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1. THESE DETAILS HAVE BEEN PREPARED IN AN EFFORT TO STANDARDIZE THE CONSTRUCTION DETAILS USED BY VARIOUS CONTRACTING AGENCIES IN MARICOPA COUNTY. THEY ARE TO BE USED IN CONJUNCTION WITH THE CURRENT METRIC EDITION OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION" SPONSORED AND DISTRIBUTED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS.

2. MANY NOTES WITHIN THESE DETAILS REFER TO VARIOUS SECTIONS OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION." WHERE THIS REFERENCE IS MADE, ONLY THE ABBREVIATION "SECT." IS USED. AN EXAMPLE OF THIS REFERENCE WOULD BE: "CLASS 'A' CONCRETE PER SECT. 725."

3. MANY NOTES WITHIN THESE DETAILS REFER TO OTHER DETAILS WITHIN THIS BOOK. WHERE THIS REFERENCE IS MADE, THE ABBREVIATION "DETAIL" IS USED. AN EXAMPLE OF THIS WOULD BE: "SEE DETAIL 391 FOR VALVE BOX INSTALLATION."


5. AN EFFORT HAS BEEN MADE TO INCLUDE THE MOST COMMONLY USED CONSTRUCTION DETAILS IN THIS BOOK. ITEMS WHICH REQUIRE DESIGN CONSIDERATION BY THE DESIGNING ENGINEER HAVE NOT BEEN INCULDED.

6. SOME OF THE DETAILS PRINTED HEREIN MAY BE USED BY OTHERS. THE DESIGNING ENGINEER SHOULD THEREFORE CONTACT THE AGENCY WITHIN WHOSE JURISDICTION HE IS WORKING FOR DIRECTION AS TO WHICH DETAIL OR PORTIONS OF DETAILS SHOULD BE USED.

7. DETAIL DRAWINGS ARE NOT TO SCALE.

8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
DIMENSION SHOULD BE GIVEN ONCE ON EACH SHEET AND SHOULD BE PLACED NEAR THE CENTER OF THE SHEET. IF ANY OF THE GIVEN CONDITIONS CHANGE, THEY SHOULD BE REDIMENSIONED AT THE POINT OF CHANGE.

GIVEN DIMENSIONS IN ORDER STARTING WITH THE LONGEST AND ENDING WITH THE SHORTEST, AS SHOWN IN THE SKETCH.

GIVE COMPLETE DIMENSIONS.

IF THE CENTERLINE OF PAVEMENT DOES NOT FALL ON THE SECTION LINE OR MONUMENT LINE OF THE STREET, DIMENSION AS ABOVE AND SHOW THE DIFFERENCE BETWEEN THE SECTION OR MONUMENT LINE AND THE CENTERLINE.
NOTES:
1. TYPE 'A' TO BE USED AT INTERSECTIONS OF MAJOR
   STREETS & COLLECTOR STREETS, AND AT OTHER SPECIAL
   PONTS IF REQUIRED BY ENGINEER, AS SHOWN ON PLANS.

2. TYPE 'B' TO BE USED AT INTERSECTION OF STREET G'S
   (EXCEPT WHERE TYPE 'A' IS SPECIFIED), CORNERS OR CHANGES
   IN ALIGNMENT OF SUBDIVISION BOUNDARIES (WHEN THEY FALL
   IN PAVEMENT), P.C.'S AND P.T.'S OF CURVES. WHEN P.I. FALLS
   IN PAVEMENT, THEN THE P.I. SHALL BE MONUMENTED.

3. TYPE 'C' TO BE USED AT CORNERS OF & CHANGE IN ALIGNMENT
   OF SUBDIVISION BOUNDARIES WHERE CORNERS OR CHANGE POINTS
   FALL OUTSIDE OF PAVED AREAS OR IN ALLEYS.

4. LETTERS TO BE APPROX. 1 mm WIDE & 1 mm DEEP.

5. USE STANDARD WROUGHT IRON WASHER 76 mm x 4 mm
   THICK WITH 35 mm HOLE

6. CAP TO BE CONSTRUCTED OF RED BRASS OR BRONZE.

7. FRAME & COVER TO INCLUDE CHAIN PER DET. 270.
   (OPTIONAL PER AGENCY REQUIREMENTS.)

CAP DETAIL

REMOVE BURRS & SAND FROM TOP

CLASS 'B' CONC.
AS PER SECT.
725 - 150 mm THICK,
1000 mm DIA.
SAND OR EARTH
STD. WROUGHT WASHER
BRASS CAP, SEE DETAIL
CLASS 'B' CONCRETE
AS PER SECT. 725
SEE NOTE 1
CYLINDER - 150 mm DIA. (MIN.)
200 mm DIA. (MAX.)

TYPE 'A'
(WITH FRAME PER DETAIL 270)

200 mm C.I. FRAME
AND COVER

6 MAX

AVEMENT

SEE NOTE #7

SEE NOTE 5

200

76

52

3

3

150

23 MIN

1575

15

750

150 mm DIA. (MIN.)
200 mm DIA. (MAX.)

SEE NOTE 2

15M REBAR
AS PER
SECT. 727
ROUND
OR SQUARE
150 mm (MIN.)
200 mm (MAX.)

CLASS 'B' CONC.
AS PER
SECT. 725

STD. WROUGHT
WASHER

BRASS CAP

 TYPE 'B'
(WITHOUT FRAME)

FINISH GRADE

15M DEFORMED
REINFORCING
ROD AS PER
SECT. 727

Cylinder
150 mm DIA. (MIN.)
200 mm DIA. (MAX.)

CLASS 'B'
CONC. AS
PER SECT. 725

SEE NOTE 3

TYPE 'C'
NOTES:

1. TYPE 'D' NORMALLY USED AT STREET INTERSECTIONS, AS SUBDIVISION MONUMENTS AND 1/16 CORNERS.

2. TYPE 'E' NORMALLY USED ON SECTION CORNERS, 1/4 CORNERS AND AT THE CENTER OF SECTIONS. CONCRETE POST IS CHAMFERED 20 mm AT TOP. MINIMUM LENGTH OF POST 800 mm LENGTH DEPENDS ON SUBSURFACE OBSTRUCTIONS SUCH AS OLD CONCRETE PAVING, ROCK, ETC. 20 mm GALVANIZED PIPE SET IN THIS POST SHALL BE A MINIMUM OF 750 mm LONG EXCLUSIVE OF COUPLING, SEE PLANS.

3. CAP TO BE CONSTRUCTED OF RED BRASS OR BRONZE.

4. FRAME AND COVER TO INCLUDE CHAIN PER STD. DETAIL 270.
NOTES:

1. FASTEN WITH M12x125 mm LAG SCREWS WITH 2 FLAT WASHERS OR (2) M16 BOLTS, WITH 4 FLAT WASHERS.

2. 38x184 mm DOUGLAS FIR PLANK (LENGTH TO BE DETERMINED ON PLANS.)

3. WHEN BARRICADE (TYPE "A") IS CONSTRUCTED ON BASES INSTEAD OF POSTS SET INTO THE GROUND, IT MAY BE DESIRABLE TO BALLAST THE BASES WITH SAND BAGS OR BY STAKING TO PROVIDE RESISTANCE TO OVERTURNING DURING PERIODS OF HIGH WINDS.

4. TWO COATS OF WHITE PAINT PER SECTION 790 SHALL BE APPLIED TO ALL EXPOSED SURFACES OF THE BARRICADE. AN ADDITIONAL TWO COATS OF ORANGE PAINT PER SECTION 790 SHALL BE APPLIED TO CREATE THE ALTERNATE ORANGE AND WHITE STRIPES FOR TEMPORARY BARRICADES AND TWO COATS OF RED PAINT PER SECTION 790 SHALL BE APPLIED TO CREATE ALTERNATE RED AND WHITE STRIPES FOR PERMANENT BARRICADES. HIGHWAY SAFETY SPHERES (BEADS) PER ADOT 708-2.02 SHALL BE APPLIED BY HAND TO ALL CROSS MEMBERS, FRONT AND BACK AND ON BOTH COLORS, IMMEDIATELY AFTER PAINTING. THE STRIPES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS.
NOTES

TYPE 'A'

USE DRIVING HEAD FOR DRIVING ALL FLANGED STEEL 'U' CHANNEL POSTS.

IN LIEU OF DRIVING FLANGED STEEL 'U' CHANNEL POSTS MAY BE SET IN CONCRETE BASE FOUNDATION AS PER TYPE 'B' BASE.

TYPE 'B' & TYPE 'C'

CONCRETE BASE FOUNDATIONS SHALL BE CLASS 'C' CONCRETE AS PER SECT. 505 AND 725.
1. Posts and blocks shall be 200 mm x 200 mm rough wood, pressure treated and unpainted. Holes shall be bored before treatment. See Sect. 415

2. All guard rail plate, fittings, hardware, etc. shall be galvanized.

3. Type 'A' guard rail installed on normal shoulder line.

4. Type 'B' guard rail installed on widened roadway shoulder line.

5. Type 'B' installation shown. Type 'A' installation same except that inside face of guard rail shall fall on the normal shoulder line as indicated by plan drawing.
'W' SECTION BACK-UP PLATE
FOR STEEL POSTS

STANDARD DETAIL
METRIC

STEEL GUARD RAIL

'W' BEAM (STEEL POST)
NOTES:
1. TOP AND RUB RAIL SHALL NOT PROJECT MORE THAN 25 mm. IF ADJUSTMENT SHORTENING IS REQUIRED, THREADS SHALL BE LEFT IN FUNCTIONAL CONDITION.
2. HORIZONTAL DISTANCE BETWEEN TOP RAIL AND MEDIAN CURB SHALL NOT EXCEED 300 mm.

DETAIL NO. 2 - MEDIAN BARRIER

INSTALLOATION OF GUARD RAIL IN EMBANKMENT CURB SECTION

DETAIL NO. 3 - RUB RAIL SPLICE (SPLICE AT POSTS ONLY)

STEEL GUARD RAIL

135-3

MARICOPA ASSOCIATION OF GOVERNMENTS

STANDARD DETAIL METRIC

3-03-2000

135-3
**Detail No. 4**

Attachment of Guard Rail to Structures

- M16 Mach. Bolt and 44x17x4 mm washer, length determined by total block thickness and self-drilling anchor.
- M16x216 mm carriage bolt, use 2-44x76x5 mm washers with 25x17 mm slotted holes, one of which shall be recessed 25 mm into back of block.

**Note**

1. 16 mm bolt size self-drilling anchor shall have a minimum 6.7 kN pull out strength in 20 MPa concrete in accordance with manufacturer's specifications.

**Detail No. 1**

Guard Rail Post Installation on Structures

- 2-152x152x12.7 angle 200 mm long
- 4-M16 bolt size self-drilling anchor and bolts.

**Detail No. 5**

Buffer End Section

- 3.51 mm thick std. guard rail plate
- Galvanized after fabrication

- Serrated holes 23x29 mm
- 406 mm approx.

**Section A-A**

- 25 mm square or hex. head mach. bolt, nut and washers

**Section**

- Pier or abutment
- Block thickness as required

**Elevation**

- 200x200x356 mm block
- 76 mm

**Metric**

- Standard detail

**Steel Guard Rail**

- Detail No. 135-4

- Maricopa Association of Governments

- Revised 3-03-2000
SAFETY POST SECTION

- **150 mm Reflective Engineer's Tape (3M High Density Yellow Pressure Sensitive Tape or Approved Equivalent)**
- **100 mm or 150 mm x 1800 mm Steel Post, Schedule 40, Galvanized**
- **Existing Grade**
- **Concrete Class (B)**
- **Existing Concrete or Asphalt**
- **Fill with Grout and Crown Top**
- **100 mm or 150 mm Nominal Post Dia.**

**Dimensions:**
- **1050 mm**
- **750 mm**
- **150 mm Min.**
- **25 mm**

**Date:** 3-03-2000
16 mm HOLE FOR 12 mm DIA. PIN, 600 mm LONG, HOT ROLLED STEEL

TYPE A

16 mm HOLE OR 12 mm DIA. PIN, 600 mm LONG, HOT ROLLED STEEL

TYPE B-1 = 900 mm
TYPE B-2 = 1200 mm
TYPE B-3 = 1800 mm

TYPE B-1, B-2, AND B-3

RADIUS 20 MIN. - 25 MAX.
10M REINFORCING BAR AS PER SECTION 727
1700 mm FOR TYPES 'A' & 'B-3'
1100 mm FOR TYPE 'B-2'

CLASS 'A' CONCRETE AS PER SECTION 725

TYPICAL SECTION

NOTE:
1. DIMENSIONAL AND REINFORCEMENT CHANGES WILL BE PERMITTED UPON PRIOR WRITTEN APPROVAL OF THE ENGINEER.

12 mm DIA. PINS — 600 mm LONG, HOT ROLLED STEEL

SAFETY CURB INSTALLATION ON DIRT

300 mm DIA. CONCRETE CYLINDER

DETAIL NO. 150
STANDARD DETAIL METRIC
PRECAST SAFETY CURB

REvised 3-03-2000 DETAIL NO. 150
NOTES

1. ALL CONCRETE SHALL BE CLASS 'C' PER SECT. 725.
2. FITTINGS NOT SPECIFICALLY DETAILED SHALL BE HEAVY DUTY DESIGN.
3. STRAIN POSTS SHALL BE SPACED AT 150 m MAXIMUM SPACING.
4. BOTH CORNER AND STRAIN POSTS SHALL HAVE STRAIN PANELS.
5. ALL POSTS SHALL BE CAPPED.
6. MEMBER SIZES SHALL BE THE FOLLOWING:

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<th>AISC SIZE</th>
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<td>73.03</td>
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<td>STRAIN POST</td>
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<td>BRACE</td>
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<tr>
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<td>4.76 x 19 FLAT</td>
<td>4.76 x 19 FLAT</td>
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7. CONSTRUCTION AND MATERIALS SHALL CONFORM TO SECT. 420 AND 722, RESPECTIVELY. SEE USS TABLE 722 FOR WEIGHTS OF MEMBERS.
NOTE:
L-xxx NUMBERS DESIGNATES FAA SPECIFICATION NO.

MINIMUM 100 mm CONCRETE BACKFILL PER SECTION 725, CLASS "A".
PROVIDE 2" SLACK FOR CONNECTIONS.
GROUND CLAMP
CONDUIT (IF SPECIFIED)
75 mm DIA. DRAIN HOLE
300 x 300 x 300 mm ABC PER SECTION 702

L-867 BASE W/COVER
L-823 CONNECTOR
L-830 TRANSFORMER
L-824 CABLE 1/C, #8, 5 KV, (6.6 AMP ONLY)
BARE COPPER COUNTERPOISE WIRE (IF SPECIFIED)
BUILDING BLOCK (BRICK OR CONC. BLOCK)

FRANGIBLE COUPLING AND DISCONNECT PLUG
FINISHED GRADE

350 mm STANDARD

L-86__ FIXTURE
\[ D = \frac{(100 - R)d + 0.9 RS \times 1000}{100} \]

**WHERE:**

- \( D \) = DRY DENSITY OF SAMPLE CONTAINING R PERCENT ROCK, kg/m\(^3\).
- \( R \) = PERCENT ROCK RETAINED ON 4.75 mm SIEVE.
- \( d \) = DRY DENSITY OF PORTION PASSING 4.75 mm SIEVE, kg/m\(^3\).
- \( S \) = BULK SP. GR. OF ROCK.

**EXAMPLE:**

**KNOWN:**
- DRY DENSITY OF MATERIAL PASSING 4.75 mm SIEVE = 1826 kg/m\(^3\).
  - PLOT AT A.

**KNOWN:**
- SPECIFIC GRAVITY OF ROCK = 2.5, PLOT AT B. DRAW LINE AB.

**KNOWN:**
- PERCENT OF ROCK IN TOTAL SAMPLE = 29. PLOT AT C.
  - DRAW LINE CD AND LOCATE D AT INTERSECTION WITH AB.
  - DRAW LINE DE LOCATING POINT E AT 1949. 1949 = DRY DENSITY IN kg/m\(^3\) OF TOTAL SAMPLE CONTAINING 29% ROCK.
A.C. PAVEMENT

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

300

150

d = DESIGN THICKNESS OF A.C. PAVEMENT PLUS AGGREGATE BASE.

TYPE 'A'

A.C. PAVEMENT

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

300

200 MIN.

TYPE 'B'

A.C. PAVEMENT

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

38 mm x 140 mm REDWOOD HEADER (ROUGH) PER STANDARD SECT. 778

19x38x450 mm WOOD STAKES AT 1500 mm O.C. PER STANDARD SECT. 778

TYPE 'C'
PAVED ALLEY DETAIL

LENGTH BETWEEN CONTRACTION JOINTS = 3 m
EXPANSION JOINTS = 30 m MAX.

UNPAVED ALLEY DETAIL

GRADE ALLEY FULL WIDTH
AND INSTALL 150 mm A.B.C. OR CRUSHED GRANITE AS INDICATED

RESIDENTIAL ALLEY DETAIL

75 mm CROWN EXCEPT WHERE DIRECTED OTHERWISE IN WRITING BY THE ENGINEER

LESS THAN 6.0 m

REVISED 3-03-2000

DETAIL NO. 202

STANDARD DETAIL METRIC

ALLEY DETAILS (PAVED AND UNPAVED)
NOTES:
1. ANGLE EQUALS 45° UNLESS SPECIFIED ON PLAN.
2. DIMENSION 'B' EQUALS 'A' + 600 mm.
3. (——) INDICATES DIRECTION OF FLOW.
4. PAINT STEEL ACCORDING TO SECTION 790. PAINT NUMBER 1-A OR 1-B.
5. R EQUALS 25 mm UNLESS OTHERWISE DIRECTED.
6. H EQUALS CURB FACE HEIGHT.
7. FOR ROLL CURB AND GUTTER, USE 600 mm TRANSITIONS TO VERTICAL CURB.

DETAIL C

SECTION 'C-C'

DETAIL A

SECTION 'A-A'

DETAIL B

SECTION 'B-B'
PLAN OF CONCRETE EQUIPMENT CROSSING

NOTES:

1. WHEN EQUIPMENT CROSSING LIES ADJACENT TO BRIDGE OR BOX CULVERT, CONSTRUCT THE EQUIPMENT CROSSING TO WIDTH OF BRIDGE ROADWAY.

2. ALL DOWELS IN CENTER JOINTS SHALL BE DEFORMED BARS AND SHALL HAVE UNBROKEN BOND. THEY SHALL BE HELD SECURELY IN PLACE, PARALLEL TO THE SUBGRADE AND PERPENDICULAR TO THE CENTER LINE OF THE ROAD.

3. THE EDGING TOOL USED FOR ALL LONGITUDINAL JOINTS SHALL BE SO CONSTRUCTED AS TO PROVIDE A SMOOTH TROWELED SURFACE 75 mm WIDE ON EACH SIDE OF THE JOINT.

4. IF APPROVED BY THE ENGINEER, OTHER DEFORMATIONS MAY BE USED IN LONGITUDINAL JOINT - DETAIL 'C'.

5. DETAIL 'C' TO BE USED ONLY WHEN FULL WIDTH CAN NOT BE POURED IN ONE POUR. USE DETAIL 'D' IF FULL WIDTH IS POURED IN ONE POUR.
NOTES:

1. W – INDICATES WIDTH OF PAVE SURFACE OF TURNOUT.
   L – INDICATES LENGTH OF PAVED SURFACE OF TURNOUT.
   R – RADIUS.

2. SIZE AND TYPE OF TURNOUT SHALL BE NOTED ON PLANS AS FOLLOWS:
   90° – WITH A RADIUS: W x L x R = SURFACE – TYPE: (4 x 9 x 4.5 m – A.C. – TYPE "C"
   TURNOUT). OTHER THAN 90° WITH 2 RADIUS TYPE "S": W x L x R x R = SURFACE – TYPE;
   (4 x 9 x 4.5 x 15 m – A.C. – TYPE "S" TURNOUT).
   OR IT MAY BE NOTED ON PLANS IN CONVENTIONAL TERMS.

3. TURNOUTS TO BE STRAIGHT TYPE UNLESS OTHERWISE NOTED ON PLANS.

4. A.C. AND BASE MATERIAL THICKNESS FOR TURNOUTS SHALL BE THE
   SAME AS SHOWN ON THE ROADWAY SECTION, UNLESS OTHERWISE NOTED.

5. ANY EXCAVATION OR EMBANKMENT FOR TURNOUTS IS INCLUDED IN THE
   ROADWAY QUANTITIES.

6. TURNOUTS ARE TO BE PLACED WHERE SHOWN ON PLANS, OR AS DIRECTED
   BY THE ENGINEER.
NOTES:

1. TRANSITION TO SPILLWAY/CHANNEL AS PER APPROVED PLANS.

2. A CENTER WALL SHALL BE INSTALLED IN SCUPPERS WIDER THAN 1200 mm OR IF MORE THAN 1 SCUPPER IS BUILT IN SERIES.

3. EXPANSION JOINT FILLER SHALL BE 13 mm BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751.
VERTICAL CURB AND GUTTER (TYPE A)

Roadway Width: 610
Curvature: 175, 150, 25, 300
Class 'B' Concrete

NOTES:
1. All exposed surfaces to be trowel finished except as shown. See Sect. 340.
2. H = 150 or as specified on plans.
3. Contraction joint spacing 3.0 m maximum.
4. Expansion joints as per Sect. 340.

ROLL CURB AND GUTTER (TYPE C)

Cold Joint
Side Walk
Class 'B' Concrete

NOTES:
1. All work and materials shall conform to Sect. 340, 505 and 725. Broom finish exposed surface.
2. Contraction joint spacing 3.0 m maximum.
3. Expansion joints as per Sect. 340.

RIBBON CURB (TYPE B)

Pavement
Slope - See Note 3
Parkway or Sidewalk

NOTES:
2. Broom finish all surfaces.
3. Ribbon curb may slope towards pavement or parkway as indicated on plans.
4. Contraction joint spacing 3.0 m maximum.

(TYPE D)

Special Sect. Use for High Side Curb with sheet drainage across street
Pavement flush with lip of gutter

NOTES:
1. All work and materials shall conform to Sect. 340, 505 and 725. Broom finish exposed surface.
2. Contraction joint spacing 3.0 m maximum.
3. Expansion joints as per Sect. 340.
**CURB AND GUTTER TRANSITION**

- 1500 mm CURB TRANSITION
- TYPE 'C'
- 13 mm EXPANSION JOINT FILLER SHALL BE BITUMINOUS TYPE PREFORMED, A.S.T.M. D-1751
- RADIUS AS SHOWN ON PLANS
- VARES

**SECTION A-A**

**NOTES:**

1. THE CURB TRANSITION WILL BE PAID FOR AS TYPE 'C'. WHEN A PROJECT CONSISTS OF TYPE 'C' CURB AND GUTTER THROUGHOUT, THE ENTIRE RETURN SHALL BE MEASURED AND PAID FOR AS TYPE 'A'.

2. WHERE PROPOSED CONSTRUCTION IS TO BE CONNECTED TO EXISTING CURB AND GUTTER, THE TRANSITION SHALL BE INDICATED ON PLANS.

---

**CURB WARNING BEACON**

- SLOPE TO
- 150 mm IN 2400 mm
- 150 mm DIAMETER SEMI-STEEL HOUSING
- GALVANIZED AMBER LENS
- (4) 13x205 ANCHOR BOLTS
- ELECTRICAL CONDUIT
- GLASS MIRROR REFLECTOR IN ALUMINUM MOUNTING
- RETAINING RING
- PAVEMENT

**INTEGRAL ROLL CURB, GUTTER AND SIDEWALK**

- 1200 ROADWAY WIDTH
- 175
- 535
- 130
- 600 R
- 100
- 14
- 150
- 190
- 100
- 285
- 14
- 6
- 15 mm BATTER

**NOTES:**

1. CONCRETE TO BE MONOLITHIC POUR, EXPOSED SURFACE FINISH AS PER SIDEWALK AND GUTTER DETAIL.

2. CONTRACTION JOINT SPACING 5.0 m MAXIMUM.

3. EXPANSION JOINTS PER SECT. 340.

---

**STANDARD DETAIL**

**METRIC**

**CURB AND GUTTER**

(TRANSITION, INTEGRAL & WARNING BEACON)

DETAIL NO. 221

MARICOPA ASSOCIATION OF GOVERNMENTS

REVISED

3-03-2000

DETAIL NO. 221
NOTES:

1. ALL VERTICAL SURFACES TO BE FORMED.
2. VERTICAL SURFACES DOWN FROM 50 mm BELOW UNDISTURBED SOIL MAY BE PLACED AGAINST NEAT CUT IF APPROVED BY THE ENGINEER AND CONCRETE WILL NOT EXTEND MORE THAN 25 mm BEYOND THEORETICAL FACE.
3. ALL EXPOSED SURFACES TO BE STRIPPED GREEN AND TROWEL FINISHED.
4. CONCRETE CURBS CONFORM TO SECT. 340.
5. MAXIMUM SPACING OF CONTRACTION JOINTS IS 3 m.
6. CONCRETE TO BE CLASS 'B' PER SECT. 725.

TYPICAL CURB TERMINATION
NOTE:
LENGTH OF TRANSITION SHALL BE EQUAL TO RADIUS OF MEDIAN NOSE, (1500 mm MINIMUM). FOR LOCATION SEE PLANS.
NOTES:

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECT. 340.

2. EXPANSION JOINT FILLER SHALL BE 13 mm BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751.

3. LARGE AGGREGATE IN CONTRACTION JOINT, SHALL BE SEPARATED TO A DEPTH OF 25 mm, FINISH DEPTH SHALL BE A MINIMUM OF 20 mm.

4. EXPANSION JOINT 30 m MAXIMUM SPACING PER SECT. 340.

5. CLASS ‘B’ CONCRETE CONSTRUCTION AS PER SECT. 725.

DETAIL NO. 230
MARICOPA ASSOCIATION OF GOVERNMENTS
STANDARD DETAIL METRIC
SIDEWALKS

REvised 01-01-2003
DETAIL NO. 230
NOTES:

1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIALY. GUTTER ELEVATION = 0.

2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECTION 725.

3. WHEN CURB HEIGHTS OF 175 mm ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]S.

SECTION B–B

TOPOGRAPHIC LINE

BOTTOM OF RAMP CURB WHEN FORMED AND POURED SEPARATELY

SECTION A–A

RIGHT-OF-WAY LINE

VARIATES 150 1070 mm LANDING 1040 mm RAMP 175 435

CONSTRUCTION JOINT 25 mm DEEP OR FORMED SEPARATELY

MATCH GUTTER FLOW LINE

FOR GROOVE SLOPING RAMP FACE, SEE DETAIL NO.1 ON TYPE 'D' RAMP DETAIL 234

T.C. = 150 mm
T.C. = 175 mm
T.C. = 75 mm
T.C. = 75 mm

CONTROL ELEVATIONS

(1200 mm S/W) R.C.
AND S/W = 170 mm
(TYP) [=195 mm]

(1500 mm S/W) R.C.
AND S/W = 175 mm
(TYP) [=200 mm]
NOTES:

1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIAL. GUTTER ELEVATION = 0.

2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECT. 725.

3. WHEN CURB HEIGHTS OF 175 MM ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]S.

SECTION B-B

BOTTOM OF RAMP CURB WHEN FORMED AND Poured SEPARATELY

SECTION A-A

RIGHT-OF-WAY LINE

RAMP CURB HEIGHT MATCHES S/W ELEVATION

TOP OF S/W

TOP OF RAMP

SUBGRADE PREPARATION, SEE SECT. 301

CONSTRUCTION JOINT 25 mm DEEP OR FORMED SEPARATELY

FOR GROOVE SLOPING RAMP FACE, SEE DETAIL NO.1 ON TYPE 'D' RAMP DETAIL 234

MATCH GUTTER FLOW LINE

R.C.&S/W=175 mm (Typ) [=200 mm]

T.C.=150 mm [=175 mm]

T.C.=75 mm

TOP RAMP = 75 mm

T.C.=150 mm [=175 mm]

T.C.=75 mm

RAMP CURB (R.C.)

FULL FACE OF RAMP

ROUGH BROOM FINISH, USE A RIPPLE SURFACE PATTERN

5mm GROOVES AT 25 mm O.C.
**SECTION A--A**

**NOTES:**

1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER. GUTTER ELEVATION = 0.
2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECT. 725.
3. WHEN CURB HEIGHTS OF 175 mm ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]'.
4. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
RIGHT-OF-WAY LINE

1200 mm SIDEWALK

RADIUS SHOWN ON PLANS

5 mm GROOVES AT 25 mm O.C. FULL FACE OF RAMP

T.C.=100 mm

S/W=120 mm

100 mm VERTICAL OR ROLL TYPE CURB AND GUTTER PER DETAIL 220 AS SHOWN ON PLANS

CURB TRANSITION PER DETAIL 221 FOR ROLL CURB

1/2Δ

1200

1650

1650

NOTES:

1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIAL. GUTTER ELEVATION=0.

2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECTION 725.

RIGHT-OF-WAY LINE

VARIES

RAMP GROOVE SLOPING RAMP FACE, SEE DETAIL NO. 1

MATCH GUTTER FLOW LINE

MATCH GUTTER FLOW LINE

GROOVE SLOPING RAMP FACE, SEE DETAIL NO. 1

SECTION A--A

DETAI1

25 mm O.C. (Typ)

RAMP

Curb & Gutter

SPECIFICATION FOR STANDARD DETAIL No. 234

SIDEWALK RAMPS - TYPE 'D'

DETAIL NO. 234

METRIC

MARICOPA ASSOCIATION OF GOVERNMENTS

REVISED 01-03-2002

DETAIL NO. 234
NOTES:

1. ALL CONCRETE TO BE CLASS 'A' UNLESS OTHERWISE APPROVED. (SECT. 725).

2. 1200 mm ON PROJECTS UNDER THE JURISDICTION OF THE COUNTY ENGINEER AND THE CITY OF MESA.

3. EITHER CONSTRUCTION JOINT OR CONTRACTION JOINT IS REQUIRED AT CENTERLINE OF STREET.

4. A SEPARATE CONCRETE PAD IS REQUIRED WHEN VALLEY GUTTER IS Poured HALF AT A TIME.

5. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
NOTES:

1. DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE BID FOR THE TYPE OF CURB USED AT THAT LOCATION.

2. WHEN WIDTH EXCEEDS 6.7 m PROVIDE A CONTRACTION JOINT ON D/W CENTERLINE.

3. BACK OF D/W OR FACE OF FUTURE S/W.

4. EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.

5. BACK OF CURB – CONSTRUCTION JOINT OR SCORE MARK.

6. CLASS 'B' CONCRETE, SECT. 725.

7. SUBGRADE PREPARATION, SECT. 301.

8. FLOW LINE OF GUTTER.

9. DEPRESSED CURB.

10. SECT. A–A AND ELEVATION, D/W VERTICAL CURB AND GUTTER OR ROLL TYPE CURB AND GUTTER.

11. ROLL TYPE CURB AND GUTTER NOT PERMITTED IN THE CITY OF MESA

12. 5 mm GROOVES AT 25 mm O.C. FULL WIDTH OF 1500 mm WARP SECTION, EACH SIDE OF DRIVEWAY. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.

---

### COMMERCIAL AND INDUSTRIAL

<table>
<thead>
<tr>
<th>DRIVeway WIDTH</th>
<th>MIN. (m)</th>
<th>MAX. (m)</th>
<th>CLASS</th>
<th>DEPTH (mm)</th>
</tr>
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<tr>
<td>INDUSTRIAL</td>
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<td>12.0</td>
<td>B</td>
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**7.5 m MIN. FOR TWO WAY TRAFFIC**

### RESIDENTIAL

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<th>DRIVeway WIDTH</th>
<th>MIN. (m)</th>
<th>MAX. (m)</th>
<th>CLASS</th>
<th>DEPTH (mm)</th>
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<td>COLLECTOR STREET</td>
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<td>9.0</td>
<td>B</td>
<td>125</td>
</tr>
<tr>
<td>LOCAL STREET</td>
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<td>9.0</td>
<td>B</td>
<td>125</td>
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*5.0 m DESIRABLE*
# TABLE A

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<th>ZONING</th>
<th>DRIVEWAY WIDTH</th>
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<tr>
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<td>MIN</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>5.0 m</td>
</tr>
<tr>
<td>INDUSTRIAL</td>
<td>5.0 m</td>
</tr>
<tr>
<td>* 7.5 m WHERE 2-WAY TRAFFIC IS ANTICIPATED</td>
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# TABLE B

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<td>RESIDENTIAL</td>
<td></td>
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<tr>
<td>MAJOR STREET</td>
<td>5.0 m</td>
</tr>
<tr>
<td>COLLECTOR STREET</td>
<td>4.0 m</td>
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<td>LOCAL STREET</td>
<td>4.0 m</td>
</tr>
<tr>
<td>* 5.0 m WIDTH IS DESIRABLE</td>
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## NOTES:

1. EXPANSION JOINT FILLER SHALL BE 13 mm BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751.

2. THIS TYPE D/W TO BE USED ONLY UPON APPROVAL OF ENGINEER.

3. CLASS 'B' CONCRETE CONSTRUCTION AS PER Sect. 725

## SECTION A-A

- **Property Line**
- **Sidewalk**
- **Driveway Width**
- **Mastic Expansion Joints**
- **150 mm Expansion Joints**
- **Flow Line: Trowel 300 mm Wide**
- **Lin. Meter of Single Gutter**

**Subgrade Preparation**

125 mm Thick - Residential
150 mm Thick - Commercial and Industrial

125 mm Thick - Residential
150 mm Thick - Commercial and Industrial
NOTES: (PARKING BAY)
1. SUFFICIENT RIGHT-OF-WAY MUST BE AVAILABLE TO CONSTRUCT PARKING BAY.
2. PARKING BAYS WILL NOT BE ALLOWED WHERE THEY CONFLICT WITH BUS STOPS.

NOTES: (BUS BAY)
1. SUFFICIENT RIGHT-OF-WAY MUST BE AVAILABLE TO CONSTRUCT BUS BAY.
2. RADIUS, SIDEWALK, CURB AND CUTTER, PAVING SLOPE AND CONCRETE APRON SHALL BE CONSTRUCTED AS FOR PARKING BAYS.
NOTES:

1. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
2. CLASS 'B' CONCRETE, PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. 5mm GROOVES AT 25 mm O.C. FULL WIDTH OF 1500 mm WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.
NOTES:

1. 5 mm GROOVES AT 25 mm D.C. FULL WIDTH OF 1200 mm WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL 234.
2. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.

SECTION A–A

NOTE:
THICKEN CONCRETE FROM 150 mm TO 200 mm IN 450 mm AT BACK OF ALLEY ENTRANCE.

CLASS 'B' CONCRETE PER SECT. 725.

SECTION A—A

PROPERTY LINE

ALLEY RIGHT-OF-WAY

1.5% MIN.

1500 MIN.

1500 MIN.

S/W WIDTH VARES

WARP

CONSTRUCTION JOINT OR SCORE MARK

NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.

WARP

NOTES:

1. IF ALLEY ENTRANCE IS USED FOR DRAINAGE, THE CENTER BACK OF ALLEY ENTRANCE MAY BE DEPRESSED 50 mm FOR 100 mm CURB OR 75 mm FOR 150 mm CURB.

2. 5 mm GROOVES AT 25 mm O.C. FULL WIDTH OF 1500 mm WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.
EXPANSION JOINT FILLER SHALL BE 13 mm BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER A.S.T.M. D-1751.

ROLL TYPE CURB AND GUTTER

CLASS 'B' CONCRETE PER SECT. 725

SECTION A–A

ELEVATION
WATER VALVE, SURVEY MONUMENT, OR SEWER
CLEAN OUT FRAME AND GRADE ADJUSTMENT

M12 ROUNDHEAD
BOLT 50 mm
LONG

10 mm CHAIN
450 mm –
500 mm IN
LENGTH.

CASTING TO CONFORM
TO SECT. 787. MINIMUM
WEIGHT 7.3 kg FOR
COVER.

CHAIN ATTACHMENT
(AS REQUIRED)

LOCK WASHER
FLATTEN BOLT END

SPACERS, AS REQUIRED

LETTERS ON COVER TO BE AS FOLLOWS:
"SEWER", "WATER", OR "SURVEY" AS DIRECTED
TOTAL WIDTH OF WORD "SEWER" OR "WATER"
95 mm. TOTAL WIDTH OF WORD "SURVEY"
114 mm. LETTER SIZE 16x19 mm, RAISED 2 mm
ABOVE LEVEL OF COVER, TYPE OF LETTERS
TO BE SUBMITTED FOR APPROVAL.

COVER SECTION A–A

DETAIL NO.
270

STANDARD DETAIL
METRIC

FRAME AND COVER INSTALLATION
AND GRADE ADJUSTMENT

REVISED
01-03-2002

DETAIL NO.
270
NOTE:
THIS DETAIL COVERS WATER GATE VALVES, 100 mm TO 300 mm INCLUSIVE, REGARDLESS OF TYPE OF PIPE USED. LARGER LINES TO BE DETAILED ON PLANS.

NOTES:
1. THIS DETAIL COVERS BUTTERFLY VALVE INSTALLATION, 75 mm TO 300 mm INCLUSIVE, REGARDLESS OF TYPE OF PIPE OR JOINT USED. LARGER LINES TO BE DETAILED ON PLANS.
2. VALVE BOX AND COVER REQUIRED PER DETAILS 270 AND 391.
DEAD ENDS

LRN = SHORTEST LENGTH OF PIPE RESTRAINED TO THE RUN OF THE TEE FITTING (BOTH SIDES OF TEE).

HORIZONTAL BENDS

TEES

VERTICAL UP BEND

VERTICAL DOWN BENDS

MARICOPA ASSOCIATION OF GOVERNMENTS

STANDARD DETAIL
METRIC

JOINT RESTRAINT FOR DUCTILE IRON AND POLYETHYLENE WRAPPED DUCTILE IRON WATER PIPES

REVISION
01-01-2003
### Restrainted Lengths, LR, for Ductile Iron Pipe

<table>
<thead>
<tr>
<th>Nominal Pipe Size (mm)</th>
<th>Horizontal Bends</th>
<th>Tees</th>
<th>Vertical Offsets</th>
<th>Dead Ends</th>
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<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22°</td>
<td>LRN=0 m</td>
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<tr>
<td></td>
<td>Down Bend</td>
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<td>100</td>
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### Restrainted Lengths, LR, for Ductile Iron Pipe with Polyethylene Wrap

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<th>Nominal Pipe Size (mm)</th>
<th>Horizontal Bends</th>
<th>Tees</th>
<th>Vertical Offsets</th>
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<td>14.3</td>
<td>6.7</td>
<td>102.7</td>
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</tbody>
</table>

**Notes:**
1. All joints within the specified length LR must be restrained. All lengths are given in meters.
2. The maximum test pressure shall not exceed 1.38 MPa.
3. The minimum depth of bury shall be 900 mm to top of pipe.
4. Restrainted lengths may be reduced when supported by engineering calculations.
NOTE:
FOR CASTING SPECIFICATIONS
SEE SECT. 787.
SECTION A-A

NOTES:
1. INSPECTION PLATE IS SAME AS USED WITH METER BOX COVER NO. 4.
2. FOR CASTING SPECIFICATIONS, SEE SECTION 787.
TOP OF COVER

NOTE:
FOR CASTING SPECIFICATIONS,
SEE SECT. 787. THE BEARING
EDGES OF THESE CASTINGS
SHALL BE MACHINED TO INSURE
A FULL BEARING ON A FLAT
SURFACE.

WATER

LETTERS
RAISED 3 mm
TYP.
NOTES:
1. THE METER BOXES SHALL CONFORM TO THE DIMENSIONS AS SHOWN AND SHALL BE MADE OF PORTLAND CEMENT CONCRETE POURED AND TAMPED (OR VIBRATED) IN TRUE FORMS.
2. USE CLASS 'AA' CONCRETE PER SECT. 725.

<table>
<thead>
<tr>
<th>DIMS</th>
<th>BOX NUMBER</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<td>A</td>
<td></td>
<td>482</td>
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<td>749</td>
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<td>E</td>
<td></td>
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<td>775</td>
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<tr>
<td>F</td>
<td></td>
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<td>337</td>
<td>381</td>
<td>502</td>
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<td>G</td>
<td></td>
<td>178</td>
<td>286</td>
<td>324</td>
<td>432</td>
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<td>I</td>
<td></td>
<td>152</td>
<td>213</td>
<td>235</td>
<td>289</td>
</tr>
<tr>
<td>J</td>
<td></td>
<td>38</td>
<td>44</td>
<td>44</td>
<td>38</td>
</tr>
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<td>K</td>
<td></td>
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</tr>
<tr>
<td>L</td>
<td></td>
<td>6</td>
<td>9</td>
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<td>9</td>
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<tr>
<td>M</td>
<td></td>
<td>406</td>
<td>534</td>
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<td>775</td>
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<td>N</td>
<td></td>
<td>64</td>
<td>89</td>
<td>102</td>
<td>102</td>
</tr>
</tbody>
</table>

19 mm OR 25 mm 38 mm 50 mm
METER METER METER

SECTION A-A

SECTION B-B

CAST IRON WATER METER BOX Lid fitting box no. 1, 2, 3 or 4 as required.
SEE APPLICABLE DETAIL

PLAN VIEW

BREAK OUT IF NECESSARY TO SET BOX TO PROPER GRADE

SECTION A-A

METER BOX DIMENSIONS

CONCRETE WATER METER BOXES

METRIC

3-06-2000
ALTERNATE: 9 mm STEEL PLATE (ASPHALT COATED) WITH 610 x 610 mm HINGED ACCESS DOOR

GROUTED IN BOLT

FINISH GRADE

PRE-CAST VAULT TOP OPENING

NOTE: TO FACILITATE INSTALLATION OF PRE-CAST VAULT USING CAST-IN-PLACE FOOTINGS, SET CENTER SECTION ON BLOCKS TO GRADE THEN POUR FOOTING. DO NOT BACKFILL CENTER SECTION UNTIL VAULT TOP IS IN PLACE AND FOOTING IS POURED.

CENTER SECTION

PRE-CAST VAULT SECTION

CAST-IN-PLACE OR PRECAST TOP SECTION

CLASS "A" CONCRETE AS PER SECT. 725

FINISH GRADE

REMOVABLE SUPPORT

(2) C.I. METER BOX COVERS SEE DETAIL 314

15M REBAR 150 mm O.C. EACH WAY

BLOCK MASONRY WITH SOLID GROUTED WALLS (GROUT TO CONFORM TO SECT. 776)

BLOCK MASONRY MAY BE USED IN LIEU OF CAST-IN-PLACE VAULT WALLS, 15M REBAR IN EVERY OTHER CORE.

CAST-IN-PLACE VAULT SECTION

NOTE: PRECAST REINFORCED VAULT SECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND DETAILS AS APPROVED BY ENGINEER.
NOTES:

1. TAPPING SLEEVE TO BE PLACED A MINIMUM OF 450 mm FROM ANY BELL COUPLING, VALVE, FITTING OR OTHER OBSTRUCTION.

2. CONTRACTOR SHALL EXCAVATE AS SHOWN AND SHALL SET TAPPING SLEEVE AND VALVE AND TIGHTEN ALL BOLTS PRIOR TO THE PRESSURE TEST.

3. ALL TAPPING SLEEVES AND VALVES MUST BE PRESSURE TESTED PRIOR TO BLOCKING OR TAPPING. THE TEST MUST BE WITNESSED AND APPROVED BY THE INSPECTOR.

4. BLOCKS ARE TO EXTEND TO UNDISTURBED GROUND AND BE INSTALLED BEFORE THE TAP IS MADE. ALL FLANGE BOLTS SHALL BE FREE AND CLEAR OF CONCRETE.

5. TAPS SHALL BE MADE BY CITY CREWS AT PREVAILING RATES OR BY APPROVED CONTRACTORS WHEN ALLOWED BY CITY.

6. THIS DETAIL COVERS TAPPING SLEEVES 100 mm THROUGH 400 mm IN SIZE ON DUCTILE IRON, CAST IRON AND ASBESTOS CEMENT PIPE. ANY OTHER SIZE OR TYPE OF PIPE WILL REQUIRE A SEPARATE SUBMITTAL AND APPROVAL BY THE ENGINEER.

<table>
<thead>
<tr>
<th>SIZE OF PIPE BEING CONNECTED (mm)</th>
<th>MINIMUM THRUST AREA REQUIRED EQUALS (AxB) (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 AND LESS</td>
<td>0.28</td>
</tr>
<tr>
<td>150</td>
<td>0.37</td>
</tr>
<tr>
<td>200</td>
<td>0.56</td>
</tr>
<tr>
<td>250</td>
<td>0.84</td>
</tr>
<tr>
<td>300</td>
<td>1.21</td>
</tr>
<tr>
<td>400</td>
<td>2.14</td>
</tr>
</tbody>
</table>
CONCRETE PRESSURE PIPE TAPPING SLEEVE

4.00 (TYP.)

SADDLE LENGTH

EXIST. MAIN

GLAND FLANGE

DRAW FLANGE

GLAND FLANGE

DRAW STUD AND NUTS

PRESSURE PLATE

INNER NECK

OUTER NECK

VALVE STUD AND NUT

LOAD BEARING SET SCREW 3-REQ'D.

BODY PLATE

CENTERLINE LENGTH

LUG BOLT NUT & WASHER

* DIMENSIONS TO BE FIELD VERIFIED

EXISTING MAIN

GLAND

GASKET

SLEEVE

GROUT

EXISTING MAIN

O.D. CONC. OF EXIST. MAIN

O.D. STEEL OF EXIST. MAIN

NOTE: DUNHILL BLEVINS ENGINEERING  3/8/00

DETAIL NO. 342

STANDARD DETAIL METRIC

CONCRETE PRESSURE PIPE TAPPING SLEEVE

REVISION 3-06-2000

DETAIL NO. 342
SECTION A-A

FOR VAULT CONSTRUCTION
SEE DETAIL 321

FINISH GRADE

WRAP EXPOSED END OF GALV. PIPE IN CONCRETE WITH TAR PAPER OR BUILDING PAPER.

FLOW

HOLE DIAMETER IS 25 mm LARGER THAN FLANGE O.D.

50 mm TYPE 'K' COPPER BY-PASS

SAWDER 50 mm COPPER TO MALE THREAD ADAPTERS

150 mm MIN. TYP.

INSULATE WATER MAIN FROM CONCRETE BOX WITH EXPANSIVE MATERIAL

450 mm MIN.

(A) - VARIES, SEE TABLE OF VAULT SIZES

VAULT DIMENSION DETAILS (mm)

<table>
<thead>
<tr>
<th>A.C.P. SIZE</th>
<th>75</th>
<th>100</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>2550</td>
<td>3200</td>
<td>3650</td>
</tr>
<tr>
<td>(B)</td>
<td>1350</td>
<td>1550</td>
<td>1550</td>
</tr>
</tbody>
</table>

NOTE: METER VAULTS MAY BE EITHER BLOCK MASONRY OR CAST-IN-PLACE OR PRE-CAST CONCRETE. SEE DETAIL 321 FOR VAULT CONSTRUCTION.
FOR VAULT CONSTRUCTION
SEE DETAIL 321

---

**LEGEND**

1. DOUBLE STRAP ALL BRONZE SERVICE SADDLES.
2. CORP. STOP, 50 mm (BALL TYPE).
3. ADAPTER, FLANGED, TO MECH. JOINT FOR A.C.P.
4. GATE VALVE, FLANGED, WITH HAND WHEEL, OPEN LEFT.
5. TURBOMETER: ROCKWELL SERIES 'W' OR HERSEY SERIES 'M.H.R.' OR NEPTUNE TRIDENT TURBINE.
6. FLANGED SWING CHECK VALVE WITH EXTERNAL LEVER AND WEIGHT.
7. 50 mm BRONZE CHECK VALVE.
8. 50 mm TURBOMETER: ROCKWELL 'W-160' OR HERSEY 'M.H.R.' OR NEPTUNE TRIDENT TURBINE.
9. STRAINER (75 mm, 100 mm, 150 mm) AVAILABLE FROM METER MANUFACTURER, INSTALL ONLY WHEN 'TURBO' IS USED.
10. FLANGED SPOOL (3 PIPE DIAMETERS IN LENGTH).
11. O.S.&Y. GATE VALVE, FLANGED WITH HAND WHEEL OPEN LEFT, AND RISING STEM.
12. TURBOMETER U.L. APPROVED: ROCKWELL W-5000 DR. OR W-2000 DR. OR HERSEY FM.-CT. OR NEPTUNE TURBINE-F5-UL.
13. 150 mm OR 250 mm STRAINER, U.L. APPROVED.
14. 50 mm THREADED OUTLET AND GATE VALVE.

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**NOTES**

1. FOR LARGER METERS, SPECIAL VAULT DESIGN IS REQUIRED.
2. USE OF REMOTE READING DEVICE AT OPTION OF UTILITY.
3. CERTAIN AGENCIES AND/OR UTILITIES PREFER TO CONSTRUCT VAULT, CONTACT AGENCY INVOLVED PRIOR TO VAULT CONSTRUCTION.
NOTES:

1. FIRELINE FROM CITY MAIN TO PROPERTY LINE SHALL BE CONSTRUCTED OF CAST IRON PIPE.

2. REINFORCING TO BE 15M REBAR ON 230 mm CENTERS EACH WAY ON TOP AND 450 mm CENTERS EACH WAY ON THE SIDES.

3. COVERS TO CONSIST OF TWO METER BOX COVERS DET. 314.

4. BY-PASS METER TO BE ACCORDING TO GOVERNING AGENCY.

5. CHECK VALVE TO BE GLOBE MODEL "A" GRINNEL, HERSEY MODEL D.C., VIKING MODEL "A", OR APPROVED EQUAL.

6. VAULT SHALL BE CONSTRUCTED IN OWNERS PROPERTY AGAINST THE FRONT PROPERTY LINE OR ANOTHER APPROVED LOCATION. WALLS AND FENCES SHALL NOT OBSTRUCT ACCESS.

7. CITY CONTROL VALVE TO BE REQUIRED AT MAIN.

8. PARTS OF PIPE TO BE EMBEDDED IN CONC. SHALL BE WRAPPED WITH 1470 g/m² ASPHALT ROOFING FELT.

9. REMOTE READING DEVICE SHALL BE OF SELF GENERATING ELECTRICAL TYPE. HYDRAULIC OR MECHANICAL DRIVE REGISTERS WILL NOT BE ACCEPTABLE.

10. CONCRETE TO BE CLASS 'B' PER SECT. 725.

<table>
<thead>
<tr>
<th>DIA. OF PIPE (mm)</th>
<th>X (mm)</th>
<th>Y (mm)</th>
<th>Z (mm)</th>
<th>BY-PASS METER SIZE (mm)</th>
<th>A (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1550</td>
<td>1700</td>
<td>1250</td>
<td>16x19</td>
<td>750</td>
</tr>
<tr>
<td>150</td>
<td>1700</td>
<td>1850</td>
<td>1250</td>
<td>16x19</td>
<td>750</td>
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<tr>
<td>200</td>
<td>1850</td>
<td>1850</td>
<td>1500</td>
<td>25</td>
<td>900</td>
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<tr>
<td>250</td>
<td>2000</td>
<td>1850</td>
<td>1750</td>
<td>38</td>
<td>900</td>
</tr>
</tbody>
</table>
NOTES:

1. JOINTS BETWEEN THE VALVE AND THE MAIN SHALL BE FLANGED TYPE. JOINTS BETWEEN THE VALVE AND HYDRANT SHALL BE RESTRAINT OR MECHANICAL TYPE.

2. 90° BEND NOT REQUIRED IF SUFFICIENT ROOM FOR PERPENDICULAR INSTALLATION.

3. FOR CONCRETE THRUST BLOCKS, SEE DETAIL 380.

4. A FLANGE JOINT BY MECHANICAL JOINT VALVE MAY BE USED AS THE TRANSITION BETWEEN THE JOINT TYPES.

5. SEE DETAIL 362 FOR LOCATION OF HYDRANT.

6. FINISH GRADE SHALL BE GROUND LEVEL, SIDEWALK, ADJACENT SIDEWALK, PAVEMENT, ADJACENT CURB OR OTHER NEARBY OBSTRUCTION DENYING WRENCH ACCESS TO THE BOTTOM FLANGE BOLTS.

150 mm SHORT BODY
90° 1/4 BEND
SEE NOTE NO. 2

PUMPER CONNECTION TO FACE CURB

WATER VALVE BLOCKING, SEE DETAIL 301

CRUSHED ROCK TRENCH MINIMUM OF 0.23 CUBIC METERS, ALONG PIPE AND ABOVE DRAIN HOLE

SEE DETAIL 391 FOR VALVE BOX INSTALLATION

FINISH GRADE OR ADJACENT GRADE, SEE NOTE #6

WATER VALVE

150 mm

WATER MAIN
NOTES:

1. OBSTRUCTIONS SUCH AS UTILITY POLES, STREET SIGNS, IRRIGATION BOXES, FENCES, ETC., MUST NOT BE PLACED BETWEEN CURB AND HYDRANT AND WITHIN THE RADIUS FOR FIRE DEPT. ACCESS.

2. DIMENSIONS SHOWN ON CONSTRUCTION DRAWINGS SUPERSEDE LOCATIONS SHOWN HERE.

3. ON LOCATIONS IN MIDBLOCK, THE FIRE HYDRANT WILL BE ALIGNED WITH A PROPERTY LINE.

PARKWAY AREA OR NO SIDEWALK

AREA WITH SIDEWALK
CAST IRON

CAST IRON MECHANICAL JOINT

ASBESTOS CEMENT

NOTES:

1. THIS DETAIL COVERS MOVING OF WATER MAINS 50 mm TO 300 mm ONLY.
2. THRUST BLOCKING AS PER DET. 380 & 381.
3. IF OFFSET IS TO GO OVER OBSTRUCTION, JOINT RESTRAINTS MUST BE USED.
4. PIPE IS TO BE CAST IRON OR DUCTILE IRON.
TYPICAL LOCATIONS OF THRUST BLOCKS

NOTES:

1. TABLE IS BASED ON 1370 kPa TEST PRESSURE AND 145 kPa SOIL IF CONDITIONS ARE FOUND TO INDICATE SOIL BEARING IS LESS, THE AREAS SHALL BE INCREASED ACCORDINGLY.

2. AREAS FOR PIPES LARGER THAN 400 mm SHALL BE CALCULATED FOR EACH PROJECT.

3. FORM ALL NON-BEARING VERTICAL SURFACES.

4. THRUST BLOCKS ARE TO EXTEND TO UNDISTURBED GROUND. CONCRETE TO BE CLASS 'C', SEC. 725.

<table>
<thead>
<tr>
<th>PIPE SIZE (mm)</th>
<th>WATER PIPE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TEE, DEAD END, 90° BEND</td>
</tr>
<tr>
<td>100 OR LESS</td>
<td>0.28</td>
</tr>
<tr>
<td>150</td>
<td>0.37</td>
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<tr>
<td>200</td>
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<tr>
<td>250</td>
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<td>300</td>
<td>1.30</td>
</tr>
<tr>
<td>400</td>
<td>2.23</td>
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</tbody>
</table>
NOTE
BARS TO CONCRETE THRUST BLOCK TO BE COATED WITH 2 COATS COAL TAR, EPOXY OR BY OTHER APPROVED METHOD. BARS TO HAVE 90° HOOK ON LOWER END, AS PER TABLE.

<table>
<thead>
<tr>
<th>PIPE SIZE (mm)</th>
<th>MIN BAR SIZE</th>
<th>&quot;A&quot;-DIMENSION HOOK (mm)</th>
<th>MIN. BLOCK DIM. (mm)</th>
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<tbody>
<tr>
<td>150</td>
<td>20M</td>
<td>150</td>
<td>900x900x900</td>
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<td>200</td>
<td>20M</td>
<td>230</td>
<td>1200x1200x750</td>
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<tr>
<td>300</td>
<td>25M</td>
<td>230</td>
<td>1200x1500x1500</td>
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</tbody>
</table>

* FOR 862 kPa WORKING PRESSURE.

NOTES:
1. EITHER THIS DETAIL OR RESTRAINT RODS CAN BE USED WHEN IT IS ALLOWED TO RELOCATE A WATER LINE UPWARD OR DOWNWARD TO CROSS A CONFLICT.
2. DUCTILE IRON PIPE MAY BE USED.
**NOTES:**

1. CURB STOP TO BE MUELLER ORISEAL (H-10283), FORD BALL VALVE B11-777, HAYES BULLETIN 400, J. JONES (J-1900) OR APPROVED EQUAL.
2. REDUCER MAY BE USED WHEN CONNECTING TO SMALLER GALVANIZED PIPE.
3. THIS DETAIL IS TO BE USED WHEN CONNECTING EXISTING GALVANIZED PIPE TO ASPHETOS CEMENT PIPE OR CAST IRON PIPE.

**NOTE:**

1. VALVE BOX TO BE SUPPORTED ON BRICKS TO PREVENT VERTICAL LOADS FROM BEING TRANSMITTED TO THE SMALL PIPE.
NOTES:

1. VALVE BOX SHALL BE ADJUSTED TO THE FINISHED GRADE PRIOR TO PLACING OF THE ASPHALTIC CONCRETE SURFACE.

2. USE PARKSON TYLER, APCO OR EQUAL DEEP SKIRTED LID (100 mm OR MORE) TYPE, SLIDING ADJUSTABLE CAST IRON VALVE BOX C.I. MIN. T.S. 207 MPa.

3. GROUND BELOW CONCRETE PAD OR 3 BRICKS TO BE COMPACTED 95% OF MAX. DENSITY.

TYPE 'B'

(CONCRETE AS PER SECT. 725)

ASPHALTIC CONCRETE PAVEMENT

THE WORD "WATER" ON COVER (TYP.)

CLASS 'B' CONCRETE AS PER SECT. 725

CONCRETE TO BE ON UNDISTURBED OR COMPACTED SOIL

FOR UNPAVED STREETS AND ALLEYS

TYPE 'A'

(TO BE USED IN AREAS SUBJECT TO VEHICULAR TRAFFIC.)

FOR DEPTHS OVER 1500 mm (MAX. LENGTH.) (SEE SHEET 2)

TYPE 'C'

(VIEW A-A)

CONCRETE RING NOT REQUIRED WHEN ADJUSTED IN UNPAVED AREAS

150 mm THICK CONCRETE RING W/ 750 mm OUTSIDE DIAMETER

SEE NOTE 2

SEE NOTE 1

FINISH GRADE

CLASS 'B' CONCRETE AS PER SECT. 725

200 mm C.I. FRAME AND COVER AS PER DETAIL 270

150 mm THICK & 1000 mm DIA.

200 mm CONCRETE PIPE; PIPE LENGTH CUT IN FIELD TO SUIT (TYP.)
**NOTES:**

1. **EXTENSION STEM:** WITH SQUARE SOCKET ON BOTTOM TO FIT 51 mm SQUARE VALVE NUT. EXTENSION TO VALVE STEMS REQUIRED ON ALL VALVES INSTALLED WHERE OPERATING NUT IS OVER 1500 mm BELOW SURFACE. LENGTH TO FIT EACH INSTALLATION. OPERATING NUT TO BE HELD ON TOP OF EXTENSION WITH STOP NUT.

2. **IF TWO OR MORE JOINTS OF A.C.P. ARE USED TO MAKE RISER, USE STANDARD A.C. PIPE RUBBER GASKET COUPLING TO JOIN PIPE. WHERE RISER LENGTH EXCEEDS 3000 mm USE 300 mm A.C. PIPE.

3. **STEM PAINTING:** ALL STEEL TO HAVE PRIME COAT OF PAINT NO. 1-D AND ONE HEAVY APPLICATION (FINISH COAT) OF PAINT NO. 9 AS PER SECT. 790.
NOTES:

1. THE DEBRIS CAP SHALL BE DESIGNED AND INSTALLED TO PREVENT DEBRIS SUCH AS DIRT, DUST, SAND, ETC., FROM PASSING AROUND THE CAP AND DOWN INTO THE VALVE HOUSING. THE CAP SHALL BE HELD IN PLACE BY A MECHANISM WHICH WILL NOT DAMAGE THE VALVE HOUSING. ONCE INSTALLED THE CAP MUST WITHSTAND, WITHOUT SLIPAGE, A MINIMUM VERTICAL FORCE OF 225 NEWTONS, AT A LOADING RATE OF 25 mm/MINUTE.

2. THE CAP SHALL BE MANUFACTURED OF CORROSIVE RESISTANT MATERIALS.

3. DEBRIS CAP SHALL BE INSTALLED AS CLOSE UNDER THE CAST IRON COVER WITHOUT INTERFERING WITH COVER OPERATION.

4. THE CAP SHALL BE CAPABLE OF SECURELY HOLDING A STANDARD LOCATING COIL, "SCOTCH MARK" 4 DISK MARKER BY 3M OR EQUAL.

5. THE CAP SHALL BE CONSTRUCTED TO ALLOW THE DEVICE TO BE SECURED BY A LOCK. THE LOCK (PAD, BARREL, ETC.) SHALL BE SUPPLIED BY THE AGENCY.


7. THE CAP SHALL BE INSTALLED IN ALL VALVE HOUSINGS AS REQUIRED BY THE CONTRACT DOCUMENTS OR BY THE AGENCY'S POLICIES.

8. THE DEBRIS CAP SHALL BE MANUFACTURED BY SW SERVICES, INC. PHOENIX, ARIZONA OR EQUAL.
NOTES:
1. LAY PIPE TO LINE AND GRADE ON BRICK CRADLE.
2. PLACE CLASS 'C' CONCRETE PER SECT. 725 & 505, IN SUCH A MANNER AS NOT TO FLOAT THE PIPE.
NOTES:

1. TYPE 'A' PIPE SUPPORT MAY BE USED FOR ANY TYPE CROSSING CONDITION.

2. TYPE 'C' PIPE SUPPORT MAY BE USED FOR CROSSING PIPES WITH A BELL DIAMETER OF 450 mm OR LESS IF SUFFICIENT CLEARANCE OVER STORM SEWER IS AVAILABLE AND TOTAL SPAN IS LESS THAN 10.5 m.

3. INTERMEDIATE PIPE SUPPORT SHALL BE USED IN CONJUNCTION WITH TYPE 'C' PIPE SUPPORT IF TOTAL SPAN EXCEEDS MAX. W' IN TABLE.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL SUPPORTS BOTH PERMANENT AND TEMPORARY. TEMPORARY SUPPORTS SHALL NOT BE A SEPARATE PAY ITEM.

5. PERMANENT PIPE SUPPORTS MAY BE DECREASED FROM PLAN QUANTITIES OR EXTENDED TO INCLUDE SOME LISTED BELOW AS TEMPORARY SUPPORTS IF CONDITIONS WARRANT THESE CHANGES AT THE TIME OF CONSTRUCTION. DECISION SHALL BE MADE BY THE ENGINEER.


7. USE TYPE 'B' PIPE SUPPORT INSTEAD OF TYPE 'C' WHEN CLEARANCE IS LESS THAN 'Y' IN TABLE, BETWEEN PIPES.

SCHEDULE OF REQUIRED SUPPORTS

<table>
<thead>
<tr>
<th>PERMANENT</th>
<th>TEMPORARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEWER LINES</td>
<td>CAST IRON PIPE</td>
</tr>
<tr>
<td>CONC. BOX CULVERT</td>
<td>CONC. BOX CULVERT</td>
</tr>
<tr>
<td>CONC. IRRIG. PIPE</td>
<td>TRAFFIC CONTROL CONDUIT</td>
</tr>
<tr>
<td>BURIED TELCO.</td>
<td>WATER &amp; SEWER LINES</td>
</tr>
<tr>
<td>GAS PIPES</td>
<td>CONC. STORM DRAIN</td>
</tr>
</tbody>
</table>

NOTE

OTHER UTILITIES AS NOTED ON THE PLANS OR AS REQUIRED BY THE ENGINEER AT TIME OF CONSTRUCTION.
### TABLE

<table>
<thead>
<tr>
<th>'W'</th>
<th>0 mm TO 2500 mm</th>
<th>2500 mm TO 5000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'Y' (mm)</td>
<td>'Y' (mm)</td>
</tr>
<tr>
<td>1800</td>
<td>15M 200</td>
<td>20M 275</td>
</tr>
<tr>
<td>2000</td>
<td>15M 225</td>
<td>20M 300</td>
</tr>
<tr>
<td>2400</td>
<td>15M 250</td>
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</tr>
<tr>
<td>2700</td>
<td>20M 275</td>
<td>20M 350</td>
</tr>
<tr>
<td>3000</td>
<td>20M 300</td>
<td>25M 375</td>
</tr>
<tr>
<td>3300</td>
<td>20M 325</td>
<td>25M 400</td>
</tr>
<tr>
<td>3700</td>
<td>20M 350</td>
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<tr>
<td>4000</td>
<td>25M 375</td>
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<td>4300</td>
<td>25M 400</td>
<td>25M 500</td>
</tr>
<tr>
<td>4600</td>
<td>25M 425</td>
<td>25M 525</td>
</tr>
<tr>
<td>4900</td>
<td>25M 450</td>
<td></td>
</tr>
<tr>
<td>5200</td>
<td>25M 475</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Provide 1:2 mortar bed with precast beam. Class 'C' concrete bedding with precast beam only (concrete as per Sect. 725). See Sect. 601 for backfill & compaction.

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**PLAN FOR TYPE 'B' SUPPORT**

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**SECTION A-A**

- Class 'A' concrete as per Sect. 725
- (4) rebar (equal to beam reinforcement)
- 300 mm or 'Y' whichever is greater, see table
- 3/4 O.D.
- 50 mm CLR
- (4) rebars
- 300 mm O.C.

**SECTION D-D**

- Pipe O.D. + 50 mm
- Min. bearing shall be 1/2 O.D. of pipe
- 100 mm O.C. spacing, see table for bar size
- 20M rebar for precast beam only
- 10M ties 300 mm O.C.
NOTES:

1. SEPARATION DISTANCES AND/OR OTHER EXTRA PROTECTION SHALL BE REQUIRED TO PROTECT WATER MAINS FROM CONTAMINATION BY SANITARY SEWER MAINS.

2. THIS CRITERIA APPLIES TO PARALLEL MAINS AS WELL AS CROSSINGS.

3. SEE CROSS SECTION DETAIL FOR LIMITS OF SEPARATION/EXTRA PROTECTION. ALL DISTANCES ARE MEASURED PERPENDICULARLY FROM THE OUTSIDE OF THE PIPES.

A. NO WATER MAINS SHALL FALL WITHIN ZONE A.

B. EXTRA PROTECTION WILL BE REQUIRED WHEN THE WATER MAIN FALLS WITHIN ZONE B. EXTRA PROTECTION SHALL CONSIST OF CONSTRUCTING THE SANITARY SEWER MAIN WITH MECHANICAL JOINT OR RESTRAINED JOINT DUCTILE IRON PIPE FOR A DISTANCE OF TEN FEET ON EITHER SIDE OF THE WATER MAIN. THE DUCTILE IRON PIPE SHALL COMPLY WITH THE AGENCY'S REQUIREMENTS FOR SEWER INSTALLATION. IN THE CASE OF A CROSSING, THE NUMBER OF JOINTS SHALL BE HELD TO A MINIMUM WITH ONE FULL JOINT OF PIPE CENTERED OVER/UNDER THE OTHER. AN ALTERNATE PROTECTION MAY CONSIST OF ENCASING BOTH PIPES IN CONCRETE AS SHOWN HEREIN.

C. NO ADDITIONAL PROTECTION WILL BE REQUIRED OUTSIDE OF THE ZONE A AND B.

4. SEPARATION REQUIREMENTS FOR 4" OR 6" INDIVIDUAL HOUSE SERVICE CONNECTIONS SHALL COMPLY WITH THE AGENCY'S PLUMBING CODES.

5. RECLAIMED WATER SHALL BE CONSIDERED AS POTABLE WATER WHEN PLACED NEXT TO A SANITARY SEWER AND CONSIDERED A PRESSURE OR FORCE SANITARY SEWER MAIN WHEN PLACED NEXT TO A POTABLE WATER MAIN.
REPLACE ALL PAVING ACCORDING TO SECTION 336

NEW CONSTRUCTION

EXISTING SEWER CONNECTION OR MAIN BROKEN DURING EXCAVATION FOR NEW CONSTRUCTION

PLAN VIEW OF REPLACEMENT

EXCAVATE 150 mm BEYOND UNBROKEN BELL TO ALLOW ROOM FOR INSPECTION

450 mm MIN. WHEN USING BELL CONNECTION

COMPACTION SHALL BE DONE IN ACCORDANCE WITH SECT. 601

150 mm MIN.

300

300

SAW SOUND PIPE SQUARE

300 mm MIN. SOLID BEARING ON EACH SIDE

REPLACEMENT WHEN NEW TRENCH

600 mm WIDE OR LESS

600 mm OR LESS

REBAR TO BE 10M WITH MAX. OF 115 mm BET. & MIN. OF 3 BARS

DIAMETER AT BELL

100

100

CONC. PER SECT. 725, CLASS 'C'

SECTION 'A-A'

300 mm MIN. SOLID BEARING ON EACH SIDE

300

50

50

100

NOTES:

1. BROKEN PIPE SHALL BE REPLACED WITH A MINIMUM OF ONE FULL JOINT AND TWO SHORT LENGTHS WITH UNBROKEN BELLS. CONSTRUCTION AND JOINTS TO BE MADE AS PER SECTION 615.
NOTES:

1. PRE-CAST, REINFORCED M.H. SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH A.S.T.M. C-478M EXCEPT AS MODIFIED BY DETAILS BELOW LEFT.

2. M.H. STEPS SHALL BE INSTALLED AT SITE OF M.H. SECTION MANUFACTURE MINIMUM CLEARANCE EACH SIDE OF M.H. LEG SHALL BE 25 mm. STEPS SHALL BE MOUNTED WITH 2 TO 1 SAND/CEMENT DRY PACK MORTAR (SEE DET. 428 FOR M.H. STEP.)

3. USE LOW ALKALI CEMENT ONLY.

MEMORY:

(2) No. 2 HOOPS FOR 100 mm RING TIED WITH 5 mm WIRE. 150 mm & 200 mm RING REQUIRE (4) No. 2 HOOPS.

TYPE 'A' TOP

(PRE-CAST ECCENTRIC CONICAL TOP M.H.)

ALTERNATE BASE ** WITH KNOCKOUTS FOR PIPES. CLEARANCE AROUND PIPES 25 mm MIN. – 75 mm MAX. EXCEPT LOWER CORNERS

DETAIL NO. 420
STANDARD DETAIL
METRIC
PRE-CAST CONCRETE SEWER MANHOLE

REVISED
3-09-2000
DETAIL NO. 420

MARICOPA ASSOCIATION
OF GOVERNMENTS
PROVIDE PRECAST
ADJUSTMENT RINGS
OR BRICK AND MORTAR
COLLAR OR COMBINATION
NOT TO EXCEED
300 mm TOTAL

COMBINED CURB
AND GUTTER

MANHOLE RING & COVER
PER DETAIL 423,
424 & 425

MANHOLE TO BE
BRICK OR PRECAST
PER SECT. 625

PIVET

MANHOLE STEPS PER
SECT. 625

TROWEL FINISH

1220 mm I.D. FOR
200–350 mm PIPE
1520 mm I.D. FOR
375–750 mm PIPE

1:3 CEMENT PLASTER COAT
OUTSIDE OF PLASTER WITH
MEMBRANE TYPE CURING
COMPOND IMMEDIATELY
AFTER PLASTER HAS BEEN
PLACED & FINISHED, "HUNT
PROCESS" OR EQUAL

125

BRICK SHALL BE
IN ACCORDANCE
WITH SECT. 775

ROWLOCK RADIAL COURSE

COURSE BRICK IN MORTAR
OR CLASS 'C' CONCRETE
PER SECT. 725, 505

CLASS 'A' CONCRETE
PER SECT. 725, 505

TROWEL FINISH SMOOTH

75 mm MIN.

300

600 mm MAX.

200

75 mm MIN.

1200 mm VARIABLE

VARIES

3-09-2000

421
M.H. FRAME AND COVER PER SECT. 625

FOUR STEEL SPACERS, 100x50 mm, THICKNESS AS REQUIRED FROM 13 mm TO 50 mm. WHEN THICKNESS IS LESS THAN 13 mm USE MORTAR, WHEN GREATER THAN 50 mm, USE BRICK.

LEAVE CONC. COLLAR LOW AND SEAL WITH 9.5 mm ASPHALT MIX PER SECTION 710, MIN. THICKNESS 19mm TO 25mm

EXISTING OR RECENTLY INSTALLED PAVEMENT

M.H. WALL THICKNESS AND MATERIAL VARIES

BASE COURSE

SUBGRADE

M.H. WALL THICKNESS AND MATERIAL VARIES

COMPACTION TO CONFORM TO SECT. 301 OR 601

SUBGRADE PREP AS REQUIRED

CLASS 'B' CONCRETE AS PER SECT. 725, 505

TROWEL SMOOTH 300 FOR M.H. OVER 4000 mm DEEP

CLASS 'A' CONCRETE PER SECT. 725, 505

COURSE BRICK IN MORTAR OR CLASS 'C' CONCRETE PER SECT. 725, 505

ROWLOCK RADIAL COURSE

300 mm MAX.

600 mm MAX.

75 mm MIN.

13 mm

200 mm WALL TO 4000 mm WALL DEPTH 3000 mm WALL BELOW 4000 mm

1:3 CEMENT PLASTER COAT OUTSIDE WITH MEMBRANE TYPE CURING COMPOUND AFTER PLASTER HAS BEEN PLACED & FINISHED "HUNT PROCESS" OR EQUAL

PIECE SIZE & ELEVATION AS SHOWN ON PLANS

M.H. STEP IS 1220 mm M.H. ONLY

M.H. RING & COVER STD. DETAIL 423, 424 & 425

200 mm WALL

300 mm MAX.

480 mm MIN.

150 mm MAX.

100 mm MIN.

900 mm MIN.

1500 mm VARIABLE

680 mm MIN.

1150 mm MAX.

600 mm MAX.

200 mm MAX.
**FACE OF COVER**
CAST IRON

**BACK OF COVER**

**CAST IRON MANHOLE RING**

**SECTION OF COVER**
APPROX, WEIGHT 125 kg

**SECTION OF RING**
APPROX, WEIGHT 95 kg

**NOTES:**
1. WEIGHT OF CASTING SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED.
2. CASTINGS SHALL CONFORM TO SECT. 787.
NOTE:

LETTERING ON MANHOLE COVER TO CONTAIN NAME OF AGENCY AND UTILITY FOR WHICH MANHOLE IS NEEDED, (I.E. “PHOENIX SANITARY SEWER”), OR AS DIRECTED. THE TOTAL WIDTH OF INDIVIDUAL LETTERS TO BE SUCH THAT LETTERS AND WORDS ARE EQUALLY SPACED AND BALANCED TO FORM A COMPLETE CIRCLE WITH SPACERS BEFORE AND AFTER THE WORD IDENTIFYING THE AGENCY INVOLVED. LETTERS TO BE 51 mm IN HEIGHT AND RAISED 3 mm ABOVE LEVEL OF COVER. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO SECTION 787.
SECTION VIEW OF FRAME AND COVER
WITH CAM LOCKING DEVICE

MATERIAL SHALL CONFORM TO A.S.T.M. STANDARDS
B 179-65 ALLOY SN122A
B 179-65 ALLOY CN42A
B 108-65 ALLOY SC103A
(ALL 3 ACCEPTABLE)

LETTERING ON MANHOLE COVER TO CONTAIN NAME OF AGENCY AND UTILITY FOR WHICH MANHOLE IS NEEDED, I.E. "PHOENIX SANITARY SEWER", OR AS DIRECTED. THE TOTAL WIDTH OF INDIVIDUAL LETTERS TO BE SUCH THAT LETTERS AND WORDS ARE EQUALLY SPACED AND BALANCED TO FORM A COMPLETE CIRCLE WITH SPACERS BEFORE AND AFTER THE WORD IDENTIFYING THE AGENCY INVOLVED. LETTERS TO BE 51 mm RAISED 3 mm ABOVE LEVEL OF COVER. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO SECT. 787.

SHALL CONFORM TO SECT. 625.3.1 – (FRAME AND COVER).
TYPE A
750 mm TO 1500 mm DROP

TYPE B
1500 mm OR MORE
NOTES:

1. NOTE: COMPACT SOIL AT END OF PIPE TO 95% OF MAXIMUM DENSITY.

2. IF DEPTH OF COVER IS LESS THAN 1500 mm OR GREATER THAN 3000 mm, INCREASE PLUG THICKNESS A MIN. OF 100 mm.
CAST IRON MANHOLE STEP

NOTES
1. ALL DIMENSIONS ARE MINIMUM EXCEPT WHERE NOTED.
2. CASTING AS PER SECT. 787.

POLYPROPYLENE MANHOLE STEP

NOTES
1. STEPS SHALL BE PLACED INTO WET CONCRETE WALL DURING MANUFACTURE OR MORTARED INTO HOLES AFTER CONCRETE HAS SET.
2. POLYPROPYLENE MUST MEET REQUIREMENTS OF A.S.T.M. 2146, TYPE II, GRADE 16906.
NOTES:

1. THIS CONTROL VAULT WITH MANHOLE AND COVER SHALL BE USED ON 150 mm AND 200 mm DIAMETER SEWER WITH FLOWS IN THE RANGE OF 2.5 L/s TO 21.5 L/s.

2. VAULT TO BE CONSTRUCTED ON STRAIGHT RUN OF BUILDING SEWER, ACCESSIBLE AND SAFELY LOCATED ON THE OWNERS PROPERTY ADJACENT TO A PUBLIC RIGHT-OF-WAY.

3. THE PALMER BOWLUS FLUME SHALL BE INSTALLED PER THE MANUFACTURERS RECOMMENDATIONS.

4. THE PRE-CAST CONCRETE VAULT SHALL BE RECTANGULAR WITH MINIMUM INSIDE DIMENSIONS OF 1220 mm WIDE AND 1830 mm LONG AND AT A DEPTH OF THE DESIGN OF THE BUILDING SEWER.

5. A SHOP DRAWING SHALL BE SUBMITTED TO THE CONTRACTING AGENCY FOR APPROVAL BEFORE INSTALLATION OF THE VAULT AND THE PALMER BOWLUS FLUME WILL BE ALLOWED.
1. Construction detail applies where contractor builds house connection. Tap extends to property line in alleys or streets or to easement line.

2. Size of tap shall be designated on plans.

3. Details shown must be met for minimum condition of less than 1500 mm.

4. Construct tap at minimum slope if cover will be less than 1500 mm at property line.

5. If depth requires, minimum slope can be reduced to 1% provided stub is staked to grade.

6. For deeper lateral or trunk sewer condition, the wye and 1/8 bend or the tee and 1/16 bend will be rotated toward the vertical position as required to obtain 1500 mm cover over tap at property line or easement line.

7. End of tap to be sealed and marked as noted.
CLEANOUT INSTALLATION

UNPAVED STREETS AND ALLEYS

THE WORD 'SEWER' ON COVER

PAVED STREETS AND ALLEYS

CLASS 'B' CONC.
PER SECT. 725, 150 mm
THICK, 1000 mm DIA.

SIZE OF PIPE AS SHOWN ON PLANS

STANDARD 45° BEND

FLOW LINE ELEVATION SHOWN ON PLANS TO THIS POINT

125 mm MIN.

200 mm C.I. FRAME AND COVER DET. 270

MAX.

PAVED STREETS AND ALLEYS

COMPACTED BACKFILL OR UNDISTURBED EARTH

STANDARD 45° BEND

VT. CLAY PIPE
PER SECT. 743

TO BE LAID ON UNDISTURBED EARTH OR COMPACTED SELECT MATERIAL (TYPE B) OR A.B.C.

200 mm V.C.P.

STATION AND LENGTH SHOWN ON PLANS TO THIS POINT

SEWER TAP AT CLEANOUT

NOTE:
END OF SEWER TAP TO BE SEALED AND MARKED IN ACCORDANCE WITH DET. 440

ONE FULL LENGTH OF PIPE

100 mm OR 150 mm V.C.P.
TAP TO PROPERTY LINE

150x200 mm OR 100x200 mm VITRIFIED CLAY INCREASER

200x200 mm WYE
DOUBLE PIPE HEADWALL

NOTES:
1. ALL CONCRETE SHALL BE CLASS ‘A’ PER SECT. 505 & 725.
2. CONCRETE BLOCK PER SECT. 510, 775 & 776.
3. CONCRETE REINF. SHALL BE 15M BAR, 300 mm BOTH WAYS.

HEADWALL DIMENSIONS

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<th>NOMINAL PIPE SIZE</th>
<th>L₁</th>
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<th>L₄</th>
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* NOMINAL PIPE SIZE GIVEN FOR REINFORCED CONC. PIPE.
2. 20M BARS BEND TO CONFORM TO PIPE

NOTES:

1. ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725.

2. ALL REINFORCING BARS SHALL BE 15M EXCEPT 20M BARS OVER PIPE. BAR SPACING APPROXIMATELY 300 mm C TO C UNLESS OTHERWISE NOTED.

3. 30° WING WALL FLARE SHOWN; 45° NORMALLY DESIRABLE.
NOTES:
1. HIGH POINT OF HEADWALL SHALL NOT PROJECT MORE THAN 75 mm ABOVE SLOPE.
2. ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725.
3. ALL REINFORCING BARS SHALL BE 15M, 300 mm C TO C AND 75 mm CLEAR TO INSIDE OF FLOOR AND WALLS.

<table>
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<th>PIPE NOMINAL SIZE</th>
<th>I.D.</th>
<th>W</th>
<th>A</th>
<th>B</th>
<th>E</th>
<th>F</th>
<th>J</th>
<th>K</th>
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<td>835</td>
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**PIPE MAY ENTER WALL**

- (2) 12 mm TAMPINS OR INSERTS

**SEE NOTE 4**

- J = 50 mm
- 350 mm
- 50 mm
- 50 mm
- 170 mm
- O.C. TYP.

**POURED WALLS**

- 15M REINFORCED BARS 450 mm O.C. BOTH WAYS, CLASS 'A' CONCRETE PER SECT. 505, 725 & 727.

**BLOCK WALLS**

- BLOCK HEADWALL TO HAVE ONE 15M REINF. BAR CENTERED IN EACH CORE FOR FULL HEIGHT AND CORES FILLED WITH CONCRETE OR CEMENT GROUT (3:1 RATIO). ALL BLOCKS TO BE JOINTED WITH MORTAR. PLASTERED ON EXPOSED SURFACES THEN SPRAY WITH WHITE PIGMENTED CURING COMPOUND. SECT. 510, 727 & 776.

**TRASH RACK**

- L76x76x6.4 mm

**RACK BARS**

- BAR 50x12 mm

**45° BLOCK CORNER**

- SPECIAL 'U'
- SPECIAL OPEN END

**NOTES:**

1. REMOVE ALL SCALE FROM RACK BARS. METAL SPRAY OR PAINT WITH ONE COAT ZINC CHROMATE OR RED LEAD PRIMER (INDUSTRIAL QUALITY). OVERCOAT WITH GREY INDUSTRIAL ENAMEL SECT. 790.

2. SHAPE, COMPACT AND PLASTER NEW DITCH FROM HEADWALL TO UNDISTURBED EXISTING DITCH. PLASTER TO EXTEND TO MINIMUM ELEVATION NOTED 1000 mm BEYOND CONNECTION TO UNDISTURBED EXISTING DITCH.


4. 350 mm PLATE SHALL NOT EXTEND BELOW TOP OF PIPE.
NOTES:

1. BRACE TO BE INSTALLED EVERY 600 mm FROM TOP OF HEADGATE FRAME. BOTTOM BRACE TO BE HIGH ENOUGH TO ENABLE FULL OPENING OF HEADGATE.

2. INSTALL 12.7 mm BOLTS INTO LEAD PLUG DRILLED TO WITHIN 25 mm OF OUT SIDE OF STANDPIPE. SPACERS TO BE INSTALLED AT EACH BOLT BETWEEN HEADGATE FRAME AND INSIDE OF STAND PIPE.

3. LOCATION OF 50 mm HOLE FOR GATE STEM TO BE DETERMINED AFTER INSTALLATION OF GATE.

SEE NOTE 1

SEE NOTE 2

SEE NOTE 3

(4) 9.5 mm BOLTS TO BE GROUTED INTO STANDPIPE EQUIVALENT WITH 38x75 mm RECTANGULAR WASHERS AND NUTS

GALVANIZED EXPANDED METAL LID (3.9 mm)

VARIES MIN. 1200 MAX. 1300

FINISH GRADE

25 mm C.R.S. LIFT ROD

HEADGATE TO BE SWANSON 800 SERIES OR APPROVED EQUAL

CLASS 'A' CONCRETE AS PER SECT. 725

FORM CONC. AROUND END OF PIPE BEHIND HEADGATE FRAME

NOTE: PAINT ARROW ON OUTSIDE OF STANDPIPE INDICATING DIRECTION "TO OPEN" HEADGATE.
PLASTER INSIDE WITH FLOAT FINISH

GROUT SOLID, FLOAT FINISH TOP

PIPE TO DITCH VARIES

TO SECURE COVER TO STRUCTURE, USE 6X75 GALVANIZED EYEBOLT AND 6X150 GALVANIZED EYEBOLT BENT TO FORM ANCHOR, AND 5 MM GALVANIZED CHAIN 600 MM LONG.

SIZE OF PIPE AS SHOWN ON PLANS

CLASS 'B' CONCRETE PER SECTION 725

S/W GRADE 150 MM MIN

ELEV. OF BOTTOM OF PAVEMENT SUBGRADE

NOTES:
1. SIZE OF JUNCTION BOX TO BE DETERMINED BY THE ENGINEER.
2. GATE TYPE, SIZE AND NUMBER REQUIRED AS SHOWN ON PLANS OR AS SPECIFIED.
NOTES:

1. A CONCRETE COLLAR IS REQUIRED WHERE PIPES OF DIFFERENT DIAMETERS OR MATERIALS ARE JOINED, OR WHERE THE CHANGE IN ALIGNMENT OR GRADE EXCEEDS THAT ALLOWED FOR ON ORDINARY JOINTS.

2. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHOULD BE THOSE OF THE LARGER PIPE. D=D−1, OR D−2 WHICHEVER IS GREATER.

3. FOR PIPE SIZES NOT LISTED USE NEXT SIZE LARGER.

4. OMIT REINFORCING ON PIPE 600 mm OR LESS IN DIAMETER.

5. WHERE REINFORCING IS REQUIRED, THE DIAMETER OF THE CIRCULAR TIES SHALL BE... OUTSIDE DIAMETER OF PIPE+T.

6. FIELD CLOSURES OF PIPE OF THE SAME DIAMETER AND WITHOUT CHANGE IN GRADE OR ALIGNMENT SHALL BE MADE WITH A CONCRETE COLLAR.

A*=ANGLE OF DEFLECTION

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NOTE:
CONTRACTOR MAY USE PRECUT FITTINGS IF DESIRED.
BID ITEM INCLUDES LATERAL PIPE, RISER, PAD, VALVE,
LABOR AND INCIDENTAL MATERIAL REQUIRED FOR
INSTALLATION.

CONSTRUCT OPTIONAL
CONCRETE SCOURING
BASIN AROUND VALVE
ASSEMBLY WHERE SPECIFIED

CLASS 'C' CONCRETE
PER SECTION 725
WITH TROWEL FINISH

BREAK PIPE
AND MAKE
WATERTIGHT
JOINTS PER
DETAIL 524

MAIN

CONCRETE PIPE
SECT. 735 & 736

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

PLUG END PER
DETAIL 427

WATERMAN ALFALFA
VALVE OR EQUAL

GROUT AS PER
DETAIL 524

CONCRETETEE
OR ELBOW
NOTES:

1. THIS DETAIL SHALL BE REQUIRED WHEN NEW OR EXISTING PIPE INSTALLATIONS WILL BE SUBJECT TO DAMAGE ANYTIME IN THE FUTURE DUE TO LACK OF PROPER COVER, AS DETERMINED BY THE ENGINEER.

2. FOR PIPE OVER 450 mm I.D. WOOD, METAL OR GYPSUM BOARD FORMS MUST BE USED TO FORM THE SIDES OF THE ENCASEMENT. GYPSUM BOARD FORMS MAY BE LEFT IN THE GROUND BELOW THE TOP OF THE ENCASEMENT. THIS SHALL BE OPTIONAL WITH POURING AGAINST TRENCH WALLS FOR ENCASEMENT OF 450 mm AND SMALLER PIPE.

3. FOR ALL SITUATIONS WHERE SIDE FORMS ARE USED, TRENCH WALLS SHALL BE OVER—EXCAVATED TO ALLOW SUFFICIENT ROOM TO OPERATE PROPER MECHANICAL COMPACTION EQUIPMENT.

4. CONCRETE WHICH SPLITS BEYOND 300 mm FROM THE SIDES OF THE PIPE FOR ANY REASON SHALL BE REMOVED BACK TO THE PROPER LINE PRIOR TO BACKFILLING.

5. SEE SECT. 601 FOR TRENCH PREPARATION. CONCRETE TO BE CLASS 'A' PER SECT. 725.

6. COVER TO BE APPROVED BY ENGINEER.
CONNECTOR CROSS SECTION

R = 1/2 O.D.

R.C.P., C.P. OR C.M.P.

SEE BAND DETAIL BELOW

C.M.P. TYPE 'A' OR TYPE 'B'

T-BOLT - SEE DETAIL BELOW

C.M.P. STORM DRAIN

NOTE:
USE 16 mm WASHER AND NUT,
ALL PIECES (NUTS, WASHERS,
AND FABRICATED BOLTS) TO
BE GALVANIZED AS PER
A.S.T.M. A-123 LATEST
REVISION.

SECTION A-A

C.M.P. PER A.A.S.H.T.O. SPEC. M-36/M-36M
EXTERIOR COATING AND INTERIOR
COATING PER A.A.S.H.T.O. SPEC.
M-190, MAY BE TYPE 'A' OR 'D'

SELECT MATERIAL

STANDARD THREAD
(COARSE)

T-BOLT

WELD ALL
AROUND

600 mm MIN.
TYP. BOTH
SIDES AND
BOTTOM

SELECT MATERIAL

C.M.P. MAIN STORM DRAIN

CONNECTOR PIPE

8 HOLES
14 mm DIA.

O.D. + 600

O.D. + 600

2.75 mm BITUMINOUS COATED
GALVANIZED METAL PLATE

600 mm PIPE AND SMALLER

1:2 MORTAR

51x51x2.75 mm WELDED
WIRE FABRIC WITH 300 mm
CIRCUMFERENTIAL OVERLAP

BAND DETAIL

C.M.P. CONNECTION TO MAIN STORM DRAIN

C.M.P. CONNECTION TO MAIN STORM DRAIN

510

MARICOPA ASSOCIATION OF
GOVERNMENTS

STANDARD DETAIL
METRIC

CORRUGATED METAL PIPE
AND INSTALLATION

REVISED 3-10-2000

DETAIL NO. 510

DETAIL NO. 510
NOTES

1. ALL CONCRETE TO BE CLASS 'A' PER SECT. 725, 505.

2. MATCH SPRING LINES OF PIPE ENTERING MANHOLE UNLESS OTHERWISE NOTED.

3. CUT PIPES TO ALLOW SETTING OF 1220 mm DIA. CYLINDRICAL FORM FROM 150 mm ABOVE MAIN LINE PIPE TO SPRING LINE. CUT PIPE 50 mm LARGER THAN FORM TO ALLOW 50 mm CONCRETE OVER ENDS OF ALL CUT PIPE.

4. INVERT AND BASE OF MANHOLE TO BE POURED AND INVERT TO BE SHAPED BY HAND TO MAKE SMOOTH TRANSITION. FINISH WITH RUBBER FLOAT.

5. CENTER MANHOLE ON PIPE JOINT WHERE PIPE CHANGES SIZES, LEAVING A GAP OF 300 mm MINIMUM, 600 mm MAXIMUM.
NOTES:
1. LINE PIPE AND STUB MAY BE CAST MONOLITHICALLY OR STUB MAY BE CAST ON TO LINE PIPE SECTION PRIOR TO COMPLETE CURING.
2. ALL LINE PIPE REINFORCEMENT SHALL BE TURNED UP INTO STUB.
3. THE VERTICAL STUB TO BE A.S.T.M. C-76 CLASS II WALL 'A' AND THE HORIZONTAL PIPE TO BE EQUAL TO STRENGTH OF PIPE ENTERING MANHOLE.
4. ALL REINFORCING STEEL SHALL CLEAR FACE OF CONCRETE BY 40 mm UNLESS SHOWN OTHERWISE.
5. CONCRETE ENCASEMENT SHALL BE CLASS 'A' PER SECT. 725, 505.

TABLE OF VALUES FOR 'F' & 'D' 

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<tr>
<th>D(mm)</th>
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<td>490</td>
<td>520</td>
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<td>580</td>
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</table>

*TRUE INNER DIAMETER DIMENSIONS. (NOT NOMINAL SIZE.)

PRECAST PIPE WITH VERTICAL STUB

MAN HOLE SHAFT PER DETAIL 522

1220 mm DIA.

100

ENCASEMENT

2640 mm MIN.

600 mm MIN.

1220 mm MIN.

1220 mm MIN.
NOTES:

1. PRECAST CONCRETE CONES AND SECTIONS TO BE A.S.T.M. C-478M.

2. BRICK MAY BE USED IN LIEU OF, OR IN COMBINATION WITH CONCRETE ADJUSTING RINGS.

3. PRECAST CONCRETE SECTIONS 1200 mm DIA. PIPE MAY BE FURNISHED IN STANDARD LENGTHS.

4. UNLESS OTHERWISE SHOWN ON PLANS, USE 2–65 mm PRECAST CONCRETE ADJUSTING RINGS ON IMPROVED STREETS AND 4–65 mm RINGS ON UNIMPROVED STREETS.

5. MANHOLE STEPS SHALL BEGIN 600 mm BELOW FINISHED GRADE AND CONTINUE AT 300 mm INTERVALS TO APPROXIMATELY 600 mm ABOVE MANHOLE SHELF. (AS REQUIRED BY AGENCY.)

65 mm RINGS SHALL BE REINFORCED WITH TWO 6.3 mm ROUND STEEL HOOPS; 150 AND 200 mm RINGS SHALL BE REINFORCED WITH FOUR 6.3 mm HOOPS, TIED WITH 2 mm WIRE 200 mm O.C.
FOR A 760 mm M.H. OPENING, USE THE STD. WATER TIGHT 760 mm M.H. FRAME & COVER, AND ANCHOR THE FRAME AS OUTLINED IN THE INSTRUCTIONS NOTED ON THIS SHEET.

FOR A 610 mm M.H. OPENING, MODIFY THE STD. 610 mm M.H. FRAME & COVER, FOLLOWING THE NOTED PROCEDURES, ONE THRU FIVE.

NOTES:

1. DRILL (8) HOLES 13.5 mm IN COVER FOR 12.7 mm CAPSCREWS, COUNTERBORE 13 mm DEEP BY 29 mm DIA. TO ACCOMODATE CAPSCREW AND SOCKET WRENCH. SPACE EQUALLY.

2. DRILL (8) HOLES AND TAP FOR 12.7 mm - 13 THREAD NATIONAL COARSE BOLT.

3. DRILL, TAP AND COUNTERBORE (2) HOLES FOR 12.7 mm CAPSCREWS TO BE USED FOR LIFTING COVER. PLUG WITH CAPSCREWS.

4. COVER AND FRAME MUST BE MATCHED, DRILLED AND TAPPED IN SETS.

5. CASTING DIMENSIONS GIVEN ABOVE ARE FROM DET. 424, 610 mm MANHOLE FRAME AND COVER.

6. BOTH 610 & 760 mm FRAMES TO BE ANCHORED AS FOLLOWS:

7. DRILL 13 mm HOLE IN FILLET. DO NOT USE ADJACENT FILLETS.

8. 6 mm STAINLESS STEEL CABLE. SECURED WITH CABLE CLAMPS.

9. 13x225 mm HOOK AND EYE TURNBUCKLE.

10. 13 mm EYE BOLT WITH 25 mm DIA. EYE.

11. INSTALL THREE CABLES PER 610 mm (FOUR CABLES FOR 760 mm COVERS). EYEBOLTS TO BE SET DIRECTLY BELOW FILLETS USED.

12. TRIPLE WRAP TURNBUCKLES AND CABLE CLAMPS WITH 25 mm WIDE TAPE, SAFE-T-CLAD, F.O.S. 655, OR APPROVED EQUAL.
NOTES:

1. DRILL (6) HOLES IN 760 mm COVER (4 HOLES IN 610 mm COVER) 13 mm CORED RECESS FOR 13 mm CAPSCREWS. SPACE EQUALLY (304 S.S.)

2. DRILL (6) HOLES IN 760 mm FRAME (4 HOLES IN 610 mm FRAME) AND TAP FOR 13 mm — NATIONAL COARSE BOLT (HEX HEAD).

3. COVER AND FRAME MUST BE MATCH MARKED, DRILLED AND TAPPED IN SETS.

4. DIMENSIONS, LETTERING, WEIGHTS AND MATERIALS SHALL CONFORM TO DET. 424.

5. REFER TO DETAIL 523-1 FOR INSTALLATION PROCEDURES.
**NOTES:**

1. 'D' SHALL BE 610 mm OR LESS. FOR LARGER VALUE OF 'D' USE MANHOLE OR JUNCTION STRUCTURE.
2. IN NO CASE SHALL THE OUTSIDE DIAMETER OF THE INLET EXCEED ONE HALF THE INSIDE DIAMETER OF THE MAIN STORM DRAIN.
3. CENTERLINE OF INLET SHALL BE ON RADIUS OF MAIN STORM DRAIN EXCEPT WHEN ELEVATION 'S' IS SHOWN ON PLANS.
5. IF ANGLE X IS 45' OR LESS USE TYPE 1.
NOTES:

1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.

2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.

3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.

4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.

5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 D PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.

DIMENSIONS

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<th></th>
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<tr>
<td>100</td>
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<tr>
<td>150</td>
<td>535</td>
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<tr>
<td>175</td>
<td>305</td>
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</tbody>
</table>

* SEE DETAILS 536–1 AND 536–2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.

** 1200 mm LOCATIONS WHERE 1200 mm S/W IS REQUIRED.
NOTES:
1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
4. FLOOR OF BASIN SHALL BE TROWELED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 D PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.

DIMENSIONS

T=150 mm IF V=1220 mm OR LESS
T=200 mm IF V IS BETWEEN 1220 AND 2440 mm.
T=250 mm IF V IS 2440 mm OR MORE
   (IF V EXCEEDS 3000 mm SPECIAL DESIGN IS REQUIRED)
V=1070 mm UNLESS OTHERWISE SPECIFIED.

* SEE DETAILS 536–1 AND 566–2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.

** 1200 mm LOCATIONS WHERE 1200 mm S/W IS REQUIRED.
SECTION A–A

CLASS 'A' CONC. PER SECT. 725

CURB SUPPORT
SEE DET. 533–1
(DET. NO. 2)

NOTES:

1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.

2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.

3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.

4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.

5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 D PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.

CURB A

100 990
150 535
175 305

DIMENSIONS

T=150 mm IF V=1220 mm OR LESS
T=200 mm IF V IS BETWEEN 1220 AND 2440 mm.
T=250 mm IF V IS 2440 mm OR MORE
(IF V EXCEEDS 3000 mm
SPECIAL DESIGN IS REQUIRED)
V=1070 mm UNLESS OTHERWISE SPECIFIED.

PLAN VIEW

*SEE DETAILS 536–1 AND 536–2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.

**1200 mm LOCATIONS WHERE 1200 mm S/W IS REQUIRED.
NOTES:

1. SINGLE C.B. (ILLUSTRATED), SUMP WITH WING BASIN UPSTREAM.
2. DOUBLE C.B. SUMP WITH SYMMETRICAL WING BASINS EACH SIDE.
3. PIPES CAN BE PLACED IN ANY WALL EXCEPT WALL ADJACENT TO A WING BASIN. PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS PLACED.
4. SUMP FLOOR SHALL HAVE A WOOD TROWEL FINISH AND A MIN. SLOPE OF 1:1 IN ALL DIRECTIONS TOWARD OUTLET PIPE.
5. ALL REINFORCING BARS SHALL BE 15M 450 mm C TO C BOTH WAYS AND 40 mm CLEAR TO INSIDE OF WALLS AND OUTSIDE WING BASIN FLOOR EXCEPT AS SHOWN. SEE SECT. 727.
6. ALL CONCRETE SHALL BE CLASS 'A', PER SECT. 725.
7. CONSTRUCTION JOINTS SHALL BE PLACED TO MEET FIELD CONDITIONS.
8. ALL EXPOSED STEEL SHALL BE GALVANIZED OR PAINTED WITH ONE SHOP COAT OF #1 PAINT AND TWO FIELD COATS OF #10 PAINT.

DIMENSIONS

V = 1000 mm MIN. WHEN L = 1000 mm
V = 1050 mm MIN. WHEN L = 2000 mm
V = 1100 mm MIN. WHEN L = 3000 mm
V = 1200 mm MIN. WHEN L = 5000 mm
T = 150 mm WHEN V IS LESS THAN 2400 mm
T = 200 mm WHEN V IS EQUAL TO OR GREATER THAN 2400 mm
H = CURB HEIGHT PRIOR TO THE TRANSITION

REINFORCEMENT DETAIL

REINFORCEMENT DETAIL

10M BAR

10M REBAR, 150 mm C TO C, SEE REINFORCEMENT DETAIL

NO BOTTOM REINFORCING CONNECTOR PIPE SEE NOTE NO. 3

SECTION B—B

WALL REINFORCEMENT SEE NOTE NO. 5

SECTION A—A

100 R TYP.

CURB SUPPORT ANCHORS 1050 mm MAX. SPACING SEE DETAIL 536–1, SECTION C–C

NOTE: REINFORCING BARS SHOWN ARE FOR ROOF SLAB ONLY. SEE NOTE NO. 5 AND SECTIONS FOR OTHER REINFORCING.
APRON NOTES:

9. APRON IS CONSTRUCTED ONLY WHEN SPECIFIED ON PLANS.

10. CONCRETE IN APRON SHALL BE NOT LESS THAN 200 mm THICK.

11. CURB FACES AT CATCH BASIN OPENING AND POINT G SHALL BE THAT OF THE EXISTING CURB FACE PLUS 50 mm OR AS OTHERWISE SHOWN.

12. ELEVATION AT THE OUTER CORNERS OF THE LOCAL DEPRESSION SHOWN ON THE PLANS ARE FOR THE FINISHED SURFACE.

13. SEE DETAIL 533-1 FOR ADDITIONAL DIMENSIONS, REBAR PLACEMENT AND OTHER INFORMATION TO CONSTRUCT CATCH BASIN.

PLAN VIEW

M AND N SHALL BE ON A STRAIGHT GRADE BETWEEN TOPS OF END HEADERS.
FRAME AND GRATE NOTES

14. FRAME AND GRATING SHALL BE TESTED FOR ACCURACY OF FIT AND SHALL BE MARKED IN SETS BEFORE DELIVERY.

15. ALL WELDING SHALL BE IN ACCORDANCE WITH STANDARD WELDING SPECIFICATIONS.

16. CROSS BARS AND END BARS MAY BE FILLET WELDED, RESISTANCE WELDED OR ELECTOR FORGED TO BEARING BARS.

17. ANCHORS SHALL BE 9.5 mm DIA. STEEL ROD, 10M REBAR, 9.5 mm DIA. x 200 mm BOLTS OR 200mm NELSON STUDS.

18. ALL PARTS SHALL BE OF STRUCTURAL GRADE STEEL.

19. ALL EXPOSED STEEL SHALL BE GALVANIZED OR PAINTED WITH ONE COAT #1 PAINT AND TWO FIELD COATS OF #10 PAINT.

SECTION F-F
CROSS BARS: 12.7x637 mm ROD, 100 mm C. TO C., 9 EACH.

BEARING BARS: 89x12.7x1003 mm 48 mm C. TO C., 14 EACH.

END BARS: 64x6.4x635 mm, 2 EACH.

GRATE DETAIL
GRATE OPENING: 0.404 m²
CROSS BARS:
12.7x637 mm ROD,
100 mm C. TO C.,
9 EACH.

BEARING BARS:
89x12.7x1003 mm
48 mm C. TO C.,
14 EACH.

END BARS:
54x6.4x635 mm,
2 EACH.

GRATE DETAIL
GRATE OPENING: 0.404 m²
NOTES:

1. ADJUSTABLE CURB, FRAME AND GRATING UNITS SHALL BE STRUCTURAL STEEL OR CAST IRON.

2. PIPES MAY ENTER OR LEAVE ANY WALL. BOTTOM OF BOX TO BE SLOPED TO OUTLET PIPE FROM ALL DIRECTIONS AND TROWELLED TO A HARD SMOOTH SURFACE.

3. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.

4. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS Poured.

5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
CROSS SECTION

NOTE:
Weld all plates to 152x152 angles.

GRATE

13 mm RODS
Threaded
both ends

ANCHOR

50x6 mm END

ADJUSTABLE CURB

330x10 mm BACK PLATE

50x6 mm END PIECE
BOLT CURB BOX TO FRAME WITH M14x2x65 mm STEEL HEX BOLTS, NUTS AND WASHERS

CURB BOX ADJUST. TO 225 mm HIGH

DATE

SECTION A—A
CAST IRON FRAME — GRATE — CURB BOX

SECTION B—B

CROSS-SECTIONAL AREA: 987 mm²

VANE DETAIL

NOTE:
DIMENSIONAL CHANGE REQUIRED FROM 1041 mm WIDTH TO 915 mm, AND 533 mm DEPTH TO 610 mm.
MATERIAL CAST GRAY IRON ASTM A—48 CLASS 35B.
FRAME WEIGHT 95 kg; GRATE 64 kg; CURB BOX 42 kg.
BOLT CURB BOX TO FRAME
WITH M14x2x65 mm STEEL HEX
HEAD BOLTS, NUTS AND WASHERS

SECTION A--A

DOUBLE UNIT CAST IRON FRAME — GRATE — CURB BOX

SECTION B--B

VANE DETAIL

NOTE:
DIMENSIONAL CHANGE REQUIRED FROM 1041 mm
WIDTH TO 1880 mm, AND 533 mm DEPTH TO 610 mm.
REQUIRES ONE CENTER STEEL I-BEAM S100x11.
MATERIAL CAST GRAY IRON ASTM A-48 CLASS 35B.
FRAME MASS 89 kg; GRATE 64 kg; CURB BOX 42 kg.
NOTES:

1. PIPES MAY ENTER OR LEAVE ANY WALL. BOTTOM OF BOX TO BE SLOPED TO OUTLET PIPE FROM ALL DIRECTIONS AND TROWELLED TO A HARD SMOOTH SURFACE.

2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.

3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.

4. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.

5. ALL WELDS ON FRAME AND SIDE BARS ON GRATE SHALL BE FULL LENGTH OF JOINT.

NOTE:
CONSTRUCT BOX AS PER CATCH BASIN TYPE 'E' (LOWER PORTION ONLY).
15M REINFORCEMENT BARS, 300 mm SPACING, WELDED TO NOSE ANGLE WITH 10 mm WELDS BOTH SIDES

10 mm Curb Support Anchor
25 mm Dia. Bar with 75 mm 90° Bend, 1050 mm Max. Spacing

SECTION C–C
FOR DETAILS 531, 532 AND 533

SECTION D–D

NOTES:
1) HORIZONTAL PLAIN ROUND GALVANIZED STEEL PROTECTION BAR SHALL BE USED WHEN CURB FACE IS 230 mm OR MORE.
2) THE BAR SHALL BE EMBEDDED 125 mm AT EACH END.

PLAN VIEW

6 mm DIAMOND FLOOR P. COVER

STEEL FILLER BLOCKS WELDED TO FRAME

DOWEL BAR

10M REINF. STEEL DOWEL BARS

25 mm GALVANIZED BAR

230

75

REVISED 3-13-2000
DETAIL NO. 536-1

COMMON DETAILS AND SECTIONS FOR CURB OPENING CATCH BASINS
SEE DROP HANDLE DETAIL

PLAN VIEW

SECTION A–A

SECTION B–B

SECTION C–C

NOTES:

1. FRAME SHALL BE NON-LOCKING.

2. FRAME AND COVER SHALL BE CAST IRON OR ASTM A–36 STRL. HORIZONTAL SURFACE OF COVER IN CONTACT WITH FRAME SHALL BE MACHINED. ASA B–46 ROUGHNESS SHALL NOT EXCEED 0.79 mm.

3. COVER SHALL BE FILLED WITH CONCRETE AND BROOM FINISHED.

4. SMALL VARIATIONS IN DIMENSIONS OF FEATURES OF A MINOR NATURE THAT ARE PART OF THE FOUNDRY'S CASTING ARE PERMISSIBLE.

1 EACH 304–S.STL. SPRING 63x13.5 I.D.x2.4
2 EACH 13 mm HEX NUT
3 EACH 13 mm FLAT WASHER
1 EACH 13 mm LOCK WASHER
ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725. EXPOSED EDGES SHALL BE FINISHED WITH A 13 mm RADIUS.

DETAIL OF ANGLE FRAME

GRATE SUPPORT

WELD INTO SECOND SPACE

BOTH SIDES WELD INTO 2ND SPACE

13x25 EYE BOLT

60x80x6 BEVELED SIDES FOR WELDS

BAR GRATE
SEE DETAIL 539

6x44x600 mm CHAIN

6x44x600 mm CHAIN TO 25x150 mm EYE BOLT IN WALL. BEND BOLT 25 mm ON END.

PIPE SIZE AS REQUIRED BY PLANS

SLOPE FLOOR TO OUTLET

PLAN

SINGLE GRATE

675x675 I.D.
GRATE FRAME

725x1325 I.D.
GRATE FRAME

C

C

C

C

C

GRATE

L76x76x13

14x90 mm BOLT OR WELDED LUG, 4 EACH - ONE ON EACH CORNER

SECTION B–B

SECTION A–A

SECTION C–C

DOUBLE GRATE

CATCH BASIN – TYPE 'G'

537

537

7–05–2000

DETAIL NO.

REvised

STANDARD DETAIL

METRIC

537

537
WHEN DOUBLE GRATE IS USED INCREASE THE LENGTH OF THE STRUCTURE ACCORDINGLY.

CUT HOLE IN PIPE 600 mm LONG FOR SINGLE GRATE STRUCTURES AND 1200 mm LONG FOR DOUBLE GRATE. WIDTH DEPENDS ON DIA. OF PIPE, NOT TO EXCEED 560 mm MIN. WIDTH TO BE SET BY PROJECT ENGINEER.

SEE DETAIL 539 FOR GRATE

725x725 mm I.D. SINGLE FRAME
725x1325 mm I.D. DOUBLE FRAME

L76x76x13 ANGLE IRON FRAME
M14x150 mm LUGS WELDED TO FRAME, 4 EACH – 1 ON EACH CORNER OF FRAME

FOR PIPE LARGER THAN 600 mm DIA. (NOMINAL)

SECTION A–A

SECTION A–A

SECTION A–A

600 mm PIPE (NOMINAL)
(6) 12mm DIA. x 713mm SINGLE, 1313mm DOUBLE TRANSVERSE RODS, 100mm ON CENTER
FLUSH WITH GRATE SURFACE.

(2) 50 x 6 x 713mm SINGLE, 1313mm DOUBLE END BARS

(15 SINGLE, 27 DOUBLE) 64 x 13 x 700mm BEARING BAR
APPROXIMATELY 50mm ON CENTER

EACH BAR & ROD

NOTES:


2. WELDING SHALL BE IN ACCORDANCE WITH A.W.S. SPECIFICATIONS.

3. FRAME AND GRATE SHALL BE TESTED FOR ACCURACY OF FIT
   AND SHALL BE MARKED IN SETS BEFORE DELIVERY.

4. THE COMPLETED ASSEMBLY SHALL BE GIVEN ONE SHOP COAT OF
   NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECTION 790.

5. THE GRATE SHALL BE FABRICATED TO WITHIN 3 mm
   SPECIFIED DIMENSIONS.
NOTES:
1. GRATING UNITS AND FRAMES SHALL BE FABRICATED FROM STRUCTURAL STEEL EXCEPT AS NOTED.
2. WELDING SHALL BE IN ACCORDANCE WITH STD. WELDING SPECS.
3. THE COMPLETED ASSEMBLY SHALL BE GIVEN TWO SHOP COATS OF NO. 1 PAINT AS PER SECT. 790.
4. FRAME AND GRATE SHALL FIT TO A MAX. ROCK OF 2.4 mm AT ANY POINT.
5. RESTRICT USE TO GRADES OF 3% OR LESS.

SECTION A-A
GRATE TYPES TB-1 AND TB-2

BAR TABLE

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<th>TYPE</th>
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TW INDICATES TRANSVERSE WELDED
TB INDICATES TRANSVERSE BOLTED
CROSS BARS:
10 mm DIA: 102
C TO C.
BEARING BARS:
89x6.4x48 mm
C TO C.
END BARS:
64x6.4 mm CROSS
BARS MAY BE FILLET
WELDED, RESISTANCE
WELDED OR
ELECTROFORGED TO
BEARING BARS.

NOTES:
1. LW INDICATES LONGITUDINAL WELDED.
2. LB INDICATES LONGITUDINAL BOLTED.
3. EF INDICATES ELECTROFORGED.
4. GRATING UNITS AND FRAMES SHALL BE
   FABRICATED FROM STRUCTURAL STEEL
   'A-36/A36M' EXCEPT AS NOTED.
5. ALL WELDING SHALL BE IN ACCORDANCE
   WITH STANDARD WELDING SPECIFICATIONS.
6. THE COMPLETED ASSEMBLY SHALL BE
   GIVEN ONE SHOP COAT OF NO. 1 PAINT.
7. FRAMES AND GRATES SHALL FIT TO A
   MAXIMUM ROCK OF 2.4 mm AT ANY
   POINT.
8. GRATE TYPE LW AND EF RESTRICTED
   TO SLOPES OF 3% OR LESS
9. GRATES TYPE LB USE LONGITUDINAL
   GRADES IN EXCESS OF 3% OR AS AN
   ALTERNATE TO TYPES LW OR EF
   ON GRADES OF 3% OR LESS.

<table>
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<tr>
<th>GRATE TYPE</th>
<th>CLEAR BAR SPACING</th>
<th>NO. BARS</th>
<th>X</th>
<th>GRATE OPENING m²</th>
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SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D
### NOTES

1. DESIGN OF END SECTION SHALL CONFORM TO STANDARD FOR REINFORCED CONCRETE PIPE.

2. END SECTION JOINT CONFORMATION SHALL MATCH THE PIPE JOINTS.

3. EMBANKMENT SLOPE SHALL BE WARPED TO MATCH SLOPE OF END SECTION.

4. CULVERT LENGTH IS AS SHOWN ON PLANS.

---

**Table: Dimensions - Millimeters**

<table>
<thead>
<tr>
<th>Nominal Pipe Size (mm)</th>
<th>Pipe Dia.</th>
<th>Approx. Mass (kg)</th>
<th>T</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
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**Diagram:**

- **Plan:**
  - Right Angle Culvert
  - Spacing for Multiple Installation
- **Section A-A:**
  - Front Elevation
  - Skewed Culvert
- **Details:**
  - Culvert Length
  - Embankment Slop
  - Normal Toe of Slope

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**Details:**

- **Detail No.:** 545
- **Revised:** 3-13-2000
- **Metric:** 545
NOTES:

1. WHERE ROCK IS ENCOUNTERED THE OUTLET MAY BE OMITTED.

2. ALL PORTIONS OF SPILLWAY TO BE TROWEL FINISHED.

3. CONCRETE FOR THE SPILLWAY INLET, SPILLWAY AND OUTLET SHALL BE CLASS ‘B’ PER SEC. 725.

4. WHEN THE OUTLET IS USED, THE WIRE MESH SHALL EXTEND THROUGH THE JOINT INTO THE OUTLET IN LIEU OF BENDING INTO THE KEY.

SECTION A-A

SPILLWAY SECTION

SECTION ON SPILLWAY C

DOUBLE INLET
CONCRETE SURFACE FORD CONCRETE WALLS

NOTES:
1. FORD WALLS SHALL BE CLASS ‘A’ CONCRETE PER SECT. 725
2. DEPTH GAUGE SHALL BE PAINTED 2 COATS WHITE ENAMEL. NUMERALS AND MARKERS SHALL BE 1 COAT BLACK ENAMEL.
3. NUMBERS ON DEPTH GAUGE TO BE 50 mm HIGH.
4. HEIGHT OF DEPTH GAUGE OPTIONAL.
5. TWO DEPTH GAUGES MAY BE USED. ONE ON EACH END OF UPSTREAM WALL.

BITUMINOUS SURFACE FORD CONCRETE WALLS

DEPTH GAUGE DETAIL
(OPTION OF THE CONTRACTING AGENCY)

FINISHED GRADE

VERTICAL ALIGNMENT TO BE AS NEAR AVERAGE TRANSVERSE GRADE OF STREAM BED AS POSSIBLE

WALL TO BE BUILT 305 mm ABOVE HIGH WATER LEVEL

WALL MAY BE BUILT TO THIS LINE

75 mm WEEP HOLE
6 m C TO C

ELEVATION LOOKING UPSTREAM
**TYPICAL GABIONS**

1. **HEAVY GAUGE FRAME WIRE.**
2. **HEAVY GAUGE TRIPLE-TWIST HEXAGONAL MESH (OR EQUAL) FASTENED TO FRAME WIRE.**
3. **CONTINUOUS HEAVY GAUGE WRAPPED AROUND FRAMES TO FASTEN GABIONS TO EACH OTHER.**
4. **PARTITIONS TO PREVENT SHIFTING, NORMALLY ONE PER 900 mm LENGTH, INSTALLED AT FACTORY.**

**NOMINAL SIZE COMBINATIONS**

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</tr>
<tr>
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<td>300, 450, 900</td>
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**NOTES:**

1. PLAIN ROCK OR CROUTED ROCK MAY BE SUBSTITUTED FOR SACKED CONCRETE.
2. GROUT FOR RIPRAP MAY BE PNEUMATICALLY PLACED MORTAR.