UNIFORM STANDARD DETAILS for PUBLIC WORKS CONSTRUCTION SPONSORED and DISTRIBUTED by the MARICOPA ASSOCIATION of GOVERNMENTS

1998 ARIZONA

(Includes Revisions Through 2008)
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555 EROSION PROTECTION/RIPRAP
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 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 (PER ARS 33-103). CONCRETE POST IS CHAMFERED 3/4" AT TOP.

3. SECTION CORNERS, 1/4 CORNERS AND CENTER OF SECTIONS SHALL BE 30" LONG, ALL OTHER MARKERS SHALL BE A MINIMUM OF 16" PER THE ARIZONA BOARD OF TECHNICAL REGISTRATION (BTR) UNLESS SUBSURFACE OBSTRUCTIONS LIMIT LENGTH.

4. IN ALL CASES, THE POINT SURVEYED SHALL BE IDENTIFIED BY A PUNCH MARK AND IN ADDITION THE CAP SHALL BE STAMPED WITH THE REGISTERED LAND SURVEYOR (RLS) REGISTRATION NUMBER AND YEAR.

5. WHEN APPLICABLE, STAMP THE APPROPRIATE PUBLIC LAND MARKINGS PER CURRENT MANUAL OF INSTRUCTIONS FOR THE SURVEY OF THE PUBLIC LANDS OF THE UNITED STATES, PREPARED BY THE BUREAU OF LAND MANAGEMENT.

6. IN ALL CASES WHEN MONUMENTS ARE SET A CORNER RECORD OR RESULTS OF SURVEY SHALL BE RECORDED. (PER BTR)
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 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.
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.
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
STEEL GUARD RAIL

W6x8.5 STEEL POST

STEEL 'W' SECTION, 12 GAUGE

'S' BEAM (STEEL POST)

'S' SECTION BACK-UP PLATE FOR STEEL POSTS

SLOT 3/4" x 2-1/2"

6" 6"

12-1/2"
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”

STD. FLARED TERMINAL SECTION

DETAIL NO. 2 – MEDIAN BARRIER

3-5/16” MIN. 1-1/2” 1-5/8” 1-3/4” 1-3/4” 1-5/8” 1-5/8” 2” 2” 2” 2” 2” 2” 2” 2” 2” 2” 2”

60d SPIKES TWO PER BLOCK
1-3/4” x 3” x 3/16” WASHER WITH 1” x 11/16” SLOTTED HOLE EACH SIDE
5/8” x 25” BUTTON HEAD BOLT AND RECESS NUT
1-3/4” x 11/16” x 9/64” CUT STEEL WASHER 1 EACH SIDE
6” x 2” CHAIN, 8.2# MIN. LENGTH 12’ 5-3/4”
5/8” x 13” CARRIAGE BOLT AND HEX

GROUND LINE

INSTALLATION OF GUARD RAIL IN EMBANKMENT CURB SECTION

DETAIL NO. 3 – RUB RAIL SPlice (SPlice AT POSTS ONLY)

2” x 3/4” SLOT IN CHANNEL AND PLATE FOR POST FASTENING
7-3/4” x 4-1/2” x 3/8” SPlice PLATE
2-11/16” ROUND OR SQUARE HOLES IN CHANNEL AND PLATE FOR 1-1/4” x 5/8” BUTTON HEAD BOLTS WITH NUT AND WASHER

© POST RUB RAIL

135-3

STANDARD DETAIL ENGLISH

STEEL GUARD RAIL
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.

SECTION

DETAIL NO. 4
ATTACHMENT OF GUARD RAIL TO STRUCTURES

ELEVATION

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.

SECTION A-A

DETAIL NO. 1
GUARD RAIL POST INSTALLATION ON STRUCTURES

DETAIL NO. 5
BUFFER END SECTION

STANDARD DETAIL
ENGLISH

STEEL GUARD RAIL

135-4

REVISED

135-4
FILL WITH GROUT AND CROWN TOP

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

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

EXISTING GRADE

CLASS B CONCRETE PER SECT. 725

EXISTING CONCRETE OR ASPHALT PAVEMENT

4" MIN. 4" MIN.

4" OR 6" DIA. POST

SAFETY POST SECTION
1. POSTS AND RAILS SHALL BE 1.5" SCHEDULE 40 HOT-DIPPED GALVANIZED STEEL PIPE ASTM A 53, GRADE A (2.72 #/LF, 1.9" O.D.). GALVANIZING SHALL BE IN ACCORDANCE WITH SECTION 771.

2. PAINT RAIL PER MAG SPECIFICATIONS SECTION 530 WHEN REQUIRED BY PLANS. SHIP PRIME WITH RUST INHIBITING PRIMER (FIELD REPAIR PRIMER AS NEEDED). COLOR PER PLANS.

3. VERTICAL POSTS TO BE EVENLY SPACED.

4. REMOVE ALL SHARP EDGES.

5. INSTALL SAFETY RAIL AS REQUIRED BY PLANS OR SPECIFICATIONS.

6. THE EMBEDMENT FOR ANCHOR TYPES 1, 2 AND 3 SHALL BE LOCATED INSIDE THE WALL REINFORCEMENT CAGE.

NOTE: SEE PLANS FOR ANCHORAGE DETAILS FOR ATTACHMENT TO SINGULARLY REINFORCED AND NON-REINFORCED WALLS.
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5/8" HOLE FOR 1/2" DIA. PIN, 24" LONG, HOT ROLLED STEEL

6-1/2"
7-1/2"
72"
4"
1"

TYPE A

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

1"
25"
4"

TYPE B-1 = 36"
TYPE B-2 = 48"
TYPE B-3 = 72"

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

NOTES:
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.

SAFETY CURB INSTALLATION ON DIRT

1/2" DIA. PINS – 24" LONG, HOT ROLLED STEEL

6" DIA. CONCRETE CYLINDER
CONCRETE CLASS B PER SECTION 725
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 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:

<table>
<thead>
<tr>
<th>MEMBER</th>
<th>AISC SIZE</th>
<th>OUTSIDE DIA.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORNER POST</td>
<td>2-1/2&quot;</td>
<td>2.875&quot;</td>
</tr>
<tr>
<td>LINE POST</td>
<td>1-1/2&quot;</td>
<td>1.900&quot;</td>
</tr>
<tr>
<td>STRAIN POST</td>
<td>1-1/2&quot;</td>
<td>1.900&quot;</td>
</tr>
<tr>
<td>BRACE</td>
<td>1-1/4&quot;</td>
<td>1.666&quot;</td>
</tr>
<tr>
<td>STRETCH BAR</td>
<td>3/16&quot;x3/4&quot;</td>
<td>3/16&quot;x3/4&quot;</td>
</tr>
<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>
</tr>
</tbody>
</table>

7. CONSTRUCTION AND MATERIALS SHALL CONFORM TO SECT. 420 AND 722, RESPECTIVELY. SEE TABLE 722 FOR WEIGHTS OF MEMBERS.

NO. 7 COILED SPRING REINFORCED WIRE TIE WITH 12 GAUGE WIRE OR HOG RING FASTENERS 1'-6" C TO C

DETAIL NO. 160

STANDARD DETAIL
ENGLISH

6' CHAIN LINK
FENCE AND GATE

MARICOPA ASSOCIATION OF GOVERNMENTS

REvised 01-01-2003

DETAIL NO. 160
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)
3/4" DIA. DRAIN HOLE
12" x 12" x 12" ABC PER SECTION 702

L-867 BASE W/COVER
L-823 CONNECTOR
L-830 TRANSFORMER
L-824 CABLE I/C, #8, 5 KV, (5.6 AMP ONLY)
BARE COPPER COUNTERPOISE WIRE (IF SPECIFIED)
BUILDING BLOCK (BRICK OR CONC. BLOCK)
USE THE FOLLOWING FORMULA TO DETERMINE MAXIMUM DENSITY:

\[ D = \frac{(100-R)d + 0.9RSx62.4}{100} \]

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

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

TYPE 'B'

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

12''

MIN.
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’**

- STEEL DIAMOND PLATE A–36
- EXPANSION JOINT
- SEE NOTE 2

**SECTION ‘B–B’**

- DIAMOND PLATE
- GUTTER FLOW LINE
- SLOPE=1.5%
- LIP OF GUTTER

**REFERENCES**

- SEE NOTE 3

**DETAIL NO.**

- 203

**REVISION**

- ENGLISH

**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 POURED IN ONE POUR. USE DETAIL 'D' IF FULL WIDTH IS POURED IN ONE POUR.

SECTION A–A

SECTION B–B

SECTION C

SECTION D

SECTION E

SECTION F

JOINT AT NEW BRIDGE DETAIL 'F'

JOINT AT EXISTING BRIDGE DETAIL 'E'
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: WxL—SURFACE—TYPE; (12' x 30’—A.C.—TYPE "B" TURNOUT).
   90° — WITH A RADIUS: WxLxR—SURFACE—TYPE; (12' x 20’ x 15’—A.C.—TYPE "C" 
   TURNOUT). OTHER THAN 90° WITH 2 RADIi—TYPE "S": WxLxR1 xR2—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.
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, ASTM D-1751.
4. CONCRETE FOR THE SCUPPER SHALL BE CLASS 'A' PER SECTION 725.
   CONCRETE FOR THE SPILLWAY SHALL BE CLASS 'A' OR CLASS 'B'.
5. 12" OFFSET DISTANCE SHALL BE INCREASED TO 2'-6" FOR DESIGNATED BICYCLE PATHS.
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, ASTM D–1751.
5. SAFETY RAIL SHALL BE CONTINUOUS BETWEEN THE SPILLWAY EXTERIOR WALLS.
6. USE WELD PLATES FOR SAFETY RAIL ANCHORS LOCATED IN THE 5” THICK CONCRETE.
SAFETY RAIL EXTENSIONS BEYOND SCUPPER PER DETAIL 145.
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.
   C. CONTACT THE AGENCY (OR INSPECTOR) ONE WEEK PRIOR TO INSTALLATION TO COORDINATE PAVEMENT MARKINGS AND SIGNING.

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.
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 LOADING 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 ROADSIDE 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.)

---

**PLATE SIZE**

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FLUSH WITH EXISTING PAVEMENT

1/2 SACK CLSM FROM 6" ABOVE TOP OF THE HIGHEST UTILITY TO THE BOTTOM OF NEW ASPHALT CONCRETE.

AGENCY'S APPROVED 12.5 mm ASPHALT CONCRETE PLACED IN 2" LIFTS. 6" MINIMUM THICKNESS OR MATCH EXISTING. ASPHALT CONCRETE SHALL BE PLACED WITHIN 4 HOURS AFTER PLACEMENT OF CLSM.

6" BEDDING ABOVE TOP OF THE HIGHEST UTILITY PIPE TO CONFORM TO SECTION 601.4.2.

SECTION A-A

POTHOLE PLAN VIEW
(NOMINAL DIMENSIONS)
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.
6. WHEN THE ADJACENT PAVEMENT SECTION SLOPES AWAY FROM THE GUTTER, THE SLOPE OF THE GUTTER PAN SHALL MATCH PAVEMENT CROSS SLOPE.

NOTES: (TYPE B)
2. BROOM FINISH ALL SURFACES.
3. RIBBON CURB MAY SLOPE TOWARDS PAVEMENT OR PARKWAY AS INDICATED ON PLANS.
4. CONTRACTION JOINT SPACING 10' MAXIMUM.
5. CONCRETE SHALL BE CLASS 'B' PER SECT. 725 AND INSTALLED PER SECT. 505.

NOTES: (C & D)
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.
MOUNTABLE CURB AND GUTTER (TYPE E)

MOUNTABLE CURB AND GUTTER (TYPE F)

NOTES: (E & F)
1. ALL EXPOSED SURFACES TO BE TROWEL FINISHED EXCEPT AS SHOWN. SEE SECT. 340.
2. CONTRACTION JOINT SPACING 10’ MAXIMUM.
3. EXPANSION JOINTS PER SECT. 340.
4. CLASS ‘B’ CONCRETE PER SECT. 725.
5. WHEN THE ADJACENT PAVEMENT SECTION SLOPES AWAY FROM THE GUTTER, THE SLOPE OF THE GUTTER PAN SHALL MATCH THE PAVEMENT CROSS SLOPE.
CURB TRANSITION TYPE 'A' TO TYPE 'C'

NOTES: (CURB AND GUTTER TRANSITIONS)
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.
4. TRANSITION BETWEEN TYPICAL SECTIONS SHALL BE ACCOMPLISHED BY THE USE OF DIRECT STRAIGHT LINE TRANSITIONS OF THE FLOW LINE AND OTHER SURFACE FEATURES.

CURB AND GUTTER TRANSITION

INTEGRAL ROLL CURB, GUTTER AND SIDEWALK

NOTES: (INTEGRAL ROLL CURB, GUTTER AND SIDEWALK)
1. CONCRETE TO BE MONOLITHIC POUR. EXPOSED SURFACE FINISH AS PER SIDEWALK AND GUTTER DETAIL.
2. CONTRACTION JOINT SPACING 5' 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.
7. WHEN PAVEMENT AND BASE COURSE EQUALS OR EXCEEDS 10" IN DEPTH, THE ENTIRE ROADWAY SIDE OF THE CURB SHALL BE FORMED. THE TOTAL CURB HEIGHT REMAINS 18" UNLESS NOTED OTHERWISE.

TYPICAL CURB TERMINATION
ROAD MEDIAN

MEDIAN LANDSCAPING OR SURFACE AS REQUIRED

AS SHOWN ON PLANS

WIDTH

FACE OF CURB

12"

CURB HEIGHT VARIES (5" MINIMUM)

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

NOTE:
LENGTH OF TRANSITION SHALL BE EQUAL TO RADIUS OF MEDIAN NOSE, (5" MINIMUM). FOR LOCATION SEE PLANS.
NOTES:
1. 1/2 INCH EXPANSION JOINT, ASTM D-1751 PER SEC. 729 AND ELASTOMERIC SEALANT PER SEC. 342
2. CONTRACTION JOINTS PER SEC. 342
3. MATERIALS AND CONSTRUCTION PER SEC. 342
4. PORTLAND CEMENT CONCRETE SHALL BE CLASS A
5. DESIGN PARAMETERS FOR THE THICKNESS IS BASED ON:
   ASSUMES MODULUS OF SUBGRADE REACTION (K) = 100 pci
   CONCRETE WORKING STRESS (f1) = 300 psi
   TERMINAL SERVICABILITY INDEX (p1) OF 2.5 OVER 20 YEARS
   AND 1 MILLION TOTAL EQUIVALENT 18-KIP SINGLE-AXLE LOAD APPLICATIONS

EXPANSION JOINT DETAIL

PAVEMENT PER CONTRACT DOCUMENTS

12" 1/4" R (TYP)
CONCRETE HEADER

80 MM (3.15 INCH) INTERLOCKING CONCRETE PAVERS
ONE INCH MAX. SAND LAYING COURSE

SWEPT SAND INTO ALL JOINTS

ELASTOMERIC SEALANT AND EXPANSION JOINT (SEE NOTE 1)

COMPACTED SUBGRADE PER SEC. 301 OR SUBBASE PER PLANS AND/OR SPECIAL PROVISIONS

SEE NOTE 5

TYPICAL HALF SECTION (AGAINST PAVEMENT)

CONCRETE PAVERS

TYPICAL SECTION AT END OR ALTERNATE HALF SECTION (AGAINST CONCRETE)
NOTES:

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECT. 340.
2. EXPANSION JOINTS 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 50' MAXIMUM SPACING PER SECT. 340.
5. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECT. 725.
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.

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

4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY’S REQUIREMENTS.

SECTION B–B

BOTTOM OF RAMP CURB WHEN FORMED AND Poured SEPARATELY

SECTION A–A

CONSTRUCTION JOINT 1" DEEP OR FORMED SEPARATELY

SUBGRADE PREPARATION, SEE SECT. 301

DETECTABLE WARNING

RIGHT-OF-WAY LINE

VARIES 6" 3'-6" LANDING 3'-5" RAMP 2'-0" 1'-5" MATCH GUTTER FLOW LINE

T.C. = 6" [=7"

T.C. = 3" [=3-1/2"

T.C. = 6" [=7"

(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]

BACK OF LANDING=3-1/2"

MATCH GUTTER FLOW LINE

SIDEWALK RAMPS - TYPE 'A'
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 SECT. 725.

3. WHEN CURB heights of 7" are shown on PANS, USE DIMENSIONS SHOWN IN [ ]'S.

4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY’S REQUIREMENTS.

SECTION B–B

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 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]S.
4. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
5. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
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. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
NOTES:

1. ALL CONCRETE TO BE CLASS ‘A’ UNLESS OTHERWISE APPROVED. (SECT. 725).
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.
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 22' 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. ROUGH BROOM FINISH FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF DRIVEWAY.

### COMMERCIAL AND INDUSTRIAL

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<td>* 24' MIN. FOR TWO WAY TRAFFIC</td>
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### RESIDENTIAL

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SECTION A–A
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*24" WHERE 2-WAY TRAFFIC IS ANTICIPATED

TABLE B

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<tr>
<td>LOCAL STREET</td>
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*16' WIDTH IS DESIRABLE

NOTES:

1. EXPANSION JOINTS SHALL COMPLY TO SECTION 340.
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

SUBGRADE PREPARATION AS PER SECT. 301

5" THICK = RESIDENTIAL
6" THICK = COMMERCIAL AND INDUSTRIAL
NOTES:
1. SUFFICIENT RIGHT-OF-WAY MUST BE AVAILABLE TO CONSTRUCT THE BUS BAY.
2. 1/2" BITUMINOUS PREFORMED EXPANSION JOINT FILLER ASTM D-1751 PER SPECIFICATION SECTION 729.
3. SUBGRADE PREPARATION PER SPECIFICATION SECTION 301 COMPACTED TO 95% MINIMUM DENSITY.
4. CONCRETE SHALL BE CLASS 'A' PER SPECIFICATION SECTION 725.
5. CONCRETE BUS BAY PAVEMENT SHALL BE BROOM FINISHED, EXCEPT WHERE OTHERWISE NOTED.
6. CONTRACTION JOINTS IN THE BUS BAY PAVEMENT SHALL MATCH THOSE IN THE CURB, 15 FT. MAXIMUM SPACING.
7. CONCRETE BEARING PAD (SECTION A–A) TO BE Poured SEPARATELY FROM CONCRETE BUS BAY PAVEMENT.

SECTION A–A
1. BOND BREAKER BETWEEN BEARING PAD AND PAVEMENT SHALL BE 15 LB. FELT OR EQUAL.

SECTION B–B
1. 1' TROWEL FINISH
2. 2% SLOPE OR AS NOTED ON PLANS
3. NEW A.C. PAVEMENT
4. STD. DET. 222 TYPE 'A' MODIFIED SINGLE CURB

SECTION C–C
1. R=3/4"
2. 6" MIN FORMED
3. 10' 3/4"
4. 6" MIN FORMED

DETAIL NO. 252
STANDARD DETAIL
ENGLISH
BUS BAYS
REVISED 01–01–2005
DETAIL NO. 252
NOTES:

1. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
2. CLASS 'B' CONCRETE, PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. ROUGH BROOM FINISH FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE.
NOTES:
1. ROUGH BROOM FINISH FULL WIDTH OF 4’
   WARP SECTION, EACH SIDE OF ALLEY ENTRANCE.
2. CLASS ‘B’ CONCRETE CONSTRUCTION PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
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. ROUGH BROOM FINISH FULL WIDTH OF 5' WARP SECTION, EACH SIDE SIDE OF ALLEY ENTRANCE.
3. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.
4. SUBGRADE PREPARATION, PER SECT. 301.
5. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
NOTES:

1. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.
2. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
3. SUBGRADE PREPARATION PER SECTION 301.

SECTION A—A
WATER VALVE, SURVEY MONUMENT, OR SEWER CLEAN OUT FRAME & GRADE ADJUSTMENT

1/2" ROUNDHEAD BOLT 2" LONG

1/2" ROUNDHEAD BOLT 2" LONG

3/8" CHAIN

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

SPACERS, AS REQUIRED

LOCK WASHER
FLATTEN BOLT END

DETAIL TYPICAL FOR BOTH FRAME AND COVER

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)

COVER SECTION A-A

EXISTING BITUMINOUS PAVEMENT

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

TOP OF SURVEY MONUMENT (BRASS CAP), WATER VALVE BOX (8" CONCRETE PIPE), SEWER PIPE (SIZE VARIES)
NOTE:
This detail covers water gate valves, 4" to 12" inclusive, regardless of type of pipe used. Larger lines to be detailed on plans.

WATER GATE VALVE

CONCRETE FOOTING
CLASS 'B' CONCRETE PER SECT. 725

WATER MAIN

BRICK PIER AS REQUIRED

CEMENT GROUTING UNDER VALVE (NON-SHRINKING)

CONCRETE FOOTING EQUAL TO TRENCH WIDTH

TRENCH WALL

TRENCH BOTTOM

WATER MAIN

SIDE OPERATOR

NOTE:
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.

BUTTERFLY VALVE

SHORT LENGTH
(APPROX. 3')

FINISH GRADE

X+4" MIN.

X+4" OR 12" MIN.

STANDARD JOINT

X

HUB-END GATE VALVE

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

X+4" MIN.
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.
LRN = SHORTEST LENGTH OF PIPE RESTRAINED TO THE RUN OF THE TEE FITTING (BOTH SIDES OF TEE).
### 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>
<th>DEAD ENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2°</td>
<td>LRN=0’</td>
</tr>
<tr>
<td></td>
<td>❖</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>18</td>
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<td>25</td>
<td>10</td>
<td>5</td>
<td>43</td>
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<td>8</td>
<td>32</td>
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<td>68</td>
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<td>12</td>
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<td>19</td>
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<td>80</td>
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<td>14</td>
<td>51</td>
<td>21</td>
<td>10</td>
<td>91</td>
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<tr>
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<td>57</td>
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<td>11</td>
<td>103</td>
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<td>18</td>
<td>62</td>
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<td>113</td>
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<td>24</td>
<td>79</td>
<td>33</td>
<td>16</td>
<td>145</td>
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</tbody>
</table>

### RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE WITH POLYETHYLENE WRAP

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE INCHES</th>
<th>HORIZONTAL BENDS</th>
<th>TEES</th>
<th>VERTICAL OFFSETS</th>
<th>DEAD ENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2°</td>
<td>LRN=0’</td>
</tr>
<tr>
<td></td>
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<td>4</td>
<td>26</td>
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<td>69</td>
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<td>14</td>
<td>74</td>
<td>31</td>
<td>15</td>
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<td>82</td>
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<td>263</td>
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<td>24</td>
<td>113</td>
<td>47</td>
<td>22</td>
<td>337</td>
</tr>
</tbody>
</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.
NUMBER "2", 1-1/4" HIGH, RAISED 1/8"

SEE SLOT DETAIL BELOW

TOP OF COVER

SLOT DETAIL

SECTION B-B

NOTE:
FOR CASTING SPECIFICATIONS
SEE SECT. 787.

SECTION A-A
SECTION A–A

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.
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
   TAMPERED (OR VIBRATED) IN
   TRUE FORMS.
2. USE CLASS 'AA' CONCRETE
   PER SECT. 725.

PLAN VIEW

SECTION A–A

SECTION B–B

<table>
<thead>
<tr>
<th>METER BOX DIMENSIONS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tr>
<td>DIMS</td>
<td>BOX NUMBER</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>19&quot;</td>
<td>24-1/2&quot;</td>
<td>29-1/2&quot;</td>
<td>33-1/2&quot;</td>
</tr>
<tr>
<td>B</td>
<td>12&quot;</td>
<td>16-3/4&quot;</td>
<td>18-1/2&quot;</td>
<td>22-3/4&quot;</td>
</tr>
<tr>
<td>C</td>
<td>11&quot;</td>
<td>12&quot;</td>
<td>13&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>D</td>
<td>14&quot;</td>
<td>19&quot;</td>
<td>23-3/4&quot;</td>
<td>27-3/4&quot;</td>
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<tr>
<td>E</td>
<td>16&quot;</td>
<td>22&quot;</td>
<td>26-1/2&quot;</td>
<td>30-1/2&quot;</td>
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<tr>
<td>F</td>
<td>9&quot;</td>
<td>13-1/4&quot;</td>
<td>15&quot;</td>
<td>19-3/4&quot;</td>
</tr>
<tr>
<td>G</td>
<td>7&quot;</td>
<td>11-1/4&quot;</td>
<td>12-3/4&quot;</td>
<td>17&quot;</td>
</tr>
<tr>
<td>H</td>
<td>9&quot;</td>
<td>14-1/4&quot;</td>
<td>15-1/2&quot;</td>
<td>19-3/4&quot;</td>
</tr>
<tr>
<td>I</td>
<td>6&quot;</td>
<td>8-3/8&quot;</td>
<td>9-1/4&quot;</td>
<td>11-3/8&quot;</td>
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<td>J</td>
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<td>1-3/4&quot;</td>
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<td>3-1/4&quot;</td>
<td>1-1/8&quot;</td>
<td>1&quot;</td>
<td>1&quot;</td>
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<tr>
<td>L</td>
<td>1/4&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>M</td>
<td>16&quot;</td>
<td>21&quot;</td>
<td>25-1/2&quot;</td>
<td>30-1/2&quot;</td>
</tr>
<tr>
<td>N</td>
<td>2-1/2&quot;</td>
<td>3-1/2&quot;</td>
<td>4&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>5/8&quot; OR 3/4&quot; METER</td>
<td>1&quot;</td>
<td>1-1/2&quot;</td>
<td>2&quot;</td>
<td>METER</td>
</tr>
</tbody>
</table>

DETAIL NO. 320
STANDARD DETAIL
ENGLISH
CONCRETE WATER METER BOXES
REVIEWED
DETAIL NO. 320
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

CAST-IN-PLACE OR PRECAST TOP SECTION

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

NO. 5 REBAR 6" O.C. EACH WAY

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. NORMALLY, 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>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; AND LESS</td>
<td>3</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4</td>
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<td>8&quot;</td>
<td>6</td>
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<td>10&quot;</td>
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<td>12&quot;</td>
<td>13</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23</td>
</tr>
</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

FINISH GRADE

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

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

6" MIN. TYP.
**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.
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.

7. IN LIEU OF THRUST BLOCKS, AN APPROVED JOINT RESTRAINT SYSTEM MAY BE USED.
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>
</tr>
</thead>
<tbody>
<tr>
<td>PIPE SIZE</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>4&quot; OR LESS</td>
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<td>6&quot;</td>
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<td>8&quot;</td>
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<tr>
<td>10&quot;</td>
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<tr>
<td>12&quot;</td>
</tr>
<tr>
<td>16&quot;</td>
</tr>
</tbody>
</table>

SECTION A-A

AREA REQUIRED FOR 90° BEND

1/2 AREA REQUIRED FOR 90° BEND

AREA FOR TEE

TOTAL AREA EQUALS AREA REQUIRED FOR TEE

THRUST BLOCK

CURB STOP

THRUHST BLOCK AREA (YxW)
<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>MIN BAR SIZE</th>
<th>&quot;A&quot; - DIMENSION HOOK</th>
<th>MIN. * BLOCK DIM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>#6</td>
<td>6&quot;</td>
<td>3' x 3' x 3'</td>
</tr>
<tr>
<td>8&quot;</td>
<td>#6</td>
<td>9&quot;</td>
<td>4' x 4' x 2.5'</td>
</tr>
<tr>
<td>12&quot;</td>
<td>#8</td>
<td>9&quot;</td>
<td>4' x 4' x 5'</td>
</tr>
</tbody>
</table>

* For 125 P.S.I. working pressure.

NOTES:

1. EITHER THIS DETAIL OR RESTRANM 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 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.

NOTE:

1. VALVE BOX TO BE SUPPORTED ON BRICKS TO PREVENT VERTICAL LOADS FROM BEING TRANSMITTED TO THE SMALL PIPE.
CAST IRON WATER METER BOX COVER PER DETAIL 311

GROUND LEVEL

CAST IRON WATER METER BOX COVER PER DETAIL 311

CONCRETE WATER METER BOX NO. 2 PER DETAIL 320

CAP

CONCRETE WATER METER BOX NO. 2 PER DETAIL 320

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

CONCRETE THRUST BLOCK PER DETAIL 380

2" COPPER PIPE

2" COPPER PIPE

WATER MAIN

2" TAPPED CAP (CAST IRON)

2" P.E. OR COPPER PIPE

2" P.E. OR COPPER PIPE

2" CORP STOP

2" BRASS COUPLING

2" BRASS ELL

2" BRASS COUPLING

2" BRASS ELL

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

TYPE 'A'

TYPE 'B'
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.

TYPE 'C'

FINISH GRADE
SEE NOTE 1

CONCRETE RING NOT REQUIRED WHEN ADJUSTED IN UNPAVED AREAS

8" THICK CONCRETE RING W/ 30" OUTSIDE DIA

SEE NOTE 2

VIEW A-A

TYPE 'A'

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

TYPE 'B'

(NOT SUBJECT TO VEHICULAR TRAFFIC)

FINISH GRADE

CLASS 'B' CONCRETE AS PER SEC. 725

COVER ONLY

2-1/2" A
SEE NOTE 3

ALTERNATE BRICKS

CONCRETE TO BE ON UNDISTURBED OR COMPACTED SOIL

8" CONCRETE PIPE, PIPE LENGTH CUT IN FIELD TO SUIT. (TYP.)

CONCRETE FRAME AND COVER AS PER DETAIL 270

6"-8" THICK & 40" DIA.

FOR UNPAVED STREETS AND ALLEYS

MEDIUM BROOM FINISH WITH RADially SCOREd MARKS (4 MIN.)

CLASS 'AA' CONCRETE AS PER SEC. 725

MEDIUM BROOM ON COVER (TYP.)

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

SECTION A-A

SECTION B-B

TYPE 'A'

TYPE 'B'

SEE SECT. 601 FOR BACKFILL & COMPACTION

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

1/3 (D) + 2" 6" MIN.

(D) DIA.

A

B

TRENCH WALLS

PIPE CONDUIT

(2) NO. 4 REBARS

3/4" O.D.

18" O.D.

2"

CONC Poured against wall of trench
JOINT METHOD WILL VARY DEPENDING ON EXISTING PIPE MATERIAL

NOT TO EXCEED ONE PIPE LENGTH

5' - 0" MIN

VARIES

VARIES

BACKFILL AND COMPACT PER SECTION 601

NEW DUCTILE IRON PIPE
CLASS 52 SIZE TO MATCH EXISTING PIPE

5' - 0" MIN

5' - 0" MIN

EXISTING CROSSING PIPE

NEW PIPE

ALTERNATE TO PIPE SUPPORT
WATER LINE EXCLUSION AND EXTRA PROTECTION ZONES*

GRAVITY SANITARY SEWER

ZONE A

ZONE B

PRESSURIZED SANITARY SEWER

ZONE A

ZONE B

NOTES:
ZONE A: NO WATER LINES ALLOWED/MINIMUM SEPARATION.
ZONE B: EXTRA PROTECTION REQUIRED FOR WATER LINES.
* REFER TO STANDARD 610, WATER LINE CONSTRUCTION.
WATER LINE EXTRA PROTECTION

DUCTILE IRON PIPE WITH RESTRAINED OR MECHANICAL JOINTS*

EXTRA PROTECTION DUCTILE IRON PIPE
(GRAVITY OR PRESSURIZED) SEWER LINE

NOTES:
* REFER TO MAG STANDARD SPECIFICATION SECTION 610.
ENCASEMENT FOR PIPE CROSSING*

NOTES:

1. CLASS 'C' CONCRETE AS PER SECTION 725.
*REFER TO MAG STANDARD SPECIFICATION SECTION 610.
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REPLACE ALL PAVING ACCORDING TO SECTION 336

NEW CONSTRUCTION

EXISTING SEWER CONNECTION OR MAIN BROKEN DURING EXCAVATION FOR NEW CONSTRUCTION

PLAN VIEW OF REPLACEMENT

COMPACTION SHALL BE DONE IN ACCORDANCE WITH SECT. 601

6" MIN. WHEN USING CAULDER CONNECTION

REPLACEMENT WHEN NEW TRENCH
MORE THAN 2' WIDE

6" MIN. WHEN USING BELL CONNECTION

EXCAVATE 6" BEYOND UNBROKEN BELL TO ALLOW ROOM FOR INSPECTION

18" MIN. WHEN USING BELL CONNECTION

COMPACTION SHALL BE DONE IN ACCORDANCE WITH SECT. 601

NEW CONSTRUCTION

12" MIN. SOLID BEARING ON EACH SIDE

SAW SOUND PIPE SQUARE

REPLACEMENT WHEN NEW TRENCH
2' WIDE OR LESS

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

CONC. PER SECT. 725, CLASS 'C'

DIAMETER AT BELL

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

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

M.H. STEPS,
SEE NOTE 2

BELL UP OR
DOWN, CONT.
OPTION

12" MAX.
12" TYP.
8" RING

FLOW

"RAM NEK" PLASTIC
GASKET OR EQUAL

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

BRICK
BRICK MAY
BE USED
IN LIEU
OF PRECAST
ADJUSTING
RINGS

30" MIN.
36" MAX.

\textbf{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 NOT REQUIRED IN 48" DIAMETER MANHOLE.
   STEPS REQUIRED IN 60" DIAMETER MANHOLE.

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

24" MAX.
12" MIN.

4" TYP.

6" TYP.

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

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 EQUAL

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.

FLOW

PRESSED
INTO BASE

CAST IN PLACE

CLASS 'A'
BASE PER SECT. 725, 505.

FLOW

(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"

3/8"

1/4"

2-1/8"

1-5/8"

1-3/4"

3/8"

2-1/4"

1"

2-1/4"

6"

VARI

ROUND OR SQUARE
BASE OPTIONAL

ADJUSTING RING DETAIL
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 RING & COVER
PER DETAIL 423,
424 & 425

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

CLASS 'A' CONCRETE
PER SECT. 725, 505

TROWEL FINISH
SMOOTH

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

PROVIDE PRECAST
ADJUSTMENT RINGS
OR BRICK AND MORTAR
COLLAR OR COMBINATION
NOT TO EXCEED
12" TOTAL

COMBINED CURB
AND GUTTER

PAVEMENT

VARIES

3" MIN

2" MAX

12" - 12"

8" - 8"

5" - 5"

1/2" - 1/2"

4" - 4"

MIN. VARIABLE

ROWLOCK RADIAL
COURSE (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. STEP IS 48" M.H. ONLY

SUBGRADE PREPARATION TO CONFORM TO SECT. 301 OR 601
CLASS 'AA' CONCRETE AS PER SECT. 725, 505 

M.H. WALL THICKNESS AND MATERIAL VARIES

MEDIUM BROOM FINISH WITH RADIALY SCORED MARKS (4 MIN.)

EXISTING OR RECENTLY INSTALLED PAVEMENT

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

CLASS 'A' CONCRETE PER SECT. 725, 505

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

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

ROWLOCK RADIAL COURSE

8" WALL TO 13' DEPTH
4" WALL Below 3'
12" WALL Below DEPTH

26-3/4" 8" 12" MAX.
44" MIN. 40" MAX.
3" TO 5" VARIABLE

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

M.H. FRAME AND COVER PER SECT. 625

PIPE SIZE & ELEVATION AS SHOWN ON PLANS

FLOW

48" I.D., PIPE 5-15"
80" I.D., PIPE 7-15"
NOTES:

1. WEIGHT OF CASTING SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED.

2. CASTINGS SHALL CONFORM TO SECT. 787.
**24" MANHOLE FRAME AND COVER**

- Bottom View - Top View
  - WT. (CL. 30) - 205 LBS
  - WT. (CL. 35) - 170 LBS

**30" MANHOLE FRAME AND COVER**

- Bottom View - Top View
  - WT. (CL. 30) - 224 LBS
  - WT. (CL. 35) - 219 LBS

---

**SECTION 'A-A' OF COVER**

- 26-1/8" x 31-7/8"
- Battery 3/16"
- 5/8" Symmetrical

**SECTION 'B-B' OF COVER**

- 2" x 31-1/2"
- Battery 1/8"
- 3/4" Symmetrical

---

**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 2" IN HEIGHT AND RAISED 1/8" 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

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

- Manhole Wall
- Stub Pipe
- Connection as required
- Concrete to spring line of pipe
- Masonry anchors min. one tie per 2 sq ft of contact area for drop connections to existing brick manholes only (Typ)
- Concrete to match new construction
- Connection as required
- Same dia.
- 45° mitered bend
- 4"
- Square, concrete encasement class 'C' sect. 725 or masonry encasement, grouted solid

**Concrete Foundations on New Manholes to Extend Under Drop Connection**

**Drop Sewer Connections**
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'.
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.

POLYPROPYLENE MANHOLE STEP
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. ELECTRONIC MARKER SHALL BE A 3M MODEL 1424-XR/D [4” DIAMETER SELF LEVELING MARKER BALL GREEN IN COLOR] OR APPROVED EQUAL OR AS REQUIRED BY THE LOCAL AGENCY.

2. MARKER SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER’S DIRECTIONS, 2’ BACK FROM THE END OF THE SEWER SERVICE STUB AND CINCH TIED TO PIPE OR ABOVE PIPE AS REQUIRED BY LOCAL AGENCY. AN ADDITIONAL MARKER SHALL BE INSTALLED AT EACH SERVICE STUB BEND.

3. ELECTRONIC MARKER SHALL BE RESTORED BY CONTRACTOR IF DISTURBED WHEN PRIVATE SERVICE LINE CONNECTION IS INSTALLED.

4. MARKER SHALL BE USED IN ADDITION TO A 2”x4” METAL STUD.

5. CONSTRUCTION DETAIL APPLIES WHERE CONTRACTOR BUILDS HOUSE CONNECTION. TAP EXTENDS TO PROPERTY LINE IN ALLEYS OR STREETS OR TO EASEMENT LINE.

6. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.

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

8. 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 DEFLECTION.

9. END OF TAP TO BE SEALED AND MARKED AS NOTED.
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. IF DEPTH REQUIRES, MINIMUM SLOPE CAN BE REDUCED TO 1/8″ PER FOOT PROVIDED STUB IS STAKED TO GRADE.
5. 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 FITTING JOINTS TO ENSURE ZERO DEGREES ANGULAR JOINT DEFLECTION.
6. END OF TAP TO BE SEALED AND MARKED AS NOTED.
7. ELECTRONIC MARKER SHALL BE A 3M MODEL 1424–XR/D [4″ DIAMETER SELF LEVELING MARKER BALL GREEN IN COLOR] OR APPROVED EQUAL OR AS REQUIRED BY THE LOCAL AGENCY.
8. # 14 BARE COPPER LOCATOR WIRE ACCESSIBLE AT R/W AND AT PROPERTY OWNER CLEANOUT BOX NO GREATER THAN 4′ DEEP.
9. STAMP OR WELD THE LETTER “S” ON LID OF METER BOX.
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 MIN. SLOPE IF COVER WILL BE LESS THAN 5' AT PROPERTY LINE.
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6. END OF TAP TO BE SEALED AND MARKED.
7. ELECTRONIC MARKER SHALL BE A 3M MODEL 1424-XR/ID [4" DIAMETER SELF LEVELING MARKER BALL GREEN IN COLOR] OR APPROVED EQUIVAL OR AS REQUIRED BY THE LOCAL AGENCY.
8. INSTALL RAISED 4" THREADED PLUG IN CLEANOUT INCORPORATING 3M MODEL 1414 ELECTRONIC DISC MARKER, GREEN IN COLOR. LOCATOR PLUG TO BE GPX PRODUCTS MODEL #228-0004 DM OR APPROVED EQUAL.
9. STAMP OR WELD THE LETTER "S" ON LID OF METER BOX.
SECTION A–A

CURB STAMP ROLLED CURB

SECTION A–A

CURB STAMP VERTICAL CURB

NOTES:

1. STAMP TOP OF CURB WITH 4” TALL BY 1/4” DEEP "S" TO DESIGNATE SEWER SERVICE LINE CROSSING.
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

8" C.I. FRAME AND COVER DET. 270

PAVED STREETS AND ALLEYS

MIN. / MAX.

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.

STATION AND LENGTH SHOWN ON PLANS TO THIS POINT

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

CLEANOUT INSTALLATION

SEWER TAP AT CLEANOUT
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DOUBLE PIPE HEADWALL

HEADWALL DIMENSIONS

<table>
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<tr>
<th>NOMINAL PIPE SIZE</th>
<th>L⁴</th>
<th>L⁵</th>
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* NOMINAL PIPE SIZE GIVEN FOR REINFORCED CONC. PIPE.

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.

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.

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

PIPE SIZE \[ W \]
12" - 21" INCL. \[ 11" \]
24" - 42" INCL. \[ 13" \]
### 1:1 1/2 EMBANKMENT SLOPE

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* (IN) refers to inlet
* (OUT) refers to outlet

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**INLET HEADWALL**

**CONSTR. JOINT**

2 - NO. 6 BARS FORM AS SHOWN

**INLET HEADWALL FACE ELEVATION**

**OUTLET SIMILAR**

**CONCRETE SHALL BE CLASS 'A' PER SECT. 725**

**SECTION A-A**

**SECTION B-B**

**CMP BEVEL DETAIL**

FOR CMP, INSTALL 3/4" X 6" HEX HEAD BOLTS, 1"-6" C TO C

**1:1 1/2 EMBANKMENT SLOPE**

**1:4 EMBANKMENT SLOPE**
2 - NO. 6 BARS BEND TO CONFORM TO PIPE

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.

PIPE  |  I.D.  | L     | E     | F     | (APPROX)
----- | ------ | ----- | ----- | ----- | ------
 18"  | 2'-0"  | 1'-0" | 1'-9" |
 24"  | 2'-0"  | 1'-0" | 1'-9" |
 30"  | 3'-0"  | 1'-6" | 2'-7" |
 36"  | 4'-0"  | 2'-0" | 3'-6" |
 42"  | 5'-0"  | 2'-6" | 4'-4" |
 48"  | 6'-0"  | 3'-0" | 5'-2" |
 54"  | 7'-0"  | 3'-6" | 6'-1" |
 60"  | 8'-0"  | 4'-0" | 6'-11" |

ELEVATION

PLAN

SECTION A-A

SECTION B-B
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, 1/2" 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' CONCRETE PER SECT. 505, 725 & 727.

**BLOCK WALLS**

BLOCK HEADWALL TO HAVE ONE NO.4 REINFORCED 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.

---

**Type 'A'**

- Paint cover both sides one prime coat, two finish coats, sect. 790, paint no. 9
- 10 guage sheet steel cover
- Handle extends 6" below top when gate is open
- Standard concrete pipe
- Concrete as required to secure gate
- Finish grade variable

---

**Type 'B'**

- (2) 5/16" holes 4" o.c.
- 1/4" rod handle
- 4" diameter pipe shown on plans
- (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 guage)

---

**See Note 1**

**See Note 2**

**See Note 3**

---

**Dimensions:**

- 10" minimum
- 52" maximum
- Headgate to be swanson 800 series or approved equal
- Form conc. around end of pipe behind headgate frame
PLAN OF COVER

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.

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.
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
DETAI 524

12"

1/2"

1/2"

1/2"

BID ITEM

CONCRETE PIPE
SECT. 735 & 736

PLUG END PER
DETAI 427

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

SOW, IDEAL,
WATERMAN ALFALFA
VALVE OR ESUAL

GROUT AS PER
DETAI 524

CONCRETE TEE
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 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 SPILLS 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.

SECTION A–A

SELECT MATERIAL

C.M.P. PER A.A.S.H.T.O. SPEC. M-36, EXTERIOR COATING AND INTERIOR COATING PER A.A.S.H.T.O. SPEC. M-150, MAY BE TYPE 'A' OR 'D'

TYP. BOTH SIDES AND BOTTOM

STANDARD THREAD (COARSE)

WELD ALL AROUND

1/2"

1/4"

1/16"

3/4"

C.M.P. MAIN STORM DRAIN

C.M.P. CONNECTION TO MAIN STORM DRAIN

24" PIPE AND SMALLER

12 GAUGE BITUMINOUS COATED GALVANIZED METAL PLATE

BAND DETAIL

2"x2"x12" GUAGE WELDED WIRE FABRIC WITH 12" CIRCUMFERENTIAL OVERLAP

1:2 MORTAR

8"

6"

2-1/2"
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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PLAN

SECTION A-A

MAN HOLE SHAFT PER DETAIL 522

48" DIA.

4"

4"

ENCASEMENT

PRECAST PIPE WITH VERTICAL STUB

SECTION B-B

STORM DRAIN MANHOLE BASE
(51" OR LARGER)
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 MACHINED 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.

6. BOTH 24" AND 30" FRAMES TO BE ANCHORED AS FOLLOWS:

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

8. 1/4" STAINLESS STEEL CABLE. SECURED WITH CABLE CLAMPS.

9. 1/2"x9" HOOK AND EYE TURNBUCKLE.

10. 1/2" EYE BOLT WITH 1" DIA. EYE.

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

12. 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.

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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.

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</table>

* 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 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. 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 4:1 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.

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

PLAN VIEW

SECTION B--B

SECTION A--A

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
SECTION D–D

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 333–1 FOR ADDITIONAL DIMENSIONS, REBAR PLACEMENT AND OTHER INFORMATION TO CONSTRUCT CATCH BASIN.

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

PLAN VIEW
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 ELECTRIC 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

BEARING BARS:
3-1/2" x 1/2" x 40"
2" C. TO C., 14 EACH

END BARS:
2-1/2" x 1/4" x 26-1/2"
2 EACH

CROSS BARS:
1/2" DIA. x 26-1/2" ROD
4" C. TO C., 9 EACH
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GRATE DETAIL
GRATE OPENING: 4.344 SQ. FT.

CROSS BARS:
1/2 DIA. x 24-7/8" ROD, 4" C. TO C., 9 EACH

BEARING BARS:
3-1/2"x1/2"x39-1/2"
1-7/8" C. TO C., 14 EACH

END BARS:
2-1/2"x1/4"x24-7/8"
2 EACH.
NOTES:

1. ADJUSTABLE CURB, FRAME AND GRAVING 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.

6. ALL CONCRETE, CLASS 'A' AS PER SECTION 725.
BOLT CURB BOX TO FRAME
WITH 1/2" x 13" x 2-1/2" STEEL
HEX BOLTS, NUTS AND WASHERS

DIRECTION OF FLOW

CURB BOX ADJUST.
TO 9" HIGH

SECTION B-B

CROSS-SECTIONAL
AREA: 1.53 SQ. IN.

NOTE:
DIMENSIONAL CHANGE REQUIRED FROM 3'-5"
WIDTH TO 3'-0" AND 1'-9" DEPTH TO 2'-0"
FRAME WEIGHT 209 LBS; GRATE 140 LBS; CURB BOX 92 LBS.

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

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.

6. TOTAL COMBINED CLEARANCE BETWEEN FRAME AND GRATE IS 1/2".

NOTE: SEE DETAIL 534-1 FOR THICKNESS AND SLOPE DIMENSIONS OF BOTTOM.
NO. 4 REINFORCEMENT BARS, 12" SPACING, WELDED TO NOSE ANGLE WITH 3/8" WELDS BOTH SIDES

NOSE ANGLE
\[ 3" \times 4" \times 1/2" \]

1/4" DIAMOND FLOOR PL COVER

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

EQUAL DISTANCE

SECTION C-C
FOR DETAILS 531, 532 AND 533

PROTECTION BAR
SEE THIS DETAIL

SECTION D-D

3/8" " GALVANIZED BAR

1" REINF. STEEL ANCHOR BARS, WELDED TO \( \angle \) FRAME

DOWEL BAR

3" 1/4" DIAMOND FLOOR PL COVER

STEEL FILLER BLOCKS WELDED TO FRAME

L1-1/4" X 1-1/4" X 1/4" IRON FRAME

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.

SECRETARY

MARICOPA ASSOCIATION OF GOVERNMENTS

DETAIL NO. 536-1 STANDARD DETAIL ENGLISH COMMON DETAILS AND SECTIONS FOR CURB OPENING CATCH BASINS

REVISED DETAIL NO. 536-1
PLAN VIEW

SECTION A-A

FURNISH FOR EACH SIDE OF HANDLE
1 EACH 304-S.STL. SPRING
2-1/2" x 17/32" I.C. x 3/32"
2 EACH 1/2" HEX NUT
3 EACH 1/2" FLAT WASHER
1 EACH 1/2" LOCK WASHER

SECTION B-B

NOTE:
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.

SECTION C-C
ALL CONCRETE SHALL BE CLASS ‘A’ PER SECT. 725.
EXPOSED EDGES SHALL BE FINISHED WITH A 1/2"
RADIUS.

DETAIL OF ANGLE FRAME
GRATE SUPPORT

1/2" R

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

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

1/4" x 1-3/4" x 24"
CHAIN

3-5/8"

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

PIECE SIZE AS
REQUIRED BY
PLANS

SLOPE FLOOR
TO OUTLET

SECTION A–A

SECTION C–C

DETAIL NO.
537

STANDARD DETAIL
ENGLISH

CATCH BASIN – TYPE 'G'

REvised
01–03–2002

DETAIL NO.
537
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 1/2" ANGLE IRON FRAME
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

SECTION A-A

SECTION A-A

24" PIPE (NOMINAL)
(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>
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<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
**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 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 roack of 0.093” 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.
NOTES:

1. INSTALL WHEN REQUIRED BY PLANS, SPECIFICATIONS, OR APPROVED BY THE ENGINEER.

2. SEE PROJECT PLANS FOR CATCH BASIN DETAILS AND PAVEMENT STRUCTURAL SECTION.
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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.

PIPE DIAMETER | APPROXIMATE WEIGHT (LBS.) | Dimensions - Inches | Approximate Slope |
---|---|---|---|
24" | 1520 | T 3, A 9-1/2, B 43-1/2, C 30, E 73-1/2, F 48 | 3 |
27" | 1930 | T 3-1/4, A 10-1/2, B 49-1/2, C 24, E 73-1/2, F 54 | 3 |
30" | 2190 | T 3-1/2, A 12, B 54, C 19-3/4, E 73-3/4, F 60 | 3 |
36" | 4100 | T 4, A 15, B 63, C 34-3/4, E 97-3/4, F 72 | 3 |
42" | 5380 | T 4-1/2, A 21, B 63, C 35, E 98, F 78 | 3 |
48" | 6550 | T 5, A 24, B 72, C 26, E 98, F 84 | 3 |
54" | 8240 | T 5-1/2, A 27, B 65, C 33-1/4, E 98-1/4, F 90 | 2 1/2 |

LENGTH OF PIPE PER PLANS

PLAN

SECTION A-A

FRONT ELEVATION

SPACING FOR MULTIPLE INSTALLATION

RIGHT ANGLE CULVERT

SKEWED CULVERT

CULVERT LENGTH

EMBANKMENT SLOPE

ROADWAY

NORMAL TOE OF SLOPE

REVIEWED

STYLE

EASTERN CULTURE

STANDARD DETAIL

ENGLISH

END SECTION-REINFORCED CONCRETE PIPE

DETAIL NO. 545

STANDARD DETAIL

ENGLISH

END SECTION-REINFORCED CONCRETE PIPE

DETAIL NO. 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 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 & 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 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"

ELEVATION LOOKING UPSTREAM
**TYPICAL GABIONS**

**PLAN**

- **LENGTH**
  - PER PLANS

**ELEVATION**

- **VARIETY**
  - EXST GROUND LINE OR STREAM BED
  - 2'-0" MIN.

- **FLOW**
  - Q SWALE OR DITCH
  - 1'-2" MIN.

**PLAN**

- **AS CALLED FOR ON PLANS**

**ELEVATION**

- **TYPE 1 RIPRAP**

**PLAN**

- **TYPE 2 RIPRAP**

**TYPICAL GABIONS**

- **CUT BANK TO DEPTH "C" BEFORE PLACING GABIONS**

- **EXST GROUND LINE OR STREAM BED**

- **GABIONS FILLED WITH STONE**

- **PLAN**

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<thead>
<tr>
<th>NOMINAL SIZE COMBINATIONS</th>
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<tbody>
<tr>
<td>LENGTH</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>6'</td>
</tr>
<tr>
<td>9'</td>
</tr>
<tr>
<td>12'</td>
</tr>
</tbody>
</table>

**NOTES:**

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

2. GROUT FOR RIPRAP MAY BE PNEUMATICALLY PLACED MORTAR.