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**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
TYPICAL SECTION A
NO SCALE

TYPICAL SECTION B
NO SCALE

NOTES
2. Subgrade (Compacted in accordance with City Standard Specifications, Section 205)
4. Refer to Standard Detail for Curb and Gutter (Type 1 and Type 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.

PAVEMENT REPLACEMENT & BACKFILL DETAIL

TRENCHES IN TYPICAL STREET NOT NEWLY CONSTRUCTED OR RECENTLY OVERLAYED

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.
A SQUARE VERTICAL CUT SHALL BE MADE

NEW A. C. PAVEMENT REPLACEMENT

NEW PORTLAND CEMENT CONCRETE

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)
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 epoxy 30" long rebar 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
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.

FLOWABLE - FILL REQUIRED FOR TRENCHES LESS THAN 1 FOOT IN WIDTH FOR EXCAVATIONS IN EXISTING PAVEMENT, PROPORTIONED IN ACCORDANCE WITH SECTION 206.

UTILITY TO BE INSTALLED IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS.

"FLOWABLE - FILL" PROPORTIONED IN ACCORDANCE WITH SECTION 206.

PAVEMENT REPLACEMENT & BACKFILL DETAIL

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

**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 feet) spacing.
3. Type 6 median curb will only be allowed where street section falls away from curb, "spill" condition.

**Length for Radii:**
- A = 1/2"
- C = 1-1/2"
- D = 1-1/2" to 2"
MIN. DEPTH OF SAWCUT OR TOOL JOINT SHALL BE CONC. THICKNESS + 1/8.

PLAN VIEW

SECTION A-A

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
Date 06/23 '93
T.O. 0-7
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.
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.
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.
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.
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'.

SECTION D-D

PEDESTRIAN RAMP DETAILS
FOR "T" INTERSECTION

Approved by:

Drawn by:

Date:

STD. D-60
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.
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-863").
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.
**PEDESTRIAN CROSSING FOR MEDIANS & ISLANDS**

**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.
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.
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.
ALTernate parallel ramps for mid-block or "T" intersection

FOR RETROFIT APPLICATIONS

IF existing sidewalk width is LESS THAN 5 FEET, transition width to provide 5' DEEP LANDING.

6" WIDE x VARIABLE HEIGHT (0" TO 8") MONOLITHIC CURB

24" DETECTABLE WARNING AREA WITH TRUNCATED DOME

6" RADIUS

5' LANDING @ 2% MAX.

5' LANDING W/2% SLOPE

STREET MUST SLOPE DOWN THIS DIRECTION

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.
**Ramps with Detectable Panels**

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.

IF "L" IS GREATER THAN 8 FEET, PROVIDE INTERMEDIATE TOOL JOINTS IN LANDING & CURB HEAD.

**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.
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
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.
NOTES
1. GRATES TO BE PAINTED TO COLORADO STATE HIGHWAY DEPTS SPECIFICATIONS FOR PAINTING STRUCTURAL STEEL.
2. X' EQUALS BOX LENGTH PLUS 6'
3. REFER TO PLANS AND SPECIFICATIONS FOR LOCATION AND DIMENSIONS OF STRUCTURE.
4. OUTLET PIPE SHALL BE CUT OFF EVEN WITH INSIDE WALL.
PLAN VIEW

SECTION B-B

SECTION A-A
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 travelling 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 IIA 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.
NOTE: REFER TO DRAWING NO. D-10-R (SHEET 3 OF 3) FOR GENERAL CONSTRUCTION NOTES.

MANHOLE STEPS @ 16" O.C.
STANDARD REVERSIBLE FRAME & COVER WITH 5" RING.

FACE OF CURB RADIUS

EXTRACTION JOINT (TYP.)

10' TRANSITION (TYP.)

#4 BARS @ 12" O.C. (SEE D-10-R DETAIL)

RADIUS POINT PERPENDICULAR TO PC.R.'S

#4 BARS @ 9" O.C. E.W.

VARIES DEPENDING ON OPENING NEEDED.

I/2" EXPANSION JOINT (TYP.)
USE 1/2" POLYURETHANE RUBBER SEALANT & I/2" PREMOLDED FILLER WITH REMOVABLE PLASTIC CAP.

(2) #8 BARS @ 12" C/C, EXTEND OUTSIDE BAR INTO CURB HEAD (TYP.)

4 BARS @ MANHOLE OPENING - 2" CL.
A 6'-0" L.
B 3'-0" L.
C 2'-0" L.

CONSTRUCTION JOINT

OUTLET PIPE - DIRECTION & SIZE VARIES.

GALV. STEEL RODS @ 3'-0" O.C. - SEE SECTION A-A

1 1/4" x 5" CHANNEL (PAINTED PER DRAWING NO. D-10-R & ANCHORED TO TOP SLAB)

PROJECTION OF INSIDE WALL TO MATCH FACE OF CURB (TYP.)

CONSTRUCT SQUARED OFF RETURN APRON WHERE CROSS PANS ARE USED.

CITY OF COLORADO SPRINGS
STANDARD RADIAL CATCH BASIN
APPROVED BY

CITY ENGINEER

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

* DIMENSION VARIES FROM 0" TO MAX.
@ MIDPOINT OF CURB RADIUS.
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.
2" Ø P.V.C. PIPE IN CONCRETE. SLOPE TO DRAIN.

MIN. ONE CUBIC FOOT OF COARSE GRAVEL IN A GEOTEXTILE SACK.

2" Ø P.V.C. PIPE IN CONCRETE. SLOPE TO DRAIN.

WINGWALL / RETAINING WALL

CONCRETE CHANNEL

NOTES

1. NO. 40 galvanized steel screen and filter fabric to be used with weep holes >2"


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.
Provide Bond Break Material i.e. #15 Asphalt Felt.

1/2" x 4" Expansion Material 1/4" below surface of Conc., sealed with Plastic Joint Sealant for Min. Req., see Note 1.

1/2" x 2'-0" Dowels with sleeves or Sliding Cap on one end

3/8" x 2'-0" Dowels with sleeves or Sliding Cap on downstream end

No. 4 @ 1' O.C. Both Ways

L1 (see note 7 or 8)

8" Min.

CENTERLINE PROFILE

Earth shall be stabilized as per Standard Spec's. Max. 2:1 slope.

2'

SECTION A - A

WWF (See Note 1) Construction Procedures shall ensure the WWF is properly positioned mid-depth in concrete lining.

6" Min. Compacted over Lip

12' Access Road

L: see note 1

Z: see note 1

Z: 2" min.

SECTION B - B

CUT-OFF WALL

6" Min. Compaction

L: see note 1

Z: see note 1

Z: 2" min.

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. L1 = 3'-6" and L2 = 6'-0" min. if Design Flow is Supercritical.

8. L1 = 2'-6" and L2 = 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.
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''.
**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 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.

**TOOL JOINT SPACING**

<table>
<thead>
<tr>
<th>Driveway Width</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>12'</td>
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<td>3'</td>
</tr>
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<td>14'</td>
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</tr>
<tr>
<td>30'</td>
<td>10'</td>
<td>5'</td>
</tr>
</tbody>
</table>

**ATTACHED SIDEWALK**

NO SCALE
1/2" THICK EXPANSION
J OINT FULL WIDTH OF
DRIVeway AT SIDEWALK/
DRIVeway EDGES

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 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.

REMOVE EXIST. CURB AND
GUTTER AT THE NEAREST
CONSTRUCTION JOINT. WHERE
REMOVAL WOULD FAIL TO PROVIDE
A STRAIGHT VERTICAL EDGE,
A SAWCUT EDGE IS REQUIRED.
SAWCUT CAN ALSO BE USED
IF REMAINING LENGTH 'D' IS
4'-0" OR GREATER.

6" RESIDENTIAL
8" ALLEYS, COMMERCIAL
AND INDUSTRIAL DRIVES

Curb and Gutter Shall
Not Be Poured Monolithic
With Driveway

DETACHED SIDEWALK

NO SCALE

CITY OF COLORADO SPRINGS

Standard Driveway
with Detached Walk

Approved By
City Engineer

Drawn By

Date 09/94 STD. D-168
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

EXISTING CURB TO BE REMOVED

EXISTING GUTTER TO REMAIN

NEW DRIVEWAY

EXISTING PAVEMENT

NO SCALE
2" STD. LETTERING
FLUSH WITH TOP

3/4" DIA.
LIFHTOLE
4" FROM EDGE

TYPE "C" LID
DESIGN 1" X 1"
SCORED 1/32" DEEP

SECTION A-A
(APPROX. 175 lbs)

SECTION B-B
(APPROX. 144 lbs)

STORM SEWER
GRATE & LID

1/8" = 1'-0"
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.
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
Provide additional R.O.W. or public improvement easement if required.

Property or easement line.

CITY STANDARD SIDEWALK 4.0'

5:1 TAPER (TYP.)

1' MIN.

CITY TREE

CITY STANDARD CURB & GUTTER

PLAN VIEW

Provide additional R.O.W. or public improvement easement if required.

Note: Prior to construction of new sidewalk, clear & grub all roots within 4" of bottom & sides of new sidewalk, unless directed otherwise.

SECTION A - A

STANDARD 60' R.O.W.

No Scale

City of Colorado Springs

Tree Root Cuts

Approved by
City Forestry

Drawn by
KLW Date 07/14 STD. D-18C
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 (CDOR).

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

Inlet steps shall be as shown on the applicable (CDOR) Division "W" 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 pipe.

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

SPECIAL DESIGN INLET

CITY OF COLORADO SPRINGS, COLORADO:

COLORADO DEPARTMENT OF HIGHWAYS

CURB INLET TYPE R (MODIFIED)

APPROVED BY: Gary R. Hanele  C.E.
CITY ENGINEER

SCALE: AS SHOWN
DATE: SEPT. 87
DWN. BY: J.L.O.
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.
Type I Base Manhole

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.

City of Colorado Springs
Storm Sewer Manhole-Type I

Approved by: [Signature]
City Engineer

Scale: 3/8" = 1'-0"
Sheet: D-20A
1 of 4
1. Type II manholes shall be used only with approval of the City Engineer and only when the pipe sizes are 10" 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.

CITY OF COLORADO SPRINGS

STORM SEWER MANHOLE-TYPE II

APPROVED BY
CITY ENGINEER

SCALE: 3/8" = 1'-0"
DATE: JAN. 89
DRAWN: PL. B.
SHEET: D-20 B OF 4
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.

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

NOTE:
ANY DAMAGE TO COATING SHALL BE REPAIRED.

CITY OF COLORADO SPRINGS

STORM SEWER MANHOLE-TYPE III

APPROVED BY __________________________

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

DATE: ____________ DRAWN: ____________ SHEET: 0-20 C

AS SHOWN JAN. 89 PL.B. 3 OF 4
STORM SEWER MANHOLE PRECAST RISER

ECCENTRIC CONE OR FLAT TOP
SEE DETAILS AT RIGHT

MANHOLE FRAME AND LID
(CITY STANDARD D-17)

CEMENT MORTAR

MORTARED 2" PRECAST GRADE RING
(2" MIN., 6" MAX.)

1/2" MIN.

24"

9"

24"

9"

14" MIN. THRU 36" MAX.
ECCENTRIC CONE

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.

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

ECCENTRIC FLAT TOP
(FOR HR < 3' ±) SCALE: 1/2" = 1' - 0"

CITY OF COLORADO SPRINGS
STORM SEWER-COVER & RISER
APPROVED BY

STORM SEWER MANHOLE PRECAST RISER

CITY ENGINEER

SCALE: AS SHOWN
DATE: JAN. 89
DRAWN: SHEET: D-20D
RE: PL.B 1 OF 4
## DETAIL 1

**TYPE OF WALK** | **MIN. TOTAL LENGTH (L) OF PLATE**
--- | ---
ATTACHED | WALK WIDTH + 10 1/2"

**1" x 3/4" SUPPORT BAR REQUIREMENTS**

<table>
<thead>
<tr>
<th>FLOOR PLATE WIDTH (W)</th>
<th>SUPPORT SPACING (S)</th>
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<tbody>
<tr>
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<td>NONE REQUIRED</td>
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<tr>
<td>2'</td>
<td>60&quot; C/C</td>
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<tr>
<td>3'</td>
<td>27&quot; C/C</td>
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<tr>
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<td>15&quot; C/C</td>
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<tr>
<td>5'</td>
<td>10&quot; C/C</td>
</tr>
<tr>
<td>6'</td>
<td>7&quot; C/C</td>
</tr>
</tbody>
</table>

**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 ZINC COATED. FIELD WELDS TO BE TOUCH-UP WITH COLD ZINC 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 [Signature]

CITY ENGINEER

SCALE: NO SCALE  DATE: JAN. 89  DRAWN: PL.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.

EXISTING WATER MAIN & SERVICE LINE

NEW STORM SEWER PIPE

EXISTING CURB STOP & ADJUSTING BOX

INSTALL NEW SERVICE LINE TYPE "K" COPPER, WITH FLARED COMPRESSION FITTINGS.

PROVIDE 6" DIA. PIPE SLEEVE, MIN. CLASS 50 DUCTILE IRON PIPE

WATER SERVICE RELOCATION

CITY OF COLORADO SPRINGS
WATER SERVICE RELOCATION
APPROVED BY
K. F.
DEPUTY ENGINEER

SCALE: NO SCALE
DATE: JAN. 89
DRAWN: PL.B.
SHEET: D-22
1 OF 1
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.
NOTE: SEE SHEET 1 OF 2 FOR NOTES AND SECTION A-A DETAIL.
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 Trelan 4EC label (Eliaco).
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' (8). The longitudinal joint closest to the curb shall be tied ($) if there is no backfill behind the curb.

Place transverse joints perpendicular 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 backing 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 bosboot or bond breaker at catch basins, manholes and other roadway appurtenances of similar or large size. Small appurtenances, such as pipe and monument boxes, will not require a bosboot or bond breaker.

Preferred transverse joint locations are: more than 5 feet from a large appurtenance with no bosboot; or at the midpoint of round bosboots or appurtenances; or at the corner of rectangular bosboots 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 bosboot may be used. With less than two clearances, use the "Typical J" Radial Joint as shown in the details. Use of square or round bosboots, or bond breaker is appropriate when the appurtenance is centered on a longitudinal joint.

The final finish requirements of C.O.D.Ed. subsection 421.15 (f) shall apply except that transverse tine grooves will not be required.

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

CITY OF COLORADO SPRINGS
CONCRETE PAVEMENT - STANDARD JOINT LAYOUT
APPROVED BY: [Signature]
CITY ENGINEER

SCALE: NO SCALE DATE: FEB. 89 DRAWN: PL.B.
SHEET D-25 A 1 OF 3
MANHOLE BOXOUT

GRATED INLET BOXOUT

BOND BREAKER

SECTION A-A

SECTION B-B

Sand Breaker shall be composed of plastic sheet, building paper or other approved material to prevent standing.
### TABLE I - 2½" x ½" CORRUGATIONS
<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>WIDTH</th>
<th>WALL THICKNESS</th>
<th>HEIGHT OF COVER LIMITS, M, ft</th>
<th>CORNER BEARING PRESSURE, M, sq ft</th>
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</thead>
<tbody>
<tr>
<td>Dia.</td>
<td>in.</td>
<td>in.</td>
<td>in.</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>30</td>
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<tr>
<td>40</td>
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### TABLE II - 3" x 1" CORRUGATIONS
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<th>PIPE SIZE</th>
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<th>HEIGHT OF COVER LIMITS, M, ft</th>
<th>CORNER BEARING PRESSURE, M, sq ft</th>
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<tbody>
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### TABLE III - 125mm x 25mm CORRUGATIONS
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<th>WALL THICKNESS</th>
<th>HEIGHT OF COVER LIMITS, M, ft</th>
<th>CORNER BEARING PRESSURE, M, sq ft</th>
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<tr>
<td>Dia.</td>
<td>in.</td>
<td>in.</td>
<td>in.</td>
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<td>0.036</td>
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<tr>
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<td>15</td>
<td>0.025</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

### 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 or abrasive conditions are expected. Neither metal nor protective coatings shall be used where such conditions may be encountered.
- 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 more than 15° of the vertical axis.

### FRENCH INSTALLATION
- Installation and maximum fill heights shall conform to the "a" standard for "pipe sewer in earth".

### ROUND PIPE - STEEL PIPE - ARCH - STEEL

### CITY OF COLORADO SPRINGS

**METAL CULVERT PIPE**

APPROVED BY: 

**J. HAYES**

**ENGINEER**

**SCALE:** NO SCALE

**DATE:** JAN. 90

**DRAWN:** PL B

**SHEET:** D - 26
<table>
<thead>
<tr>
<th>TABLE I</th>
<th>6' X 8' CORRUGATIONS</th>
<th>HOLLOW STEEL PIPE</th>
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<tbody>
<tr>
<td>PIPE</td>
<td>DIA.</td>
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<tr>
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<td>IN.</td>
<td>FT.</td>
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<th>TABLE II</th>
<th>6' X 8' CORRUGATIONS</th>
<th>STEEL PIPE-ARCH</th>
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<tr>
<td>PIPE</td>
<td>SIZE</td>
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**GENERAL NOTES**

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

PIPE OR PIPE-ARCH WITH DIMS CUT TO FIT A SLOPE, SHALL BE REINFORCED AND THE DETAIL 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 BUT NOT MORE THAN 3 FEET APART TO PERMIT CEMENT SPREADING.

TYPICAL USE OF PIPE-ARCHES ARE SHOWN AS APPROXIMATIONS ONLY AND ARE NOT TO BE USED AS SPECIFICATIONS. TWIXT ADJACENT SIDES NEED NOT MORE THAN 3 FEET APART.

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

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

**APPENDIX**

- **TR - TOP OF PIPE TO TOP OF SURFACE**
- **WS - TOP OF PIPE-ARCH TO CENTERLINE**
- **DIAM - DIAMETER OF SECTION**
- **Fl. - NUMBER OF FEET, MAXIMUM HEIGHT OF FALL OVER TOP OF COVER, INCLUDING INCHES**

Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division.
TRENCH BEDDING CLASSIFICATION - ROUND PRECAST CONCRETE PIPE

CLASS A
Reinforced $A_t = 1.0\%$ $L_f = 4.8$
Plain $A_t = 0.4\%$ $L_f = 2.8$

CLASS B
$L_f = 1.9$

CLASS C
$L_f = 1.5$

Shaped Subgrade with Granular Foundation

Granular Foundation

Legend

<table>
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<tr>
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<td>3&quot;</td>
</tr>
<tr>
<td>30&quot; to 60&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>66&quot; &amp; larger</td>
<td>6&quot;</td>
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$B_c = $ outside diameter
$H = $ backfill cover above top of pipe
$D = $ inside diameter
$d = $ depth of bedding material below pipe
$A_t = $ area of transverse steel in the cradle or arch expressed as a percentage of area of concrete or 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.
TRENCH BEDDING CLASSIFICATION - PRECAST CONCRETE SECTIONS

HORIZONTAL ELLIPTICAL PIPE

CLASS B
$L_1 = 1.9$

Vertically Compacted Granular Material
Fine Granular Fill Material 2" Min.

CLASS C
$L_1 = 1.5$

Lightly Compacted Backfill
Shaped to Fit

VERTICAL ELLIPTICAL PIPE

CLASS B
$L_1 = 1.9$

Vertically Compacted Granular Material
Fine Granular Fill Material 2" Min.

CLASS C
$L_1 = 1.5$

Lightly Compacted Backfill
Shaped to Fit

PRECAST BOX SECTION

CLASS B

Compacted Granular Material
Fine Granular Fill Material 6" min.

CLASS C

Compacted Granular Material
Lightly Compacted Backfill

NATIVE GRANULAR MATERIAL
TRENCH BEDDING FOR FLEXIBLE PIPE

UNCLASSIFIED TRENCH
BACKFILL. (UNLESS CLASSIFIED
MATERIAL IS SPECIFIED)

LEVEL LIFTS OF BEDDING
BACKFILL, PLACED IN LAYERS
6" TO 12" THICK, AND THEN
COMPACTED. (GRANULAR
MATERIAL)

BEDDING BACKFILL COMPACTED
UNDER HAUNCHES TO SPRING LINE.

FOR NARROW TRENCH, W<24",
SHAPE BEDDING TO PIPE INVERT
FOR A WIDTH OF D/2.

ADDITIONAL FOUNDATION PREPARATION
MAY BE REQUIRED IN UNSTABLE
TRENCH CONDITIONS AS DIRECTED BY
THE ENGINEER.

ORDINARY TRENCH
CONDITION

UNCLASSIFIED BACKFILL

LEVEL LIFTS OF BEDDING BACK-
FILL, PLACED IN LAYERS 6"
TO 12" THICK, AND COMPACTED.
(GRANULAR MATERIAL)

SLOPE TRENCH
AS REQUIRED
ABOVE TOP OF
PIPE ZONE.

MIN. D/8
(12" MIN.)

SPRING LINE
OF PIPE

MIN. D/8
(12" MIN.)

W

6" MIN.

GRANULAR
MATERIAL

6" MIN.

GRANULAR
MATERIAL

WHERE UNSUITABLE MATERIAL IS
ENCOUNTERED OVEREXCAVATE
AND BACKFILL WITH SELECT
GRANULAR MATERIAL PER
SPECIFICATIONS, MINIMUM
COMPACTION 90% STANDARD
PROCTOR DENSITY.

ORDINARY TRENCH
CONDITION

SHAPED BEDDING
(Pipe - Arch)

CORNER SUPPORT ZONE
EXCELLENT MATERIAL,
HIGHLY COMPACTED.

SOIL FINE GRADED TO SHAPE OF
BOTTOM OF PIPE ARCH OR BEDDING
BLANKET OF GRANULAR MATERIAL
SHAPED WITH TEMPLATE.
Depth of scour to be increased if required by acour potential. Indicate dimension on plan.

**HEADWALL & TOEWALL QUANTITIES**

*Note: 0.049 cu yd Concrete and 3.4 lb. Roof Steel from these quantities when Concrete city is specified.

Includes all Headwall and ToeWall reinforcing.

**DIMENSIONS & QUANTITIES**

**GENERAL NOTES**

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

All construction joints shall be thoroughly chowed before fresh concrete is placed.

Concrete joints shall be scored at 3 ft for cent and shall extend through the entire cross section of the Box Culvert.

Splice quantities for longitudinal bars are not included.

**DESIGN DATA**

Unit Stress, $f_y = 30,000$ psi

$E = 1,900,000$

**DESIGN CRITERIA**

Concrete to be specified strength not exceed the second strength grade. For culverts on or near water bodies, special design will be required.

**LOAD DATA**

Live Load = AASHTO, HS-20 (1.25)

Dead Load = Earth Load = 4.1 psf (0.193 kPa)

Equivalent Fluid Pressure = 0.04 psi (0.002 kPa)

The maximum spacing length for bars shall be

**SPACE LENGTHS**

*All stress conversed on concrete shall be 0.75*
**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.**

---

### Dimensions & Quantities

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<tr>
<th>HEIGHT OF WALL</th>
<th>TYPE</th>
<th>STONE</th>
<th>LENGTH</th>
<th>WALL</th>
<th>EARTH CORE</th>
<th>QUANTITIES</th>
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<td>1000</td>
<td>1/2</td>
</tr>
</tbody>
</table>

---

### General Notes

- All work shall be done in accordance with the Standard Specifications applicable to the project.
- All concrete shall be Class "A" (Fine Concrete).
- Foundation shall be made of concrete except as otherwise specified.
- All construction joints shall be thoroughly cleaned before backfill concrete is placed.
- Concrete shall be placed at 33 barrel centers and shall extend through the entire cross section of the box culvert.

### Design Criteria

- Live Load: AASHTO HS 20-44
- Dead Load: EN 1991-2 80 kN/m²
- Earth Pressure: H = 0.5 m, T = 2 m
- Minimum slope length for common bar sizes: 5 m

---

### Bar List

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SIZE</th>
<th>TREATED STEEL</th>
<th>BAR</th>
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<td>Concrete</td>
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<td>1000</td>
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*Includes all headwall and toe wall reinforcing.

**Doubled Ø3/4 and 1 1/4 in. bar in foundation, concrete bars in specified.
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 5/8" angle attached with 6 inch nelson studs, hot dip galvanized.**

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**STANDARD M-601-3**

*January, 1982*

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**SECTION A-A**

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**SECTION B-B**

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**PLAN**

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**NOTES**

**DESIGN CRITERIA**

- Culvert to rest on subgrade, or culvert supported on existing foundation. For culverts on piers or rock foundations, special design will be required.

**LOADING CASES**

- Live Load - 60,000 lbs
- Dead Load - 60,000 lbs
- Snow Load - 200 psf
- Snow Load - 200 psf
- Flood Pressure - 50 psi

The maximum space length for common box culverts shall be:

- 30 feet
- 60 feet
- 90 feet

Space length is specified in the design data. All exposed corners on concrete shall be chamfered 1/4".

---

**GENERAL**

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 placed.

Construction joints shall be spaced at 25 foot max. centers and shall extend through the entire cross section of the Box Culvert.

Space quantities for longitudinal bars are not included.

**DESIGN DATA**

- Unit Stresses: $f_0 = 10,000$ psi
- $f_0 = 1,200$ psi
**Typical Section**

- **Concrete Apron**: If specified on plans.
- **Shored Handwall**: As specified on plans.
- **Concrete Apron**: As specified on plans.
- **Concrete Apron**: As specified on plans.
- **Location of Top Wall**: If Concrete Apron is not specified.

**Typical Culvert Layout**

- **Detailed Layout**
  - Expansion Joint Material: Must conform to AASHTO M-215 and appear satisfactory.
  - Dimensions: 24"H x 24"L x 24"W and angles for rigid joints.
  - Maximum Splice Length for common bar size shall be:
  - **BAR SIZE**: 6" x 6" x 6"
  - **SPICE LENGTH**: 6" x 6"

**Wingwalls for Pipe or Box Culvert**

- **Concrete, Class A (Blue Color)**
- **Concrete, Class B (White Color)**
- **Concrete, Class C (Gray Color)**

**General Notes**

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

**Design Data**

- Unit Weight: 2,000 lb/ft³
- Unit Weight: 1,000 lb/ft³
- Equivalent Fluid Pressure: 30 lb/ft²
- **Maximum Side Pressure**: 1 lb/ft²
- All construction joints shall be thoroughly cleaned before fresh concrete is placed.
- Wingwall Concrete shall be:
  - Concrete: Class A (Blue Color)
  - Concrete: Class B (White Color)
  - Concrete: Class C (Gray Color)