS			
Tree Root Cuts			
Approved by: Tom Cougan	City Forestry		
Approved by: Gary F. Haynes	City Engineer		
Drawn by: KLM	Date: 07/94	STD. D-18C	

SPECIAL DESIGN INLET

CITY OF COLORADO SPRINGS, COLORADO

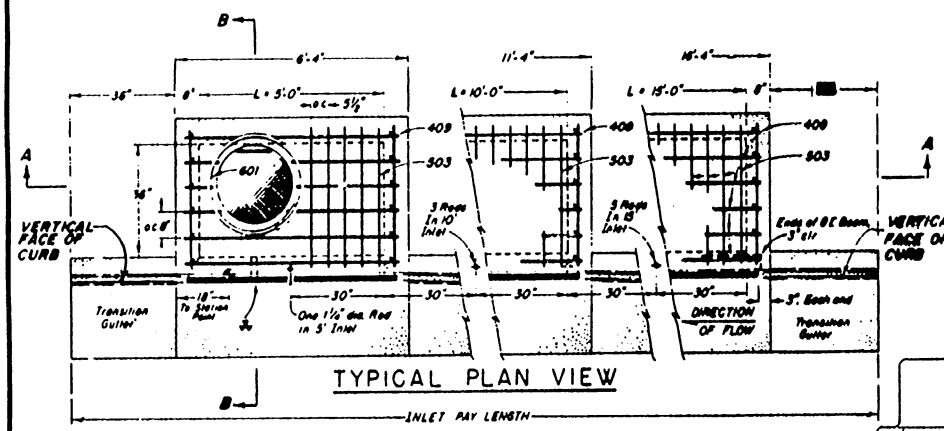
COLORADO DEPARTMENT OF HIGHWAYS
CURB INLET TYPE R (MODIFIED)

APPROVED BY: Gary R. Haynes BRR
CITY ENGINEER

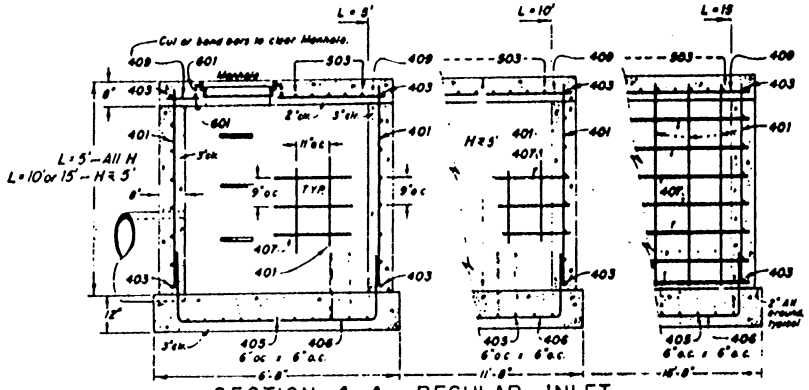
SCALE	DATE	DWN. BY	
AS SHOWN	REV. 1/88	JLO	D-19A SHT. 1 OF 2

* 3 3/4" IF 6" VERTICAL CURB & GUTTER,
6 1/4" IF 8" VERTICAL CURB & GUTTER

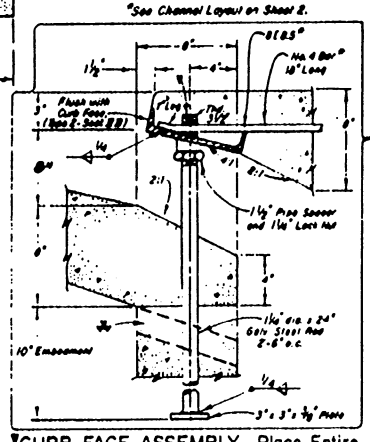
■ NOTE:
FOR ALL INLETS ON A CONTINUOUS GRADE, THE UPSTREAM TRANSITION GUTTER LENGTH SHALL BE 10 FEET. FOR ALL OTHER LOCATIONS, TRANSITION LENGTHS SHALL BE 3 FEET MINIMUM. ADDITIONAL 10 FEET TRANSITION NEEDED IF NORMAL RAMP CURB & GUTTER.



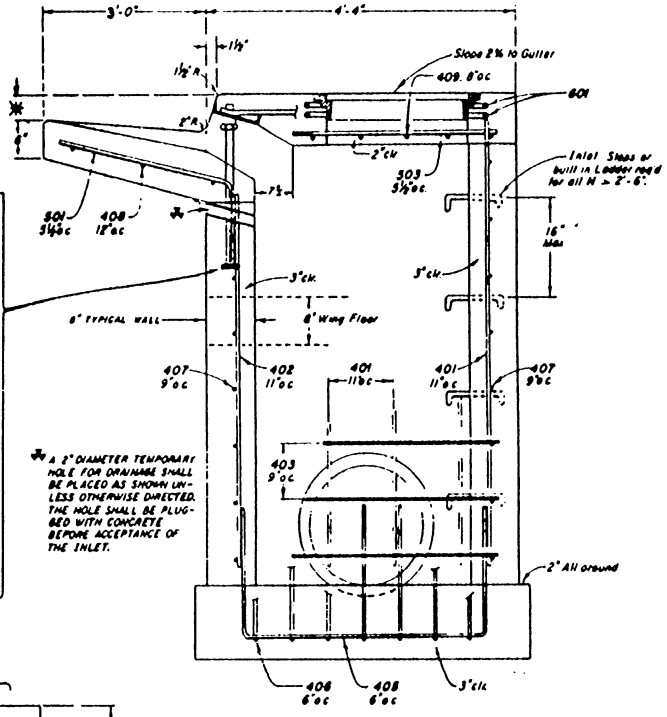
TYPICAL PLAN VIEW



SECTION A-A REGULAR INLET



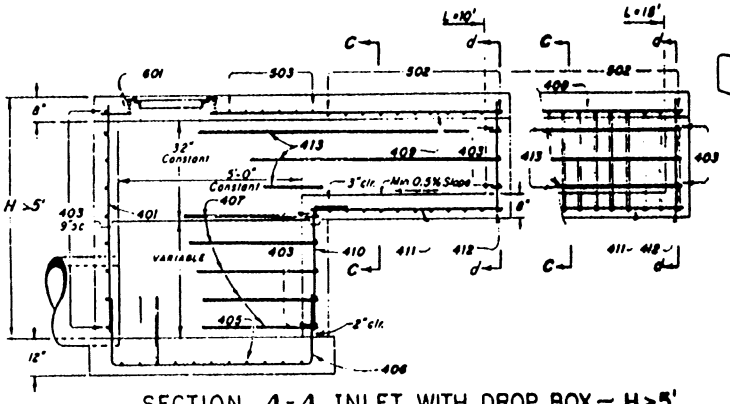
*CURB FACE ASSEMBLY, Place Entire Assembly Before Pouring Concrete.



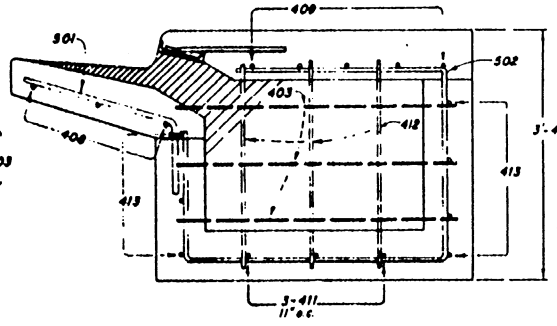
* A 2" DIAMETER TEMPORARY HOLE FOR DRAINAGE SHALL BE PLACED AS SHOWN UNLESS OTHERWISE DIRECTED. THE HOLE SHALL BE PLUGGED WITH CONCRETE BEFORE ACCEPTANCE OF THE INLET.

SECTION B-B
TYPICAL END VIEW

NOTE: MANHOLE RING & COVER, STATION POINT AND OUTFLOW PIPE ARE TO BE LOCATED AT THE SAME END OF THE INLET.



SECTION A-A INLET WITH DROP BOX — H>5'



(Dotted Bars are in Section d-d)

SECTIONS C-C & d-d

NOTE: THIS IS A SPECIAL DESIGN INLET TO BE USED ONLY WITH PRIOR APPROVAL BY THE CITY ENGINEER.

REVISED JAN'89 PLB SPECIAL DESIGN INLET

TABLE ONE – BAR LIST FOR CURB INLETS, TYPE R

MARK	DIA in	o.c. Spacing	TYPE	ALL INLETS L = 5' No. Req'd	Length	INLETS, H ≥ 5' 10' No. Req'd	Length	15' No. Req'd	Length	INLETS, H > 5' 10' No. Req'd	Length	15' No. Req'd	Length
401		11"	II	15	#	21	#	26	#	11	#	11	#
402		11"	II	7	#	13	#	18	#	7	#	7	#
403		9"	II	#	4'-0"	#	4'-0"	#	4'-0"	#	4'-0"	#	4'-0"
405		6"	VI	11	6'-10"	21	6'-10"	31	6'-10"	11	6'-10"	11	6'-10
406		6"	VIII	7	8'-10"	7	13'-10"	7	18'-10"	7	8'-10"	7	8'-10"
407	1/4"	9"	II	#	5'-10"	#	10'-10	#	15'-10"	#	5'-10"	#	5'-10"
408		12"	II	3	6'-0"	3	11'-0"	3	16'-0"	3	11'-0"	3	16'-0"
409		8"	II	6	5'-10"	6	10'-10"	6	15'-10"	6	10'-10"	6	15'-10"
410		11"	VII							3	#	3	#
411		11"	II							3	5'-2"	3	10'-2"
412		11"	II							3	2'-9"	3	2'-9"
413		9	II							7	10'-10"	7	15'-10"
501		5½"	IV	11	4'-4"	22	4'-4"	33	4'-4"	22	4'-4"	33	4'-4"
502	3/8"	5½"	III							11	11'-5"	22	11'-5"
503		5½"	II	5	3'-6"	16	3'-6	27	3'-6"	6	3'-6"	6	3'-6"
601	1/4"	2½"	V	2	8'-10"	2	8'-10"	2	8'-10"	2	8'-10"	2	8'-10"
BEAM	—	—	—	1	5'-10	1	10'-10"	1	15'-10"	1	10'-10"	1	15'-10"
F				2 Bars, 1 Rod	—	4 Bars, 3 Rods	—	4 Bars, 3 Rods	—	4 Bars, 3 Rods	—	4 Bars, 3 Rods	—

H Variable, refer to Table TWO.
@ Include 18' No 4 Bars (See Channel Layout Detail).
F See Curb Face Assembly on Sheet 1 and Channel Layout Details on this sheet

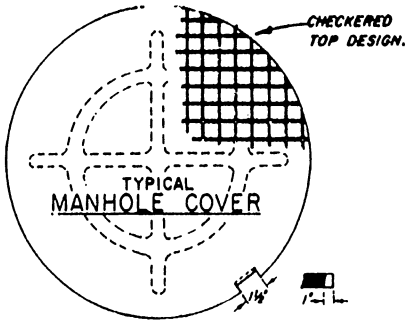
REGULAR INLETS

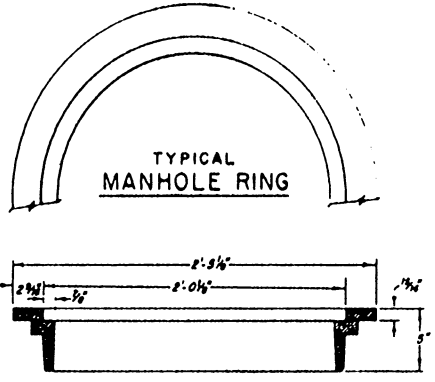
DROP BOX INLETS

TABLE TWO – BARS AND QUANTITIES VARIABLE WITH H

H	Length 401	402	410	No Req'd Regular 403	407	No Req'd Drop Box 403	407	L = 5' Cu Yd Conc	Lb Steel	L = 10' Cu Yd Conc	Lb Steel	L = 15' Cu Yd Conc	Lb Steel
3'-0"	2'-8"	1'-8"		10	7			3.2	285	5.3	497	7.4	706
3'-6"	3'-2"	2'-2"		10	7			3.4	305	5.7	528	7.9	747
4'-0"	3'-8"	2'-8"		12	9			3.7	326	6.0	559	8.4	786
4'-6"	4'-2"	3'-2"		12	9			3.9	334	6.4	571	8.8	803
5'-0"	4'-8"	3'-8"		14	11			4.1	354	6.7	602	9.3	844
5'-6"	5'-2"	4'-2"	3'-5"	16	13	15	6	4.4	375	6.0	607	7.5	840
6'-0"	5'-8"	4'-8"	3'-11"	16	13	16	6	4.6	382	6.2	616	7.7	850
6'-6"	6'-2"	5'-2"	4'-5"	18	15	18	8	4.8	402	6.4	637	7.9	870
7'-0"	6'-8"	5'-8"	4'-11"	20	17	19	10	5.0	423	6.6	654	8.1	887
7'-6"	7'-2"	6'-2"	5'-5"	20	17	20	10	5.3	430	6.9	664	8.4	897
8'-0"	7'-8"	6'-8"	5'-11"	22	19	22	12	5.5	451	7.1	684	8.6	917
8'-6"	8'-2"	7'-2"	6'-5"	24	21	23	14	5.7	471	7.3	702	8.8	934
9'-0"	8'-8"	7'-8"	6'-11"	24	21	24	14	6.0	479	7.6	711	9.1	944
9'-6"	9'-2"	8'-2"	7'-5"	26	23	26	16	6.2	499	7.8	732	9.3	964
10'-0"	9'-8"	8'-8"	7'-11"	28	25	27	18	6.4	520	8.0	749	9.5	982
10'-6"	10'-2"	9'-2"	8'-5"	28	25	28	18	6.7	527	8.3	759	9.8	991
11'-0"	10'-8"	9'-8"	8'-11"	30	27	30	20	6.9	547	8.5	779	10.0	1012

NOTE: For L=5', L=10 and L=15'.
REGULAR INLETS: Total quantities needed are OUTSIDE of the heavy black line.
DROP BOX INLETS: Total quantities needed are INSIDE of the heavy black line.
STEEL WEIGHTS DO NOT INCLUDE STRUCTURAL STEEL.

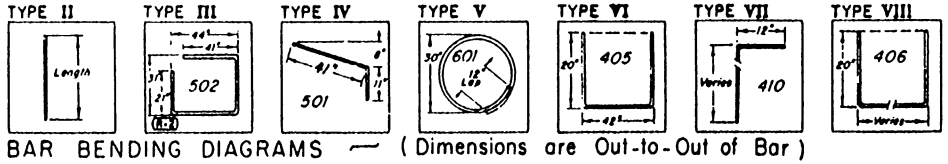




Approximate Weights:

Cover	= 125 lbs.
Ring	= 135 lbs.
TOTAL	= 260 lbs.

BAR BENDING DIAGRAMS – (Dimensions are Out-to-Out of Bar)



NOTE: FOR ALL INLETS, WHERE A 10' UPSTREAM TRANSITION GUTTER IS USED, THE CONCRETE QUANTY SHALL BE APPROX. 0.4 C.Y. MORE THAN THAT SHOWN.

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

All concrete shall be Class A or B (CDOH).

Concrete walls shall be formed on both sides and shall be 8" thick.

Inlet steps shall be as shown on the applicable (CDOH) Division "M" Standard.

Curb face assembly shall be galvanized after welding.

Exposed concrete corners shall be beveled to a 1-1/2" face. Curb and gutter corners shall be finished to match the existing curb and gutter beyond the transition gutter.

All reinforcing bars shall be tagged with bar designation and station number.

Reinforcing bars shall be deformed and shall be of intermediate grade steel.

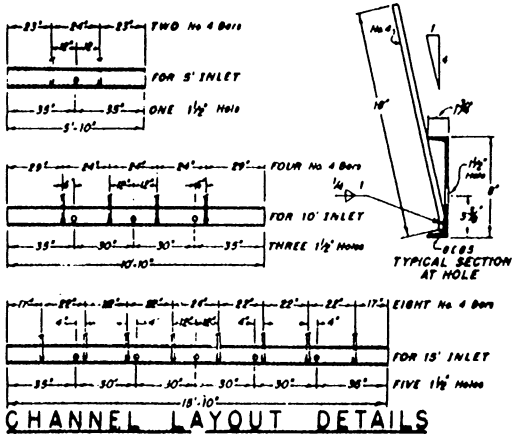
Dimensions and weights of typical manhole ring and cover are nominal.

All bars shall be a minimum 2" clear.

Since pipe entries into the inlet are variable, the dimensions shown are typical. Actual dimensions and quantities for concrete and reinforcement shall be as required in the work.

Quantities include volumes occupied by pipes.

Structural steel shall be galvanized and shall conform to the requirements of Section 509 (CDOH).



CHANNEL LAYOUT DETAILS

SPECIAL DESIGN INLET

CITY OF COLORADO SPRINGS, COLORADO.

COLORADO DEPARTMENT OF HIGHWAYS
CURB INLET TYPE R (MODIFIED)

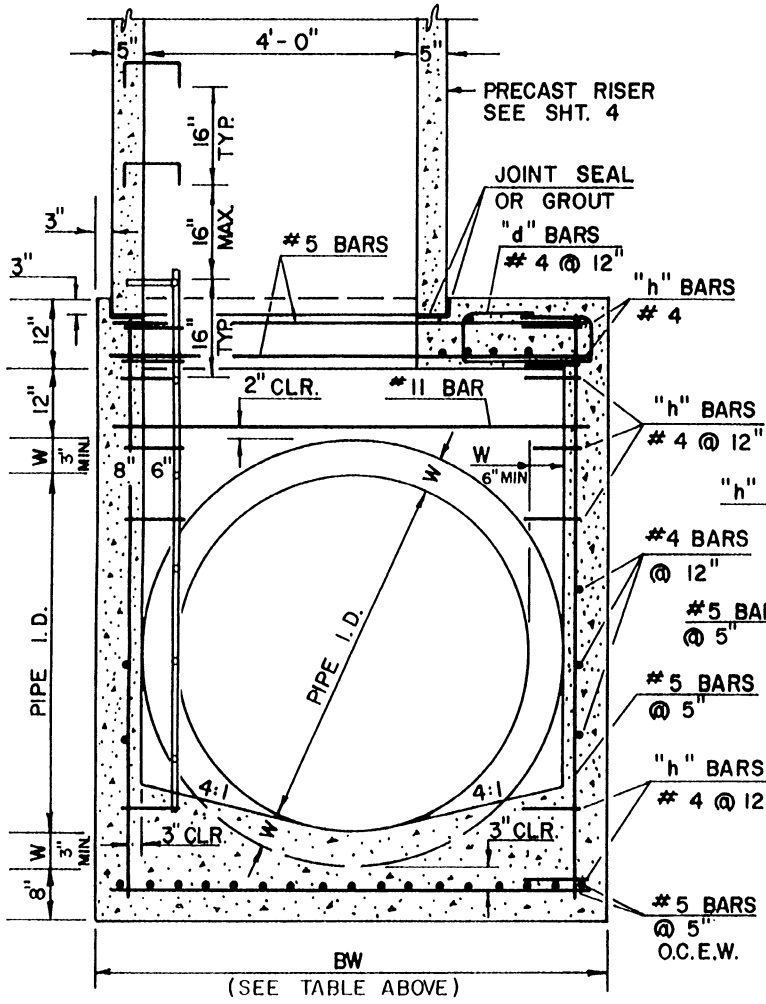
APPROVED BY: Gary R Haynes BAT
CITY ENGINEER

SCALE	DATE	DWN. BY	D-19B
AS SHOWN	SEPT. 87	JLO	SHT. 2 OF 2

REVISED JAN '89 PLB SPECIAL DESIGN I

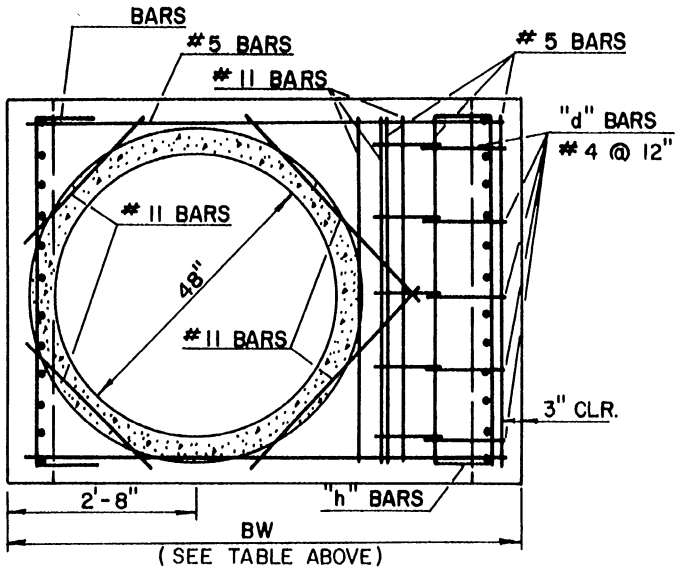
NOTE: THIS IS A SPECIAL DESIGN INLET TO BE USED ONLY WITH PRIOR APPROVAL BY THE CITY ENGINEER.

PIPE I.D.	BW
48" AND SMALLER	6'-4"
54"	6'-10"
60" AND LARGER	O.D.+16"



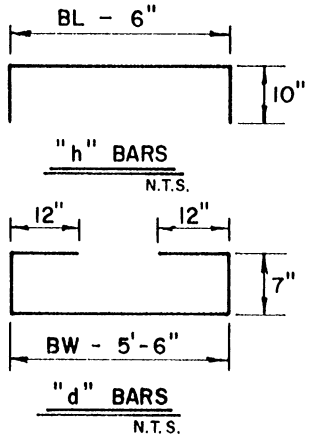
SECTION VIEW

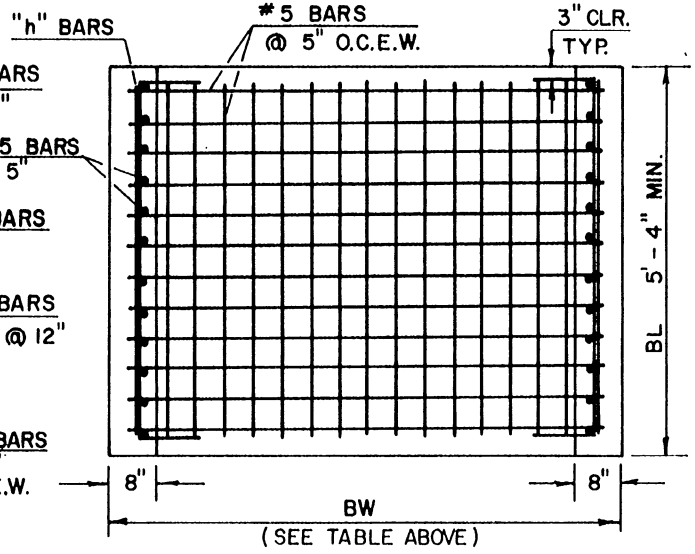
SCALE: 3/8" = 1'-0"



SLAB REINFORCING

SCALE: 3/8" = 1'-0"





BASE REINFORCING

SCALE: 3/8" = 1'-0"

NOTES

1. Type I manhole shall be used in all cases unless otherwise approved by the City Engineer
2. View and Details shown are typical for straight through design only. Design Engineer shall determine manhole base configuration and dimensions for particular pipe sizes and alignment.
3. Either ladder or steps shall be installed when manhole depth exceeds 30". Lowest step shall be a maximum of 16" above the floor.
4. Floor of the manhole shall be trowelled to a smooth, hard surface and shall slope towards the outlet (8:1 max., 1/2" per ft. min.). Floor shall be shaped and channelled; see sheet 2 for typical channel details.

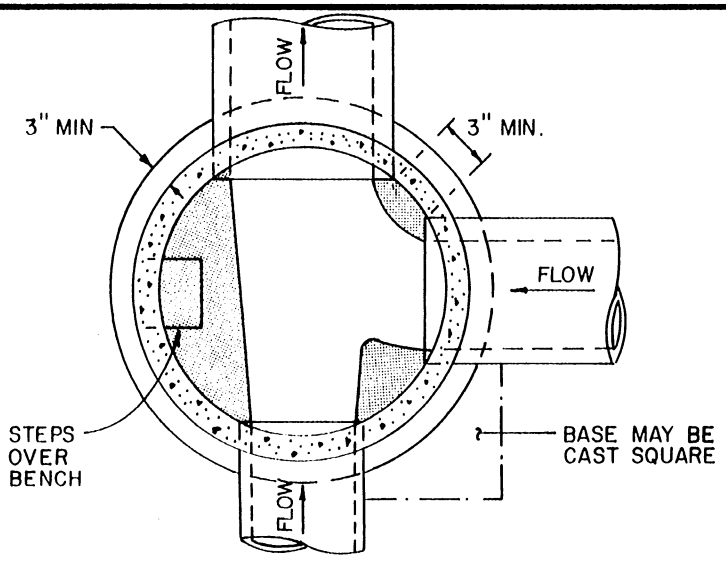
TYPE I BASE MANHOLE

CITY OF COLORADO SPRINGS

STORM SEWER MANHOLE-TYPE I

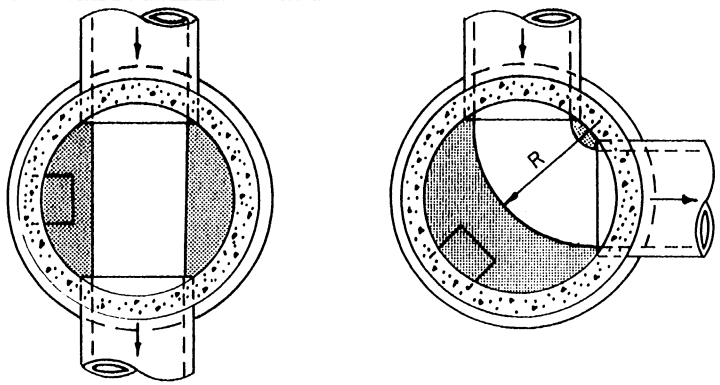
APPROVED BY Gary K. Haynes CITY ENGINEER

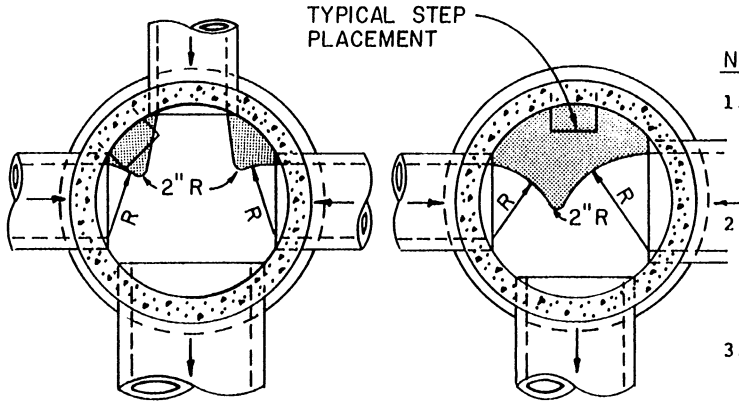
SCALE:	DATE:	DRAWN:	SHEET: D-20A
AS SHOWN	JAN. 89	P.L.B.	1 OF 4



PLAN VIEW OF BASE

SCALE 3/8"=1'-0"



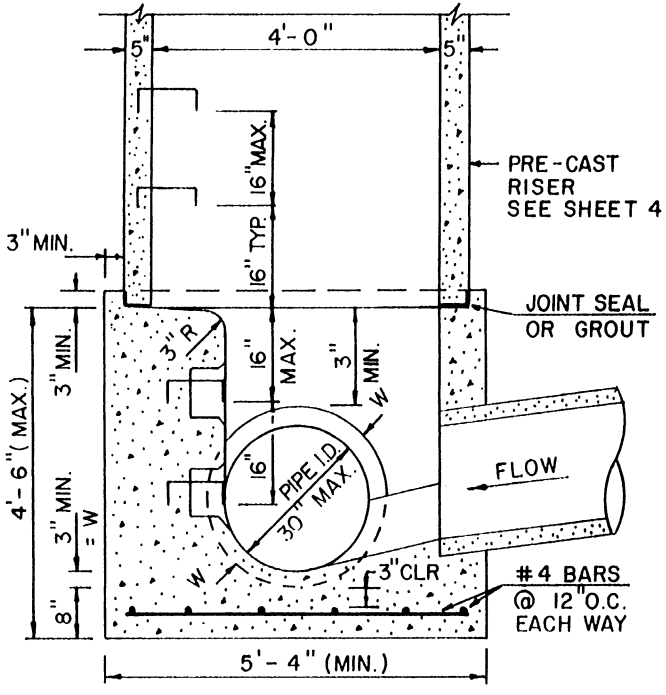


TYPICAL CHANNEL DETAILS

SCALE 1/4"=1'-0"

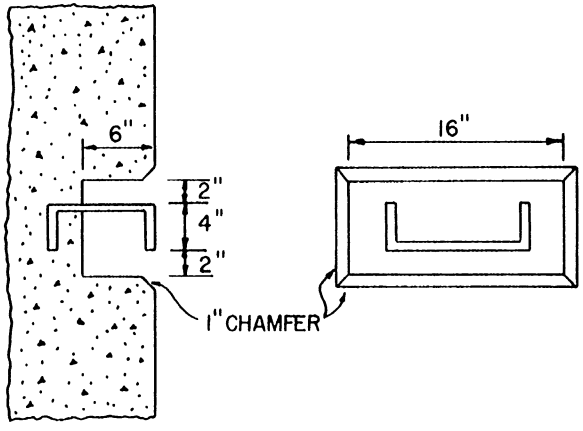
NOTES

1. Type II manholes shall be used only with approval of the City Engineer and only when the pipe sizes are 30" or less inside diameter.
2. View and Details are typical. Design Engineer shall determine manhole base configuration and dimensions for particular pipe sizes and alignment.
3. Either ladder or steps shall be installed when manhole depth exceeds 30". Steps in base shall be installed in "toe pockets" (see detail this sheet). Lowest step shall be a maximum of 16" above the floor.
4. Pipes shall be trimmed to final shape and set before manhole is poured.
5. Bench shall be sloped toward center of manhole base (4:1 max., 1/2" per ft. min.).
6. Floor of manhole shall be trowelled to a smooth, hard surface and shall slope towards the outlet (8:1 max., 1/2" per ft. min.). Floor shall be shaped and channelled; see details this sheet.



SECTION VIEW

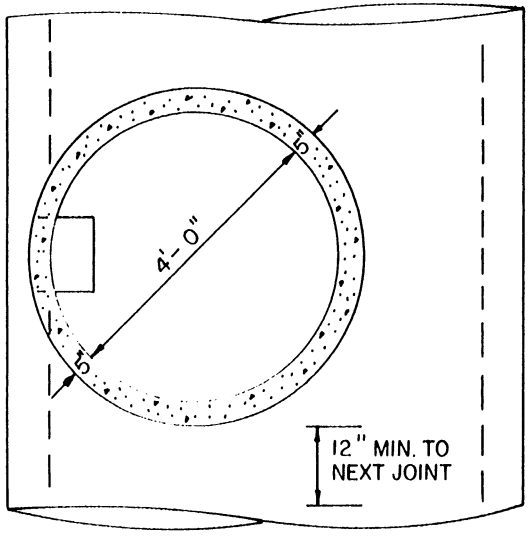
SCALE 3/8"=1'-0"



TOE POCKETS DETAILS

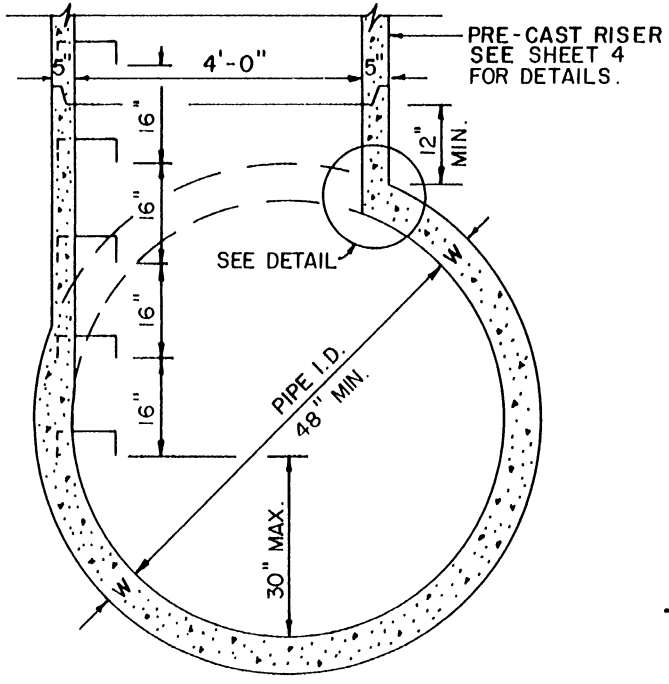
SCALE 3/4"=1'-0"

CITY OF COLORADO SPRINGS			
STORM SEWER MANHOLE-TYPE II			
APPROVED BY Jay R. Haynes CITY ENGINEER			
SCALE: AS SHOWN	DATE: JAN. 89	DRAWN: P.L.B.	SHEET: D-20 B OF 4



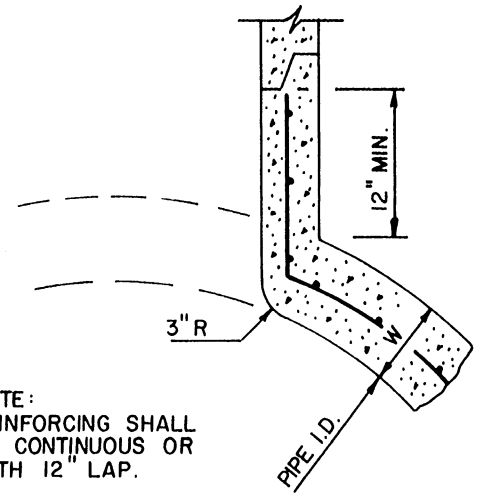
PLAN VIEW

SCALE 3/8"=1'-0"



SECTION VIEW

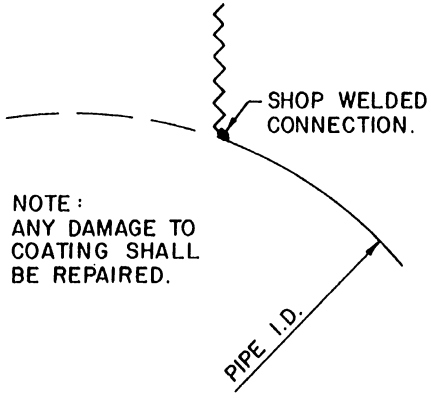
SCALE 3/8"=1'-0"



NOTE:
REINFORCING SHALL
BE CONTINUOUS OR
WITH 12" LAP.

R.C.P. CONNECTION DETAIL

SCALE 3/4"=1'-0"



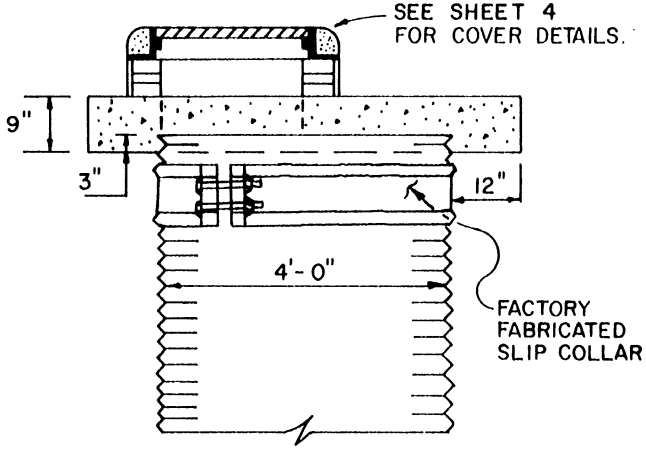
NOTE:
ANY DAMAGE TO
COATING SHALL
BE REPAIRED.

C.S.P. CONNECTION DETAIL

SCALE 3/4"=1'-0"

NOTES:

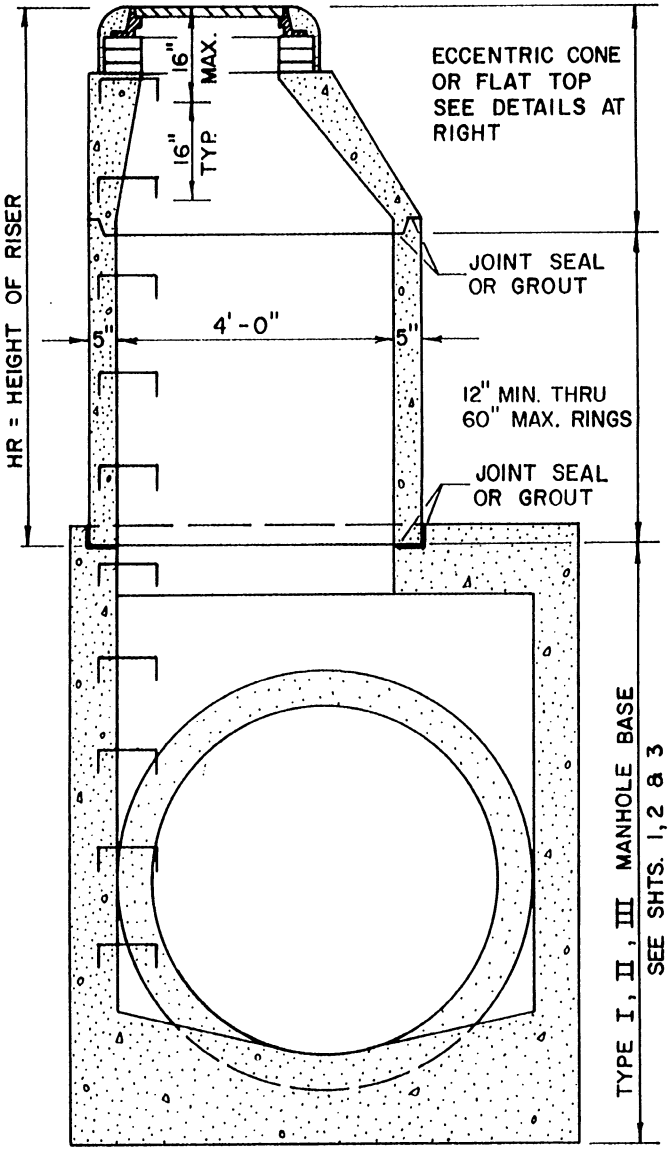
1. Type III manholes shall be used only with approval by the City Engineer and only when all of the following conditions are met:
   a. Pipe is 48" or larger inside diameter
   b. No change in pipe size
   c. No change in pipe material
   d. No change in horizontal alignment
   e. Slope is flat and continuous
2. Type III manholes shall be fabricated by the manufacturer/supplier and delivered to the site as a single unit. Field fabrication shall not be permitted.
3. Either ladder or steps shall be installed. Lowest step shall be a maximum of 30" above the invert of the pipe.



SPECIAL LID FOR USE WITH C.S.P. RISER.

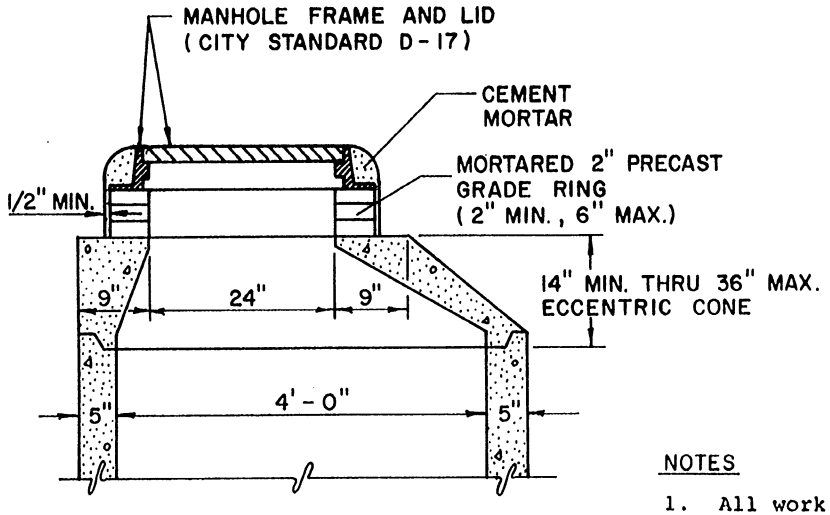
SCALE 3/8"=1'-0"

CITY OF COLORADO SPRINGS			
STORM SEWER MANHOLE-TYPE III			
APPROVED BY Gary R. Haynes CITY ENGINEER			
SCALE: AS SHOWN	DATE: JAN.89	DRAWN: P.L.B.	SHEET: D-20C 3 OF 4



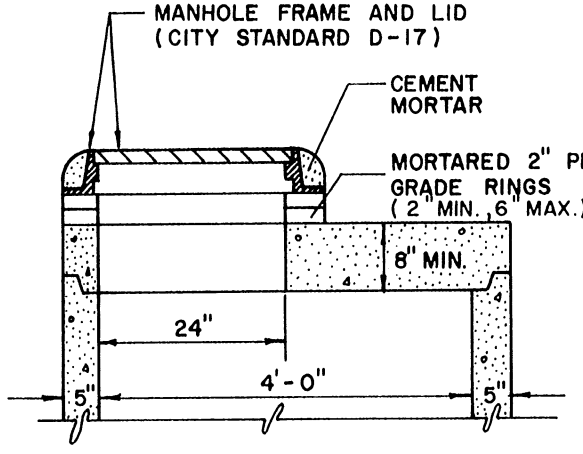
SECTION VIEW

SCALE: 3/8" = 1'-0"



ECCENTRIC CONE TOP

(FOR HR > 3' ±) SCALE: 1/2" = 1'-0"



ECCENTRIC FLAT TOP

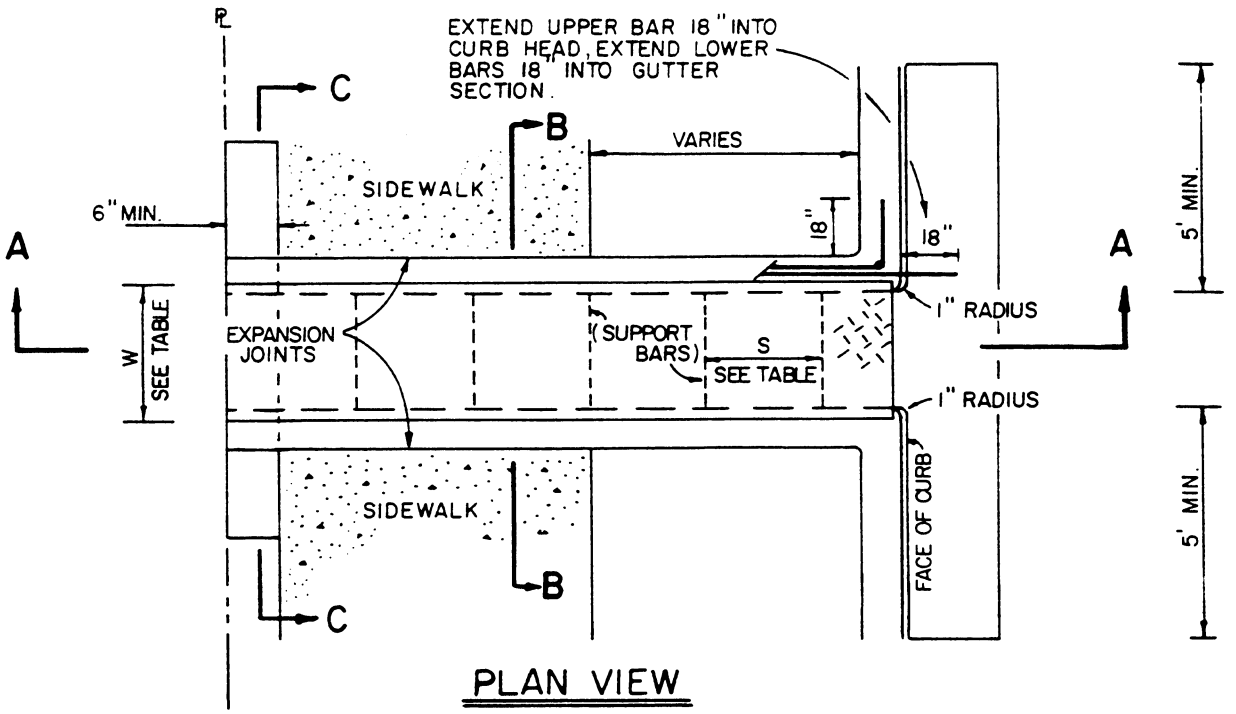
(FOR HR < 3' ±) SCALE: 1/2" = 1'-0"

NOTES

1. All work shall be done in accordance with the standard and supplemental specifications applicable to the project.
2. Precast risers shall conform to ASTM C-478.
3. Steps shall be installed when manhole depth exceeds 30". Steps shall be cast iron or extruded aluminum, 1000 lb. capacity, 12" wide with non-skid grooves and drop front on safety noses, in accordance with approved OSHA requirements.

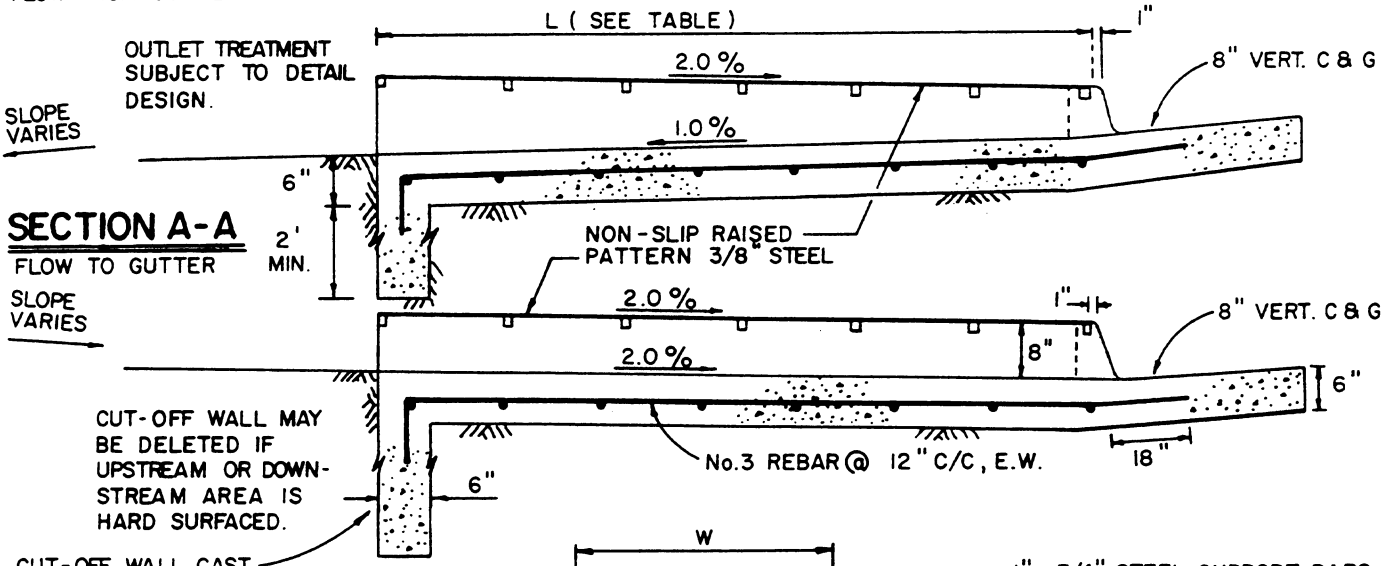
STORM SEWER MANHOLE PRECAST RISER

CITY OF COLORADO SPRINGS			
STORM SEWER-COVER & RISER			
APPROVED BY Gary R. Haynes CITY ENGINEER			
SCALE: AS SHOWN	DATE: JAN. 89	DRAWN: PLB	SHEET: D-20D 1 OF 4

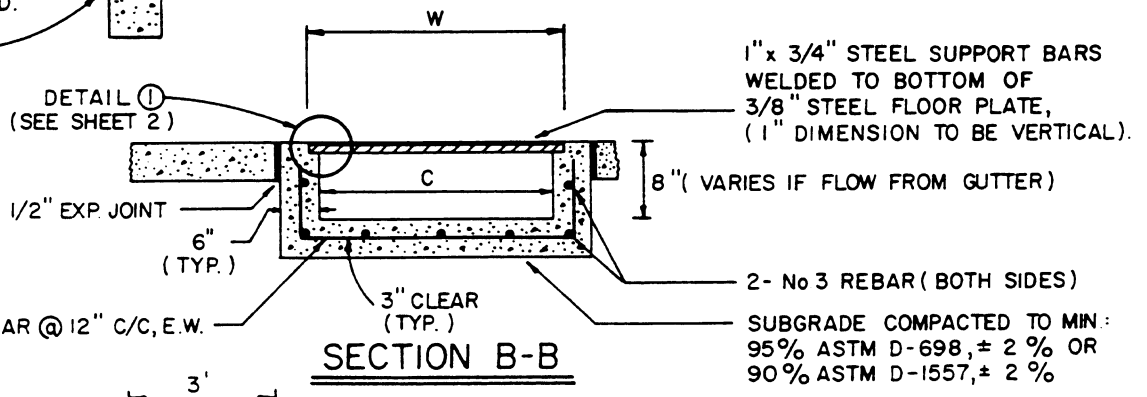


PLAN VIEW

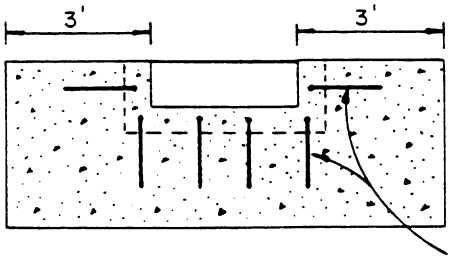
SECTION A-A
FLOW FROM GUTTER



SECTION A-A
FLOW TO GUTTER

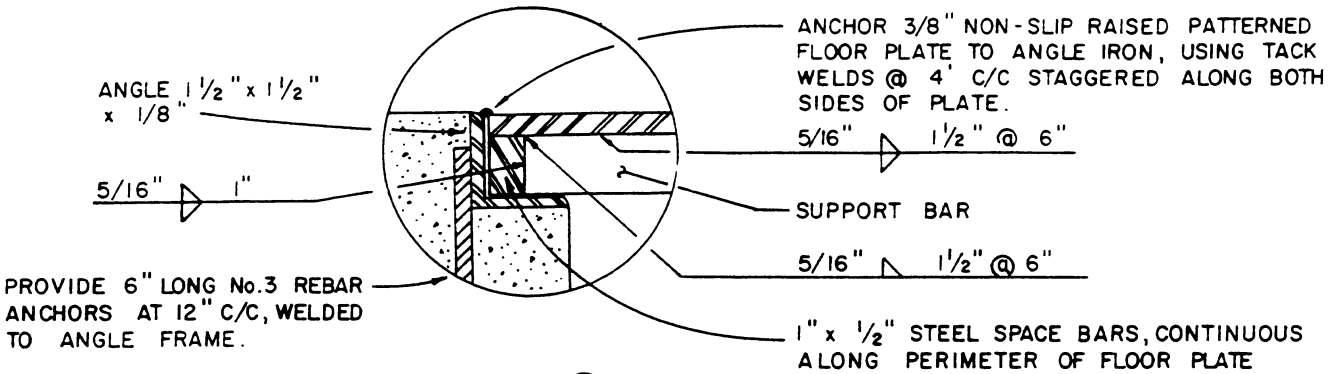


SECTION B-B



SECTION C-C

CITY OF COLORADO SPRINGS			
CURB OPENING DETAIL			
APPROVED BY Gary R. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: JAN. 89	DRAWN: P.L.B.	SHEET: D-21A 1 OF 2



DETAIL ①

TYPE OF WALK	MIN. TOTAL LENGTH (L) OF PLATE
ATTACHED	WALK WIDTH + 10 1/2"
DETACHED OR ROADWAYS WITHOUT WALKS	VARIES, HOWEVER ENTIRE CHASE SECTION SHALL BE COVERED WITHIN PUBLIC R.O.W. (SEE NOTE 5)

1" x 3/4" SUPPORT BAR REQUIREMENTS	
FLOOR PLATE WIDTH(W)	SUPPORT SPACING(S)
1'	NONE REQUIRED
2'	60" C/C
3'	27" C/C
4'	15" C/C
5'	10" C/C
6'	7" C/C

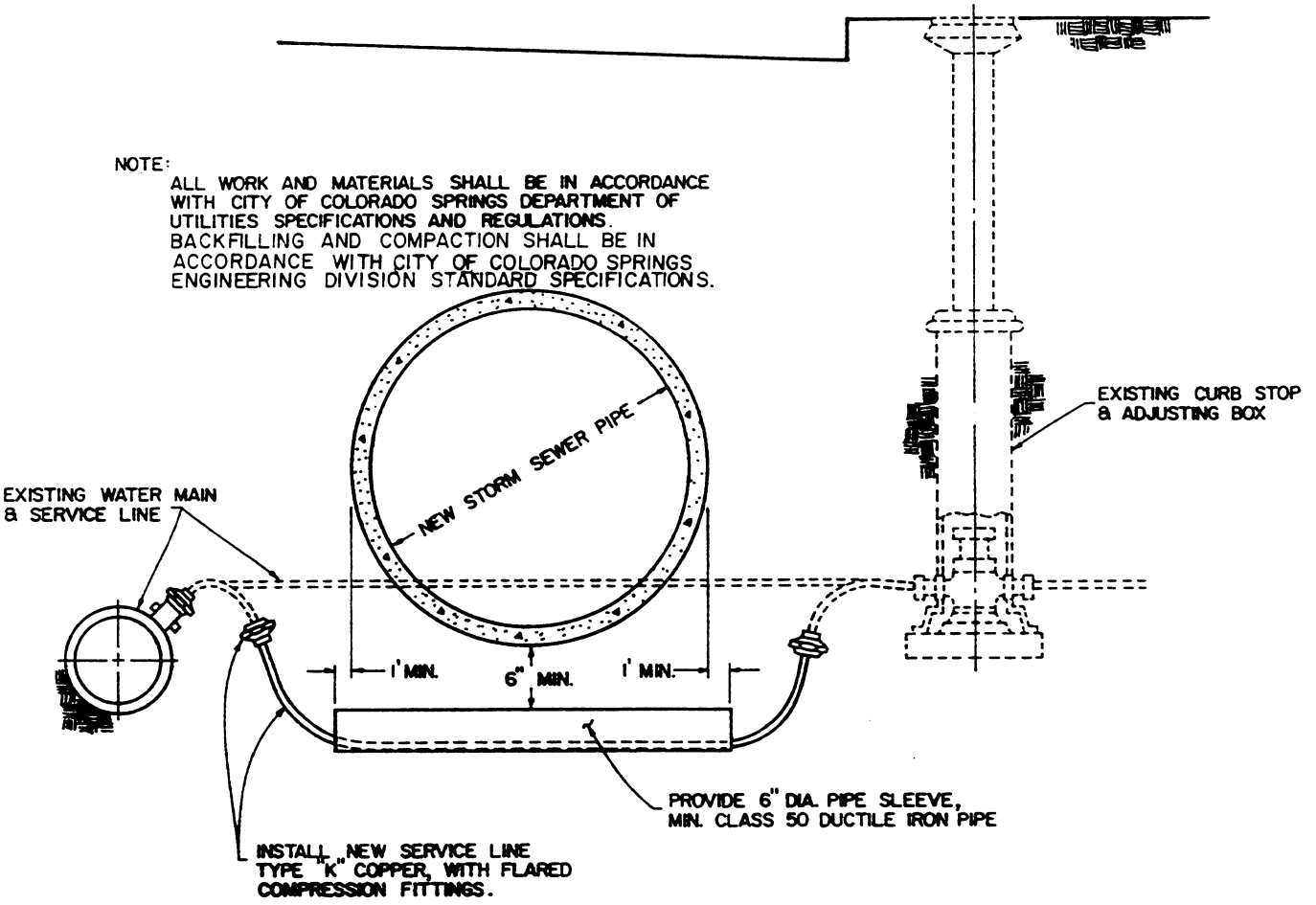
NOTE: EACH END OF FLOOR PLATE SHALL BE SUPPORTED BY SUPPORT BARS, WHEN SUPPORT BARS ARE SPECIFIED. CHASE OPENING (C) = W - 2 3/8"

NOTES:

1. ALL EXPOSED METAL TO BE HOT DIPPED ZINE COATED. FIELD WELDS TO BE TOUCH-UP WITH COLD ZINE COATING.
2. WHEN OTHER THAN TYPE I (8") CURB EXISTS, THE CONTRACTOR SHALL REMOVE THE EXISTING CURB TO ALLOW FOR THE REQUIRED TRANSITIONS, AS FOLLOWS: BEGINNING AT THE EDGE OF THE CHASE SECTION, THERE SHALL BE A MINIMUM OF 5 FEET OF TYPE I CURB PLUS 10 FEET OF TRANSITION TO EXISTING CURB TYPE.
3. ALL REMOVAL OF EXISTING CURB SHALL BE BY SAW-CUT, OR BY REMOVAL TO AN EXISTING EXPANSION OR COLD JOINT. REMAINING SECTION AFTER SAW CUTTING TO BE MINIMUM 4' IN LENGTH.
4. CHASE SECTION TO BE POURED MONOLITHICALLY WITH CURB & GUTTER SECTION AND CUT-OFF WALL.
5. WHEN CHASE SECTION LENGTH(L) EXCEEDS 15' PROVIDE TOOL JOINT IN CONCRETE AT MAXIMUM OF 10' SPACING. FABRICATE FLOOR PLATES IN MULTIPLE SECTION NOT TO EXCEED 10' IN LENGTH.

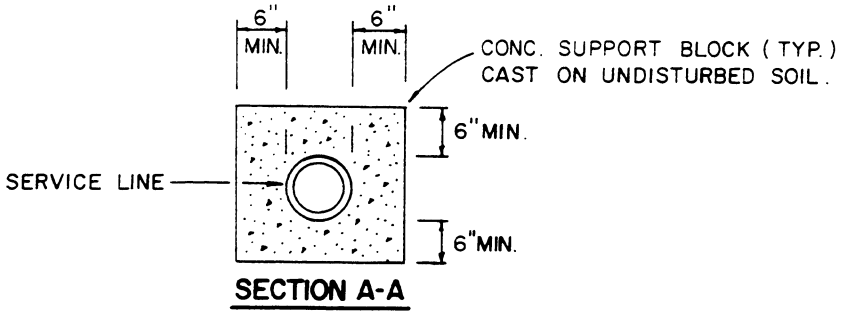
CITY OF COLORADO SPRINGS			
CURB OPENING DETAIL			
APPROVED BY Gary R. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: JAN. 89	DRAWN: P.L.B.	SHEET: D-21B 2 OF 2

NOTE:
ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF COLORADO SPRINGS DEPARTMENT OF UTILITIES SPECIFICATIONS AND REGULATIONS.
BACKFILLING AND COMPACTION SHALL BE IN ACCORDANCE WITH CITY OF COLORADO SPRINGS ENGINEERING DIVISION STANDARD SPECIFICATIONS.

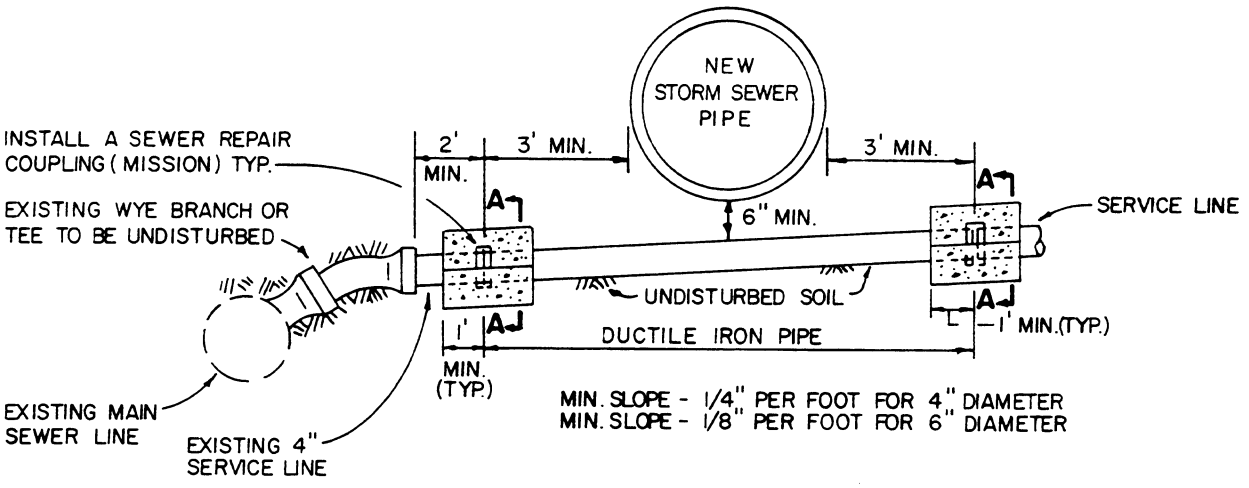


WATER SERVICE RELOCATION

CITY OF COLORADO SPRINGS			
WATER SERVICE RELOCATION			
APPROVED BY Gary R. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: JAN. 89	DRAWN: P.L.B.	SHEET: D-22 1 OF 1

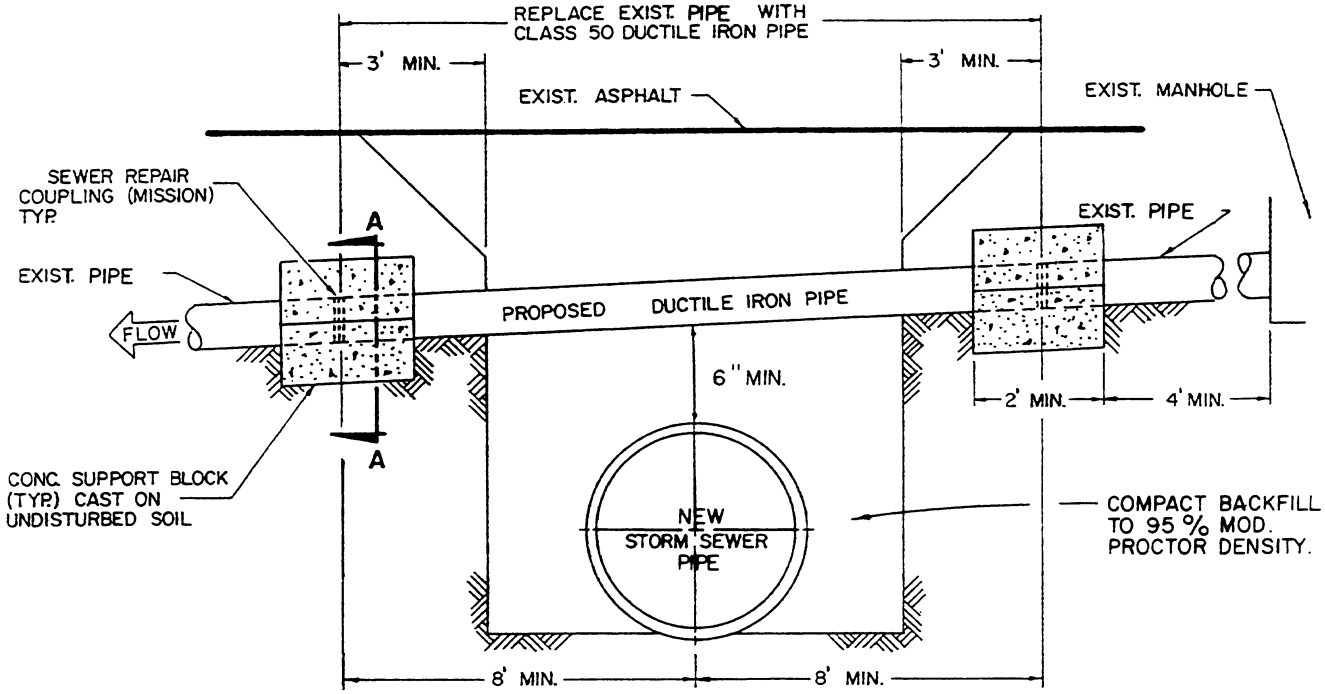


SECTION A-A



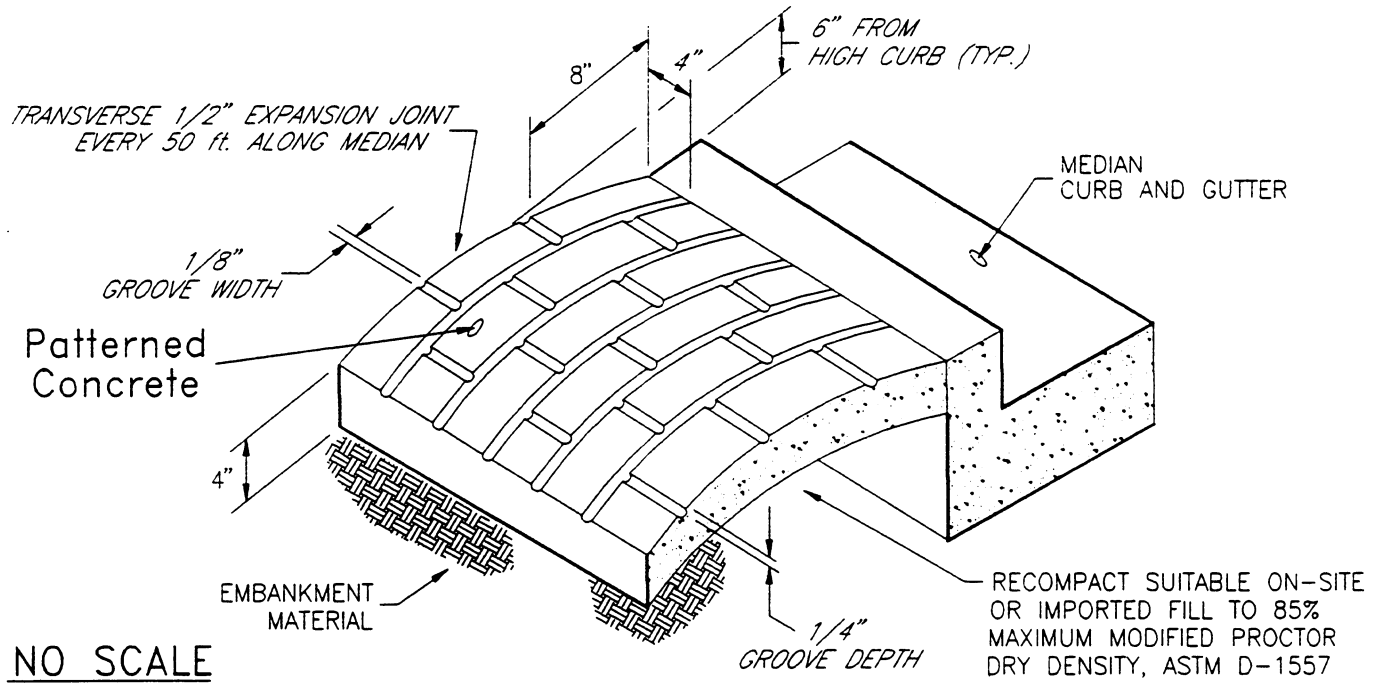
1. ALL FITTINGS AND MATERIALS NECESSARY ARE TO BE INCLUDED IN THE TOTAL COST OF RELOCATING SEWER SERVICE LINE.
2. ALL WORK SHALL BE ACCOMPLISHED UNDER THE OBSERVATION OF A COLORADO SPRINGS WASTEWATER DIVISION INSPECTOR AND THE ENGINEER.
3. SAW CUT EXISTING PIPE; JOIN TO D.I.P. WITH MISSION REPAIR COUPLING OR EQUIVALENT.
4. USE DUCTILE IRON PIPE (D.I.P.), CLASS 51 TO REPLACE EXISTING PIPE.
5. COMPACT BACKFILL FROM BOTTOM OF SANITARY SEWER TRENCH TO BOTTOM OF STORM SEWER TRENCH TO 95 % MOD. PROCTOR DENSITY AT EACH SANITARY SEWER REPLACEMENT.
6. IN ORDER TO CLEAR THE NEW STORM SEWER PIPING, RELOCATION OF AN EXISTING TAP MAY BE NECESSARY. NEW TAPS WILL BE ACCOMPLISHED PER CITY WASTEWATER DIVISION STANDARDS AND INCLUDE:
   (A) PLUG EXISTING TEE OR WYE AT THE MAIN WITH PREFORMED WATER-TIGHT PLUG
   (B) MAKE A NEW MACHINE CUT TAP DOWNSTREAM OF EXISTING TAP.
   (C) INSTALL NEW WYE SADDLE PER CITY STANDARDS.
   (D) INSTALL ADAPTER GASKET IN WYE FOR USE OF DUCTILE IRON PIPE BENEATH STORM SEWER.
7. IF GREATER THAN 18" CLEAR VERTICAL DISTANCE EXISTS BETWEEN NEW STORM SEWER PIPE AND SEWER SERVICE, THIS CROSSING DETAIL WILL NOT BE REQUIRED.

CITY OF COLORADO SPRINGS			
SEWER SERVICE RELOCATION			
APPROVED BY Gary R. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: JAN. 89	DRAWN: P.L.B.	SHEET D-23A 1 OF 2



NOTE : SEE SHEET 1 OF 2 FOR NOTES AND SECTION A - A DETAIL.

CITY OF COLORADO SPRINGS			
SEWER SERVICE RELOCATION			
APPROVED BY Gary R. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: JAN. 89	DRAWN: P.L.B.	SHEET D-23 B 2 OF 2



NO SCALE

NOTES

A) The median paving shall be constructed with 4 inch thick, integrally colored concrete, embossed with a running bond 4" x 8" brick pattern as shown.

B) Install 1/2" x 4" expansion material at median noses, fixed objects, and at transverse joints at 50 ft. intervals (maximum) along the median.

C) The color additive shall be an approved commercially pure or synthetic mineral pigment, factory formulated and packaged in cubic yard dosage increments. The mixture shall be "Chromix" as manufactured by L.M. Scofield Company, "Davis Colors" as manufactured by Davis Color Company, or approved equal.

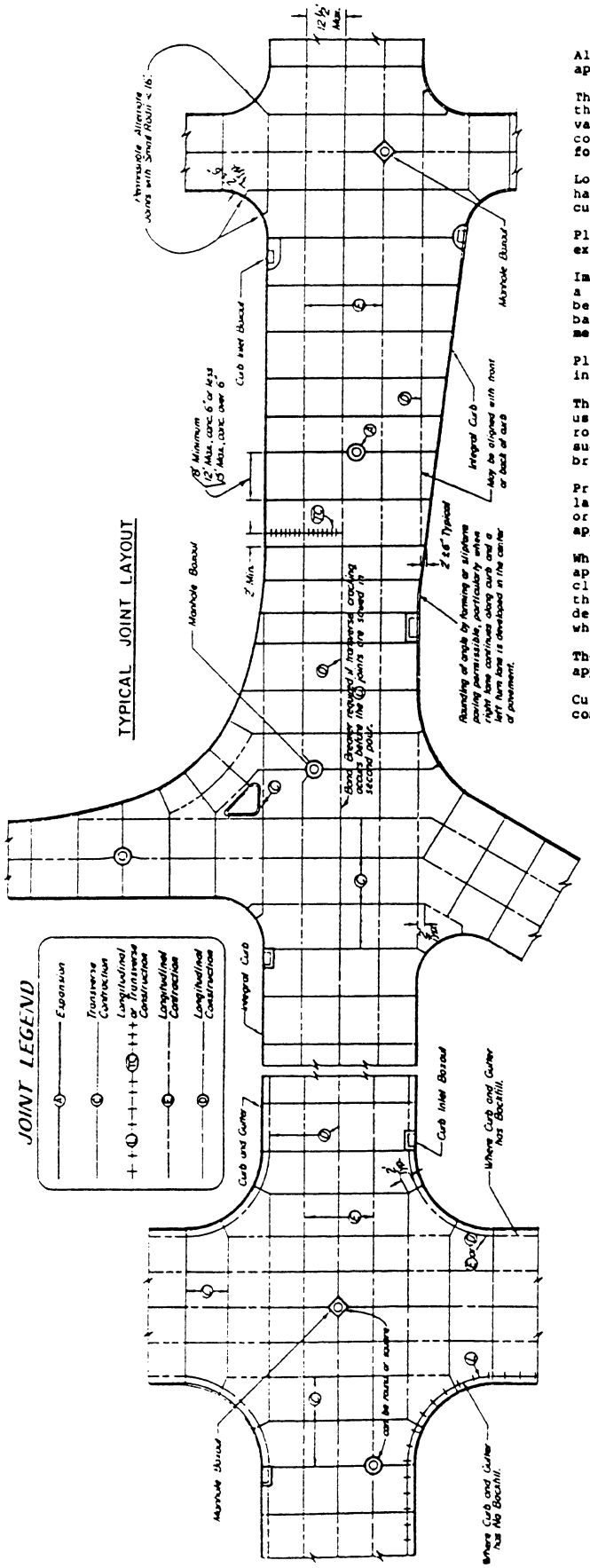
D) Patterned concrete to be colored L.M. Scofield Company "Santa Barbara Brown, C-35", Davis Color Company, Pigment No. 678, 5 lbs/sack, or an approved equal.

E) The matching curing compound shall be a blend of waxes and pigments in a solvent emulsion base and conform to the requirements of ASTM C-309. The curing compound shall be "Lithocrome Colorwax" as manufactured by L.M. Scofield Company, "Davis Color-Seal, as manufactured by Davis Color Company, or approved equal.

F) The concrete mix design shall conform to the requirements of the color admixture manufacturer and the following:
   1) 28 -day compressive strength = 3000 psi (min.)
   2) Water/Cement Ratio = 0.45 (max.)
   3) Cement Content = 6-1/2 sacks/C.Y. (min.) (Type II cement)
   4) Maximum Aggregate Size = 3/8"
   5) Entrained Air Content = 6% - 10%
   6) Slump = 4 inches (max.) - 1 inch (min.)

G) For weed control prior to median paving, apply a pre-emergent herbicide to median subgrade area per manufacturer's specifications for paving under the Barrier 50 Label (pbi Gordon). Trifluralin is labeled for use under asphalt under the Treflan 4EC label (Elanco).

CITY OF COLORADO SPRINGS			
Patterned Concrete Median Paving			
approved by: Gary R. Haynie	City Engineer		
Drawn By: JZ	Date: 04/93	STD. D-24	



GENERAL NOTES

All work shall be done in accordance with the standard specifications applicable to the project.

The typical joint layout shown is intended to be used as a standard for the joint layout for the project. If the Contractor proposes variations from this standard, or the project has unusual or irregular conditions not covered herein, he shall prepare a pavement joint layout for the variations and unusual conditions for approval by the Engineer.

Longitudinal joints shall coincide with lane markings, if possible, and have maximum spacing of 12.5'. The longitudinal joint closest to the curb shall be tied (≠) if there is no backfill behind the curb.

Place transverse joints perpedicular to the centerline of pavement and extend through the curb or curb and gutter.

Immediately after sawing, joints shall be cleaned of cement slurry with a pressurized water jet or other acceptable method. Joints shall also be cleaned with compressed air just ahead (100' or less) of placing backer rod and poured joint material. The Engineer may require other methods if necessary to clean joint.

Place 1/2" min. expansion joint filler in top 6 inches of curb of intersection return radius points.

The Contractor shall, unless otherwise shown on the plans, select and use either a boxout or bond breaker at catch basins, manholes and other roadway appurtenances of similar or large size. Small appurtenances, such as vlave and monument boxes, will not require a boxout or bond breaker.

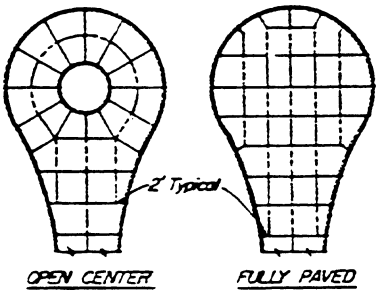
Preferred transverse joint locations are: more than 5 feet from a large appurtenance with no boxout; or at the midpoint of round boxouts or appurtenances; or at the corner of rectangular boxouts or appurtenances.

Where a longitudinal joint is located one foot or more clear of an appurtenance edge, a bond breaker may be used. With 2 feet or more clearance, either a bond breaker or boxout may be used. With less than these clearances, use the "Typical 2' Radial Joint" as shown in the details. Use of square or round boxout, or bond breaker is appropriate when the appurtenance is centered on a longitudinal joint.

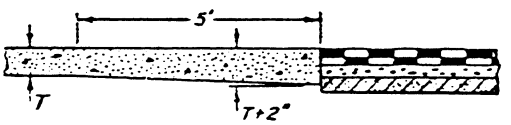
The final finish requirements of C.D.O.H., subsection 412.15 (f), shall apply except that transverse tined grooves will not be required.

Curb inlets may be constructed in vertical stages if it will facilitate continuous slipform paving.

CUL-DE-SAC

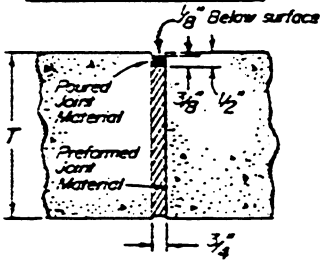


CONCRETE TO FLEXIBLE PAVEMENT TRANSITION

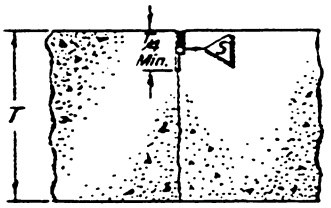


CITY OF COLORADO SPRINGS			
CONCRETE PAVEMENT – STANDARD JOINT LAYOUT			
APPROVED BY Gary K. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: FEB. 89	DRAWN: P.L.B.	SHEET D-25A 1 OF 3

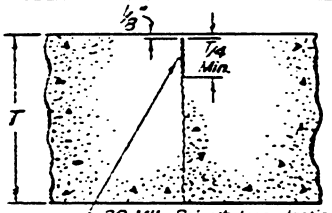
(A) EXPANSION JOINT



(C) TRANSVERSE CONTRACTION JOINT



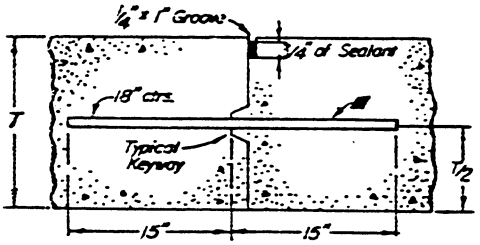
(C) ALTERNATE TRANSVERSE CONTRACTION JOINT



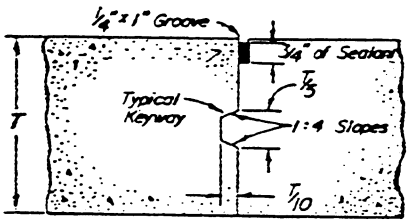
20 MIL Polyethylene plastic parting strip. Splice with ends butted.

(TC) TRANSVERSE CONSTRUCTION JOINT

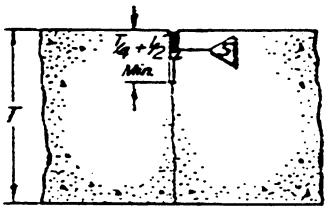
Required when pour has been interrupted more than 30 minutes and at end of a days pour.



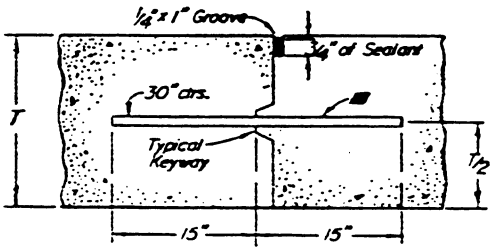
(D) LONGITUDINAL CONSTRUCTION JOINT



(E) LONGITUDINAL CONTRACTION JOINT

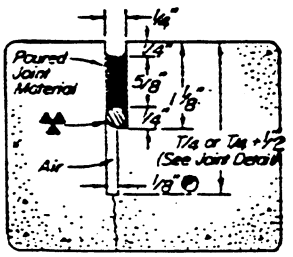


(L) LONGITUDINAL CONSTRUCTION JOINT (WITH TIE BARS)



■ — Bars shall be deformed reinforcing bars. No. 4 when T<8 and No. 5 when T>8.

SAWED JOINT

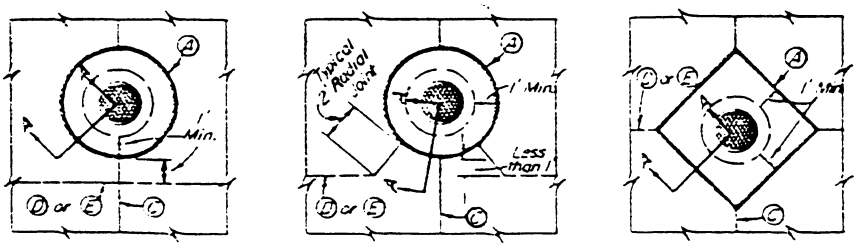


▲ Backer rod of open or closed cell polyurethane strand as approved.

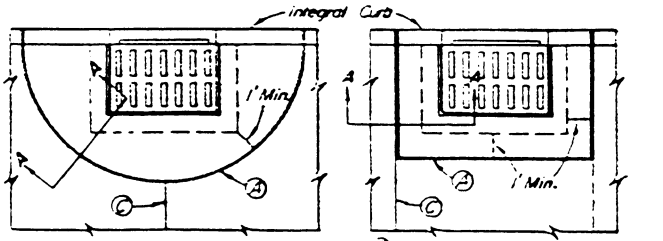
● May be 1/4" saw cut for it's full depth with joint material and backer rod at same depth shown.

CITY OF COLORADO SPRINGS			
CONCRETE PAVEMENT – STANDARD JOINT LAYOUT			
APPROVED BY Gary R. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: FEB. 89	DRAWN: P.L.B.	SHEET D-25B 2 OF 3

MANHOLE BOXOUT

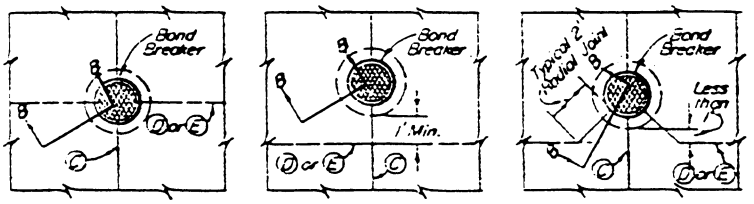


GRATED INLET BOXOUT

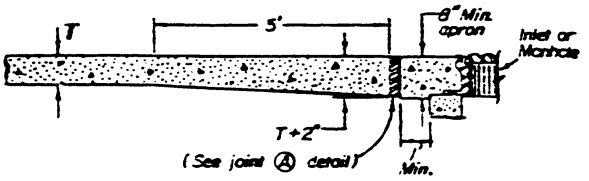


© Transverse joint at both boxout corners if boxout is 8' or longer.

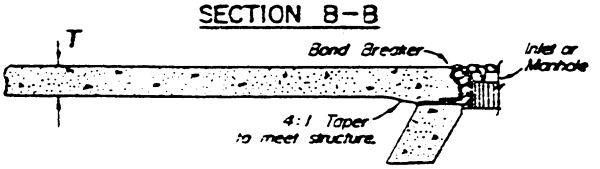
BOND BREAKER



SECTION A-A



SECTION B-B



Bond Breaker shall be composed of plastic sheet, building paper or other approved material to prevent bonding.

CITY OF COLORADO SPRINGS			
CONCRETE PAVEMENT - STANDARD JOINT LAYOUT			
APPROVED BY Gary K. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: FEB. 89	DRAWN: P.L.B.	SHEET D-25C 3 OF 3

STANDARD M-603-1

(SHEET 1 OF 2)
(JANUARY, 1982)

FEDERAL AID REGION NO.	DIVISION	PROJECT NO.	SHEET NO.
VIII	COLORADO		

REVISIONS

TABLE I - 2 2/3" x 1/2" CORRUGATIONS
ROUND STEEL PIPE

12" MIN. COVER *

PIPE DIA in	HEIGHT OF COVER LIMITS, M ft. WALL THICKNESS (Inches) 0.064	0.079	0.109	0.138	0.168
~~12~~	~~60~~	~~100~~	~~100~~	~~100~~	~~100~~
15	74	80	100	100	100
18	61	67	86	90	94
21	53	57	74	77	81
24	46	50	65	68	71
27	41	44	57	60	63
30	37	40	52	54	56
36	30	33	43	45	47
42	34	47	74	77	81
48	30	41	65	68	71
54		36	57	60	63
60			52	54	57
66				49	51
72				45	47
78					43
84					40

TABLE II - 3" x 1" CORRUGATIONS
ROUND STEEL PIPE

PIPE DIA in	* MIN. COVER in	HEIGHT OF COVER LIMITS, M ft. WALL THICKNESS (Inches) 0.064	0.079	0.109	0.138	0.168
36	12	53	66	98	100	100
42	12	45	56	84	100	100
48	12	39	49	73	88	98
54	12	35	44	65	78	87
60	12	31	39	58	70	78
66	12	28	36	53	64	71
72	12	26	33	49	58	65
78	12	24	30	45	54	60
84	12	22	28	42	50	56
90	12	21	26	39	47	52
96	12		24	36	44	49
102	18		23	34	41	46
108	18			32	39	43
114	18			30	37	41
120	18			29	35	39

** COVER GREATER THAN 90 FT. SHALL BE USED ONLY AFTER THOROUGH INVESTIGATION OF FOUNDATION MATERIAL.

TABLE III - 125mm x 25mm CORRUGATIONS
ROUND STEEL PIPE

PIPE DIA. In.	* MIN. COVER In.	HEIGHT OF COVER LIMITS, M ft. WALL THICKNESS (Inches) 0.064	0.079	0.109	0.138	0.168
48	12	39	49	73	88	98
54	12	35	44	65	78	87
60	12	31	39	58	70	78
66	12	28	36	53	64	71
72	12	26	33	49	58	65
78	12	24	30	45	54	60
84	12	22	28	42	50	56
90	12	21	26	39	47	52
96	12		24	36	44	49
102	18		23	34	41	46
108	18			32	39	43
114	18			30	37	41
120	18			29	35	39

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.

THE TABLES ON THESE SHEETS SHOW MINIMUM THICKNESS FOR STRUCTURAL REQUIREMENTS ONLY. THEY ARE INTENDED FOR USE ONLY WHERE CORROSIVE AND/OR ABRASIVE CONDITIONS ARE NEGLIGIBLE. HEAVIER METAL AND/OR PROTECTIVE COATINGS SHALL BE USED WHERE SITE INVESTIGATIONS INDICATE CORROSIVE AND/OR ABRASIVE CONDITIONS.

▼ PIPE-ARCH WITH EQUAL PERIPHERY AND WITH SPAN AND RISE DIMENSIONS APPROXIMATELY EQUAL TO THOSE REQUIRED BY PLANS WILL BE PERMITTED.

ADEQUATE COVER SHALL BE PROVIDED DURING CONSTRUCTION TO PROTECT THE STRUCTURE FROM DAMAGE.

PIPE SHALL BE PLACED WITH LONGITUDINAL SEAMS AT THE SIDES OR QUARTER POINTS BUT NOT ALONG TOP OF VERTICAL AXIS.

~~STRUCTURAL PLATE PIPES OF EQUAL OR GREATER DIAMETER, CONFORMING TO SECTION 240 OF THIS STANDARD SPECIFICATIONS, MAY BE SUBSTITUTED FOR THE PIPES ON THESE SHEETS AT NO ADDITIONAL COST TO THE PROJECT.~~

WHEN A CULVERT IS TO BE EXTENDED WITH PIPE OF A DIFFERENT MATERIAL, THE CONNECTION SHALL CONFORM TO THE DETAILS ON PLANS OR BE APPROVED.

EXTENSIONS FOR CMP ARCH CULVERT SHALL MATCH THE CORRUGATIONS AND THE SPAN AND RISE DIMENSIONS OF THE CULVERT TO BE EXTENDED.

THE MINIMUM COVER, EXCLUDING PAVEMENT, OVER CORRUGATED METAL PIPE CULVERT SHALL BE AS STAKED BY THE ENGINEER, BUT SHALL NOT BE LESS THAN SHOWN IN THE TABLES ON THESE SHEETS.

~~BACKFILL AND COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 206.~~

TRENCH INSTALLATION:
INSTALLATION AND MAXIMUM FILL HEIGHTS SHALL CONFORM TO THE "M" STANDARD FOR "PIPE SEWER IN TRENCH".

* Top of Pipe to Top of Subgrade

ROUND PIPE — STEEL
PIPE-ARCH — STEEL

TABLE IV — 2 2/3" x 1/2" CORRUGATIONS
STEEL PIPE-ARCH (2)

12" MIN. COVER *

PIPE SIZE ▼ In. SPAN x RISE	EQUIV. DIA. In	WALL THICKNESS In.	HEIGHT OF COVER LIMITS, M ft. CORNER BEARING PRESSURE 2 Tons Per Sq. Ft. CORNER RADII	
17 x 13	15	0.064	3"	11
21 x 15	18	0.064	3"	9
24 x 18	21	0.064	3"	8
28 x 20	24	0.064	3"	7
35 x 24	30	0.064	3"	5
42 x 29	36	0.064	3 1/2"	5
49 x 33	42	0.079	4"	5
57 x 38	48	0.109	5"	5
64 x 43	54	0.109	6"	6
71 x 47	60	0.138	7"	6
77 x 52	66	0.168	8"	6
83 x 57	72	0.168	9"	7

TABLE V — 3" x 1" & 125 mm x 25 mm CORRUGATIONS
STEEL PIPE-ARCH (2)

PIPE SIZE ▼ In. SPAN x RISE	EQUIV. DIA. In.	WALL THICKNESS In.	* MIN. COVER In.	HEIGHT OF COVER LIMITS, M ft. CORNER BEARING PRESSURE 2 Tons Per Sq. Ft. CORNER RADII	
40 x 31	36	0.064	12	8"	8
46 x 34	42	0.064	12	8"	8
53 x 41	48	0.064	12	7"	8
60 x 46	54	0.064	12	8"	8
66 x 51	60	0.064	12	9"	9
73 x 55	66	0.064	12	12"	10
81 x 59	72	0.064	12	14"	11
87 x 63	78	0.064	12	14"	10
95 x 67	84	0.079	12	16"	11
103 x 71	90	0.109	18	16"	10
112 x 75	96	0.109	18	18"	10
117 x 79	102	0.109	18	18"	10
128 x 83	108	0.138	24	18"	9
137 x 87	114	0.138	24	18"	8
142 x 91	120	0.168	24	18"	8

(2) PIPE-ARCH IS INTENDED FOR USE WHERE MINIMUM COVER REQUIREMENTS FOR ROUND PIPE CAN NOT BE MET.
WHEN COVER EXCEEDS 15 FT. - USE ROUND PIPE.

▼ SEE THIRD GENERAL NOTE.

Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

CITY OF COLORADO SPRINGS

METAL CULVERT PIPE

APPROVED BY Gary R. Haynes
CITY ENGINEER

SCALE:	DATE:	DRAWN:	SHEET
NO SCALE	JAN. 90	P.L.B.	D - 26

STANDARD M-510-1

(SHEET 1 OF 2)
(JANUARY, 1982)

REGION NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO			

REVISIONS

TABLE I — 6" x 2" CORRUGATIONS ROUND STEEL PIPE

PIPE DIA. In.	* MIN. COVER In.	HEIGHT OF COVER LIMITS, H Ft. — WALL THICKNESS (Inches) 0.109	0.138	0.166	0.188	0.218	0.249	0.280
60	12	47	68	90	100	100	100	100
66	12	43	62	81	93	100	100	100
72	12	39	57	75	86	100	100	100
78	12	36	52	69	79	95	100	100
84	12	34	49	64	73	88	100	100
90	12	31	45	60	68	82	97	100
96	12	29	43	56	64	77	91	100
102	18	28	40	52	60	73	86	94
108	18	26	38	50	57	69	81	88
114	18	25	36	47	54	65	77	84
120	18	23	34	45	51	62	73	80
126	18	22	32	42	49	59	69	76
132	18	21	31	40	46	56	66	72
138	18	20	29	39	44	54	63	69
144	18	19	28	37	43	51	61	66
150	24	19	27	36	41	49	58	64
156	24	18	26	34	39	47	56	61
162	24	17	25	33	38	46	54	59
168	24	17	24	32	36	44	52	57
174	24	16	23	31	35	42	50	55
180	24	15	22	30	34	41	48	53
186	24	15	22	29	33	40	47	51
192	24		21	28	32	38	45	50
198	30		20	27	31	37	44	48
204	30		20	26	30	36	43	47
210	30		19	25	29	35	41	45
216	30			25	28	34	40	44
222	30			24	27	33	39	43
228	30			23	27	32	38	42
234	30			23	26	31	37	41
240	30				25	31	36	40
246	36				25	30	35	39
252	36					29	34	38
258	36					28	34	37
264	36					28	33	36
270	36					27	32	35
276	36						31	34
282	36						31	34
288	42						30	33
294	42							32
300	42							32
306	42							31

TABLE II — 6" x 2" CORRUGATIONS STEEL PIPE-ARCH (M)

PIPE SIZE▼ Ft - In. SPAN x RISE	* MIN. COVER In.	MIN. WALL THICKNESS In.	HEIGHT OF COVER LIMITS, H Ft. — CORNER BEARING PRESSURE 2 Tons Per Sq. Ft.
6-1 x 4-7	12	0.109	15
6-4 x 4-9	12	0.109	15
6-9 x 4-11	12	0.109	14
7-0 x 5-1	12	0.109	14
7-3 x 5-3	12	0.109	13
7-8 x 5-5	12	0.109	13
7-11 x 5-7	12	0.109	12
8-2 x 5-9	18	0.109	12
8-7 x 5-11	18	0.109	11
8-10 x 6-1	18	0.109	11
9-4 x 6-3	18	0.109	10
9-6 x 6-5	18	0.109	10
9-9 x 6-7	18	0.109	10
10-3 x 6-9	18	0.109	9
10-8 x 6-11	18	0.109	9
10-11 x 7-1	18	0.109	9
11-5 x 7-3	18	0.109	8
11-7 x 7-5	18	0.109	7
11-10 x 7-7	18	0.109	7
12-4 x 7-9	30	0.109	6
12-6 x 7-11	30	0.109	6
12-8 x 8-1	30	0.109	6
12-10 x 8-4	30	0.109	6
13-3 x 8-4	30	0.109	13
13-6 x 9-6	30	0.109	12
14-0 x 9-8	30	0.109	12
14-2 x 9-10	30	0.109	12
14-5 x 10-0	30	0.109	11
14-11 x 10-2	30	0.109	11
15-4 x 10-4	30	0.109	11
15-7 x 10-6	30	0.109	11
15-10 x 10-8	30	0.109	10
16-3 x 10-10	30	0.138	10
16-8 x 11-0	30	0.138	10
17-0 x 11-2	30	0.138	10
17-2 x 11-4	30	0.138	10
17-5 x 11-6	30	0.138	9
17-11 x 11-8	30	0.138	9
18-1 x 11-10	30	0.168	9
18-7 x 12-0	30	0.168	9
18-9 x 12-2	30	0.168	9
19-3 x 12-4	30	0.168	8
19-6 x 12-6	30	0.168	8
19-8 x 12-8	30	0.168	7
19-11 x 12-10	30	0.168	7
20-5 x 13-0	36	0.188	7
20-7 x 13-2	36	0.188	6

18" / 31" — CORNER RADII

* — TOP OF PIPE TO TOP OF SUBGRADE.

(M) — PIPE-ARCH IS INTENDED FOR USE WHERE MINIMUM COVER REQUIREMENTS FOR ROUND PIPE CAN NOT BE MET. USE ROUND PIPE WHEN COVER EXCEEDS 15 FEET.

H — HEIGHT OF COVER LIMIT, IN FEET, MAXIMUM HEIGHT OF FILL OVER TOP OF CULVERT, INCLUDING PAVEMENT.

Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.

PIPE OR PIPE-ARCH WITH ENDS CUT TO FIT A SLOPE, SHALL BE REINFORCED AND THE DETAILS SHALL BE AS SHOWN ON THE LAYOUT FOR THE STRUCTURE ON THE PLANS.

WHERE MULTIPLE PIPES ARE USED, THEY SHALL BE SPACED SO THAT ADJACENT SIDES OF THE PIPE SHALL BE AT LEAST ONE-HALF DIAMETER OR ONE-HALF SPAN APART TO PERMIT CAREFUL TAMPING OF THE BACKFILL MATERIAL, EXCEPT THAT THE CLEAR DISTANCE BETWEEN ADJACENT SIDES NEED NOT BE MORE THAN 3 FEET.

DURING CONSTRUCTION, ADEQUATE COVER SHALL BE PROVIDED TO PROTECT THE STRUCTURE FROM DAMAGE.

COVER GREATER THAN 100 FEET SHALL BE USED ONLY AFTER THOROUGH INVESTIGATION OF FOUNDATION MATERIAL.

▼ — PIPE-ARCH WITH EQUAL PERIPHERY AND WITH SPAN AND RISE DIMENSIONS APPROXIMATELY EQUAL TO TO THOSE REQUIRED BY PLANS WILL BE PERMITTED.

~~PIPE OR PIPE-ARCH IN ACCORDANCE WITH SECTION 603 SHALL NOT BE SUBSTITUTED FOR STRUCTURAL PLATE PIPE OR PIPE-ARCH.~~

CITY OF COLORADO SPRINGS

STRUCTURAL PLATE CULVERT PIPE

APPROVED BY Gary R. Haynes
CITY ENGINEER

SCALE:	DATE:	DRAWN:	SHEET
NO SCALE	JAN. 90	P.L.B.	D-27

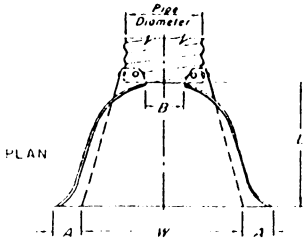
Adopted from and in conformance with the
State of Colorado Department of Highways
with Revisions by the City of Colorado
Springs Engineering Division

STANDARD M-603-10

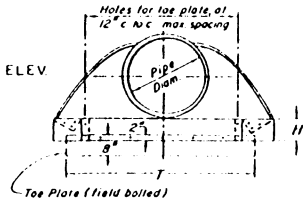
(JANUARY, 1982)

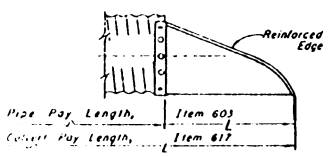
FEDERAL HIGHWAY REGION NO	DIVISION	PROJ NO	SHEET NO	TOTAL SHEETS
VIII	COLORADO			

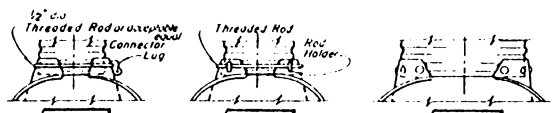
REVISIONS



PIPE DIAM in	THICKNESS in	DIMENSIONS A (1'-2) in	B (Max) in	H (1'-2) in	L (1½'-2) in	W (2'-2) in	T in
15	.064	7	8	6	26	30	40
18	.064	8	10	6	31	36	46
21	.064	9	12	6	36	42	52
24	.064	10	13	6	41	48	58
30	.079	12	16	8	51	60	70
36	.079	14	19	9	60	72	94
42	.109	16	22	11	69	84	106
48	.109	18	27	12	78	90	112
54	.109	18	30	12	84	102	124







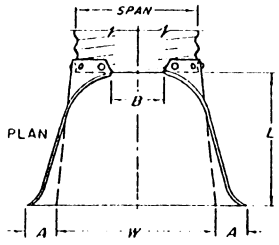
For 12" thru 24" pipe with annular corrugations. Not to be used on helically formed pipe unless recorrugated.

For 30" thru 36" pipe with annular corrugations. Not to be used on helically formed pipe unless recorrugated

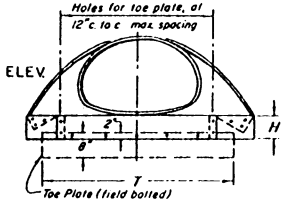
For 42" thru 84" pipe with annular corrugations and all sizes with helical corrugations. Snap attach a 2 ft max length of annular pipe with galv. rivets or bolts, spot welds, or 2" long weld at 8" ctrs. Repair burnt galv. per Specs.

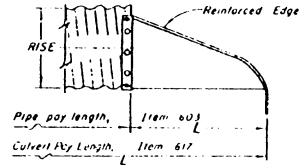
TYPICAL CONNECTIONS

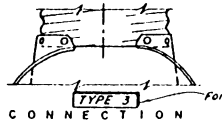
END SECTION AND CONNECTION DETAILS FOR ROUND CORRUGATED METAL PIPE CULVERTS



PIPE ARCH SPAN x RISE in	in	THICKNESS in	DIMENSIONS A (1'-2) in	B (Max) in	H (1'-2) in	I (1½'-2) in	W (2'-2) in	T in
17	13	.064	7	9	6	19	30	40
21	15	.064	7	10	6	23	36	46
24	18	.064	8	12	6	28	42	52
28	20	.064	9	14	6	32	48	58
35	24	.079	10	16	6	39	60	70
42	29	.079	12	18	8	46	73	85
49	33	.109	13	21	9	53	85	103
57	38	.109	18	26	12	63	90	108
64	43	.109	18	30	12	70	102	120
~~71~~	~~43~~	~~.109~~						







For all sizes of pipe with Annular or Helical corrugations

CONNECTION

NOTE:
End sections for pipe arches shall be shop attached to a minimum 2 ft of pipe with galvanized rivets or bolts, or by welding

END SECTION AND CONNECTION DETAIL FOR CORRUGATED METAL PIPE ARCH CULVERT

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project

Concrete End Sections are to be furnished with tongue or groove as req'd.

~~Alternate equivalent designs for Concrete End Sections may be submitted to the Division for approval.~~ Design length of culvert is based on length of End Section shown in table. Additional pipe required to provide the design length of the culvert shall be furnished by and at the expense of the Contractor.

Other sizes of concrete pipe and end sections may be available upon request, however, the designer should contact supplier prior to calling for sizes other than those shown on this standard.

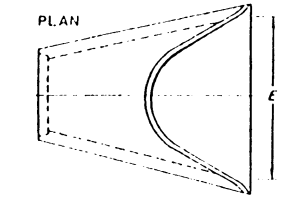
Inside configuration and joint of concrete end section and pipe shall match.

End sections for CMP Arch Culvert shall match the dimensions of the culvert shown on plans.

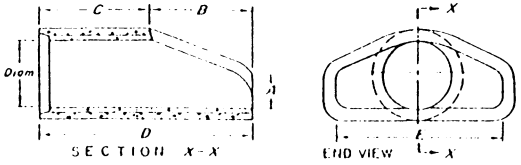
Galvanized Toe Plate as shown will be required on End Sections for corrugated steel pipe and shall be same thickness as End Sections. Toe Plate shall be field bolted to End Section with ⅜" galvanized bolts, nuts and washers.

~~Designs for Aluminum End Sections for use on aluminum culverts shall be submitted to the Division for approval prior to use.~~

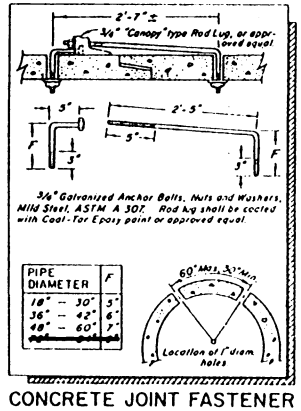
Concrete Pipe Joint Fasteners, where shown on plans, shall be installed so that a minimum of 15 linear feet of the outlet end of the pipe are mechanically locked together. End Section lengths, when used, will be included in the 15 l.f. requirement.



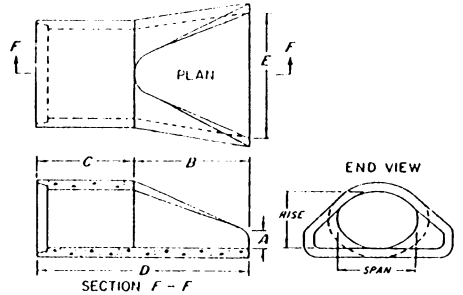
PIPE I.D. in	DIMENSIONS A in	B in	C in	D in	E in
15	7	26	47	73	29
18	11½	26	48	74	36
24	12	43	54	97	48
30	17	53	43	96	60
36	18	60	37	97	71
42	24	61	36	97	78
48	29	70	28	98	84
54	27	63	35	100	90
~~60~~	~~30~~	~~66~~	~~34~~	~~100~~	~~96~~



END SECTION FOR REINFORCED CONCRETE CIRCULAR PIPE



CONCRETE JOINT FASTENER



EQUIVALENT CIRCULAR DIAM (Inches)	NOMINAL (in) SPAN	RISE	DIMENSIONS (Inches) A	B	C	D	E
24	30	19	8½	39	53	72	48
30	38	24	9½	54	18	72	60
36	45	29	11⅛	60	24	84	72
42	53	34	13¾	60	36	96	78
48	60	38	21	60	36	96	84
54	69	43	23½	60	36	96	90
~~60~~	~~76~~	~~48~~	~~24~~	~~60~~	~~36~~	~~96~~	~~96~~

END SECTION FOR REINFORCED CONCRETE ELLIPTICAL PIPE

CITY OF COLORADO SPRINGS			
CONCRETE AND METAL END SECTIONS			
APPROVED BY Guy R. Hymes CITY ENGINEER			
SCALE: NO SCALE	DATE: JAN. 90	DRAWN: P.L.B.	SHEET D-28

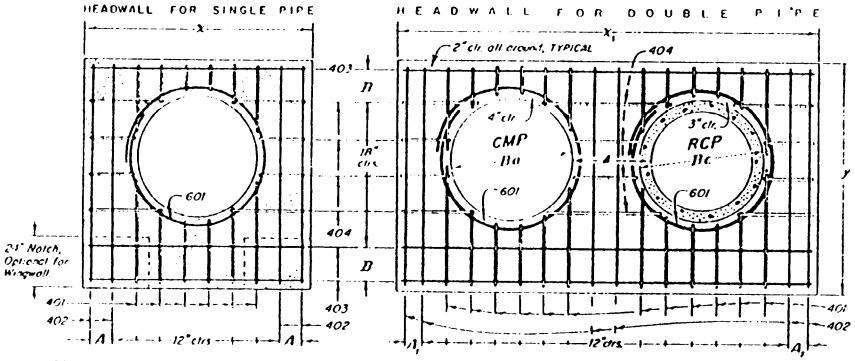
Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

*Depth of toe wall to be increased if required by scour potential. Indicate dimension on plan.

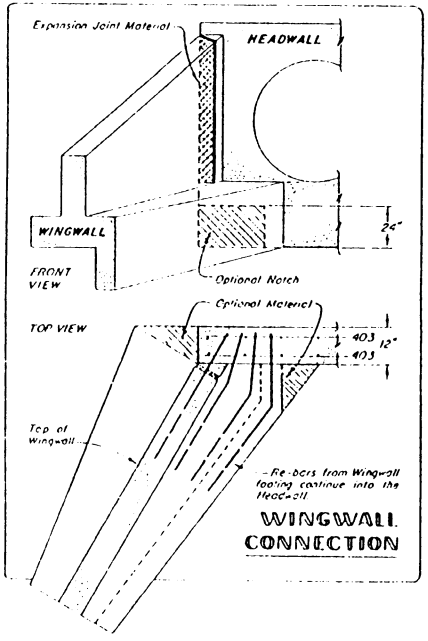
STANDARD M-601-10

(JANUARY, 1982)

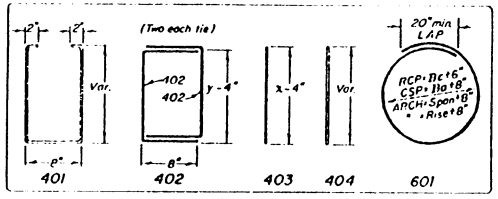
REVISIONS



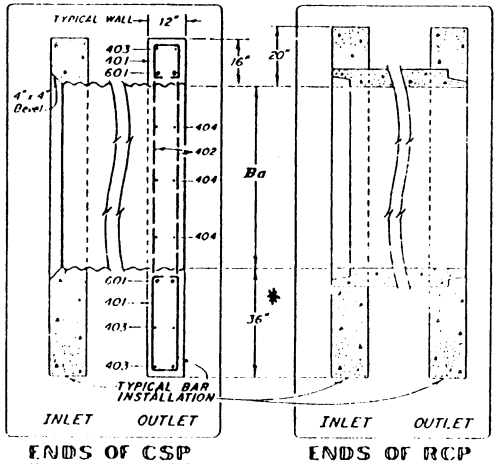
TYPICAL BAR LAYOUT FOR CONCRETE HEADWALLS



WINGWALL CONNECTION

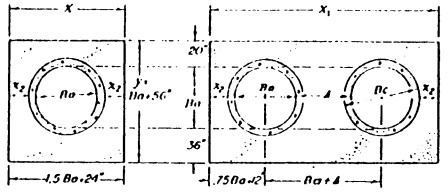


BAR BENDING



ENDS OF CSP

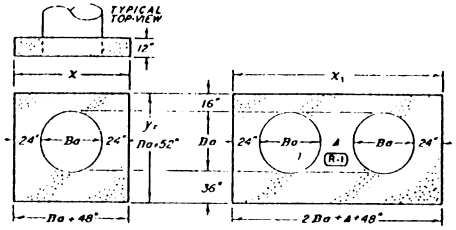
ENDS OF RCP



HEADWALL FOR RCP - ROUND

DIMENSIONS

Ba in.	Bc in.	X ft-in.	A in.	X_1 ft-in.	A_1 in.	y ft-in.	B in.	X_2 in.	QUANTITIES CONCRETE SGL cu yd	CONCRETE DBL cu yd	STEEL SGL lbs.	STEEL DBL lbs.
60	72	9-6	7	17-0	10	9-8	11	21	2.35	3.99	236	414
66	79	10-3	11½	18-6	7	10-2	14	22	2.60	4.44	249	433
72	86	11-0	10	20-0	10	10-8	17	23	2.85	4.91	270	476
78	93	11-9	8½	21-3	11	11-2	11	24	3.11	5.29	306	527
84	100	12-6	7	22-6	7	11-8	14	25	3.38	5.68	333	572
90	107	13-3	11½	23-9	8½	12-2	17	26	3.66	6.08	335	593
96	114	14-0	10	25-0	10	12-8	11	27	3.94	6.48	379	649
102	121	14-9	8½	26-3	11½	13-2	14	28	4.24	6.89	400	664
108	128	15-6	7	27-6	7	13-8	17	29	4.54	7.30	424	707



HEADWALL FOR CMP - ROUND

DIMENSIONS

Ba in.	X ft-in.	A in.	X_1 ft-in.	A_1 in.	y ft-in.	B in.	QUANTITIES CONCRETE SGL cu yd	CONCRETE DBL cu yd	STEEL SGL lbs.	STEEL DBL lbs.
60	9-0	10	16-6	7	9-4	18	2.38	4.25	217	396
66	9-6	7	17-9	8½	9-10	12	2.58	4.70	252	454
72	10-0	10	19-0	10	10-4	13	2.78	5.17	255	472
78	10-6	7	20-0	10	10-10	18	2.98	5.56	276	499
84	11-0	10	21-0	10	11-4	12	3.19	5.95	297	553
90	11-6	7	22-0	10	11-10	13	3.40	6.36	317	571
96	12-0	10	23-0	10	12-4	18	3.62	6.79	321	597
102	12-6	7	24-0	10	12-10	12	3.84	7.21	384	663
108	13-0	10	25-0	10	13-4	13	4.06	7.63	362	678

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

Concrete shall be Class A or B

Headwall shall be perpendicular to the culvert ℄ unless otherwise shown on the plans.

For Wingwall details, see Standard M-601-WW.

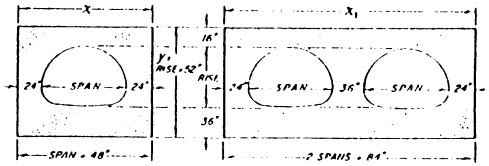
Volume occupied by pipe has been deducted from Steel and Concrete quantities.

4 ——— When 2 or more conduits are laid side by side they shall be placed so that the adjacent pipes will be ½ Inside Diameter or ½ Inside Span or 3 feet apart (including wall thickness) whichever is less.

HEADWALL FOR CMP - ARCH

DIMENSIONS

EQUIV Ba in.	SPAN in.	RISE in.	X ft-in.	A in.	X_1 ft-in.	A_1 in.	y ft-in.	B in.	QUANTITIES CONCRETE SGL cu yd	CONCRETE DBL cu yd	STEEL SGL lbs.	STEEL DBL lbs.
72	81	59	10-9	8½	20-6	7	9-3	17½	2.72	5.10	250	467
78	87	63	11-3	11½	21-6	7	9-7	10½	2.85	5.34	275	531
84	93	67	11-9	8½	22-10	9	9-11	12½	3.08	5.79	290	547
90	103	71	12-7	7½	24-2	11	10-3	15	3.30	6.21	321	591
96	112	75	13-4	12	25-8	8	10-7	16½	3.52	6.65	314	606
102	117	79	13-9	8½	26-6	7	10-11	9½	3.63	6.86	356	672
108	128	83	14-8	8	28-4	12	11-3	17½	3.96	7.51	376	699



HEADWALL FOR STRUCTURAL PLATE - ARCH

DIMENSIONS

EQUIV Ba in.	SPAN ft-in.	RISE ft-in.	X ft-in.	A in.	X_1 ft-in.	A_1 in.	y ft-in.	B in.	QUANTITIES CONCRETE SGL cu yd	CONCRETE DBL cu yd	STEEL SGL lbs.	STEEL DBL lbs.
66	6-1	4-7	10-1	10½	19-2	11	8-11	15½	2.58	4.70	232	424
75	7-0	5-1	11-0	10	21-0	10	9-5	9½	2.80	5.25	282	509
84	7-11	5-7	11-11	9½	22-10	9	9-11	12½	3.08	5.79	291	540
93	8-10	6-1	12-10	9	24-8	8	10-5	15½	3.36	6.33	309	622
102	9-9	6-7	13-9	8½	26-6	7	10-11	9½	3.63	6.86	379	673
111	10-11	7-1	14-11	9½	28-10	9	11-5	12½	4.05	7.67	377	711
120	11-10	7-7	15-10	9	30-8	8	11-11	15½	4.36	8.28	395	731
132	12-10	8-4	16-10	9	32-8	8	12-8	11	4.75	9.03	441	839
141	14-1	8-9	18-1	10½	35-2	11	13-1	13½	5.17	9.86	448	931
150	15-4	9-3	19-4	12	37-8	8	13-7	16½	5.69	10.84	490	953
159	15-10	9-10	19-10	9	38-8	8	14-2	11	5.89	11.25	534	1019

CITY OF COLORADO SPRINGS

HEADWALL FOR PIPE CULVERTS

APPROVED BY Gary L. Haynes CITY ENGINEER

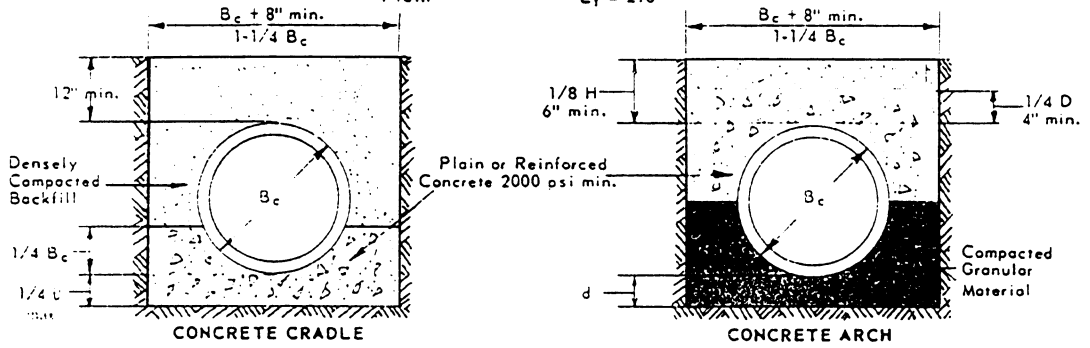
SCALE:	DATE:	DRAWN:	SHEET
NO SCALE	JAN. 90	P.L.B.	D-29

SOURCE: AMERICAN CONCRETE PIPE ASSOCIATION

TRENCH BEDDING CLASSIFICATION - ROUND PRECAST CONCRETE PIPE

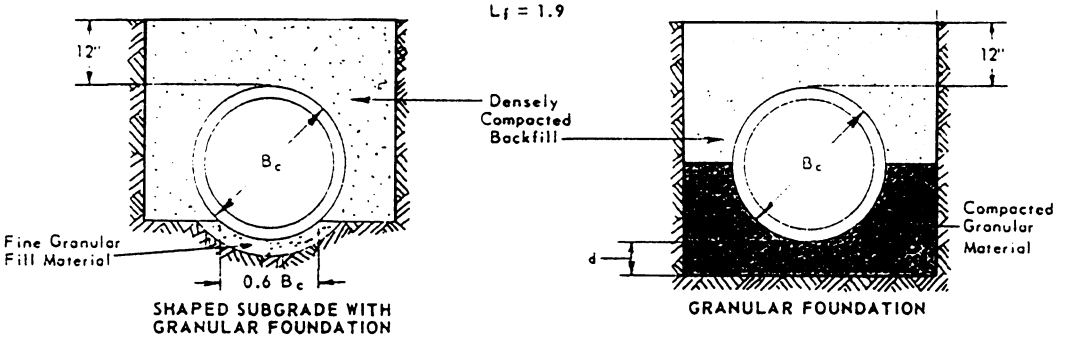
CLASS A

Reinforced A_s = 1.0% L_f = 4.8
Reinforced A_s = 0.4% L_f = 3.4
Plain L_f = 2.8



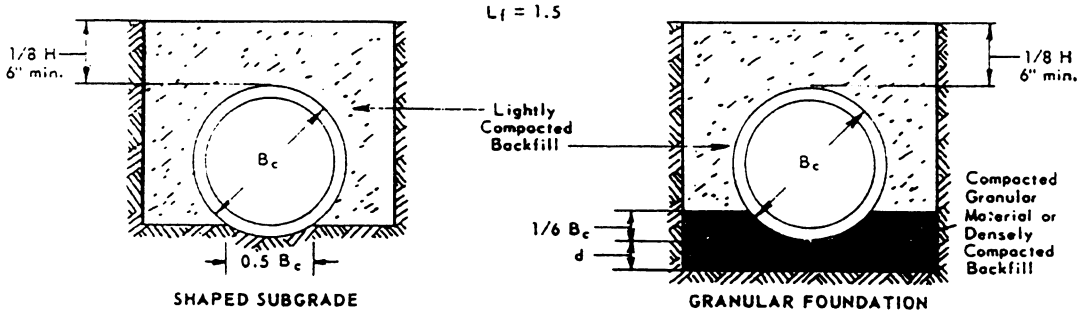
CLASS B

L_f = 1.9



CLASS C

L_f = 1.5



Depth of Bedding Material Below Pipe

D	d (min.)
27" & smaller	3"
30" to 60"	4"
66" & larger	6"

Legend

B_c = outside diameter
H = backfill cover above top of pipe
D = inside diameter
d = depth of bedding material below pipe
A_s = area of transverse steel in the cradle or arch expressed as a percentage of area of concrete at invert or crown.

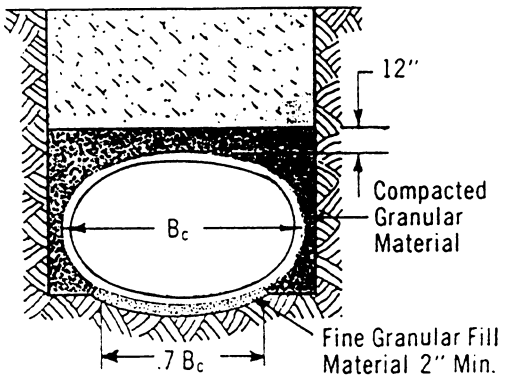
Notes:
For Class B and C beddings, subgrades should be excavated or over excavated, if necessary, so a uniform foundation free of protruding rocks may be provided.
Special care may be necessary with Class A or other unyielding foundations to cushion pipe from shock when blasting can be anticipated in the area.

CITY OF COLORADO SPRINGS			
TRENCH BEDDING CLASSIFICATION			
APPROVED BY Chas R. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: JAN. 90	DRAWN: P.L.B.	SHEET D - 30

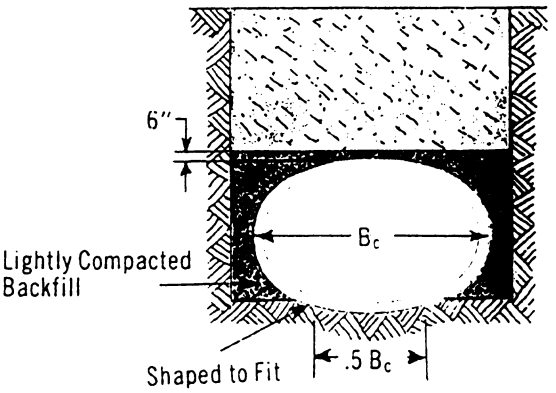
SOURCE: AMERICAN CONCRETE PIPE ASSOCIATION

TRENCH BEDDING CLASSIFICATION - PRECAST CONCRETE SECTIONS

HORIZONTAL ELLIPTICAL PIPE

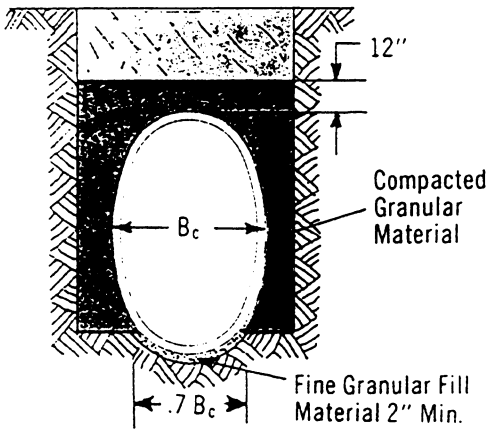


CLASS B
L_f=1.9



CLASS C
L_f=1.5

VERTICAL ELLIPTICAL PIPE



CLASS B
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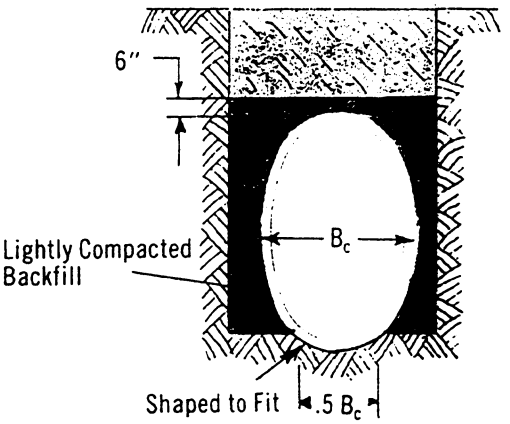

CLASS C
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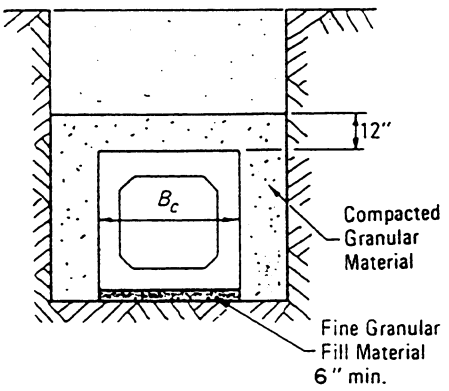
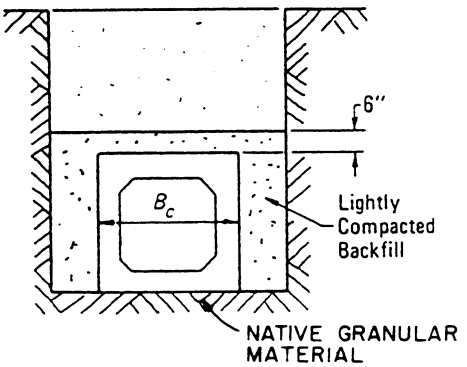
PRECAST BOX SECTION



CLASS B

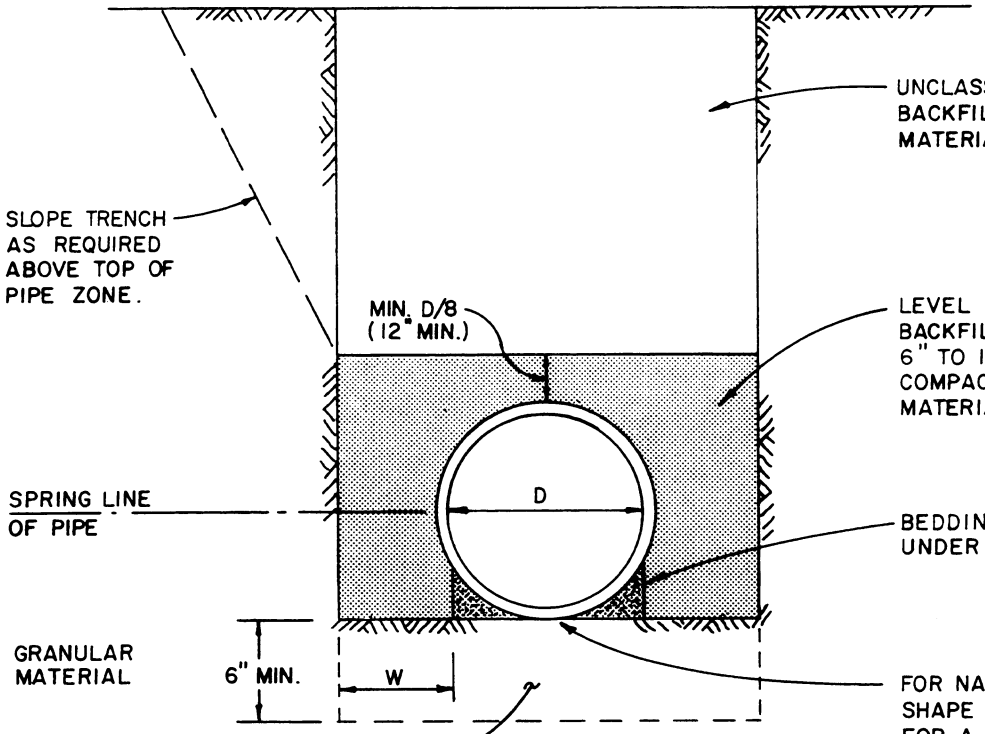


CLASS C

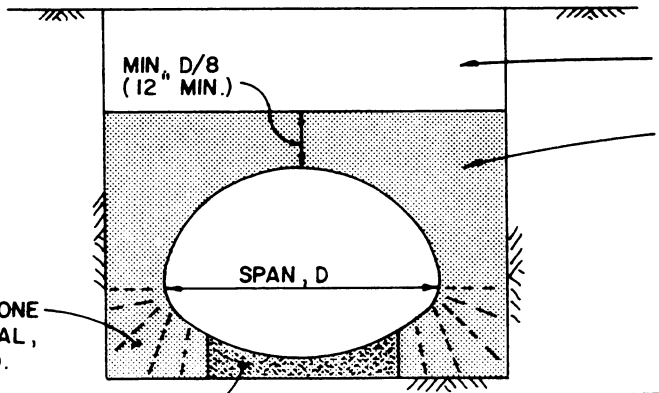
CITY OF COLORADO SPRINGS			
TRENCH BEDDING CLASSIFICATION			
APPROVED BY Gary E. Hayes CITY ENGINEER			
SCALE: NO SCALE	DATE: JAN. 90	DRAWN: P.L.B.	SHEET D-31

SOURCE: ASTM A-798 " INSTALLING FACTORY - MADE CORRUGATED STEEL SEWER PIPE.
ASTM D-2321 UNDERGROUND INSTALLATION OF FLEXIBLE THERMOPLASTIC SEWER PIPE.

TRENCH BEDDING FOR FLEXIBLE PIPE



ORDINARY TRENCH CONDITION



SHAPED BEDDING

(PIPE - ARCH)

CITY OF COLORADO SPRINGS			
TRENCH BEDDING FOR FLEXIBLE PIPE			
APPROVED BY Gary L. Haynes CITY ENGINEER			
SCALE: NO SCALE	DATE: JAN. 90	DRAWN: P.L.B.	SHEET D - 32

Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

*Depth of toe wall to be increased if required by scour potential. Indicate dimension on plan.

STANDARD M-601-1

(JANUARY, 1982)

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
VIII	COLORADO			

REVISIONS

f-BARS (Cont)

SPAN S	HEADWALL SKEW ANGLE 90° to 75°	74° to 60°	59° to 45°
5' or 6'	#4	#4	#5
7' or 8'	#4	#5	#6
9' or 10'	#5	#6	#7
11' or 12'	#6	#7	#8
13' or 14'	#7	#8	#9

Six f-bars required for each headwall.

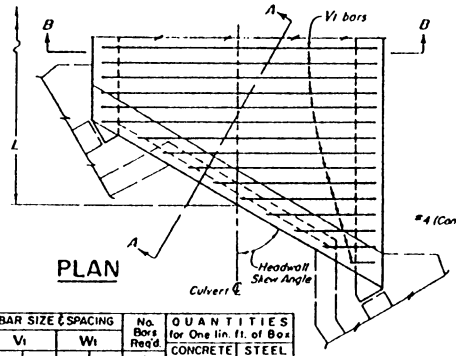
HEADWALL & TOEWALL QUANTITIES

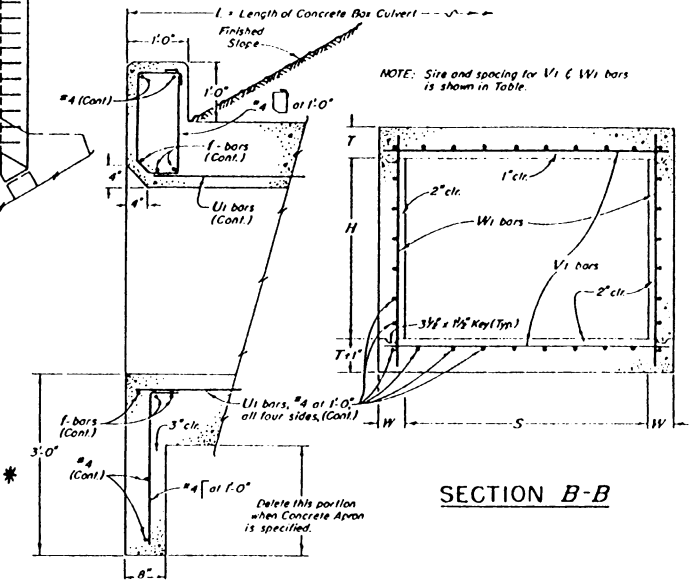
f-BAR SIZE #	APPROX. QUANTS FOR ONE HEADWALL & TOEWALL LBS. PER LINEAR FT.
4	13
5	15
6	18
7	21
8	25
9	29

Concrete = 0.083 cu yds/lin. ft.

* Deduct 0.049 cu yd. Concrete and 3.4 lb. Reinf. Steel from these quantities when Concrete Apron is specified.

Includes all Headwall and Toewall reinforcing





SECTION B-B

SECTION A-A

DIMENSIONS & QUANTITIES

HEIGHT OF FILL ALLOWED ft.	TYPE	SPAN S	HEIGHT H	SLAB T	WALL W	BAR SIZE & SPACING V1 Size	V1 Spa.	W1 Size	W1 Spa.	No. Bars Req'd U1	QUANTITIES for One lin. ft. of Box CONCRETE cu. yds.	STEEL lbs.
16	5A	5'	3'	8"	8"	#6	8"	#4	8"	16	0.481	45.3
			4'							18	0.530	48.7
			5'							20	0.579	52.0
20	5B	5'	3'	8½"	8"	#6	8"	#4	8"	16	0.500	45.5
			4'							18	0.549	48.8
			5'							20	0.598	52.2
14	6A	6'	4'	8½"	8"	#6	8"	#4	8"	20	0.605	54.7
			5'							22	0.654	58.1
			6'							24	0.704	61.4
			7'							26	0.755	64.9
20	6B	6'	4'	10"	8"	#7	8"	#5	8"	20	0.671	72.4
			5'							22	0.730	76.9
			6'							24	0.771	81.4
			7'							26	0.820	83.9
12	7A	7'	4'	9"	9"	#6	7"	#4	7"	22	0.720	68.2
			5'							24	0.778	71.9
			6'							26	0.832	75.5
			7'							28	0.887	79.2
15	7B	7'	4'	10"	9"	#7	8"	#5	8"	22	0.772	81.0
			5'							24	0.827	85.5
			6'							26	0.883	90.0
			7'							28	0.938	94.5
20	7C	7'	4'	11"	9"	#7	7"	#5	7"	22	0.826	91.1
			5'							24	0.881	96.0
			6'							26	0.937	101.0
			7'							28	0.992	106.0
10	8A	8'	4'	9½"	10"	#6	7"	#4	7"	24	0.844	75.8
			5'							26	0.905	79.5
			6'							28	0.966	83.2
			7'							30	1.027	86.8
			8'							32	1.089	90.5
16	8B	8'	4'	11½"	10"	#7	7"	#5	7"	24	0.963	100.9
			5'							26	1.025	103.9
			6'							28	1.086	110.8
			7'							30	1.148	113.8
			8'							32	1.210	120.8
20	8C	8'	4'	12½"	10"	#7	6"	#5	6"	24	1.023	115.8
			5'							26	1.084	121.4
			6'							28	1.146	126.9
			7'							30	1.208	132.5
			8'							32	1.270	138.1
7	9A	9'	5'	10"	11"	#7	8"	#5	8"	28	1.040	102.7
			6'							30	1.108	107.1
			7'							32	1.176	111.6
			8'							34	1.244	116.1
			9'							36	1.311	120.7
14	9B	9'	5'	12"	11"	#7	6"	#5	6"	28	1.174	131.9
			6'							30	1.242	137.5
			7'							32	1.310	143.1
			8'							34	1.378	148.6
			9'							36	1.445	154.2
20	9C	9'	5'	14"	11"	#8	7"	#6	7"	28	1.309	150.4
			6'							30	1.377	156.5
			7'							32	1.444	162.4
			8'							34	1.513	170.0
			9'							36	1.581	176.6
5	10A	10'	6'	10½"	12"	#7	8"	#4	8"	32	1.260	107.7
			7'							34	1.334	111.0
			8'							36	1.408	114.4
			9'							38	1.483	117.8
			10'							40	1.558	121.1
10	10B	10'	6'	12"	12"	#7	7"	#5	7"	32	1.369	130.4
			7'							34	1.443	135.4
			8'							36	1.517	140.4
			9'							38	1.591	145.3
			10'							40	1.665	150.3
16	10C	10'	6'	14"	12"	#8	8"	#6	8"	32	1.518	150.7
			7'							34	1.593	156.6
			8'							36	1.666	162.5
			9'							38	1.741	168.4
			10'							40	1.815	174.3
5	11A	11'	6'	11"	12"	#7	7"	#4	7"	34	1.367	128.6
			7'							36	1.441	134.6
			8'							38	1.515	135.9
			9'							40	1.589	139.6
			10'							42	1.664	143.1
9	11B	11'	6'	12½"	12"	#8	8"	#5	8"	34	1.490	148.3
			7'							36	1.564	152.8
			8'							38	1.638	157.3
			9'							40	1.712	161.8
			10'							42	1.783	166.4
13	11C	11'	6'	14"	12"	#7	6"	#5	6"	34	1.608	159.5
			7'							36	1.682	165.1
			8'							38	1.756	170.7
			9'							40	1.830	176.2
			10'							42	1.904	181.8
5	12A	12'	6'	12"	12"	#7	7"	#4	7"	36	1.595	137.4
			7'							38	1.598	141.0
			8'							40	1.673	144.7
			9'							42	1.747	148.4
			10'							44	1.821	152.0
10	12B	12'	6'	14"	12"	#8	7"	#5	7"	36	1.697	177.7
			7'							38	1.772	182.7
			8'							40	1.846	187.7
			9'							42	1.920	192.6
			10'							44	1.994	197.6
4	13A	13'	6'	12½"	12"	#7	7"	#4	7"	38	1.643	146.0
			7'							40	1.720	149.7
			8'							42	1.794	153.3
			9'							44	1.868	157.0
			10'							48	1.942	160.7
8	13B	13'	6'	14"	12"	#8	7"	#5	7"	38	1.767	188.4
			7'							40	1.841	193.3
			8'							42	1.935	198.3
			9'							44	2.009	203.3
			10'							46	2.083	208.2
4	14A	14'	6'	13½"	12"	#8	8"	#5	8"	40	1.827	177.2
			7'							42	1.901	181.7
			8'							44	1.975	186.2
			9'							46	2.049	190.7
			10'							48	2.123	195.2
8	14B	14'	6'	15"	12"	#8	7"	#5	7"	40	1.973	199.5
			7'							42	2.049	204.5
			8'							44	2.123	209.4
			9'							46	2.198	214.4
			10'							48	2.270	219.4

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

All concrete shall be Class "A" (Box Culvert).

All construction joints shall be thoroughly cleaned before fresh concrete is poured.

Construction joints shall be spaced at 35 foot max. centers and shall extend through the entire cross section of the Box Culvert.

Splice quantities for longitudinal bars are not included.

DESIGN DATA: AASHTO, 1973,
Unit Stresses: f_s = 20,000 psi
f_c = 1,800 psi
n = 10

DESIGN CRITERIA:
Culvert in trench on unyielding subgrade, or culvert unbranched on yielding foundation. For culverts on piles or rock foundations, special design will be required.

LOADING DATA:
Live Load = AASHTO, H S 20-44
Dead Load = Earth Load = 84 lbs/cu ft
Equivalent Fluid Pressure = 30 lbs/cu ft.

The minimum splice length for common bar sizes shall be:

BAR SIZE	#4	#5	#6	#7	#8	#9
SPLICE LENGTH	1'-0"	1'-2"	1'-6"	2'-3"	3'-0"	3'-10"

All exposed corners on concrete shall be chamfered ¾"

CITY OF COLORADO SPRINGS

SINGLE CONCRETE BOX CULVERT

APPROVED BY Gary R. Hayes
CITY ENGINEER

SCALE	DATE	DRAWN	SHEET
NO SCALE	JAN. 90	PL B.	D-33

Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

*Depth of toe wall to be increased if required by scour potential. Indicate dimension on plan.

**Upstream vertical wall edge shall have a full height 5 X 5 X 3/8" angle attached with 6 inch nelson studs. hot dip galvanized.

STANDARD M-601-2

(JANUARY, 1982)

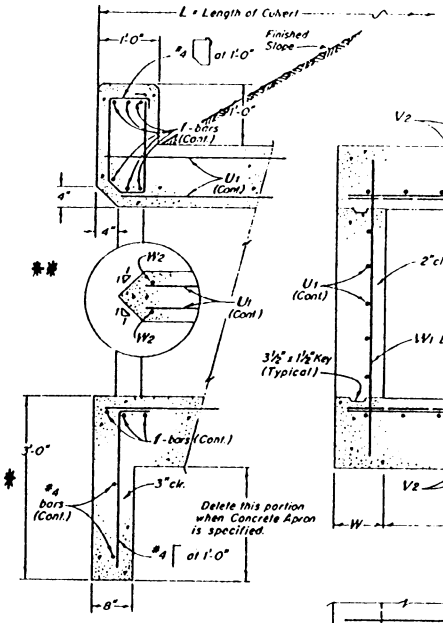
FEDERAL AID PROJ. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
V3	COLORADO			

REVISIONS

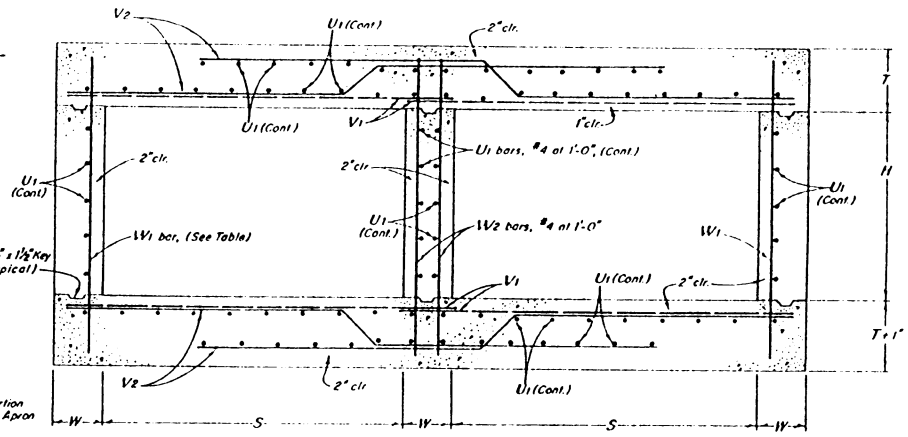
DIMENSIONS & QUANTITIES

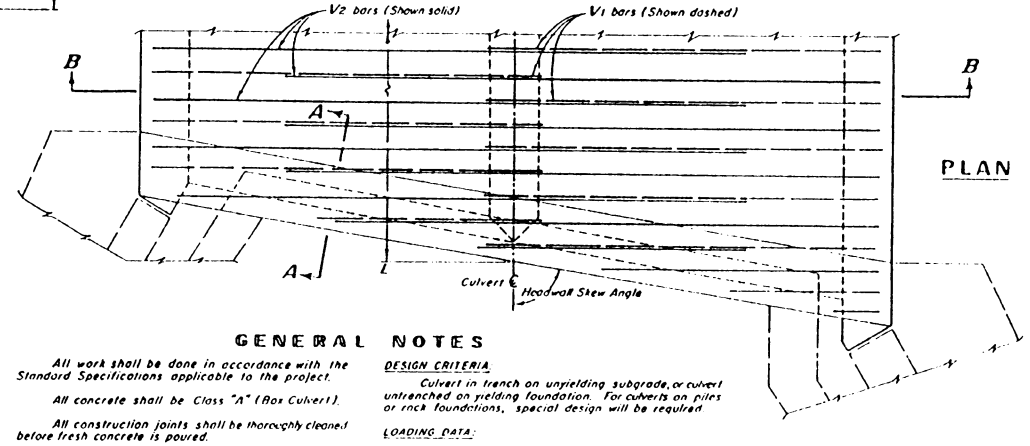
HEIGHT OF FILL ALLOWED	TYPE	SPAN S	HEIGHT H	SLAB T	WALL W	BAR SIZE & SPACING V1 / V2 Span	W1 Size	W1 Spc.	No BARS Req'd U1	QUANTITIES for One Linear Ft of Box CONCRETE Cu Yds	STEEL Lbs.
10'	6-6-A	6'	3'	8½"	8"	#4 / #5 5½"	#4	12"	48	1.000	112.3
			4'					12"	52	1.073	117.7
			5'					12"	56	1.148	123.1
			6'					12"	60	1.220	128.5
15'	6-6-B	6'	3'	9½"	8"	#4 / #5 5"	#4	13"	48	1.087	120.3
			4'					12"	52	1.161	125.7
			5'					12"	56	1.235	131.1
			6'					8"	60	1.309	141.4
20'	6-6-C	6'	3'	10½"	8"	#4 / #5 4½"	#4	12"	48	1.173	130.0
			4'					12"	52	1.247	135.4
			5'					10"	56	1.321	142.5
			6'					7"	60	1.395	152.4
10'	8-8-A	8'	3'	10"	10"	#5 / #6 6"	#4	12"	60	1.477	174.4
			4'					12"	64	1.569	179.8
			5'					12"	68	1.662	185.2
			6'					12"	72	1.755	190.6
15'	8-8-B	8'	3'	11"	10"	#5 / #6 5½"	#4	12"	60	1.592	188.6
			4'					12"	64	1.684	192.0
			5'					12"	68	1.777	197.4
			6'					8"	72	1.869	207.9
20'	8-8-C	8'	3'	12½"	10"	#5 / #6 5"	#4	12"	60	1.763	202.0
			4'					12"	64	1.856	207.4
			5'					10"	68	1.948	214.6
			6'					7"	72	2.041	225.7
5'	10-10-A	10'	4'	10"	12"	#5 / #7 7"	#5	15"	78	1.935	228.3
			6'					15"	86	2.157	239.8
			8'					12"	94	2.380	253.2
			10'					9"	102	2.602	275.5
10'	10-10-B	10'	4'	12"	12"	#5 / #7 7"	#5	15"	78	2.220	231.0
			6'					15"	86	2.442	242.5
			8'					12"	94	2.664	258.0
			10'					8"	102	2.886	282.6
15'	10-10-C	10'	4'	14"	12"	#5 / #7 6"	#5	15"	78	2.503	260.8
			6'					12"	86	2.725	275.6
			8'					9"	94	2.947	295.0
			10'					6"	102	3.170	325.5
5'	12-12-A	12'	6'	12"	12"	#5 / #7 7"	#5	15"	98	2.751	278.9
			8'					12"	106	2.973	294.5
			10'					9"	114	3.195	315.0
10'	12-12-B	12'	6'	14"	12"	#5 / #7 6"	#5	15"	98	3.083	313.5
			8'					12"	106	3.305	329.2
			10'					8"	114	3.528	354.1
15'	12-12-C	12'	6'	16"	12"	#5 / #7 5"	#5	12"	98	3.416	365.1
			8'					9"	106	3.638	384.7
			10'					6"	114	3.860	413.7
5'	14-14-A	14'	6'	15"	12"	#5 / #7 6"	#5	15"	110	3.633	396.2
			8'					12"	118	3.855	372.0
			10'					9"	126	4.077	392.9
10'	14-14-B	14'	6'	16"	12"	#5 / #7 5"	#5	15"	110	3.824	409.4
			8'					12"	118	4.046	425.2
			10'					8"	126	4.269	450.5

SECTION A-A



SECTION B-B

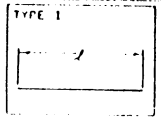




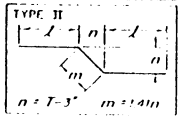
BAR LIST

MARK	SIZE	NUMBER REQ'D	TYPE	ℓ	TOTAL LENGTH
V1	See Table	2ℓ/Spa. +2	I	S+1.5W+4"	ℓ
V2			II	0.75S+4"	2ℓ+m
W1			I	11+2T-4"	ℓ
W2	#4	2ℓ+2	I	11+2T-4"	ℓ
U1	#4	See Table	I	ℓ	ℓ

TYPE I



TYPE II



f - BARS (Cont.)

SPAN S	HEADWALL SKEW 90° to 75°	74° to 60°	59° to 45°
6'	#4	#4	#5
8'	#4	#5	#6
10'	#5	#6	#7
12'	#6	#7	#8
14'	#7	#8	#9

Nine f-bars required for each headwall.

HEADWALL & TOEWALL QUANTITIES

f-BAR SIZE #	APPROX. QUANTS. FOR ONE Headwall & Toewall lbs. per lin. ft.	
4	13	*
5	17	
6	21	
7	26	
8	31	
9	38	
Concrete = .0085 cu yd/l.f.		

* Includes all Headwall and Toewall reinforcing

▲ Deduct 0.049 cu yd Concrete and 3.4 lb. Reinforcing Steel from these quantities when Concrete Apron is specified.

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

All concrete shall be Class "A" (Box Culvert).

All construction joints shall be thoroughly cleaned before fresh concrete is poured.

Construction joints shall be spaced at 35 foot max. centers and shall extend through the entire cross section of the Box Culvert.

Splice quantities for longitudinal bars are not included.

DESIGN DATA: AASHTO, 1973,
Unit Stresses: f_s = 20,000 psi
f_c = 1,200 psi
n = 10

DESIGN CRITERIA

Culvert in trench on unyielding subgrade, or culvert untrenched on yielding foundation. For culverts on piles or rock foundations, special design will be required.

LOADING DATA:

Live Load = AASHTO, HS 20-44

Dead Load = Earth Load = 84 lbs./cu ft.
Equiv. Fluid Pressure = 30 lbs./cu ft.

The minimum splice length for common bar sizes shall be:

BAR SIZE	#4	#5	#6	#7	#8	#9
SPLICE LENGTH	1'-0"	1'-2"	1'-8"	2'-3"	3'-0"	3'-10"

All exposed corners on concrete shall be chamfered ¾".

CITY OF COLORADO SPRINGS

DOUBLE CONCRETE BOX CULVERT

APPROVED BY Gary R. Hayes
CITY ENGINEER

SCALE	DATE	DRAWN	SHEET
NO SCALE	JAN. 90	P.L.B.	D-34

Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

*Depth of toes wall to be increased if required by scour potential. Indicate dimension on plan.

**Upstream vertical wall edge shall have a full height 5 X 5 X 3/8" angle attached with 6 inch nelson studs. hot dip galvanized.

STANDARD M-601-3

(JANUARY, 1982)

REVISIONS

DIMENSIONS & QUANTITIES

HEIGHT OF FILL ALLOWED	TYPE	CLEAR SPAN S1	CLEAR SPAN S2	HEIGHT H	SLAB T	SIZE OF BARS V1 or V3	SPACING OF BARS V	SPACING OF BARS W1	NO BARS EACH L1	QUANTITIES for One Lin. Ft. of Box CONCRETE Cu yds.	QUANTITIES for One Lin. Ft. of Box STEEL Lbs.
5'	9-12-A	9'	12'	6'	10"	#7	7½"	15"	136	2.948	408.9
				8'				13"	148	3.207	425.6
				10'				11"	160	3.467	449.1
10'	9-12-B	9'	12'	6'	11"	#4	7"	15"	136	3.156	348.4
				8'				12"	148	3.415	369.0
				10'				6"	160	3.447	398.6
15'	9-12-C	9'	12'	6'	12"	#4	5½"	15"	136	3.363	412.5
				8'				9"	148	3.622	439.9
				10'				6"	160	3.881	475.1
5'	11-14-A	11'	14'	6'	11"	#6	6"	15"	156	3.581	513.9
				8'				15"	168	3.841	530.6
				10'				11"	180	4.100	554.3
10'	11-14-B	11'	14'	6'	12½"	#4	5½"	15"	156	3.948	477.1
				8'				12"	168	4.207	497.8
				10'				8"	180	4.467	527.6
15'	11-14-C	11'	14'	6'	14"	#4	5"	15"	156	4.315	515.6
				8'				9"	168	4.574	543.5
				10'				6"	180	4.833	579.1
5'	13-16-A	13'	16'	6'	12½"	#6	5½"	15"	176	4.430	626.6
				8'				15"	188	4.689	643.3
				10'				10"	200	4.948	669.8
10'	13-16-B	13'	16'	6'	14"	#4	5"	15"	176	4.652	583.9
				8'				12"	188	5.111	604.8
				10'				8"	200	5.370	634.7
15'	13-16-C	13'	16'	6'	15½"	#4	4"	15"	176	5.270	697.3
				8'				9"	188	5.530	725.4
				10'				6"	200	5.789	761.3

BAR LIST

MARK	SIZE	NUMBER REQUIRED	TYPE	L	TOTAL LENGTH
V1	See Table	24 L / Spa. + 4	I	S1 + 1'-9"	L
V2	#7	24 L / Spa. + 4	II	0.61 S2	2L + m
V3	See Table	12 L / Spa. + 2	I	S2 + 1'-10"	L
V4	#7	12 L / Spa. + 2	III	0.726 S1	3L + 2m
W1	#5	24 L / Spa. + 2	I	H + 2T - 4"	L
W2	#4	4L + 4	I	H + 2T - 4"	L
U1	#4	See Table	I	L	L

TYPE I

TYPE II

n = T - 3"
m = 1.41 n

TYPE III

n = T - 3"
m = 1.41 n

HEADWALL & TOEWALL QUANTITIES

f - BAR SIZE #	APPROX. QUANTS. FOR ONE HEADWALL & TOEWALL LBS. PER LIN. FT.
5	17
6	21
7	26
8	31
9	38
Concrete = 0.085 cuyds/lin ft.	

* Includes all Headwall and Toewall reinforcing.

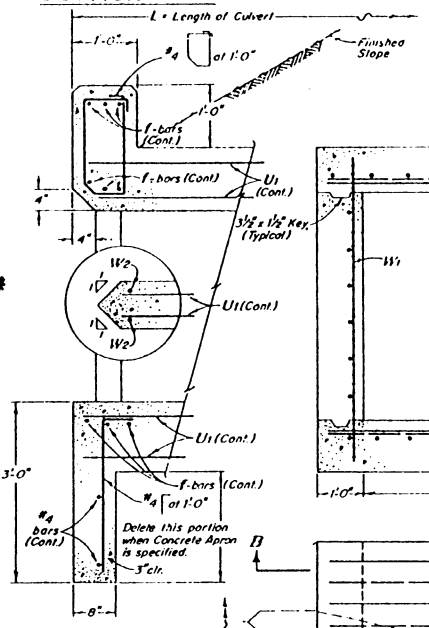
▲ Deduct 0.049 cu yd. Concrete and 3.4 lb. Reinf. Steel from these quantities when Concrete Apron is specified.

f - BARS (Continuous)

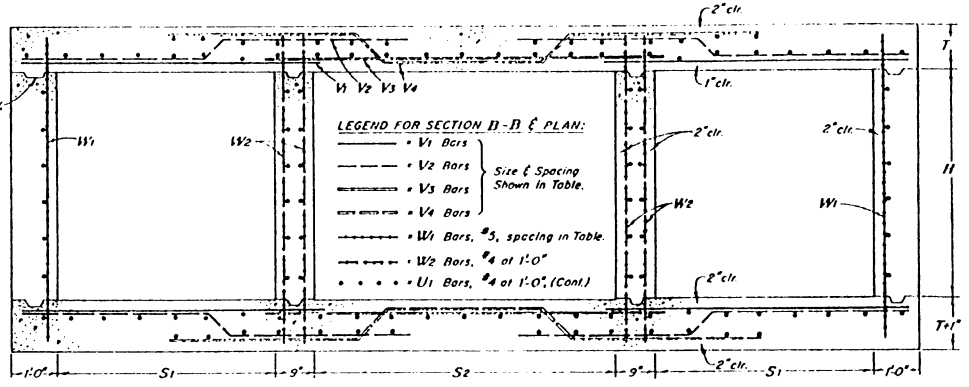
SPAN S2	HEADWALL SKEW ANGLE 90° to 75°	74° to 60°	59° to 45°
12'	#5	#6	#7
14'	#6	#7	#8
16'	#7	#8	#9

Nine f - bars required for each headwall.

SECTION A-A



SECTION B-B

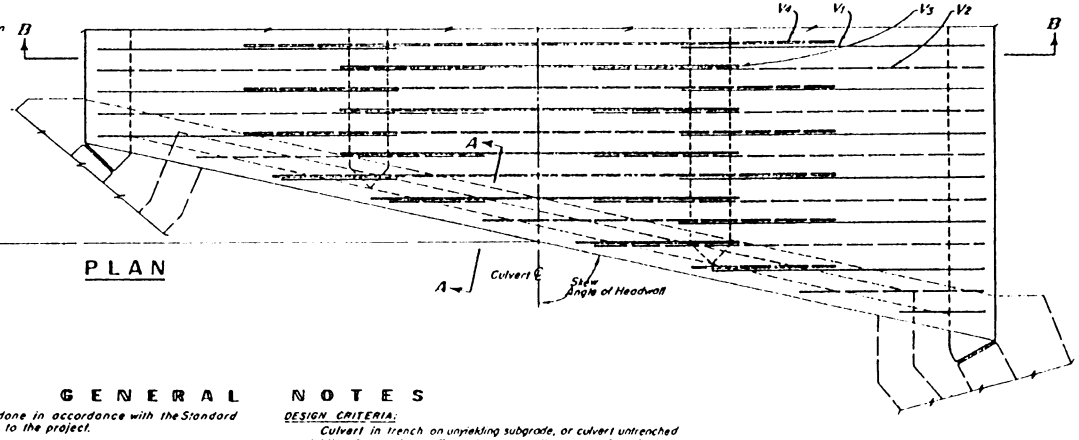


LEGEND FOR SECTION B-B & PLAN:
- V1 Bars
- V2 Bars
- V3 Bars
- V4 Bars

Size & Spacing Shown in Table.

- W1 Bars, #5, spacing in Table.
- W2 Bars, #4 at 1'-0"
- U1 Bars, #4 at 1'-0", (Cont.)

PLAN



GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

All concrete shall be Class "A" (Box Culvert).

All construction joints shall be thoroughly cleaned before fresh concrete is poured.

Construction joints shall be spaced at 35 foot max. centers and shall extend through the entire cross section of the Box Culvert

Splice quantities for longitudinal bars are not included.

DESIGN DATA: AASHTO, 1973,
Unit Stresses: f_s = 20,000 psi
f_c = 1,200 psi
n = 10

DESIGN CRITERIA:
Culvert in trench on unyielding subgrade, or culvert untrenched on yielding foundation. For culverts on piles or rock foundations, special design will be required.

LOADING DATA:
Live Load = AASHTO, HS 20-44
Dead Load = Earth Load = 84 lbs/cu ft.
Equiv. Fluid Pressure = 30 lbs/cu ft.

The minimum splice length for common bar sizes shall be.

BAR SIZE	#4	#5	#6	#7	#8	#9
SPLICE LENGTH	1'-0"	1'-2"	1'-8"	2'-3"	3'-0"	3'-10"

All exposed corners on concrete shall be chamfered ¾".

CITY OF COLORADO SPRINGS

TRIPLE CONCRETE BOX CULVERT

APPROVED BY Hayes K. Haynes
CITY ENGINEER

SCALE:	DATE:	DRAWN:	SHEET
NO SCALE	JAN. 90	P.L.B.	D - 35

Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

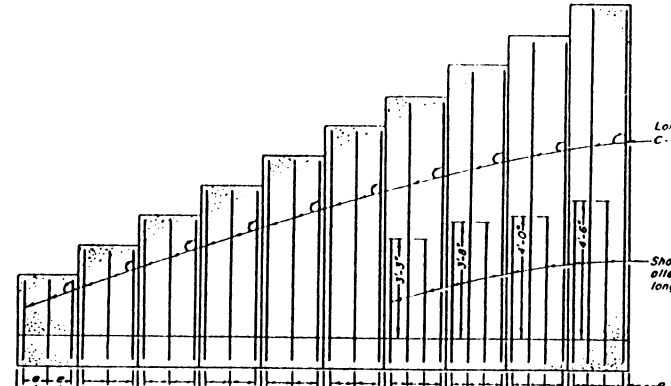
*Depth of toe wall to be increased if required by scour potential. Indicate dimension on plan.

STANDARD M-601-20

(JANUARY, 1982)

FEDERAL AID PROJECT NO.	DIVISION	PROJECT NO.	SHEET NO.	TOTAL SHEETS
STR	COLORADO			

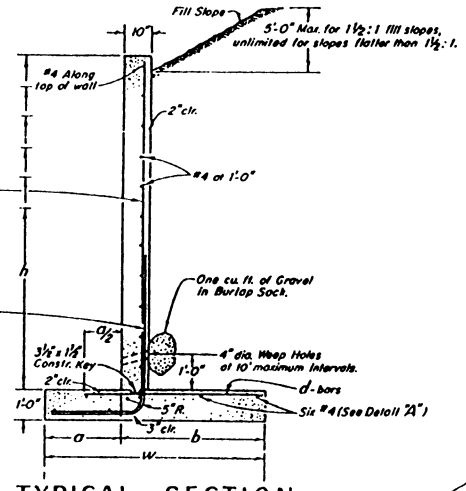
REVISIONS



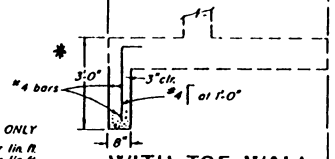
e =	1'-6"	1'-6"	1'-6"	1'-6"	1'-0"	0'-8½"	1'-0"	0'-9½"	0'-7"	0'-5½" clrs.
h =	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'
a =	1'-0"	1'-2"	1'-4"	1'-6"	1'-8"	1'-10"	2'-0"	2'-2"	2'-4"	2'-6"
b =	1'-8"	2'-0"	2'-4"	2'-8"	3'-0"	3'-4"	3'-8"	4'-0"	4'-4"	4'-8"
w =	2'-8"	3'-2"	3'-8"	4'-2"	4'-8"	5'-2"	5'-8"	6'-2"	6'-8"	7'-2"
C ℄ d bars	#4 at 1'-6"	#4 at 1'-6"	#4 at 1'-6"	#4 at 1'-6"	#4 at 1'-0"	#4 at 8½"	#6 at 1'-0"	#6 at 9½"	#6 at 7"	#6 at 5½" clrs
*Conc. cu yd/l.f.	0.161	0.210	0.259	0.308	0.358	0.407	0.457	0.506	0.556	0.604
*Reinf. lb/l.f.	8.0	9.3	10.7	12.1	16.2	21.7	29.0	37.0	51.0	67.3

* Does not include Toe Wall quantities.

DESIGN TABLE



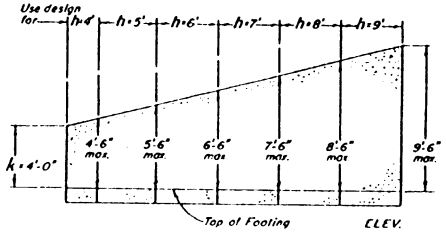
TYPICAL SECTION

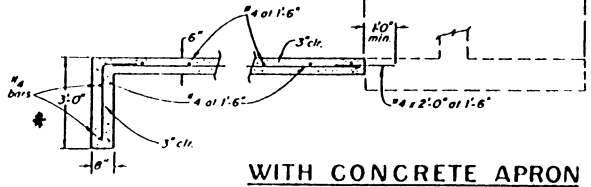


QUANTITIES FOR TOE WALL ONLY

Concrete 0.049 cu.yd. per lin. ft.
Reinforcement 3.4 lb. per lin. ft.

WITH TOE WALL

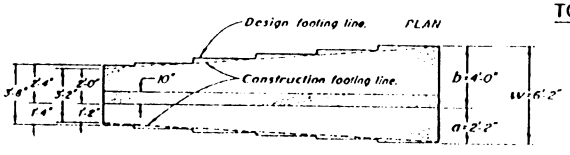




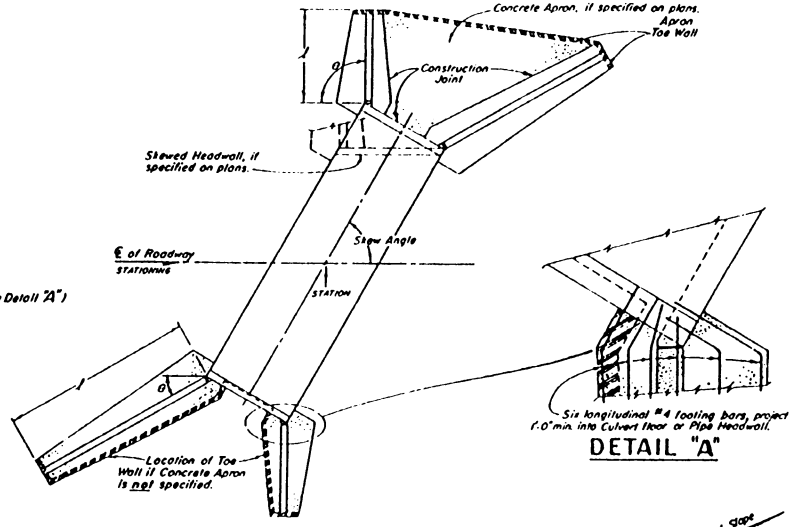
WITH CONCRETE APRON

APRON TOE WALL

Re-bar: .89 lb/sq. ft.



SIGN EXAMPLE



DETAIL "A"

TYPICAL CULVERT LAYOUT

GENERAL NOTES

All work shall be done in accordance with the Standard Specifications applicable to the project.

All exposed corners on concrete shall be chamfered ¾".

Wingwall footings and floor of Box Culvert shall be placed monolithically.

Expansion Joint Material shall conform to AASHTO M-213 and payment therefor shall be included in the price for Concrete, (Box Culvert) or (Wall).

Dimensions "H," "Ba," "Rise," "k," "J," "m" and angles for wingwalls shall be as shown on the plans.

The minimum splice length for common bar sizes shall be:

BAR SIZE	#4	#6
SPLICE LENGTH	1'-0"	1'-8"

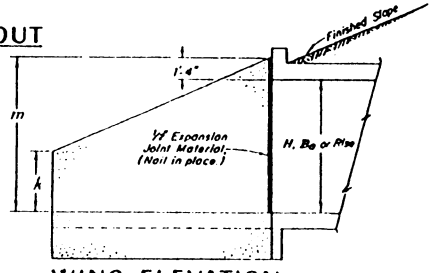
DESIGN DATA:

Unit Stresses: f_s = 20,000 psi
f_c = 1,200 psi
n = 10

Equivalent Fluid Pressure = 30 lbs/cu.ft.
Maximum Toe Pressure = 1 Ton/sq. ft.

All construction joints shall be thoroughly cleaned before fresh concrete is poured.

Wingwall Concrete shall be:
Concrete, Class A (Box Culvert) for CBC's
Concrete, Class A, B or D (Wall) for Pipes



WING ELEVATION

m = H, Ba or Rise + (1':4') unless otherwise shown on Plans

CITY OF COLORADO SPRINGS

WINGWALLS FOR PIPE OR BOX CULVERT

APPROVED BY Gary R. Haynes
CITY ENGINEER

SCALE:	DATE:	DRAWN:	SHEET
NO SCALE	JAN. 90	P.L.B.	D-36