### 400 SERIES
**SEWER INFORMATION**

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**IRRIGATION AND STORM DRAIN INFORMATION (CTD)**

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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."

4. Many details cover more than one sheet. These sheets have been given the same number with a suffix number, example: 391-1 and 391-2.

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 included.

6. Some of the details printed herein may be used by some of the agencies but not 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.
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 POINTS IF REQUIRED BY ENGINEER, AS SHOWN ON PLANS.

2. TYPE 'B' TO BE USED AT INTERSECTION OF STREET CENTERLINES (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, AND CHANGE IN ALIGNMENT OF, SUBDIVISION BOUNDARIES WHERE CORNERS OR CHANGE POINTS FALL OUTSIDE OF PAVED AREAS OR IN ALLEYS.

4. LETTERS TO BE APPROX. 1/32" WIDE & 1/32" DEEP.

5. USE STANDARD WROUGHT IRON WASHER 3" O.D. x 11/64" THICK WITH 1-3/8" HOLE

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

7. FRAME & COVER TO INCLUDE CHAIN PER DET. 270. (OPTIONAL PER AGENCY REQUIREMENTS.)
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 3/4" AT TOP. MINIMUM LENGTH OF POST 31-1/2". LENGTH DEPENDS ON SUBSURFACE OBSTRUCTIONS SUCH AS OLD CONCRETE PAVING, ROCK, ETC. 3/4" GALVANIZED PIPE SET IN THIS POST SHALL BE A MINIMUM OF 30" 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 1/2" x 5" LAG SCREWS WITH 2 FLAT WASHERS OR (2) 5/8" BOLTS, WITH 4 FLAT WASHERS.

2. 2" x 8" 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. 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.
FLANGED STEEL 'U' CHANNEL (2 LBS. OR 3 LBS. PER SQUARE FOOT AS SPECIFIED)

2-1/2" DIA. STANDARD PIPE GALVANIZED OR 2-3/8" O.D. STANDARD PIPE GALVANIZED (AS SPECIFIED)

2" DIA. STANDARD PIPE GALVANIZED

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.

DETAIL NO. 131
STANDARD DETAIL ENGLISH STREET SIGN BASE

MARICOPA ASSOCIATION OF GOVERNMENTS

REVISED DETAIL NO. 131
NOTES

1. POSTS AND BLOCKS SHALL BE 8" x 8" 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.
6. INSTALL LAP PLATES SO THAT EXPOSED EDGES ARE AWAY FROM APPROACHING TRAFFIC.

FACE ELEVATION

SIDE ELEVATION

PLAN

DETAIL NO. 1

STANDARD DETAIL
ENGLISH

STEEL GUARD RAIL
'W' SECTION BACK-UP PLATE FOR STEEL POSTS

W6x8.5 STEEL POST

STEEL 'W' SECTION, 12 GAUGE

'S' BEAM (STEEL POST)
NOTES:
1. TOP AND RUB RAIL SHALL NOT PROJECT MORE THAN 1" IF ADJUSTMENT SHORTENING IS REQUIRED, THREADS SHALL BE LEFT IN FUNCTIONAL CONDITION.
2. HORIZONTAL DISTANCE BETWEEN TOP RAIL AND MEDIAN CURB SHALL NOT EXCEED 12"
SECTION

ATTACHMENT OF GUARD RAIL TO STRUCTURES

NOTE

1. 5/8" BOLT SIZE SELF DRILLING ANCHOR SHALL HAVE A MINIMUM 1500# PULL OUT STRENGTH IN 2500 P.S.I. CONCRETE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

ELEVATION

SECTION A-A

DETAIL NO. 1

GUARD RAIL POST INSTALLATION ON STRUCTURES

DETALL NO. 4

ATTACHMENT OF GUARD RAIL TO STRUCTURES

DETAIL NO. 5

BUFFER END SECTION

PIER OR ABUTMENT

8" x 8" x 1'-2"

BLOCK THICKNESS AS REQUIRED

1'-4" MAX.

5/8" MACH. BOLT AND 1-3/4" x 11/16" x 9/64"

WASHER. LENGTH DETERMINED BY TOTAL BLOCK THICKNESS AND SELF DRILLING ANCHOR.

5/8" x 8-1/2" CARRIAGE BOLT, USE TWO 1-3/4" x 3" x 3/16" WASHERS WITH 1" x 11/16" SLOTTED HOLES, ONE OF WHICH SHALL BE RECESSED 1" INTO BACK OF BLOCK.

1" SQUARE OR HEX. HEAD MACH. BOLT, NUT AND WASHERS

POST LENGTH AS REQUIRED

FINISHED GRADE

TWO 6" x 6" x 1/2" ANGLE 8" LONG

FOUR 5/8" BOLT SIZE SELF DRILLING ANCHOR AND BOLTS. SEE NOTE 1

2'-1/2"

10 GAUGE STD. GUARD RAIL PLATE. GALVANIZE AFTER FABRICATION

APPROX.

1'-4"

SLOTTED HOLES (4)

29/32" x 1'-18"

MARICOPA ASSOCIATION OF GOVERNMENTS

135-4

STANDARD DETAIL
ENGLISH

STEEL GUARD RAIL

REVISED

DETAIL NO. 135-4
SAFETY POST SECTION

EXISTING CONCRETE OR ASPHALT PAVEMENT

4" DIA. OR 6" DIA. X 6'-0" STEEL POST, SCHEDULE 40, GALVANIZED

CLASS B CONCRETE PER SECT. 725

EXISTING GRADE

FILL WITH GROUT AND CROWN TOP

6" REFLECTIVE ENGINEER'S TAPE (3M HIGH DENSITY YELLOW PRESSURE SENSITIVE TAPE OR APPROVED EQUIVALENT)

4" MIN. 4" MIN.

4" OR 6" DIA. POST
TYPE A

5/8" HOLE FOR 1/2" DIA. PIN, 24" LONG, HOT ROLLED STEEL

NOTE:
1. DIMENSIONAL AND REINFORCEMENT CHANGES WILL BE PERMITTED UPON PRIOR WRITTEN APPROVAL OF THE ENGINEER.
2. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE CLASS 'A' PER SECTION 725.

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

RADIUS 3/4" MIN. - 1" MAX.

NO.3 REINFORCING BAR AS PER SECTION 727
69" FOR TYPES 'A' AND 'B-3'
45" FOR TYPE 'B-2'

TYPICAL SECTION

SAFETY CURB
INSTALLATION ON DIRT

DETAIL NO. 150
STANDARD DETAIL
ENGLISH
PRECAST SAFETY CURB

REVISED
DETAIL NO. 150
NOTES

1. ALL CONCRETE SHALL BE CLASS 'C' PER SECT. 72S.

2. FITTINGS NOT SPECIFICALLY DETAILED SHALL BE HEAVY DUTY DESIGN.

3. STRAIN POSTS SHALL BE SPACED AT 500' 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>2-1/2&quot;</td>
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<td>LINE POST</td>
<td>1-1/2&quot;</td>
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<tr>
<td>STRAIN POST</td>
<td>1-1/2&quot;</td>
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<td>1-1/4&quot;</td>
<td>1.666&quot;</td>
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<tr>
<td>STRETCH BAR</td>
<td>3/16&quot;x3/4&quot; FLAT</td>
<td>3/16&quot;x3/4&quot; FLAT</td>
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<tr>
<td>GATE POST</td>
<td>3-1/2&quot;</td>
<td>4.000&quot;</td>
</tr>
<tr>
<td>TOP RAIL</td>
<td>1-1/4&quot;</td>
<td>1.666&quot;</td>
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7. CONSTRUCTION AND MATERIALS SHALL CONFORM TO SECT. 420 AND 722, RESPECTIVELY. SEE TABLE 722 FOR WEIGHTS OF MEMBERS.

DETAIL NO. 160
STANDARD DETAIL ENGLISH
6' CHAIN LINK FENCE AND GATE
NOTE:
L-xxx NUMBERS DESIGNATES FAA SPECIFICATION NO.

MINIMUM 4" CONCRETE BACKFILL PER SECTION 725, CLASS "A".
PROVIDE 2" SLACK FOR CONNECTIONS.
GROUND CLAMP
CONDUIT (IF SPECIFIED)

L-867 BASE W/Cover
L-823 CONNECTOR
L-830 TRANSFORMER
L-824 CABLE I/C, #8, 5 KV, (6.6 AMP ONLY)
BARE COPPER COUNTERPOISE WIRE (IF SPECIFIED)

3/4" DIA. DRAIN HOLE
12" x 12" x 12" ABC PER SECTION 702

BUILDING BLOCK (BRICK OR CONC. BLOCK)
USE THE FOLLOWING FORMULA TO DETERMINE MAXIMUM DENSITY:

\[ D = \frac{(100-R)d+0.9R S \times 62.4}{100} \]

OR USE THE GRAPH AS SHOWN BELOW:

WHERE:
- \( D \) = DRY DENSITY OF SAMPLE CONTAINING \( R \) PERCENT ROCK, LBS. PER CU. FT.
- \( R \) = PERCENT ROCK RETAINED ON A NO. 4 SIEVE.
- \( d \) = DRY DENSITY OF PORTION PASSING NO. 4 SIEVE LBS. PER CU.FT.
- \( S \) = BULK SPECIFIC GRAVITY OF ROCK.

EXAMPLE:

GIVEN A MATERIAL THAT HAS A DRY DENSITY OF 114 LBS PER CU. FT, A SPECIFIC GRAVITY OF 2.5, AND GIVEN THAT ONLY 29% OF A PORTION PASSES THROUGH A NO. 4 SIEVE, WHAT IS THE DRY DENSITY OF THE SAMPLE?

SOLUTION:

STEP 1: PLOT THE DRY DENSITY OF MATERIAL PASSING A NO. 4 SIEVE \( (d) \) ON LEFT SIDE OF GRAPH (POINT 1). (EXAMPLE: POINT 1 SHOWS \( d = 114 \) LBS. PER. CU.FT.);

STEP 2: PLOT THE BULK SPECIFIC GRAVITY OF ROCK \( (S) \) ON RIGHT MONOBAR (POINT 2). (EXAMPLE POINT 2 SHOWS \( S = 2.5 \));

STEP 3: CONNECT POINTS 1 AND 2 TO FORM LINE 1–2;

STEP 4: PLOT THE PERCENT OF ROCK RETAINED ON A NO. 4 SIEVE ON THE BOTTOM OF THE GRAPH (POINT 3). (EXAMPLE: POINT 3 SHOWS \( R = 29 \) PERCENT)

STEP 5: DRAW HORIZONTAL LINE FROM POINT 4 TO LEFT SIDE OF GRAPH (POINT 5);

STEP 6: READ POINT 5 FOR THE VALUE OF THE DRY DENSITY \( (D) \). (EXAMPLE: POINT 5 SHOWS \( D = 121.6 \) LBS. PER CU.FT.)
**TYPE 'A'**

- A.C. PAVEMENT
- AGGREGATE BASE PER STANDARD SECT. 310
- GRADING PER STANDARD SECT. 301

**TYPE 'B'**

- A.C. PAVEMENT
- AGGREGATE BASE PER STANDARD SECT. 310
- GRADING PER STANDARD SECT. 301

**TYPE 'C'**

- A.C. PAVEMENT
- AGGREGATE BASE PER STANDARD SECT. 310
- GRADING PER STANDARD SECT. 301

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

2" x 6" REDWOOD HEADER (ROUGH) PER STANDARD SECT. 778

1" x 2" x 18" WOOD STAKES AT 5'-0" O.C. PER STANDARD SECT. 778
PAVED ALLEY DETAIL

UNPAVED ALLEY DETAIL

RESIDENTIAL ALLEY DETAIL
NOTES:
1. ANGLE EQUALS 45° UNLESS SPECIFIED ON PLAN.
2. DIMENSION 'B' EQUALS 'A' + 2'
3. (→) INDICATES DIRECTION OF FLOW.
4. PAINT STEEL ACCORDING TO SECTION 790. PAINT NUMBER 1-A OR 1-B.
5. R EQUALS 1'' UNLESS OTHERWISE DIRECTED.
6. H EQUALS CURB FACE HEIGHT.
7. FOR ROLL CURB AND GUTTER, USE 2' TRANSITIONS TO VERTICAL CURB.
8. CONCRETE SHALL BE CLASS B PER SECT. 725 AND INSTALLED PER SECT. 505.

DETAIL C

2" x 2" x 1/8"
ANGLE BOTH SIDES

NO.4 REINFORCEMENT BAR, 4" LONG
3 EACH SIDE, MIN.

SECTION 'A-A'

SECTION 'B-B'

DETAIL NO.
203

REVISIONS

SCUPPERS

DETAIL NO.
203
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 3" 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 POURRED IN ONE POUR. USE DETAIL 'D' IF FULL WIDTH IS POURRED IN ONE POUR.
NOTES:

1. W – Indicates width of paved 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° – No radius: W x L = Surface – Type; (12’ x 30’ – A.C. – Type “B” Turnout).
   90° – With a radius: W x L x R = Surface – Type; (12’ x 20’ x 15’ – A.C. – Type “C”
   Turnout). Other than 90° with 2 radii – Type “S”: W x L x R₁ x R₂ = Surface – Type;
   (12’ x 20’ x 15’ – 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.

* Unless otherwise noted on plans
SECTION A-A

SECTION B-B

SECTION C-C

SCUPPER PLAN VIEW

NOTE:
1. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE CLASS 'B' PER SECTION 725.

NO. 4 REINF. BARS, 8" O.C.

SEE NOTE 2 ON DETAIL 206.2

NO. 4 DOWEL REINF. BARS - ALL WALLS

6"

(OR AS NOTED ON PLAN)

VARIABLE

CURB OPENING 4"

(OR AS NOTED ON PLANS)

TOP OF SIDEWALK AT BACK SIDE OF SCUPPER

DOWELS

NO. 4 REINF. BARS @ 8" O.C.

S/W WIDTH PER PLANS

2'

1'-9"

6"

4'

1/2" EXPANSION JOINT

DEPRESSION LINE

GUTTER LINE

1/2" EXPANSION JOINT

TOP OF CURB

(OR AS NOTED ON PLANS)

CONCRETE CHANNEL TO R

C

SEE NOTE 1 ON DETAIL 206-2

6"

2'
NOTES:

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

2. A CENTER WALL SHALL BE INSTALLED IN SCUPPERS WIDER THAN 4" OR IF MORE THAN 1 SCUPPER IS BUILT IN SERIES.

3. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751.

4. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE CLASS "B" PER SECTION 725.
**NOTES:**

1. HUMPS MUST BE THE FULL 3" FOR MAXIMUM EFFECT BUT SHALL NOT EXCEED 3.25".
2. HUMPS CONSTRUCTED OVER 3.25" SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.
3. CROSS-SECTION ELEVATIONS SHALL HAVE A MAXIMUM TOLERANCE OF ±0.25".
4. SPEED HUMPS SHALL NOT BE PLACED OVER MANHOLES, WATER VALVES, SURVEY MONUMENTS, JUNCTION CHAMBERS, ETC. OR IN CONFLICT WITH DRIVEWAYS.
5. SPEED HUMPS MUST BE PLACED AT LOCATIONS APPROVED BY THE AGENCY.
6. HUMP TO BE CONSTRUCTED WITH ASPHALT MIX APPROVED BY THE AGENCY. ASPHALT COMPACTION SHALL BE PER SECTION 321. A TACK COAT PER SECTION 713 SHALL BE APPLIED PRIOR TO APPLICATION OF PAVEMENT.
7. INSTALLATION JOINTS:
   A. STANDARD INSTALLATION: THE EXISTING ROADWAY SHALL BE MILLED TO A MINIMUM DEPTH OF 3/4" AROUND THE PERIMETER. CROSS SECTION DIMENSIONS DO NOT INCLUDE THE 3/4" MILLING. CONTRACTOR MUST PROVIDE VERIFICATION OF CROSS-SECTION DIMENSIONS.
   B. ALTERNATIVE INSTALLATION: FOR TRANSVERSE JOINTS (CROSS ROADWAY), THE EXISTING ASPHALT SHALL BE SAW CUT AND REMOVED FOR A WIDTH OF 18". THE ASPHALT SHALL BE REPLACED WITH THE SAME ASPHALT AND AT THE SAME TIME AS THE HUMP ASPHALT. FOR LONGITUDINAL JOINTS, THE EXISTING ASPHALT SHALL BE OVERLAID AND TAPERED IN 12". CROSS-SECTION DIMENSIONS REFLECT DISTANCES FROM THE SURFACE OF EXISTING ASPHALT.
8. CONTACT THE AGENCY (OR INSPECTOR) ONE WEEK PRIOR TO INSTALLATION TO COORDINATE PAVEMENT MARKINGS AND SIGNING.

**SECTION A—A**

IMPORTANT:
TO GAIN MAXIMUM EFFECT, HUMPS MUST BE THE FULL 3". CONTRACTORS MUST NOT EXCEED THIS HEIGHT BASED ON CONSIDERATION FOR EMERGENCY POLICE AND FIRE DEPARTMENT VEHICLES.

**SECTION B—B**
NOTES:

1. USE TYPE 1 PLATE INSTALLATION WHERE POSTED SPEED LIMIT IS LESS THAN 30 MPH. USE TYPE 2 PLATE INSTALLATION WHERE POSTED SPEED LIMIT IS 30 MPH OR GREATER.

2. FOR TYPE 2 PLATE INSTALLATION, THE STEEL PLATE SHALL BE RECESSED BY MILLING INTO THE EXISTING ASPHALT TO SET FLUSH WITH THE SURFACE OF THE EXISTING ASPHALT. FULL DEPTH CUTTING OF PAVEMENT SECTION OUTSIDE OF TRENCH IS NOT PERMITTED. MILLING DEPTH SHALL MATCH THICKNESS OF PLATE. THE GAP BETWEEN THE EDGE OF THE PLATE AND THE ADJACENT EXISTING ASPHALT PAVEMENT MUST BE FILLED WITH TEMPORARY ASPHALT.

3. TRENCH WIDTHS ARE BASED ON AN ANALYSIS PER THE 14TH EDITION OF STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES BY AASHTO. AN ASSUMED AXLE LOAD OF 12 TONS WITH A 30% IMPACT FACTOR WAS USED. THE AXLE LENGTH IS 6 FEET; THEREFORE THE NUMBER OF WHEELS CARRIED BY A PLATE DEPENDS ON THE ROADWAY WIDTH.

4. STEEL PLATE MUST BE ABLE TO WITHSTAND H-20 TRAFFIC LOADINGS WITHOUT ANY MOVEMENT.

5. PLATES SHALL BE FABRICATED FROM ASTM A36 STEEL (MIN).

6. PLATES SHALL BE SECURED FROM LATERAL MOVEMENT AND VERTICAL VIBRATION (ASSOCIATED NOISE) WHILE IN USE BY TEMPORARY ASPHALT (COLD MIX.)
**VERTICAL CURB AND GUTTER (TYPE A)**

- 7" width
- 1/2" batter optional
- Varies
- 6" height
- 6" width
- 12" brush finish

**NOTES: (TYPE A)**
1. All exposed surfaces to be trowel finished except as shown. See Sect. 340.
2. H=6" or as specified on plans.
3. Contraction joint spacing 10' maximum.
4. Expansion joints as per Sect. 340.
5. Class 'B' concrete per 725.

**ROLL CURB AND GUTTER (TYPE C)**

- 7" roadway width
- 9-1/2" road width
- 9-1/2" 24"
- 24"
- 24"
- 1/2" batter optional
- 1/2" batter optional
- 1/2" batter optional
- 1/2" batter optional
- 1/2" batter optional
- 1/2" batter optional
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- 1/2" batter optional

**NOTES: (TYPE C)**
1. All work and materials shall conform to Sect. 304, 505 and 725. Broom finish to exposed surface.
2. Contraction joint spacing 10' maximum.
3. Expansion joints as per Sect. 340.
4. Class 'B' concrete per 725.

**RIBBON CURB (TYPE B)**

- 7" roadway width
- 24"
- 24"
- 24"
- 24"
- 1/2" batter optional
- 1/2" batter optional
- 1/2" batter optional
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- 1/2" batter optional
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- 1/2" batter optional
- 1/2" batter optional

**NOTES: (TYPE B)**
2. Broom finish all surfaces.
3. Ribbon curb may slope towards pavement or sidewalk as indicated on plans.
4. Contraction joint spacing 10' maximum.
5. Concrete shall be Class 'B' per Sect. 725 and installed per Sect. 505.

**TYPE D**

- Special sect. use for high side curb with sheet drainage across street
- Pavement flush with lip of gutter

**NOTES: (C & D)**
1. All work and materials shall conform to Sect. 304, 305 and 725. Broom finish to exposed surface.
2. Contraction joint spacing 10' maximum.
3. Expansion joints as per Sect. 340.
4. Class 'B' concrete per 725.
CURB AND GUTTER TRANSITION

5' CURB TRANSITION

1/2" EXPANSION JOINT FILLER SHALL BE BITUMINOUS TYPE PREFORMED, A.S.T.M. D-1751

RADIUS AS SHOWN ON PLANS

SECTION A-A

NOTES: (CURB AND GUTTER TRANSITIONS)

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.

3. CLASS 'B' CONCRETE PER SECT. 725.

CURB WARNING BEACON

GALVANIZED SEMI-STEEL HOUSING

5-3/8" DIA. AMBER LENS

7/8" MIN.

ELECTRICAL CONDUIT

GLASS MIRROR REFLECTOR IN ALUMINUM MOUNTING

(4) 1/2" x 8" ANCHOR BOLTS

PAVEMENT

INTEGRAL ROLL CURB, GUTTER AND SIDEWALK

SCORE MARK 1/8" WIDE X 1/2" DEEP - TOOL BOTH EDGES

NOTES:

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

2. CONTRACTION JOINT SPACING 16" MAXIMUM.

3. EXPANSION JOINTS PER SECT. 340.

4. CLASS 'B' CONCRETE PER SECT. 725.
NOTES:

1. ALL VERTICAL SURFACES TO BE FORMED.
2. VERTICAL SURFACES DOWN FROM 2" BELOW UNDISTURBED SOIL MAY BE PLACED AGAINST NEAT CUT IF APPROVED BY THE ENGINEER AND CONCRETE WILL NOT EXTEND MORE THAN 1" 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 10’
6. CONCRETE TO BE CLASS 'B' PER SECT. 725.
NOTE:
LENGTH OF TRANSITION SHALL BE EQUAL TO RADIUS OF MEDIAN NOSE, (5' MINIMUM). FOR LOCATION SEE PLANS.

4" THICK, CLASS 'B' CONCRETE PLACED IN MEDIAN NOSE TO 1 FOOT BACK FROM TRANSITION. USE A LIGHT BROOM FINISH.
NOTES:

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECT. 340.

2. EXPANSION JOINT FILLER SHALL BE 1/2" 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 1", FINISH DEPTH SHALL BE A MINIMUM OF 3/4".

4. EXPANSION JOINT 100’ MAXIMUM SPACING PER SECT. 340.
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 7'' ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]'S.

SECTION A-A

RIGHT-OF-WAY LINE

VARIES 6"  3'-6" LANDING  3'-5" RAMP

BOTTOM OF RAMP CURB WHEN FORMED AND Poured SEPARATELY

CONSTRUCTION JOINT 1'' DEEP OR FORMED SEPARATELY

SUBGRADE PREPARATION, SEE SECT. 301

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

MATCH CUTTER FLOW LINE

SECTION B-B

TOP OF S/W

TOP OF RAMP

BOTTOM OF RAMP CURB WHEN FORMED AND Poured SEPARATELY

RIGHT-OF-WAY

LINE

CORNER OF CURB AND CURTNER PER DETAIL NO. 220

1/4'' GROOVES AT 1'' O.C. FULL FACE OF RAMP

RAMP CURB (R.C.)

RAMP CURB HEIGHT MATCHES S/W ELEVATION

TAPER (PAID AS S/W) OCCURS ON 4'' S/W ONLY

4' OR 5' SHOWN ON PLANS

BACK OF LANDING = 3'-1/2''

(4' S/W) R.C. AND S/W = 6'-3/4''
(TYP) [=7'-7/8]

(5' S/W) R.C. AND S/W = 6'-7/8''
(TYP) [=7'-7/8]

T.C. = 6'' [=7'']

T.C. = 3''

T.C. = 6'' [=7'']

T.C. = 3''

T.C. = 3''
NOTES:

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

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

3. WHEN CURB HEIGHTS OF 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]'S.

SECTION B-B

BOTTOM OF RAMP CURB WHEN FORMED AND Poured SEPARATELY

SECTION A-A

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

SUBGRADE PREPARATION, SEE SECT. 301

CONSTRUCTION JOINT 1" DEEP OR FORMED SEPARATELY

MATCH GUTTER FLOW LINE

TOP OF S/W

TOP OF RAMP

RIGHT-OF-WAY LINE

RAMP CURB HEIGHT MATCHES S/W ELEVATION

TAPER (PAID AS S/W)

TOP RAMP = 3"

R.C.& S/W = 6-7/8" (TYP) [=7-7/8"]

T.C. = 6" [=7"]

T.C. = 6" [=7"]

T.C. = 3"

T.C. = 3"

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**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 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]'S.

**SECTION A—A**

**SECTION B—B**

- TOP OF SIDEWALK
- BOTTOM OF RAMP CURB WHEN FORMED AND POURED SEPARATELY
- RIGHT-OF-WAY LINE
- 1:10 TAPER TYP. BOTH SIDES (PAID AS SIDEWALK)
- 1/4" GROOVES AT 1" O.C. FULL FACE OF RAMP
- RAMP CURB (R.C.)
- CURB AND GUTTER AS PER DETAIL 220
- R.C. & S/W=7-1/8" (TYP) [=8-1/8"]
- BACK OF LANDING=3-1/2"
- T.C.=6" [=7”]
- T.C.=6" [=7”]
- T.C.=3" TOP RAMP=3"

**CONTROL ELEVATIONS**

SEE NOTES 1 AND 3

**SIDEWALK RAMPS – TYPE 'C'**

**DETAIL NO.** 233  
**STANDARD DETAIL** ENGLISH  
**REvised**  
**DETAIL NO.** 233
NOTES:

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

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

1. ALL CONCRETE TO BE CLASS ‘A’ UNLESS OTHERWISE APPROVED. (SECT. 729).

2. 4’ 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.
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 22' PROVIDE A CONTRACTION JOINT ON D/W CENTERLINE.

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

4. MASTIC EXPANSION JOINT THROUGH CURB AND GUTTER. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER A.S.T.M. D-1751.

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. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' 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</th>
<th>Max</th>
<th>Class</th>
<th>Depth X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>16'</td>
<td>40'</td>
<td>B</td>
<td>6&quot;</td>
</tr>
<tr>
<td>Industrial</td>
<td>16'</td>
<td>40'</td>
<td>B</td>
<td>6&quot;</td>
</tr>
<tr>
<td>*24' Min. For Two Way Traffic</td>
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## Residential

<table>
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<th>Driveway Width</th>
<th>Min</th>
<th>Max</th>
<th>Class</th>
<th>Depth X</th>
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</thead>
<tbody>
<tr>
<td>Major Street</td>
<td>16'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>Collector Street</td>
<td>*12'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>Local Street</td>
<td>12'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>*16' Desirable</td>
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DETAIL NO. 250
STANDARD DETAIL
ENGLISH
DRIVEWAY ENTRANCES

REVISED DETAIL NO.
250
**SECTION A-A**

**TABLE A**

<table>
<thead>
<tr>
<th>ZONING</th>
<th>DRIVEWAY WIDTH</th>
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</thead>
<tbody>
<tr>
<td>COMMERCIAL</td>
<td>MIN: 16'</td>
</tr>
<tr>
<td>INDUSTRIAL</td>
<td>MAX: 40'</td>
</tr>
<tr>
<td><em>24’ WHERE 2-WAY TRAFFIC IS ANTICIPATED</em></td>
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</table>

**TABLE B**

<table>
<thead>
<tr>
<th>ZONING</th>
<th>DRIVEWAY WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL</td>
<td>MIN: 16'</td>
</tr>
<tr>
<td>MAJOR STREET</td>
<td>MAX: 30'</td>
</tr>
<tr>
<td>COLLECTOR STREET</td>
<td>12'</td>
</tr>
<tr>
<td>LOCAL STREET</td>
<td>30'</td>
</tr>
<tr>
<td><em>16’ WIDTH IS DESIRABLE</em></td>
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</tbody>
</table>

**NOTES:**

1. EXPANSION JOINT FILLER SHALL BE 1/2” 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
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.

DETAIL 'A'

SEE DETAIL ABOVE

MAJOR OR COLLECTOR

SEE DETAIL ABOVE

STREET

250' MIN. AT 1/4 MILE MULTIPLES AND ALL SIGNALIZED INTERSECTIONS. 20' MIN. AT ALL OTHER INTERSECTIONS.

PARKING BAY

-existing R/W line

10'

CURB LINE

70' PULL-IN

65' Min. PLUS 65' PER ADDITIONAL BUS

40' PULL-OUT

OPTIONAL R/W LINE

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.

BUS BAY
NOTES:

1. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER A.S.T.M. D-1751. BETWEEN SIDEWALK AND ALLEY ENTRANCE AND THROUGH CURB AND GUTTER.

2. CLASS 'B' CONCRETE, PER SECT. 725.

3. SUBGRADE PREPARATION, PER SECT. 301.

4. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.
NOTES:

1. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 4' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'O' RAMP DETAIL 234.

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

3. SUBGRADE PREPARATION, PER SECT. 301.
THICKEN CONCRETE FROM 6" TO 8" IN 18" AT BACK OF ALLEY ENTRANCE

SECTION A-A

NOTES:

1. IF ALLEY ENTRANCE IS USED FOR DRAINAGE, THE CENTER BACK OF ALLEY ENTRANCE MAY BE DEPRESSED 2" FOR 4" CURB OR 3" FOR 6" CURB.

2. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.

3. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.

4. SUBGRADE PREPARATION, PER SECT. 301.

5. EXPANSION JOINT (TYP.)
WING TYPE ALLEY ENTRANCE
(WITH ROLL TYPE CURB AND GUTTER)

SECTION A-A

EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER A.S.T.M. D-1751.

ROLL TYPE CURB AND GUTTER

CLASS 'B' CONCRETE PER SECT. 725
WATER VALVE, SURVEY MONUMENT, OR SEWER CLEAN OUT FRAME & GRADE ADJUSTMENT

CLASS 'AA' CONC. ALL AROUND FRAME PER SECT. 725

TOP OF SURVEY MONUMENT (BRASS CAP), WATER VALVE BOX (8" CONCRETE PIPE), SEWER PIPE (SIZE VARIES)

EXISTING BITUMINOUS PAVEMENT

SUBGRADE PREP AS REQUIRED COMPACTION TO CONFORM TO SECT. 301 OR 601.

8" FRAME AND COVER

MEDIUM BROOM FINISH WITH RADIAL SCORED JOINTS (4 MIN.)

LETTERS ON COVER TO BE AS FOLLOWS: "SEWER", "WATER", OR "SURVEY" AS DIRECTED TOTAL WIDTH OF WORD "SEWER" OR "WATER" 3-3/4" TOTAL WIDTH OF WORD "SURVEY" 4-1/2" LETTER SIZE 5/8" X 3/4", RAISED 1/16" ABOVE LEVEL OF COVER, TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL.

CHAIN ATTACHMENT (AS REQUIRED)

CASTING TO CONFORM TO SECT. 787. MINIMUM WEIGHT 16 LBS. FOR COVER.

LOCK WASHER FLATTEN BOLT END

SPACERS, AS REQUIRED

1/2" ROUNDHEAD BOLT 2" LONG

1/2"  2" MIN.

1/32" 3/8" CHAIN

DETAIL TYPICAL FOR BOTH FRAME AND COVER

COVER SECTION A-A

SEWER WATER SURVEY

8" C.I. FRAME AND COVER

1/2" 15" DIA. 16" DIA.

1/2"

10" DIA.

3/4"

1/8 R

1/2"

1/2"

7/8" 3/8"

3-1/2" 1/2"

10" DIA.

7-1/2" DIA. 10" DIA.

A

A

DETAIL NO. 270

STANDARD DETAIL ENGLISH FRAME AND COVER

REVISED 01-01-2001

DETAIL NO. 270
NOTE:
THIS DETAIL COVERS WATER GATE VALVES, 4" TO 12" INCLUSIVE REGARDLESS OF TYPE OF PIPE USED. LARGER LINES TO BE DETAILED ON PLANS.

CONCRETE FOOTING CLASS 'B' CONCRETE PER SECT. 725

FINISH GRADE
CLASS 'C' CONCRETE AS PER SECT. 725 FORM AS REQUIRED TO KEEP CLEAR OF JOINTS.

CEMENT GROUTING UNDER VALVE (NON-SHRINKING)

WATER MAIN
TRENCH WALL
WATER MAIN
TRENCH BOTTOM

SIDE OPERATOR
BRICK PIER AS REQUIRED

4" MIN.
X+4" OR 12" MIN.

X+4" 12" MIN.

NOTES:
1. THIS DETAIL COVERS BUTTERFLY VALVE INSTALLATION, 3" TO 12" 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.
RODS ARE ATTACHED TO LUGS CAST ON BELL OF HYDRANT. IF HYDRANT IS NOT FITTED WITH LUGS, RODS ARE ATTACHED AS SHOWN BY THE DOTTED LINES.
THIS DETAIL IS FOR USE ONLY ON UNDERGROUND INSTALLATIONS WHERE THE USE OF CONCRETE THRUST BLOCKING PER DETAIL 380 CANNOT BE USED BECAUSE OF OBSTRUCTIONS, OR REQUIREMENTS OF THE SPECIFICATIONS...

* CLAMPS SHALL BE 1/2 BY 2 INCHES FOR PIPE 4 AND 6 INCHES IN DIAMETER; 5/8 BY 2-1/2 INCHES FOR PIPE 8 AND 10 INCHES; 5/8 BY 3 INCHES FOR PIPE 12 INCHES. BOLT HOLES SHALL BE 1/16 INCH IN DIAMETER LARGER THAN BOLTS.

* RODS SHALL BE 3/4 INCHES IN DIAMETER FOR PIPES 4, 6 AND 8 INCHES IN DIAMETER; 7/8 INCHES FOR PIPE 10 INCHES AND 1 INCH IN DIAMETER FOR PIPE 12 INCHES.

* BOLTS SHALL BE 5/8 INCHES IN DIAMETER FOR PIPE 4, 6 AND 8 INCHES IN DIAMETER; 3/4 INCHES FOR PIPE 10 INCHES AND 7/8 INCHES IN DIAMETER FOR PIPE 12 INCHES.

* WASHERS MAY BE CAST IRON OR STEEL, ROUND OR SQUARE. DIMENSIONS FOR CAST IRON WASHERS ARE 5/8 BY 3 INCHES FOR PIPE 4, 6, 8 AND 10 INCHES IN DIAMETER AND 3/4 BY 3-1/2 INCHES FOR PIPE 12 INCHES. DIMENSIONS FOR STEEL WASHERS ARE 1/2 BY 3 INCHES FOR PIPE 4, 6, 8 AND 10 INCHES IN DIAMETER AND 1/2 BY 3-1/2 INCHES FOR PIPE 12 INCHES IN DIAMETER. HOLES SHALL BE 1/8 INCH LARGER THAN THE RODS.

FOR PIPE LARGER THAN 12 INCHES IN DIAMETER, RESTRAINT DETAILS SHALL BE SUBMITTED FOR APPROVAL PRIOR TO INSTALLATION.


2. HIGH STRENGTH, HEAT TREATED CAST IRON TEE-HEAD BOLTS WITH HEXAGON NUTS, ALL IN ACCORDANCE WITH THE STRENGTH REQUIREMENTS OF A.W.W.A. C-111, MAY BE USED IN LIEU OF THE CADMIUM PLATED BOLTS AND NUTS.

3. THE SKETCHES IN THIS SERIES OF FIGURES SHOW ACCEPTABLE METHODS OF PROVIDING ANCHORAGE. THERE IS NO PARTICULAR SIGNIFICANCE TO BE ATTACHED TO WHETHER THE SKETCH SHOWS A BELL AND SPIGOT JOINT OR A STANDARD MECHANICAL JOINT. THE ANCHORING PROCEDURE ILLUSTRATED APPLIES IN MOST CASES TO EITHER TYPE OF JOINT. IN SOME CASES, DIMENSIONS OF THE PARTICULAR PIPE OR HUB AND SPACE AVAILABLE FOR WORKING AROUND THE PARTICULAR JOINT WILL INFLUENCE THE CHOICE OF METHODS USED.


5. COATING TYPE: A.H.D. ASPHALTIC PRIMER 719(A). — ALL EXPOSED METAL.
DEAD ENDS

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

HORIZONTAL BENDS

UNDISTURBED SOIL

TEES

VERTICAL DOWN BENDS

UNDISTURBED SOIL

VERTICAL UP BEND
### RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE INCHES</th>
<th>HORIZONTAL BENDS</th>
<th>TEES</th>
<th>VERTICAL OFFSETS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2°</td>
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<tr>
<td></td>
<td>DOWN BEND</td>
<td>UP BEND</td>
<td>DOWN BEND</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td>7</td>
<td>4</td>
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<td>24</td>
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### RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE WITH POLYETHYLENE WRAP

<table>
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<th>TEES</th>
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<td>DOWN BEND</td>
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<tr>
<td>4</td>
<td>26</td>
<td>11</td>
<td>5</td>
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<tr>
<td>24</td>
<td>113</td>
<td>47</td>
<td>22</td>
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</table>

**NOTES:**

1. ALL JOINTS WITHIN THE SPECIFIED LENGTH LR MUST BE RESTRAINED. ALL LENGTHS ARE GIVEN IN FEET.
2. THE MAXIMUM TEST PRESSURE SHALL NOT EXCEED 200 PSI
3. THE MINIMUM DEPTH OF BURY SHALL BE 3' TO TOP OF PIPE.
4. RESTRAINED LENGTHS MAY BE REDUCED WHEN SUPPORTED BY ENGINEERING CALCULATIONS.
SECTION A-A

SECTION B-B

NOTE:
FOR CASTING SPECIFICATIONS
SEE SECT. 787.

TOP OF COVER

SLOT DETAIL

WATER

LETTERS RAISED 1/8"
NOTES:

1. INSPECTION PLATE IS SAME AS USED WITH METER BOX COVER NO. 4.

2. FOR CASTING SPECIFICATIONS, SEE SECTION 787.

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

PLAN OF COVER

SECTION A-A

LETTERING DETAIL

TOP OF COVER
NOTES:

1. FOR CASTING SPECIFICATIONS, SEE SECT. 787.

2. THE BEARING EDGES OF THESE CASTINGS SHALL BE MACHINED TO INSURE A FULL BEARING ON A FLAT SURFACE.
CAST IRON WATER METER BOX
LID FITTING BOX NO. 1, 2, 3 OR 4 AS REQUIRED.

SEE APPLICABLE DETAIL

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.

METER BOX DIMENSIONS

<table>
<thead>
<tr>
<th>DIMS</th>
<th>BOX NUMBER</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
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<td>H</td>
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<td>I</td>
<td>6&quot;</td>
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<tr>
<td>J</td>
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<tr>
<td>K</td>
<td>3/4&quot;</td>
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<tr>
<td>M</td>
<td>16&quot;</td>
</tr>
<tr>
<td>N</td>
<td>2-1/2&quot;</td>
</tr>
</tbody>
</table>

5/8" OR 3/4" METER 1" 1-1/2" 2"
ALTERNATE: 3/8" STEEL PLATE (ASPHALT COATED) WITH 2" x 2" HINGED ACCESS DOOR

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.

PRE-CAST VAULT SECTION

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

CAST-IN-PLACE OR PRECAST TOP SECTION

CLASS "A" CONCRETE AS PER SECT. 725

FINISH GRADE

CONCRETE MASONRY UNITS (BLOCK) WITH SOLID GROUTED WALLS (GROUT CONFORM TO SECT. 776, CMU CONFORM TO SECT. 775)

BLOCK MASONRY MAY BE USED IN LIEU OF CAST-IN-PLACE VAULT WALLS, NO. 4 REBAR IN EVERY OTHER CORE.

CAST-IN-PLACE VAULT SECTION
NOTES:

1. TAPPING SLEEVE TO BE PLACED A MINIMUM OF 18" 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. CONCRETE THRUST BLOCKS SHALL BE CLASS "B" PER SECT. 725. NORMALY, CURE TIME FOR CONCRETE IS 24 HOURS BEFORE BACKFILLING.

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

7. THIS DETAIL COVERS TAPPING SLEEVES 4" THROUGH 16" 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</th>
<th>MINIMUM THRUST AREA REQUIRED EQUALS (AxB) (SQUARE FEET)</th>
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<tbody>
<tr>
<td>4&quot; AND LESS</td>
<td>3</td>
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<td>6&quot;</td>
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<td>8&quot;</td>
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<td>12&quot;</td>
<td>13</td>
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<tr>
<td>16&quot;</td>
<td>23</td>
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</tbody>
</table>
FOR VAULT CONSTRUCTION SEE DETAIL 321

SECTION A-A

CONCRETE SUPPORT UNDER NO. 4 5 11 12

CRUSHED ROCK

WOOD SHIMS

2" GALV. PIPE SUPPORT

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

HOLE DIAMETER IS 1" LARGER THAN FLANGE O.D.

2" TYPE 'K' COPPER BY-PASS

SOLDER 2" COPPER TO MALE THREAD ADAPTERS

FLOW

6" MIN. TYP.

18" MIN.

INSULATE WATER MAIN FROM CONCRETE BOX WITH EXPANSIVE MATERIAL

(A) - VARIES, SEE TABLE OF VAULT SIZES

(b) - VARIES, SEE TABLE OF VAULT SIZES

VAULT DIMENSION DETAILS

<table>
<thead>
<tr>
<th>A.C.P. SIZE</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>6&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>8'-4&quot;</td>
<td>10'-6&quot;</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>(B)</td>
<td>4'-4&quot;</td>
<td>5'-0&quot;</td>
<td>5'-0&quot;</td>
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</tbody>
</table>

NOTE: METER VAULTS MAY BE EITHER CONCRETE MASONRY UNITS 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, 2" (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. 2" BRONZE CHECK VALVE.
8. 2" TURBOMETER: ROCKWELL 'W-160' OR HERSEY 'M.H.R.' OR NEPTUNE TRIDENT TURBINE.
9. STRAINER (3", 4", 6") 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.
13. 6" OR 10" STRAINER, U.L. APPROVED.
14. 2" THREADED OUTLET AND GATE VALVE.

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.

DETALL NO. 345-2
STANDARD DETAIL ENGLISH 4", 6" WATER METER WITH ON-SITE FIRE HYDRANTS

REVISED DETAIL NO. 345-2
NOTES:

1. FIRELINE FROM CITY MAIN TO PROPERTY LINE SHALL BE CONSTRUCTED OF CAST IRON PIPE.
2. REINFORCING TO BE 1/2" DIAMETER REBAR ON 6" CENTERS EACH WAY ON TOP AND 12" 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" GRINNELL, HERSEY MODEL D.C., VIKING MODEL "A" OR APPRROVED EQUAL.
6. VAULT SHALL BE CONSTRUCTED IN OWNERS PROPERTY AGAINST THE FRONT PROPERTY LINE OR ANOTHER APPROVED LOCATION. WALLS AND FENCES SHALL NOT OBBUILD TO FINISH GRADE BADGER METER CO. READ-O-MATIC REGISTER OR APPROVED METER SIZE.
7. CITY CONTROL VALVE TO BE REQUIRED AT MAIN.
8. PARTS OF PIPE TO BE EMBEDDED IN CONC.
9. REMOTE READING DEVICE SHALL BE OF SELF GENERATING ELECTRICAL TYPE.
10. CONCRETE TO BE CLASS 'B' PER SECT. 725.

<table>
<thead>
<tr>
<th>DIA. OF PIPE</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>BY-PASS METER SIZE</th>
<th>A</th>
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<tbody>
<tr>
<td>4&quot;</td>
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<td>69&quot;</td>
<td>1-1/2&quot;</td>
<td>36&quot;</td>
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</tbody>
</table>

SECTION B-B

SECTION A-A
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.

SEE DETAIL 391 FOR VALVE BOX INSTALLATION

CRUSHED ROCK TRENCH
MINIMUM OF 8 CU. FT.
ALONG PIPE AND
ABOVE DRAIN HOLE

1" MIN
4" MAX.
SEE NOTE #6

FINISH GRADE OR ADJACENT GRADE, SEE
NOTE #6

6" VALVE

WATER VALVE BLOCKING, SEE
DETAIL 301

6" SHORT BODY 90° BEND
SEE NOTE NO. 2

PUMPER CONNECTION TO FACE CURB

WATER MAIN

VARIES

C.I.P.

TEE

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**

**NOTES:**

1. THIS DETAIL COVERS MOVING OF WATER MAINS 2” TO 12” 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 200 P.S.I. TEST PRESSURE AND 3,000 LBS/SQ FT. SOIL. IF CONDITIONS ARE FOUND TO INDICATE SOIL BEARING IS LESS, THE AREAS SHALL BE INCREASED ACCORDINGLY.
2. AREAS FOR PIPES LARGER THAN 16” 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’, SECT. 725.

<table>
<thead>
<tr>
<th>MINIMUM THRUST BLOCK AREA REQUIRED (YxW) (SQ. FT.)</th>
<th>WATER PIPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPE SIZE</td>
<td>TEE, DEAD END, 90° BEND</td>
</tr>
<tr>
<td>4” OR LESS</td>
<td>3</td>
</tr>
<tr>
<td>6”</td>
<td>4</td>
</tr>
<tr>
<td>8”</td>
<td>6</td>
</tr>
<tr>
<td>10”</td>
<td>10</td>
</tr>
<tr>
<td>12”</td>
<td>14</td>
</tr>
<tr>
<td>16”</td>
<td>24</td>
</tr>
</tbody>
</table>
### 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.

3. 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.
**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 ASBESTOS CEMENT PIPE OR CAST IRON PIPE.

**TYPE 'A'**

**NOTE:**

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

**TYPE 'B'**
CONCRETE WATER METER BOX NO. 2 PER DETAIL 320

2" P.E. OR COPPER PIPE

2" CORP STOP

2" BRASS COUPLING

WATER MAIN

2" BRASS ELL

2" TAPPED CAP (CAST IRON)

CAST IRON WATER METER BOX COVER PER DETAIL 311

GROUND LEVEL

2" ADAPTER BRASS OR COPPER

6" GRAVEL BED

CAST IRON VALVE BOX (LOCKING) PER DETAIL 391-1 BASE TO REST ON THRUST BLOCK

2" BRONZE CURB STOP

TAPPED PLUG OR CAP

WATER LINE

BRONZE OR BRASS FITTING

CONCRETE THRUST BLOCK PER DETAIL 380

VALVE BOX LOCATION MAY VARY IF APPROVED BY THE CITY ENGINEER.

TYPE 'A'

TYPE 'B'

DETAIL NO. 390

STANDARD DETAIL ENGLISH CURB STOP WITH FLUSHING PIPE

REvised DETAIL NO. 390
NOTES:
1. VALVE BOX SHALL BE ADJUSTED TO THE FINISHED GRADE PRIOR TO PLACING OF THE PORTLAND CEMENT CONCRETE SURFACE.
2. USE PARKSON TYLER, APCO OR EQUAL DEEP SKIRTED LID (4" OR MORE) TYPE, SLIDING ADJUSTABLE CAST IRON VALVE BOX C.I. MIN. T.S. 30,000 P.S.I.
3. GROUND BELOW CONCRETE PAD OR 3 BRICKS TO BE COMPACTED 95% OF MAX. DENSITY.
NOTES:

1. EXTENSION STEM: WITH SQUARE SOCKET ON BOTTOM TO FIT 2" SQUARE VALVE NUT. EXTENSION TO VALVE STEMS REQUIRED ON ALL VALVES INSTALLED WHERE OPERATING NUT IS OVER 5' 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 10' USE 12" 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 50 POUNDS AT A LOADING RATE OF 1 INCH/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 18" OR LESS IF SUFFICIENT CLEARANCE OVER STORM SEWER IS AVAILABLE AND TOTAL SPAN IS LESS THAN 34'.

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.

8. CLASS ‘A’ CONCRETE AS PER SECT. 725 UNLESS OTHERWISE NOTED.

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>OTHER UTILITIES AS NOTED ON THE PLANS</td>
<td>CONC. IRRIG. PIPE</td>
</tr>
<tr>
<td>OR AS REQUIRED BY THE ENGINEER AT TIME</td>
<td>BURIED TELCO.</td>
</tr>
<tr>
<td>OF CONSTRUCTION.</td>
<td>GAS PIPES</td>
</tr>
<tr>
<td></td>
<td>CONC. STORM DRAIN</td>
</tr>
<tr>
<td></td>
<td>CONC. BOX CULVERT</td>
</tr>
<tr>
<td></td>
<td>TRAFFIC CONTROL CONDUIT</td>
</tr>
<tr>
<td></td>
<td>WATER &amp; SEWER LINES</td>
</tr>
</tbody>
</table>

SECTION A–A

OPTIONAL BEARING WALL CONSTRUCTION FOR LARGE DIAMETER (D) PIPE TO BE FORMED IN TRENCH.

SECTION B–B

SEE SECT. 601 FOR BACKFILL & COMPACTION

TYPE 'A'

(2) NO. 4 REBARS

TYPE 'B'

PIPE CONDUIT
NEW DUCTILE IRON PIPE CLASS 52 SIZE TO MATCH EXISTING PIPE

EXISTING CROSSING PIPE

NEW PIPE

JOINT METHOD WILL VARY DEPENDING ON EXISTING PIPE MATERIAL

NOT TO EXCEED ONE PIPE LENGTH

5'-0" MIN

VARIABLE

VARIABLE

BACKFILL AND COMPACT PER SECTION 601

5'-0" MIN

ALTERNATE TO PIPE SUPPORT
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.

6. CLASS "C" CONCRETE AS PER SECTION 725.

ENCASEMENT FOR PARALLEL PIPES
NOTE:
1. CLASS 'C' CONCRETE AS PER SECTION 725.

ENCASEMENT FOR PIPE CROSSING
PLAN VIEW OF REPLACEMENT

EXCAVATE 6" BEYOND UNBROKEN
BELL TO ALLOW
ROOM FOR INSPECTION

18" MIN.
WHEN USING BELL
CONNECTION

6" MIN. WHEN USING
CAULDER CONNECTION

COMPACTION SHALL BE DONE IN
ACCORDANCE WITH SECT. 601

NEW CONSTRUCTION

EXISTING SEWER
CONNECTION OR
MAIN BROKEN
DURING EXCAVATION
FOR NEW CONSTRUCTION

REPLACEMENT WHEN NEW TRENCH
2' WIDE OR LESS

6" MIN. WHEN USING
CAULDER CONNECTION

NEW CONSTRUCTION

REPLACEMENT WHEN NEW TRENCH
MORE THAN 2' WIDE

12" MIN.
SOLID BEARING
ON EACH SIDE

12" MIN.
SOLID BEARING
ON EACH SIDE

REBAR TO BE
NO. 4 WITH MAX.
OF 6" BETWEEN
& MIN. OF 3 BARS

DIAMETER
AT BELL

CONC. PER SECT.
725, CLASS 'C'

SECTION 'A-A'

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-478 EXCEPT AS MODIFIED HEREIN.

2. M.H. STEPS SHALL BE INSTALLED AT SITE OF M.H. SECTION MANUFACTURE. MINIMUM CLEARANCE EACH SIDE OF M.H. LEG SHALL BE 1”. STEPS SHALL BE MOUNTED WITH 2 TO 1 SAND/CEMENT DRY PACK MORTAR. (SEE DET. 428 FOR M.H. STEP.) STEPS REQUIRED IN 48” DIAMETER MANHOLE. STEPS NOT REQUIRED IN 60” DIAMETER MANHOLE.

3. USE LOW ALKALI CEMENT ONLY.
FOR INSTALLATION IN PVM'T. SEE DETAIL 422

24" TO 26-3/4" ON 48" M.H. 30" ON 60" M.H.

FINISH GRADE

24" OR 30" FRAME & COVER PER DET. 423, 424, 425

6" MIN. - 8" MAX. REINFORCED CONC. ADJUSTING RINGS

FLAT REINFORCED CONC. TOP

BELL UP OR DOWN, CONT. OPTION

"RAM NEK" PLASTIC GASKET OR EQUALL

RUBBER GASKET W/ EXPANDED BELL JOINT

TYPE 'B' TOP

48" I.D., 60" FOR 15" PIPE AND OVER

5" TYP.

M.H. STEPS, SEE NOTE 2

1-1/2" NOMINAL COVER OVER STEEL. (TYP.)

4" TYP.

PRESSED INTO BASE

FLOW

CAST IN PLACE

CEMENT MORTAR CONC. BASE PER SECT. 725, 505.

(2) NO.2 HOOPS FOR 4"
RING TIED WITH NO. 4 A.S.& W. GAUGE WIRE.
6" & 8" RING REQUIRE (4) NO. 2 HOOPS.

1/4"

2-1/8"

1-5/8"

1-3/4"

3/8" - VARES

ADJUSTING RING DETAIL

ROUND OR SQUARE BASE OPTIONAL

FLOW
PIPE SIZE & ELEVATION
AS SHOWN ON PLANS

TROWEL FINISH

MANHOLE STEPS PER
SECT. 625

48” I.D. FOR 8” – 14” PIPE
60” I.D. FOR 15” – 30” PIPE

MANHOLE TO BE
BRICK OR PRECAST
PER SECT. 625
BRICK SHALL BE
IN ACCORDANCE
WITH SECT. 775

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

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

CLASS 'A' CONCRETE
PER SECT. 725, 505

TROWEL FINISH
SMOOTH

REVIEW FOR PRECAST
ADJUSTMENT RINGS
OR BRICK AND MORTAR
COLLAR OR COMBINATION
NOT TO EXCEED
12” TOTAL

COMBINED CURB
AND GUTTER

PAVEMENT

VARIES

5”

1 1/2

4” VARIABLE

ROWLOCK RADIAL
COARSE (BRICK M.H.)
FOUR STEEL SPACERS, 4"x2" THICKNESS AS REQUIRED FROM 1/2" to 2" WHEN THICKNESS IS LESS THAN 1/2" USE MORTAR, WHEN GREATER THAN 1/2", USE BRICK.

M.H. FRAME AND COVER PER SECT. 625

M.H. STEP IS 48" M.H. ONLY

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

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

BRICK SHALL BE IN ACCORDANCE WITH SECT. 775

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

CLASS 'A' CONCRETE PER SECT. 725, 505

TROWEL SMOOTH 12" FOR M.H. OVER 13" DEEP

ROWLOCK RADIAL COURSE

M.H. WALL THICKNESS AND MATERIAL VARIES

SUBGRADE PREPARATION TO CONFORM TO SECT. 301 OR 601

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

EXISTING OR RECENTLY INSTALLED PAVEMENT

MEDIUM BROOM FINISH WITH RADIALLY SCORED MARKS (4 MIN.)
FACE OF COVER
CAST IRON

FOR COVER LETTERING
SEE NOTE ON DETAIL 424

BACK OF COVER

CAST IRON
MANHOLE RING

SECTION OF COVER
APPROX. WEIGHT 275 LBS.

DETAIL

SECTION OF RING
APPROX. WEIGHT 210 LBS.

NOTES:
1. WEIGHT OF CASTING SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED.
2. CASTINGS SHALL CONFORM TO SECT. 787.
SECTION VIEW OF FRAME AND COVER
WITH CAM LOCKING DEVICE

NOTES:
1. 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)

2. 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 2" RAISED 1/8"
   ABOVE LEVEL OF COVER. TYPE OF LETTERS TO BE
   SUBMITTED FOR APPROVAL.

3. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2%
   LESS THAN THE APPROXIMATE WEIGHT SPECIFIED.

4. CASTINGS SHALL CONFORM TO SECT. 787.

5. SHALL CONFORM TO SECT. 625.3.1 - (FRAME
   AND COVER).
**Type A**

2.5' to 5' drop

**Type B**

5' or more

All pipe to be vitrified clay

Concrete to spring line of pipe

Caulder coupling connection or approved equal

Concrete foundations on new manholes to extend under drop connection

Square, concrete encasement class 'C' sect. 725 or masonry encasement grouted solid

Masonry anchors min. one tie per 2 sq ft of contact area for drop connections to existing manholes only (typ)

Concrete to width of trench sect. 505 & 725

Manhole foundation

Manhole wall

Stubs pipe

Top of sewer

2.5' min. to 5' max

Drop of sewer

Manhole wall

Y branch

45' mitered bend

4"

Pour invert

Of sewer
TYPICAL STUB OUT

NOTES:
1. NOTE: COMPACT SOIL AT END OF PIPE TO 95% OF MAXIMUM DENSITY.
2. IF DEPTH OF COVER IS LESS THAN 5' OR GREATER THAN 10' INCREASE PLUG THICKNESS A MIN. OF 4".

SEWER LINE

1/2" LAYER CEMENT PLASTER (WATERTIGHT)

BLOCK OR BRICK AND MORTAR PLUG (SEE NOTE)

DRAIN LINE

PIPE SIZE
12" – 36"  8"
39" – 48"  12"
51" – 72"  18"
75" – 90"  24"
96" – 114"  32"
120" – 132"  36"
138" – 150"  40"

PLUG (SEE DETAIL RIGHT)

BELL END

SEWER MANHOLE WALL

INVERT ELEVATION ACCORDING TO PLAN

MANHOLE FOUNDATION

DRY PACK FOR PRECAST CONCRETE MANHOLE

SIZE ACCORDING TO PLAN

VIT. CLAY PIPE

BAND SEAL COUPLING

#20 COPPER WIRE WITH YELLOW INSULATION OR 2" x 4" STAKE

ANCHOR WITH BRICK OR STAKE AT TRENCH BOTTOM OR TIE TO BELL END

SEWER LINE

VIT. CLAY OR PLASTIC PLUG

PREFORMED JOINT

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

CAST IRON 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 6" AND 8" DIAMETER SEWER WITH FLOWS IN THE RANGE OF 40 TO 340 GPM.

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 4" WIDE AND 6" 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.
NOTES:

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. CONSTRUCT TAP AT MINIMUM SLOPE IF COVER WILL BE LESS THAN 5' AT PROPERTY LINE.

4. ALL FITTINGS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D-2321. THE CONTRACTOR MAY VARY FROM THE DRAWING TO USE THE APPROPRIATE WYES, TEE-WYES AND BENDS TO ENSURE NO MISALIGNMENT OF THE PIPE AND FITTINGS. BLOCK OR BRACE FITTINGS JOINTS TO ENSURE ZERO DEGREES ANGULAR JOINT DIRECTION.

5. END OF TAP TO BE SEALED AND MARKED AS NOTED.
**Cleanout Installation**

- The word 'sewer' on cover
- Unpaved streets and alleys
- Class 'AA' Conc. per sect. 725, 6"-8" thick, 40" dia.
- Size of pipe as shown on plans
- Standard 45° bend
- Flow line elevation shown on plans to this point
- Station and length shown on plans to this point

**Sewer Tap at Cleanout**

- 8" C.I. frame and cover det. 270
- Paved streets and alleys
- Compacted backfill or undisturbed earth
- Standard 45° bend
- Vit. clay pipe per sect. 743
- To be laid on undisturbed earth or compacted select material (type B) or A.B.C.

**Note:**

End of sewer tap to be sealed and marked in accordance with det. 440

- 8" V.C.P.
- One full length of pipe
- 4" or 6" V.C.P. tap to property line
- 6"x8" or 4"x8" vitrified clay increaser
- 8"x8" Wye
DOUBLE PIPE HEADWALL

WALL BLOCKS TO BE 8"x8"x16". FILL ALL CORES WITH GROUT MIX 1:3.

NOTES:
1. ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 505 & 725.
2. CONCRETE MASONRY UNITS (BLOCK) PER SECT. 510, 775 & 776.
3. CONCRETE REINF. SHALL BE NO.4 BAR 12" O.C. BOTH WAYS.

HEADWALL DIMENSIONS

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
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<tr>
<td>12&quot;</td>
<td>1'-4&quot;</td>
<td>2'-0&quot;</td>
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<td>9'-4&quot;</td>
<td>2'-2&quot;</td>
<td>5'-9&quot;</td>
</tr>
</tbody>
</table>

* NO.4 BAR 12" O.C. BOTH WAYS.

ELEVATION
CONCRETE MASONRY UNITS (BLOCK) HEADWALLS JOINED WITH CEMENT MORTAR AND CONCRETE PLASTERED BOTH SIDES OF WALL FULL HEIGHT AND SHALL BE CURED PER SECT. 726.

DETAIL "A"
2 - NO. 6 BARS BEND TO CONFORM TO PIPE

3/4" CHAMFER, ALL EXPOSED CORNERS

NOTES:
1. ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725.
2. ALL REINFORCING BARS SHALL BE NO. 4 EXCEPT NO. 6 BARS OVER PIPE. BAR SPACING APPROXIMATELY 12" 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 3" ABOVE SLOPE.**

2. **ALL CONCRETE SHALL BE CLASS "A" PER SECT. 725.**

3. **ALL REINFORCING BARS SHALL BE NO. 4, 12" C TO C AND 3" CLEAR TO INSIDE OF FLOOR AND WALLS.**
POURED WALLS

NO. 4 REINFORCED BARS 12" O.C. BOTH WAYS, CLASS 'A' CONC PER SECT. 505, 725 & 727.

BLOCK WALLS

BLOCK HEADWALL TO HAVE ONE NO. 4 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.

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 3 FEET BEYOND CONNECTION TO UNDISTURBED EXISTING DITCH.


4. 14" PLATE SHALL NOT EXTEND BELOW TOP OF PIPE.
NOTES:

1. Brace to be installed every 2' from top of headgate frame. Bottom brace to be high enough to enable full opening of headgate.

2. Install 1/2" bolts into lead plug drilled to within 1" of out side of standpipe. Spacers to be installed at each bolt between headgate frame and inside of stand pipe.

3. Location of 2" hole for gate stem to be determined after installation of gate.

4. Concrete shall be class A per Sect. 725.

Paint arrow on outside of standpipe indicating direction "to open" headgate.

(4) 3/8" bolts to be grouted into standpipe equi-distant with 1-1/2"x3" rectangular washers and nuts.

GALVANIZED EXPANDED METAL LID (9 GAUGE)

Reinf. Conc. Pipe

Varies Min. 48" Max. 52"

Finish Grade

1" C.R.S. Lift Rod

Headgate to be Swanson 800 Series or approved equal

Form Conc. around end of pipe behind headgate frame

Type 'A'

Size of Pipe as shown on plans

Type 'B'

Size of Pipe as shown on plans
PLAN OF COVER

(2) 1-1/2"x1-1/2"x1/8" ANGLES WELDED TO 1-1/2" NO. 9 EXPANDED METAL (PENMETAL OR EQUAL)

TO SECURE COVER TO STRUCTURE, USE 1/4"x3" GALVANIZED EYEBOLT AND 1/4"x6" GALVANIZED EYEBOLT BENT TO FORM ANCHOR, AND 3/16" GALVANIZED CHAIN 2" LONG

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.
3. CONCRETE MASONRY UNITS (BLOCK) PER SECT. 510, 775 & 776
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 AND LESS THAN 66" USE NEXT SIZE LARGER.

4. OMIT REINFORCING ON PIPE 24" 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.

7. CONCRETE SHALL BE CLASS B PER SECT. 725.

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

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

CONCRETE PIPE
SECT. 735 & 736

PLUG END PER
DETAIL 427

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

GROUT AS PER
DETAIL 524

CONCRETE TEE
OR ELBOW

SNOW, IDEAL,
WATERMAN ALFALFA
VALVE OR EQUAL

12"

1/2

3/4

GROUT AS PER
DETAIL 524
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 18" 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 18" 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 SPLILLS BEYOND 12" FROM THE SIDES OF THE PIPE FOR ANY REASON SHALL BE REMOVED BACK TO THE PROPER LINE PRIOR TO BACKFILLING.

5. SEE SECTION 601 FOR TRENCH PREPARATION.

6. CONCRETE TO BE CLASS ‘A’ PER SECT. 725.

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

NOTE:
USE 5/8" WASHER AND NUT, ALL PIECES (NUTS, WASHERS, AND FABRICATED BOLTS) TO BE GALVANIZED AS PER A.S.T.M. A-123 LATEST REVISION.

C.M.P. CONNECTION TO MAIN STORM DRAIN
24" PIPE AND SMALLER


SECTION A-A

SELECT MATERIAL

STANDARD THREAD (COARSE)

WELD ALL AROUND

8 HOLES
9/16" DIA.

CONNECTOR PIPE

1/2"

2-1/2"

1/2"

2"

1/4"

3/4"

C.M.P. MAIN STORM DRAIN

CATCH BASIN

BAND DETAIL

1:2 MORTAR

2"x2"x12" GAUGE WELDED WIRE FABRIC WITH 12" CIRCUMFERENTIAL OVERLAP
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 4' DIA. CYLINDRICAL FORM FROM 6" ABOVE MAIN LINE PIPE TO SPRING LINE. CUT PIPE 2" LARGER THAN FORM TO ALLOW 2" 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 12" MINIMUM, 24" 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 1-1/2" UNLESS SHOWN OTHERWISE.
5. CONCRETE ENCASEMENT SHALL BE CLASS 'A' PER SECT. 725 AND 505.

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MAN HOLE SHAFT PER DETAIL 522

PRECAST PIPE WITH VERTICAL STUB

ENCASEMENT
NOTES:
1. PRECAST CONCRETE CONES AND SECTIONS TO BE A.S.T.M. C-478.
2. BRICK MAY BE USED IN LIEU OF OR IN COMBINATION WITH CONCRETE ADJUSTING RINGS.
3. PRECAST CONCRETE SECTIONS 48" DIA PIPE MAY BE FURNISHED IN STANDARD LENGTHS.
4. UNLESS OTHERWISE SHOWN ON PLANS, USE (2) 2-1/2" PRECAST CONCRETE ADJUSTING RINGS ON IMPROVED STREETS AND (4) 2-1/2" RINGS ON UNIMPROVED STREETS.
5. MANHOLE STEPS SHALL BEGIN 2'-0" BELOW FINISHED GRADE AND CONTINUE AT 12" INTERVALS TO APPROXIMATELY 2' ABOVE MANHOLE SHELF. (AS REQUIRED BY AGENCY.)
6. CONCRETE SHALL BE CLASS A PER SECTION 725 AND 505.
FOR A 30" M.H. OPENING, USE THE STD. WATER TIGHT 30" M.H. FRAME & COVER, AND ANCHOR THE FRAME AS OUTLINED IN THE INSTRUCTIONS NOTED ON THIS SHEET.

FOR A 24" M.H. OPENING, MODIFY THE STD. 24" M.H. FRAME & COVER, FOLLOWING THE NOTED PROCEDURES, ONE THRU FIVE.

NOTES:

1. DRILL (8) HOLES 17/32" IN COVER FOR 1/2" CAPSCREWS, COUNTERBORE 1/2" DEEP BY 1-1/8" DIA. TO ACCOMODATE CAPSCREW AND SOCKET WRENCH. SPACE EQUALLY.

2. DRILL (8) HOLES AND TAP FOR 1/2" - 13 THREAD NATIONAL COARSE BOLT.

3. DRILL, TAP AND COUNTERBORE (2) HOLES FOR 1/2" 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, 24" MANHOLE FRAME AND COVER. BOTH 24" AND 30" FRAMES TO BE ANCHORED AS FOLLOWS:

6. DRILL 1/2" HOLE IN FILLET. DO NOT USE ADJACENT FILLETS.

7. 1/4" STAINLESS STEEL CABLE. SECURED WITH CABLE CLAMPS.

8. 1/2"x9" HOOK AND EYE TURNBUCKLE.

9. 1/2" EYE BOLT WITH 1" DIA. EYE.

10. INSTALL THREE CABLES PER 24" COVER (FOUR CABLES FOR 30" COVERS). EYEBOLTS TO BE SET DIRECTLY BELOW FILLETS USED.

11. TRIPLE WRAP TURNBUCKLES AND CABLE CLAMPS WITH 1" WIDE TAPE, SAFE-T-CLAD, F.O.S. 655, OR APPROVED EQUAL.
NOTES:

1. DRILL (6) HOLES IN 30" COVER (4 HOLES IN 24" COVER) 17/32" CORED RECESS FOR 1/2" CAPSCREWS. SPACE EQUALLY (304 S.S.)

2. DRILL (6) HOLES IN 30" FRAME (4 HOLES IN 24" FRAME) AND TAP FOR 1/2" – 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.
STORM DRAIN LATERAL PIPE CONNECTIONS

NOTES:
1. D SHALL BE 24" 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.
4. THE MINIMUM OPENING INTO THE STORM DRAIN SHALL BE THE OUTSIDE DIAMETER OF THE CONNECTING PIPE PLUS 1".
5. IF ANGLE X FROM HORIZONTAL IS 45° OR LESS USE TYPE 1.
   IF ANGLE X IS 45° OR OVER USE TYPE 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.
6. CONCRETE SHALL BE CLASS A PER SECTION 725.

DIMENSIONS

T=6" IF V=4" OR LESS
T=8" IF V IS BETWEEN 4" AND 8"
T=10" IF V IS 8" OR MORE (IF V EXCEEDS 10" SPECIAL DESIGN IS REQUIRED)
V=4" UNLESS OTHERWISE SPECIFIED.

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

** 4" LOCATIONS WHERE 4" 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 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 SECTION 725.

6. CONCRETE SHALL BE CLASS A PER SECTION 725.

DIMENSIONS

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T=6" IF V=4' OR LESS
T=8" IF V IS BETWEEN 4' AND 8'
T=10' IF V IS 8' OR MORE (IF V EXCEEDS 10' SPECIAL DESIGN IS REQUIRED)
V=3'-6" UNLESS OTHERWISE SPECIFIED.

* SEE DETAILS 536-1 AND 536-2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.
** 4' LOCATIONS WHERE 4' 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.

6. CONCRETE SHALL BE CLASS A PER SECTION 725.

DIMENSIONS

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<td>V=3&quot;-6&quot; UNLESS OTHERWISE SPECIFIED</td>
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* SEE DETAILS 536-1 AND 536-2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.

** 4" LOCATIONS WHERE 4" 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 NO. 4 18" C TO C BOTH WAYS AND 1-1/2" 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 = 3'-3" MIN. WHEN L = 3'
V = 3'-5" MIN. WHEN L = 6'
V = 3'-7" MIN. WHEN L = 10'
V = 4'-0" MIN. WHEN L = 17'
T = 6" WHEN V IS LESS THAN 8'
T = 8" WHEN V IS EQUAL TO OR GREATER THAN 8'
H = CURB HEIGHT PRIOR TO THE TRANSITION

REINFORCEMENT DETAIL
2' CURB & GUTTER PER DETAIL 221 BOTH SIDES

SECTION D-D

FOR S/W INSTALLATION BEHIND CATCH Basin SEE DETAIL 230

SECTION E-E

APRON NOTES:

9. APRON IS CONSTRUCTED ONLY WHEN SPECIFIED ON PLANS.

10. CONCRETE IN APRON SHALL BE NOT LESS THAN 8" THICK.

11. CURB FACES AT CATCH Basin OPENING AND POINT G SHALL BE THAT OF THE EXISTING CURB FACE PLUS 2" 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 ELECTRO FORGED TO BEARING BARS.

17. ANCHORS SHALL BE 3/8" DIA. STEEL ROD, NO. 3 REBAR, 3/8" DIA. X 8" BOLTS OR 8" 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: 1/2 DIA. x 24-7/8" ROD, 4" C. TO C., 9 EACH

BEARING BARS: 3-1/2" x 1/2" x 39-1/2" 1-7/8" C. TO C., 14 EACH

END BARS: 2-1/2" x 1/4" x 24-7/8" 2 EACH.

GRATE DETAIL
GRATE OPENING: 4.344 SQ. FT.

SECTION B-B
**SECTION A-A**

**SECTION B-B**

**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 TROWELED 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.

6. ALL CONCRETE, CLASS 'A' AS PER SECTION 725.

**DIMENSION**

V=3'-0" UNLESS OTHERWISE SPECIFIED.

* DIMENSIONAL CHANGE WITH DETAIL 534-3 AND DETAIL 534-4.
CROSS SECTION

1/4" R

1/4" WELD

1/4" WELD

5'-6" NO. 6 REINF. BAR
2" x 1-1/2" x 1/4"
1/4" R

1'-7-1/2"
6"
8" x 3/8" x 3'-5" TOP
1/4" WELD
13" x 3/8" BACK PLATE
1-1/2" x 1" BOLTS
5" x 3" x 3/8" FRAME
2" x 1/4" x 6" LUGS
1/2" x 8" BOLTS

1/2" RODS THREADED BOTH ENDS

1'-9"

6"/10.5# 1/4" WELD

2'-1/2"

(20) 2" x 1/2" x 15" FLAT BARS AT 2" O.C.

1-1/2" PIPE SPACER

1-1/2" LONG X

6"

GRATE

8" x 3/8" TOP PLATE

3'-5"

8"

12" x 1/4" BOND PLATE

2" x 1/4" END

1/4" WELD

1/4" WELD

5" x 3" x 3/8"

NOTE:
WELD ALL PLATES TO
6" x 6" ANGLES.

DRILL (2) 1"
HOLDS FOR BOND
AS SHOWN

13" x 3/8" BACK PLATE

6" x 6" x 3/8" x 13-3/8"

2'-5"

1-1/2"

6-1/8"

2" x 1/4" END PIECE

ANCHOR

ADJUSTABLE CURB

COMPOSITE VIEW
BOLT CURB BOX TO FRAME WITH 1/2" x 13" x 2-1/2" STEEL HEX BOLTS, NUTS AND WASHERS

CURB BOX ADJUST. TO 9" HIGH

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

SECTION B-B

NOTE:
DIMENSIONAL CHANGE REQUIRED FROM 3'-5"
WIDTH TO 3'-0" AND 1'-9" DEPTH TO 2'-0"
MATERIAL CAST GRAY IRON ASTM A-48-83 CLASS 35B.
FRAME WEIGHT 209 LBS; GRATE 140 LBS; CURB BOX 92 LBS.
BOLT CURB BOX TO FRAME
WITH 1/2" x 13" x 2-1/2" STEEL HEX
HEAD BOLTS, NUTS AND WASHERS

DIRECTION OF FLOW
1/2" (TYP.)

SECTION A-A
DOUBLE UNIT CAST IRON FRAME — GRATE — CURB BOX

36-1/2"
35-1/2"
12 EQUAL SPACES AT 2-13/16"
33"
36"
80-1/2" APPROX.
34-1/4"
7/8"

SECTION B-B
CROSS-SECTIONAL
AREA: 1.53 SQ. IN.

NOTE:
DIMENSIONAL CHANGE REQUIRED FROM 3'-5"
WIDTH TO 6'-2", AND 1'-9" DEPTH TO 2'-0"
REQUIRES ONE CENTER STEEL I-BEAM 4" x 7.7 LBS.
MATERIAL CAST GRAY IRON ASTM A-48-83 CLASS 35B.
FRAME WEIGHT 197 LBS.; GRATE 140 LBS.; CURB BOX 92 LBS.
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).
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 9" OR MORE.
2) THE BAR SHALL BE EMBEDDED 5" AT EACH END.

DOWEL BAR

# 3 REINF. STEEL DOWEL BARS

1/4" DIAMOND FLOOR & COVER

L1–1/4" x 1–1/4" x 1/4" IRON FRAME

PROTECTION BAR
SEE THIS DETAIL

1" GALVANIZED BAR

1" X 3/4" X 1/2"

3/8" FLAT HEAD STAINLESS STEEL CAP SCREWS – COUNTERSINK

NOSE ANGLE 45°

3/8" WELD BARS TO FRAME

NO. 3 REINF. STEEL– ANCHOR BARS, WELDED TO FRAME

CURB SUPPORT ANCHOR 1" DIA. BAR WITH 3" 90° BEND, 3"–6" MAX. SPACING

CURB SUPPORT ANCHOR 1" DIA. BAR WITH 3" 90° BEND, 3"–6" MAX. SPACING

NOTE:
1) HORIZONTAL PLAIN ROUND GALVANIZED STEEL PROTECTION BAR SHALL BE USED WHEN CURB FACE IS 9" OR MORE.

2) THE BAR SHALL BE EMBEDDED 5" AT EACH END.

STANDARD DETAIL
FOR Curb OPENING CATCH BASINS

COMMON DETAILS AND SECTIONS

DETAIL NO.
536–1

MARICOPA ASSOCIATION OF GOVERNMENTS

STANDARD DETAIL
ENGLISH

COMMON DETAILS AND SECTIONS
FOR CURB OPENING CATCH BASINS

REVISED
DETAIL NO.
536–1
PLAN VIEW

DROPOFF HANDLE

SECTION A-A

SECTION C-C

SECTION B-B

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 1/32".
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.
ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725.
EXPOSED EDGES SHALL BE FINISHED WITH A 1/2"
RADIUS.

DETAIL OF ANGLE FRAME
GRADE SUPPORT

WELD INTO SECOND SPACE

1/2" DIA X 1" EYE BOLT

2-3/8" X 3-1/8" X 1/4"
BEVELED SIDES FOR WELDS

3-5/8" 1/4" X 1-3/4" X 24"
CHAIN

BAR GRATE
SEE DETAIL 539

1/4" X 1-3/4" X 24" CHAIN TO 1" X 6"
EYE BOLT IN WALL. BEND BOLT 1"
ON END.

PLAN
SINGLE GRATE

29" X 29" I.D.
GRADE FRAME

3" X 2-1/2" X 1/2"
1/2" X 3-1/2" BOLT OR
WELDED LUG, 4 EACH -
ONE ON EACH CORNER

SECTION B-B

1/2" DIA X 1" EYE BOLT

2-3/8" X 3-1/8" X 1/4"
BEVELED SIDES FOR WELDS

PLAN
DOUBLE GRATE

29" X 53" I.D.
GRADE FRAME

SECTION A-A

48"
PIPE SIZE AS REQUIRED BY PLANS

SLOPE FLOOR TO OUTLET

SECTION C-C

"D" VARYS

12" 8"
8"
12" 6" 5"
WHEN DOUBLE GRATE IS USED INCREASE THE LENGTH OF THE STRUCTURE ACCORDINGLY.

CUT HOLE IN PIPE 24" LONG FOR SINGLE GRATE STRUCTURES AND 48" LONG FOR DOUBLE GRAte. WIDTH DEPENDS ON DIA. OF PIPE, NOT TO EXCEED 22" MIN. WIDTH TO BE SET BY PROJECT ENGINEER.

SEE DETAIL 539 FOR GRATE

29" x 29" I.D. SINGLE FRAME
29" x 53" I.D. DOUBLE FRAME

3" x 2-1/2" x 1-1/2" ANGLE IRON FRAME
1-1/2" DIA x 6" LUGS WELDED TO FRAME, 4 EACH ON EACH CORNER OF FRAME

FOR PIPE LARGER THAN 24" DIA. (NOMINAL)

SECTION A-A

DETAIL OF ANGLE FRAME GRATE SUPPORT

SECTION A-A

24" PIPE (NOMINAL)

D=(VARIES)

C=3'-4"

B=(VARIES)

3'-4"
(6) 1/2" DIA. x 28-1/2" SINGLE, 52-1/2" DOUBLE TRANSVERSE RODS, 4" ON CENTER 
FLUSH WITH GRATE SURFACE.

(2) 2" x 1/4" x 28-1/2" SINGLE, 52-1/2" DOUBLE END BARS

(15 SINGLE, 26 DOUBLE) 2-1/2" x 1/2" x 28" BEARING BAR
APPROXIMATELY 2" ON CENTER

3/16" 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 1/8"
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 0.093” AT ANY POINT.
5. RESTRICT USE TO GRADES OF 3% OR LESS.

BAR TABLE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>CLEAR SPACING</th>
<th>NO. BARS</th>
<th>X</th>
<th>GRATE OPENING (ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TW OR TB-1.0</td>
<td>1”</td>
<td>26</td>
<td>1”</td>
<td>3.21</td>
</tr>
<tr>
<td>TW OR TB-1.1</td>
<td>1-3/8”</td>
<td>21</td>
<td>1”</td>
<td>3.32</td>
</tr>
<tr>
<td>TW OR TB-1.2</td>
<td>2”</td>
<td>16</td>
<td>1”</td>
<td>4.66</td>
</tr>
<tr>
<td>TW OR TB-2.0</td>
<td>1”</td>
<td>26</td>
<td>1”</td>
<td>2.32</td>
</tr>
<tr>
<td>TW OR TB-2.1</td>
<td>1-3/8”</td>
<td>21</td>
<td>1”</td>
<td>2.41</td>
</tr>
<tr>
<td>TW OR TB-2.2</td>
<td>2”</td>
<td>16</td>
<td>1”</td>
<td>2.65</td>
</tr>
</tbody>
</table>

TW INDICATES TRANSVERSE WELDED
TB INDICATES TRANSVERSE BOLTED
<table>
<thead>
<tr>
<th>PIPE DIA.</th>
<th>APPROX. WEIGHT (LBS.)</th>
<th>LENGTH OF PIPE</th>
<th>DIMENSIONS – INCHES</th>
<th>APPROX. SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>24&quot;</td>
<td>1520</td>
<td></td>
<td>T  A  B  C  E  F</td>
<td></td>
</tr>
<tr>
<td>27&quot;</td>
<td>1930</td>
<td></td>
<td>3  9-1/2 43-1/2 30</td>
<td>73-1/2 48</td>
</tr>
<tr>
<td>30&quot;</td>
<td>2190</td>
<td></td>
<td>3-1/2 12 54 19-3/4</td>
<td>73-3/4 60</td>
</tr>
<tr>
<td>36&quot;</td>
<td>4100</td>
<td></td>
<td>4  15 63 34-3/4 72</td>
<td>97-3/4 72</td>
</tr>
<tr>
<td>42&quot;</td>
<td>5380</td>
<td></td>
<td>4-1/2 21 63 35 98</td>
<td>78 3</td>
</tr>
<tr>
<td>48&quot;</td>
<td>6550</td>
<td></td>
<td>5  24 72 26 98</td>
<td>84 3</td>
</tr>
<tr>
<td>54&quot;</td>
<td>8240</td>
<td></td>
<td>5-1/2 27 65 33-1/4</td>
<td>98-1/4 90 2 1/2</td>
</tr>
</tbody>
</table>

**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.
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 SECT. 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

SPILLWAY INLET AND OUTLET
**CONCRETE SURFACE FORD CONCRETE WALLS**

- Depth gauge see detail (optional)
- 3" weep holes
- Fine aggregate flow
- Slope 0.015'/ft.
- 2 - No. 4 bars top and bottom
- 8" Class 'A' concrete as per sect. 725

**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 2" high.
4. Height of depth gauge optional.
5. Two depth gauges may be used. One on each end of upstream wall. Start with 2' instead of 1'

**BITUMINOUS SURFACE FORD CONCRETE WALLS**

- Depth gauge see detail (optional)
- 3" weep holes
- Fine aggregate flow
- Slope 0.015'/ft.
- 2 - No. 4 bars top and bottom

**DEPTH GAUGE DETAIL**

- Option of the contracting agency
- Min. distance below stream bed.
- Vertical alignment to be as near average transverse grade of stream bed as possible
- Depth gauge
- Finished grade
- Wall to be built one foot above high water level

**ELEVATION LOOKING UPSTREAM**

- 3% max.
- Upstream wall
- Wall may be built to this line
- 3" weep hole 20' c to c

**DEVELOPMENT**

- Standard detail
- English
- Concrete cut-off walls

**DETAIL NO.**

552

**REVISIONS**

- No revisions

**DETAIL NO.**

552
TYPICAL GABIONS

PLAN

ELEVATION

TYPE 1 RIPRAP

EXST GROUND LINE OR STREAM BED

VARYS 2'-0" MIN.

ELEVATION

PLAN

AS CALLED FOR ON PLANS

1'-2" MIN.

ELEVATION

TYPE 2 RIPRAP

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 3' LENGTH, INSTALLED AT FACTORY.

CUT BANK TO DEPTH "C" BEFORE PLACING GABIONS

EXST GROUND LINE OR STREAM BED

GABIONS FILLED WITH STONE

2'-0" MIN.

NOMINAL SIZE COMBINATIONS

<table>
<thead>
<tr>
<th>LENGTH</th>
<th>WIDTH</th>
<th>DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>6'</td>
<td>3'</td>
<td>1'-1.5' 3'</td>
</tr>
<tr>
<td>9'</td>
<td>3'</td>
<td>1'-1.5' 3'</td>
</tr>
<tr>
<td>12'</td>
<td>3'</td>
<td>1'-1.5' 3'</td>
</tr>
</tbody>
</table>

OTHER SIZES AVAILABLE FROM MANUFACTURER.

NOTES:

1. PLAIN ROCK OR CROUTED ROCK MAY BE SUBSTITUTED FOR SACKED CONCRETE.

2. GROUT FOR RIPRAP MAY BE PNEUMATICALLY PLACED MORTAR.