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* NEWLY REVISED.
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 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, SECTION CORNERS, SECTION 1/4 CORNERS, CENTER OF SECTIONS, AND AT OTHER POINTS AS SHOWN ON PLANS.

2. TYPE 'B' TO BE USED (EXCEPT WHERE TYPE 'A' IS SPECIFIED) AT INTERSECTION OF STREET CENTERLINES, PC'S, PT'S AND PI'S OF CURVES, SECTION 1/16 CORNERS, SUBDIVISION CORNERS, CHANGE IN ALIGNMENT OF SUBDIVISION BOUNDARIES, AND AT OTHER POINTS AS SHOWN ON PLANS.

3. FOR UNPAVED STREETS AND ALLEYS SET TOP OF MARKER SIX INCHES BELOW FINISHED GRADE.

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

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

6. FLATTENING THE BOTTOM 2" OF THE GALVANIZED PIPE IS OPTIONAL.

7. TOP OF CONCRETE POST IS CHAMFERED 3/4" EXCEPT WHEN SET FLUSH WITH PAVEMENT.

8. THE CAP SHALL SHOW THE POINT SURVEYED BY A PUNCH MARK OR SCRIEBED CROSS AND THE CAP SHALL BE STAMPED WITH THE YEAR AND THE REGISTERED LAND SURVEYOR'S (RLS) REGISTRATION NUMBER.

9. WHEN APPLICABLE, THE CAP SHALL BE STAMPED WITH THE APPROPRIATE PUBLIC LAND MARKING PER CURRENT MANUAL OF INSTRUCTIONS FOR THE SURVEY OF PUBLIC LANDS OF THE UNITED STATES, PREPARED BY THE BUREAU OF LAND MANAGEMENT.

10. SUBMIT TO THE ENGINEER A COPY OF THE RECORDED CORNER RECORD OR RESULTS OF SURVEY TO DOCUMENT COMPLIANCE WITH THE ARIZONA BOARD OF TECHNICAL REGISTRATION REQUIREMENTS.

CAP DETAIL

TYPE 'C'

DETAIL NO. 120
STANDARD DETAIL
ENGLISH
SURVEY MARKER

REVISED 01-01-2015
DETAIL NO. 120
NOTES:
1. LOCATE PAVEMENT MARKER IN CENTER OF TRAVEL LANE AND ALIGN WITH HYDRANT.
2. FOR MULTIPLE LANE ROADS LOCATE PAVEMENT MARKER IN LEFT MOST THROUGH TRAFFIC LANE.
3. ADJUST MARKER LOCATION TO BE LOCATED OUTSIDE OF ANY DELINEATED CROSSWALK AREA.
4. FOR HYDRANT LOCATED ON FAR SIDE OF RAISED MEDIAN, LOCATE PAVEMENT MARKER ON TOP OF MEDIAN CURB ALIGNED WITH HYDRANT.
5. OMIT FOR CUL-DE-SAC GREATER THAN 250' IN LENGTH.
6. FIRE HYDRANT PAVEMENT MARKERS SHALL BE 2-WAY RETROREFLECTIVE BLUE: ADOT TYPE B8, 911A-BLUE BY FIRE LITE AMERACE CORPORATION, OR APPROVED EQUAL.
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.
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.
FILL WITH GROUT AND CROWN TOP

6" RETROREFLECTIVE ENGINEER’S TAPE (3M HIGH DENSITY YELLOW PRESSURE SENSITIVE TAPE OR APPROVED EQUIVALENT), TYP.

4" OR 6" DIA. STEEL GUARD POST, SCH. 40, GALVANIZED

¼" x 5½" DIAMETER CAP PLATE
SEAL WELD ALL AROUND

5" DIA. STEEL GUARD POST SCH. 40

½" A-36 STEEL COLLAR
5½" ID X 7½" OD, FILLET WELD TO GUARD POST BOTH SIDES, ALL AROUND

1" SLEEVE PROJECTION

CLASS B CONCRETE PER SECT. 725

6" DIA. X 34" SCH. 40 GROUND SLEEVE WITH ¼" X 6½" CAP PLATE, SEAL WELD ALL AROUND

3" MIN. TYP.

TYPE 1 PERMANENT

EXISTING GRADE, TYP.

36" MINIMUM

VARIES PER PLANS

6" MINIMUM

VARIES PER PLANS

REMOVAL HOLES
SEE NOTE 2

FINISHED GRADE, TYP.

3" CLEAR

3" MIN. TYP.

30" GAP

4" SLICE

30"

TYPE 2 REMOVABLE

NOTES

1. BOLLARDS SHALL HAVE A HEIGHT OF 3 FEET OR BE EQUAL TO THE HEIGHT OF THE BACK SCREEN WALL OF BIN ENCLOSURES. POSTS SHALL BE PLACED A MINIMUM OF 4" FROM THE WALL.

2. REMOVABLE POSTS SHALL HAVE 1"dia. HOLES DRILLED THROUGH AT A DISTANCE ⅔ THE OVERALL POST LENGTH FROM TOP.

3. REMOVABLE POST – GRIND SMOOTH ALL SHARP EDGES PRIOR TO GALVANIZATION. GALVANIZE PER ASTM A54 AFTER FABRICATION.
TYPE 1 SURFACE MOUNT

TYPE 2 GROUND MOUNT

NOTES

1. CONTRACTOR SHALL CLEAN ROADWAY SURFACE PRIOR TO PLACEMENT OF FLEXIBLE TUBULAR MARKER.
2. FLEXIBLE TUBULAR MARKERS SHALL BE CEMENTED TO THE PAVEMENT SURFACE WITH AN EPOXY ADHESIVE IN ACCORDANCE WITH THE TUBULAR MARKER MANUFACTURER'S SPECIFICATIONS.
3. YELLOW TUBULAR MARKERS SHALL HAVE A YELLOW POST AND YELLOW "HIGH INTENSITY GRADE" RETROREFLECTIVE SHEETING. ORANGE TUBULAR MARKERS SHALL HAVE AN ORANGE POST AND WHITE HIGH INTENSITY RETROREFLECTIVE SHEETING.
4. POST SHALL BE FLEXIBLE, HIGH IMPACT RESISTANT PLASTIC MATERIAL.
NOTES:

1. POSTS AND RAILS SHALL BE 1.5" SCHEDULE 40 HOT-DIPPED GALVANIZED STEEL PIPE ASTM A 53, GRADE B (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.

7. SAFETY RAIL IS NOT TO BE USED AS A PEDESTRIAN BRIDGE RAIL.

**ELEVATION**

**TYPE 1**  
ANCHOR PLATE DETAIL

**TYPE 2**  
EXPANSION BOLT DETAIL

**TYPE 3**  
PIPE SLEEVE DETAIL

**TYPE 4**  
GROUND INSTALLATION DETAIL

**NOTE:** SEE PLANS FOR ANCHORAGE DETAILS FOR ATTACHMENT TO SINGULARLY REINFORCED AND NON-REINFORCED WALLS.

DETAIL NO. 145  
STANDARD DETAIL ENGLISH  
SAFETY RAIL  
REVISED 01-01-2011  
DETAIL NO. 145
5/8" HOLE FOR 1/2" DIA. PIN, 24" LONG, HOT ROLLED STEEL

TYPE A

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

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

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

RADIUS 3/4" MIN. - 1" MAX.
NO.3 REINFORCING BAR AS PER SECTION 727
69" FOR TYPES 'A' AND 'B-3'
45" FOR TYPE 'B-2'

TYPICAL SECTION

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; FLAT</td>
<td>3/16&quot;x3/4&quot; FLAT</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 772, RESPECTIVELY. SEE TABLE 772-1 FOR WEIGHTS OF MEMBERS.
LONGITUDINAL TRENCH
(TRENCH IN PAVEMENT PARALLEL TO TRAFFIC)

TRANSVERSE TRENCH
(TRENCH IN PAVEMENT NOT PARALLEL TO TRAFFIC)

EXISTING S/W TYP.

EXISTING PAVEMENT

Q OF STREET

EXISTING C/G TYP.

TRENCH

EXISTING S/W TYP.

EXISTING PAVEMENT

Q OF STREET

EXISTING C/G TYP.

TRENCH

CURB, GUTTER, CONCRETE PAVEMENT OR CROSSWALK, DECORATIVE PAVERS, OR EXISTING PATCH

EXIST. AC

TYPE "A", TYPE "B" OR "T-TOP" TRENCH REPAIR

MINIMUM WIDTH AT SPRINGLINE ON EACH SIDE OF PIPE

PIPE EMBEDMENT ZONE

INFLAT BACKFILL

FOUNDATION

MINIMUM WIDTH AT SPRINGLINE ON EACH SIDE OF PIPE

12" MIN

TOP OF PIPE, CONDUIT OR CONCRETE-ENCASED DUCT BANK

FINAL BACKFILL

TRENCH WIDTH

TRENCH CROSS-SECTION DETAIL

REMNANT PAVEMENT REMOVAL

NOTES:
1. SEE SECTION 601 FOR TRENCH EXCAVATION, BACKFILLING AND COMPACTION REQUIREMENTS.

2. SEE MAG DETAIL 200-1 FOR DETAILED TRENCH REPAIR REQUIREMENTS FOR TRENCH TYPES NOTED HERIN.

3. SEE MAG DETAIL 211 FOR REQUIREMENTS REGARDING THE USE OF PLATING TRANSVERSE TRENCHES. USE OF STEEL PLATES SHALL NOT EXCEED 72 HOURS AFTER COMPLETION OF BACKFILL AND PRIOR TO FINAL PATCHING.
TYPE 'A'

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

12"

6"

SUBJECT TO VEHICULAR TRAFFIC
COMPACT TO 95%

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"

SUBJECT TO VEHICULAR TRAFFIC
COMPACT TO 95%

SAFETY EDGE

OVERLAY OR
FINISHING COURSE
TACK COAT

EXISTING PAVEMENT
OR NEW PAVEMENT
AGGREGATE BASE
PER STANDARD
SECT. 310
GRADING PER
STANDARD
SECT. 301

30°± 5°

EDGE ROADWAY PAVEMENT

UNPAVED SHOULDERS
RECOMPACT TO 95%

TACK COAT

COMPACTED SUBGRADE

5" MIN.
PAVED ALLEY DETAIL

THICKENED EDGE (OMIT IF MATCHING TO EXISTING ASPHALT AREA)

LENGTH BETWEEN CONTRACTION JOINTS - 15'
EXPANSION JOINTS - 100' MAX.

UNPAVED ALLEY DETAIL

GRADE ALLEY FULL WIDTH
AND INSTALL 6" A.B.C. OR CRUSHED GRANITE AS INDICATED

RESIDENTIAL ALLEY DETAIL

3" CROWN EXCEPT WHERE
DIRECTED OTHERWISE IN WRITING BY THE ENGINEER

LESS THAN 20'

2" ASPHALTIC CONC. SECT. 710
3/8" FLATHEAD STAINLESS STEEL CAP SCREW COUNTERSINK (6 EACH MIN.)

EXPANSION JOINT

SEE NOTE 5

SEE NOTE 1

TRANSITION FROM ROLL CURB TO VERTICAL CURB

SECTION 'A—A'

SECTION 'B—B'

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

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

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

STEEL DIAMOND PLATE A-36

EXPANSION JOINT

16"

1/2"

2"

(2'-6" MAXIMUM)

SEE DETAIL C

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

DIAMOND PLATE

GUTTER FLOW LINE

SLOPE=1.5%

LIP OF GUTTER

EXPANSION JOINT

SEE NOTE 3
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.
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 RADIUS-TYPE "S": WxLxR1xR2=SURFACE-TYPE;
   (12' x 20' x 15'-A.C.-TYPE "S" TURNOUT).
   OR IT MAY BE NOTED ON PLANS IN CONVENTIONAL TERMS.

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

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

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

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

* UNLESS OTHERWISE NOTED ON PLANS
SECTION A–A

SECTION B–B

SECTION C–C SPILLWAY

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.
NO. 4 REINFORCEMENT WELDED TO ANGLE SEE DETAIL 536-1, SECTION C-C

Nose angle \( \geq 3" \times 4" \times 1/2" \)

STANDARD CURB BATTER

CONCRETE EDGE

1/4" x 3-1/2" x 5-1/2"

3/4" 2" 3/4" 3/4" 3/4"

5-1/2" 3-1/2"

NO. 4 REINF. BAR (TYP)

RAIL POST

WELD PLATE

SAFETY RAIL SEE DETAIL 145 & NOTE 5

SEE DETAIL ABOVE LEFT

(SEE PLAN VIEW)

SEE NOTE 6

S=1.5%

S=3.4%

5" SAFETY RAIL OFFSET

SECTION D-D

NOTE:

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. 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" OR LESS THAN 3.00" 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 COMPACTON 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 MILL 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 24". THE ASPHALT SHALL BE REPLACED WITH THE SAME ASPHALT AND AT THE SAME TIME AS THE HUMP ASPHALT. FOR LONGITUDINAL JOINTS, THE EXISTING ASPHALT SHALL BE OVERLAID AND TAPERED IN 12". CROSS-SECTION DIMENSIONS REFLECT DISTANCES FROM THE SURFACE OF EXISTING ASPHALT.

8. CONTACT THE AGENCY (OR INSPECTOR) ONE WEEK PRIOR TO INSTALLATION TO COORDINATE PAVEMENT MARKINGS AND SIGNING.
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 AXLELOADING OF 12 TONS WITH A 30% IMPACT FACTOR WAS USED. THE AXLE LENGTH IS 6 FEET. THEREFORE THE NUMBER OF WHEELS CARRIED BY A PLATE DEPENDS ON THE ROADWAY WIDTH.

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

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

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

NOTES:
1. DIMENSIONS ARE NOMINAL.
2. EDGES SHALL BE CUT TO A NEAT VERTICAL FACE.
3. PLACE CLSM BACKFILL IN ACCORDANCE WITH SECTION 604.
4. PLACE AGENCY-APPROVED ASPHALT CONCRETE IN MAXIMUM 2" LIFTS.

SECTION A-A

6" MIN. THICKNESS OR MATCH EXISTING, WHICHER IS GREATER.

ASPHALT VARIABLE THICKNESS
FINAL BACKFILL MATERIAL OPTIONS:
- NATIVE SOIL PER SECTION 601 (TYPE B ONLY)
- ABC PER SECTION 702 (TYPE B ONLY)
- 1/2-SACK CLSM PER SECTION 728
HIGHEST EXISTING UTILITY(S)
MATERIAL TO CONFORM TO SECTION 601

SECTION VIEW

TYPE B PAVEMENT REPAIR

NOTES:
1. CUT, REMOVE AND REPLACE PAVEMENT PLUG IN ACCORDANCE WITH SECTION 355.
2. PLACE BACKFILL IN ACCORDANCE WITH SECTION 355.
3. BONDING MATERIAL SHALL BE AS SPECIFIED IN SECTION 708.

SECTION A-A

1-1/2" TO 2" COMPACTED CRUSHED GRAVEL (ASTM C33 #8)

BONDING MATERIAL
PAVEMENT PLUG

18"-24"

DRILLED/CORED PILOT HOLE

PLAN VIEW

PLAN VIEW

18"-24"

1' A

A

A

1'
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.
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)
1. TRANSITIONS WILL BE PAID FOR AS THE PREDOMINANT TYPE OF CURB AND GUTTER BEING TRANSITIONED. WHEN TYPE 'A' CURB AND GUTTER ARE USED AT CURB RETURNS AND TYPE 'C' CURB AND GUTTER IS PREDOMINANTLY USED ELSEWHERE, THE TYPE 'A' TO TYPE 'C' TRANSITIONS SHALL BE MEASURED AND PAID FOR AS TYPE 'C' CURB AND GUTTER.
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 SECTION 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

1/2" EXPANSION JOINT FILLER SHALL BE BITUMINOUS TYPE PREFORMED, ASTM D1751

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 SECTION 340.
4. CLASS 'B' CONCRETE PER SECTION 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

TYPE 'A'

TYPE 'B'
NOTE:
LENGTH OF TRANSITION SHALL BE
EQUAL TO RADIUS OF MEDIAN NOSE,
(5' MINIMUM). FOR LOCATION
SEE PLANS.

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

1. 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 f' = 300 psi
   TERMINAL SERVICABILITY INDEX Ip of 2.5 OVER 20 YEARS
   AND 1 MILLION TOTAL EQUIVALENT 18-KIP SINGLE-AXLE
   LOAD APPLICATIONS
NOTES:

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECTION 340.
2. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, PER SECTION 729.
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 JOINTS SHALL CONFORM TO SECTION 340, BE INSTALLED PRIOR TO CONCRETE PLACEMENT, AND AT A MAXIMUM SPACING OF 50'.
5. CONCRETE SHALL BE CLASS 'B' PER SECTION 725.
6. WHEN SIDEWALK AND ADJACENT CURB ARE CONSTRUCTED MONOLITHICALLY, ALL EXPANSION AND CONTRACTION JOINTS SHALL EXTEND ACROSS THE CURB.
**NOTES:**
1. CLASS 'B' CONCRETE PER SECTION 725.
2. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
3. SIDEWALK SURFACE TO MATCH
   1½% SLOPE FROM TOP OF CURB
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
5. DETAIL IS ADA COMPLIANT FOR $S_G \leq 2\%$.

**TYPE 'A' (DETACHED SIDEWALK)**

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

SECTION B-B

TYPE 'B'

Curb Ramps

Notes:
1. Class 'B' Concrete per Section 725.
2. Expansion Joints Shall Conform to Section 340.
3. Detectable Warning is to Comply with the Jurisdictional Agency's requirements.
4. Increase 'L' or 'D' as Needed to Have the Top of Ramp Form a Radial Line.
5. When Top of Ramp is Less Than 4" from Curb Return, Extend Ramp to the Curb Return.
6. Detail is ADA Compliant for $S_g \leq 2\%$.

<table>
<thead>
<tr>
<th>Curb Height</th>
<th>D (min)</th>
<th>$S_g \leq 1%$</th>
<th>$S_g \leq 2%$</th>
</tr>
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<tbody>
<tr>
<td>4&quot;</td>
<td>4.0'</td>
<td>4.0'</td>
<td>4.5'</td>
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<tr>
<td>6&quot;</td>
<td>6.0'</td>
<td>6.0'</td>
<td>6.5'</td>
</tr>
<tr>
<td>7&quot;</td>
<td>7.0'</td>
<td>6.5'</td>
<td>7.5'</td>
</tr>
</tbody>
</table>

$S_g =$ Maximum Gutter Slope Within Ramp Limits
NOTES:
1. CLASS 'B' CONCRETE CONSTRUCTION PER SECTION 725.
2. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENT.
3. RAMP LONGITUDINAL SLOPE SHALL BE 12:1 OR FLATTER.
4. RAMP CROSS SLOPE SHALL BE 1\%.
5. DETAIL IS ADA COMPLIANT FOR CURB RADII ≥ 20' AND GUTTER SLOPE ≤ 2.0%.

DETAIL

SECTION B-B

SECTION A-A

TYPE 'C'

DETAIL NO. 235-3

STANDARD DETAIL
ENGLISH

CURB RAMPS

REVISED 01-01-2012

DETAIL NO. 235-3
**NOTES:**

1. CLASS 'B' CONCRETE PER SECTION 725.
2. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
3. SIDEWALK SURFACE TO MATCH 1 1/2% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY’S REQUIREMENTS.
5. DETAIL IS ADA COMPLIANT FOR $S_0\leq 2\%$.

---

**SECTION A-A**

**TYPE 'D' DETACHED SIDEWALK**
SECTION B-B

SECTION A-A

RAMP CURB HEIGHT TO MATCH S/W ELEVATION AT EACH END

ROUGH BROOM FINISH, USE A RIPPLE SURFACE PATTERN

EXPANSION JOINT

CURB AND GUTTER DETAIL 220, TYPE A

BOTTOM OF RAMP CURB WHEN FORMED & POURED SEPARATELY

RIGHT-OF-WAY LINE

10:1 SIDEWALK TAPER TYPICAL BOTH SIDES

SIDEWALK WIDTH AS SHOWN ON PLANS

D (min)

<table>
<thead>
<tr>
<th>CURB HEIGHT</th>
<th>$S_o \leq 1%$</th>
<th>$S_o \leq 2%$</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>4.0'</td>
<td>4.5'</td>
</tr>
<tr>
<td>6&quot;</td>
<td>6.0'</td>
<td>6.5'</td>
</tr>
<tr>
<td>7&quot;</td>
<td>6.5'</td>
<td>7.5'</td>
</tr>
</tbody>
</table>

$S_o =$MAXIMUM GUTTER SLOPE WITHIN RAMP LIMITS

NOTES:

1. CLASS 'B' CONCRETE PER SECTION 725.
2. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
3. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
4. DETAIL IS ADA COMPLIANT FOR $S_o \leq 2\%$.

TYPE 'E'

CURB RAMPS

DETAIL NO. 235-5

STANDARD DETAIL ENGLISH

REVISED 01-01-2011
NOTES:

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

2. EITHER A CONSTRUCTION JOINT OR CONTRACTION JOINT IS REQUIRED AT THE STREET CENTERLINE.

3. A SEPARATE CONCRETE PAD IS REQUIRED AT ALL EXPANSION JOINTS AND ALL CONSTRUCTION JOINTS.

4. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.

5. CONTRACTION JOINTS SHALL SEPARATE LARGE AGGREGATE BY MOVING THE AGGREGATE TO EITHER SIDE OF THE JOINT FOR A MINIMUM DEPTH OF 2½ INCHES. THE FINISHED JOINT SHALL HAVE 1/4 INCH MAXIMUM RADIUS AT THE TOP SURFACE AND BE A MINIMUM OF 3/4 INCHES OF DEPTH.

CONTRACTION JOINT AT APPROXIMATELY
1/3 DISTANCE FROM EXPANSION JOINT.
(MATCH TO CURB RAMP JOINT OR SIDEWALK JOINT)

SECTION A-A
VALLEY GUTTER

CONCRETE PAD REQUIRED AT CONSTRUCTION JOINTS

SUBGRADE PREPARATION AS PER SECT. 301

TOP OF CURB 9"

BROOM 2.5' TROWEL 2.5' BROOM

SEE NOTE 2

FLOW LINE

THIS AREA INDICATES LIMITS OF VALLEY GUTTER MEASUREMENT

EXPANSION JOINT

TROWEL

ELEVATION PER PLAN

RADIUS AS SHOWN ON PLANS

CONTRACTION JOINT AT APPROXIMATELY 1/3 DISTANCE FROM EXPANSION JOINT.
(MATCH TO CURB RAMP JOINT OR SIDEWALK JOINT)

SECTION A-A
VALLEY GUTTER

CONCRETE PAD REQUIRED AT CONSTRUCTION JOINTS

SUBGRADE PREPARATION AS PER SECT. 301

TOP OF CURB 9"

BROOM 2.5' TROWEL 2.5' BROOM

SEE NOTE 2

FLOW LINE

THIS AREA INDICATES LIMITS OF VALLEY GUTTER MEASUREMENT

EXPANSION JOINT

TROWEL

ELEVATION PER PLAN

RADIUS AS SHOWN ON PLANS

CONTRACTION JOINT AT APPROXIMATELY 1/3 DISTANCE FROM EXPANSION JOINT.
(MATCH TO CURB RAMP JOINT OR SIDEWALK JOINT)
NOTES:
1. DEPRESSED CURB SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE TYPE OF CURB USED AT THAT LOCATION.
2. CONTRACTION JOINT ON D/W CENTERLINE.
3. CONTRACTION JOINT.
4. 1/2-INCH EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.
5. BACK OF CURB – CONSTRUCTION JOINT.
6. CONCRETE CLASS AS NOTED IN TABLE.
7. CONCRETE PER SECTION 725.
8. SUBGRADE PREPARATION, SECT. 301.
9. FLOW LINE OF GUTTER.
10. DEPRESSED CURB.
11. ROUGH BROOM FINISH FULL WIDTH OF RAMP AND WINGS.
12. TROWEL AND USE LIGHT HAIR BROOM FINISH FOR WALKWAY AREA.
13. ‘DRIVEWAY ENTRANCE WIDTH’ IS THE DRIVEWAY WIDTH PLUS ADDITIONAL WIDENING REQUIRED BY THE LOCAL JURISDICTION.
14. ELEVATION AT TOP OF DRIVEWAY RAMP SHALL BE EQUAL TO OR HIGHER THAN NORMAL CURB ELEVATION.

COMMERCIAL AND INDUSTRIAL
<table>
<thead>
<tr>
<th>DRIVEWAY ENTRANCE WIDTH</th>
<th>MIN.</th>
<th>MAX.</th>
<th>CLASS</th>
<th>DEPTH ‘X’</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMERCIAL</td>
<td>16’</td>
<td>40’</td>
<td>A</td>
<td>9”</td>
</tr>
<tr>
<td>INDUSTRIAL</td>
<td>16’</td>
<td>40’</td>
<td>A</td>
<td>9”</td>
</tr>
<tr>
<td>*24’ MIN. FOR TWO WAY TRAFFIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RESIDENTIAL
<table>
<thead>
<tr>
<th>DRIVEWAY ENTRANCE WIDTH</th>
<th>MIN.</th>
<th>MAX.</th>
<th>CLASS</th>
<th>DEPTH ‘X’</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAJOR STREET</td>
<td>16’</td>
<td>30’</td>
<td>B</td>
<td>5”</td>
</tr>
<tr>
<td>COLLECTOR STREET</td>
<td>12’</td>
<td>30’</td>
<td>B</td>
<td>5”</td>
</tr>
<tr>
<td>LOCAL STREET</td>
<td>12’</td>
<td>30’</td>
<td>B</td>
<td>5”</td>
</tr>
<tr>
<td>*16’ DESIRABLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION A--A

Curb and Gutter

MATCH 1/2” R
3/4”±1/4”
6” OR DEPTH WHICHEVER IS GREATER

MATCH S/W WIDTH
SLOPE 1.5% DESIRABLE 2.0% MAXIMUM

DEPTH ‘X’

FLOWLINE

RAMP

5’ MIN

MATCH S/W WIDTH

SLOPE

DEPTH ‘X’
1. Depressed Curb shall be paid for at the contract unit price for the type of curb used at that location.

2. Contraction joint(s) for driveway entrance: width less than 22' none required; width greater than 22' and less than 30' locate single joint on D/W centerline. Width of 30' or greater locate two joints to equally divide the driveway entrance width.

3. Detail geometrics are based on a curb height of six inches (6'), an attached sidewalk width of five feet (5'), and a driveway ramp length not exceeding four feet (4'). Geometric modifications may be required when conditions are modified.

4. 1/2-inch expansion joints shall comply with section 340.


6. Concrete class as noted in Table. Concrete per section 725.

7. Subgrade preparation, sect. 301.


11. Rough broom finish full width of ramp and wings.

12. Trowel and use light hair broom finish for walkway area.

13. 'Driveway entrance width' is the driveway width plus additional widening required by the Local Jurisdiction.

14. Elevation at top of driveway ramp shall be equal to or higher than normal curb elevation.

### Commercial and Industrial

<table>
<thead>
<tr>
<th>Driveway Entrance Width</th>
<th>Min.</th>
<th>Max.</th>
<th>Class</th>
<th>Depth 'x'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Industrial</td>
<td>16'</td>
<td>40'</td>
<td>A</td>
<td>9&quot;</td>
</tr>
<tr>
<td>24' min. for two way traffic</td>
<td>16'</td>
<td>40'</td>
<td>A</td>
<td>9&quot;</td>
</tr>
</tbody>
</table>

### Residential

<table>
<thead>
<tr>
<th>Driveway Entrance Width</th>
<th>Min.</th>
<th>Max.</th>
<th>Class</th>
<th>Depth 'x'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Street</td>
<td>16'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>Collector Street</td>
<td>12'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>Local Street</td>
<td>12'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>*16' desirable</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
TABLE A

<table>
<thead>
<tr>
<th>ZONING</th>
<th>DRIVeway WIDTH</th>
<th>MIN.</th>
<th>MAX.</th>
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</thead>
<tbody>
<tr>
<td>COMMERCIAL AND INDUSTRIAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>16'</td>
<td>24'</td>
<td></td>
</tr>
<tr>
<td>INDUSTRIAL</td>
<td>16'</td>
<td>40'</td>
<td></td>
</tr>
<tr>
<td>* 24' WHERE 2-WAY TRAFFIC IS ANTIcaTIPED</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE B

<table>
<thead>
<tr>
<th>ZONING</th>
<th>DRIVeway WIDTH</th>
<th>MIN.</th>
<th>MAX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAJOR STREET</td>
<td>16'</td>
<td>30'</td>
<td></td>
</tr>
<tr>
<td>COLLECTOR STREET</td>
<td>12'</td>
<td>30'</td>
<td></td>
</tr>
<tr>
<td>LOCAL STREET</td>
<td>12'</td>
<td>30'</td>
<td></td>
</tr>
<tr>
<td>* 16' WIDTH IS DESIRABLE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

PROVIDE EXPANSION JOINTS IN S/W WHEN COMMERCIAL AND INDUSTRIAL D/W'S ARE USED

EXPANSION JOINT

WHEN WIDTH EXCEEDS 16', PROVIDE CONTRACTION JOINT ON D/W CENTERLINE

FLOW LINE TROWEL 12" WIDE

LINEAR FEET OF SINGLE GUTTER

EXPANSION JOINT

5" THICK = RESIDENTIAL
6" THICK = COMMERCIAL AND INDUSTRIAL

SUBGRADE PREPARATION AS PER SECT. 301

MARICOPA ASSOCIATION OF GOVERNMENTS

RETURN TYPE DRIVeways

01–01–2003
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

BOND BREAKER BETWEEN BEARING PAD AND PAVEMENT SHALL BE 15 LBS. FELT OR EQUAL.

SECTION B-B

NEW A.C. PAVEMENT

SECTION C-C

STD. DET. 222 TYPE 'A' MODIFIED SINGLE CURB

DRAWN:  01-01-2005  CHECKED:  01-01-2005

REPORT NO. 252  STANDARD DETAIL  ENGLISH  BUS BAYS

MARICOPA COUNTY  GOVERNMEXT
**TYPE A - WITHOUT RETAINING CURB**

* SEE PLANS FOR ALLEY SURFACING REQUIREMENTS

**TYPE B - WITH RETAINING CURB**

* SEE PLANS FOR RETAINING CURB LENGTHS, TOP OF CURB ELEVATIONS, AND ALLEY SURFACING REQUIREMENTS

**NOTES:**
1. CLASS "A" CONCRETE PER SECTION 725.
2. LIMITS OF HEAVY ROUGH BROOM FINISH.
3. EXPANSION JOINTS PER SECTION 340.
4. SUBGRADE PREPARATION PER SECTION 301.
5. SINGLE CURB PER DETAIL 222, TYPE "B".
6. ALLEY CURBING PER PLANS.
7. DEPRESSED CURB SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE TYPE OF CURB USED AT THAT LOCATION.
8. CONTROL JOINT.
THICKEN CONCRETE FROM 6" TO 8" IN 18" AT BACK OF ALLEY ENTRANCE

COMBINED CURB AND GUTTER

MATCH FLOWLINE ±3/4" ±1/4"

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.
CLEAN OUT FRAME & GRADE ADJUSTMENT
WATER VALVE, SURVEY MONUMENT, OR SEWER

COVER SECTION A-A

MINIMUM WEIGHT 16#  
MEDIUM BROOM FINISH WITH RADially SCORED JOINTS (4 MIN.)
SUBGRADE PREP AS REQUIRED
EXISTING BITUMINOUS PAVEMENT

NOTES:
1. CASTING TO CONFORM TO SECT. 787.
2. 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.
3. Indicates machine finished surface.
NOTE:
CLASS 'C' CONCRETE AS PER SECT. 725
FORM AS REQUIRED TO KEEP CLEAR OF JOINTS.

NOTE:
THIS DETAIL COVERS WATER GATE VALVES, 4" TO 12" INCLUSIVE REGARDLESS OF TYPE OF PIPE USED. LARGER LINES TO BE DETAILED ON PLANS.

NOTES:
1. THIS DETAIL COVERS BUTTERFLY VALVE INSTALLATION, 3" TO 12" INCLUSIVE, REGARDLESS OF TYPE OF PIPE OR JOINT USED. LARGER LINES TO BE DETAILED ON PLANS.
2. VALVE BOX AND COVER REQUIRED PER DETAILS 270 AND 391.
RODS ARE ATTACHED TO LUGS CAST ON BELL OF HYDRANT. IF HYDRANT IS NOT FITTED WITH LUGS, RODS ARE ATTACHED AS SHOWN BY THE DOTTED LINES.
THIS DETAIL IS FOR USE ONLY ON UNDERGROUND INSTALLATIONS WHERE THE USE OF CONCRETE THRUST BLOCKING PER DETAIL 380 CANNOT BE USED BECAUSE OF OBSTRUCTIONS, OR REQUIREMENTS OF THE SPECIFICATIONS...

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

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

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

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

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


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

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


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

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

HORIZONTAL BENDS

UNDISTURBED SOIL

Tees

VERTICAL UP BEND

UNDISTURBED SOIL

VERTICAL DOWN BENDS
## Restrainted Lengths, LR, for Ductile Iron Pipe

<table>
<thead>
<tr>
<th>Nominal Pipe Size Inches</th>
<th>Horizontal Bends</th>
<th>Tees</th>
<th>Vertical Offsets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2&quot;</td>
</tr>
<tr>
<td></td>
<td>Down Bend (B)</td>
<td>Up Bend (U)</td>
<td>Down Bend (B)</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>10</td>
<td>5</td>
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<td>8</td>
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</tr>
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<td>24</td>
<td>79</td>
<td>33</td>
<td>16</td>
</tr>
</tbody>
</table>

### Restrainted 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2&quot;</td>
</tr>
<tr>
<td></td>
<td>Down Bend (B)</td>
<td>Up Bend (U)</td>
<td>Down Bend (B)</td>
</tr>
<tr>
<td>4</td>
<td>26</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>15</td>
<td>7</td>
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<td>8</td>
<td>47</td>
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<td>10</td>
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</tr>
<tr>
<td>24</td>
<td>113</td>
<td>47</td>
<td>22</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. Restrainted lengths may be reduced when supported by engineering calculations.
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. THE METER BOXES SHALL CONFORM TO THE DIMENSIONS AS SHOWN AND SHALL BE MADE OF PORTLAND CEMENT CONCRETE POURED AND TAMPED (OR VIBRATED) IN TRUE FORMS.
2. USE CLASS 'AA' CONCRETE PER SECT. 725.
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

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>
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<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>12&quot;</td>
<td>13</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23</td>
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</tbody>
</table>
DRAW FLANGE
GLAND FLANGE
GROUT HOLE
DRAW STUD AND NUTS
PRESSURE PLATE
INNER NECK
VALVE STUD AND NUT
LOAD BEARING SET SCREW 3 REQD.
BODY PLATE
OUTER NECK
BODY PLATE
CENTERLINE LENGTH
LUG BOLT NUT & WASHER

* DIMENSIONS TO BE FIELD VERIFIED

EXIST. MAIN
SADDLE LENGTH

GLAND
GASKET
GROUT
SLEEVE
EXISTING MAIN

CONCRETE PRESSURE PIPE TAPPING SLEEVE
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. FIRELINE FROM CITY MAIN TO PROPERTY LINE SHALL BE CONSTRUCTED OF CAST IRON PIPE.

2. REINFORCING TO BE 1/2" DIAMETER REBAR ON 6" CENTERS EACH WAY ON TOP AND 12" CENTERS EACH WAY ON THE SIDES.

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

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

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

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

7. CITY CONTROL VALVE TO BE REQUIRED AT MAIN.

8. PARTS OF PIPE TO BE EMBEDDED IN CONC. SHALL BE WRAPPED WITH 30 LB ASPHALT ROOFING FELT.

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

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

---

<table>
<thead>
<tr>
<th>DIA. OF PIPE</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>BY-PASS METER SIZE</th>
<th>A</th>
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<tbody>
<tr>
<td>4&quot;</td>
<td>60&quot;</td>
<td>66&quot;</td>
<td>49&quot;</td>
<td>5/8&quot; x 3/4&quot;</td>
<td>30&quot;</td>
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<td>66&quot;</td>
<td>72&quot;</td>
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<td>72&quot;</td>
<td>58&quot;</td>
<td>1&quot;</td>
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<td>78&quot;</td>
<td>72&quot;</td>
<td>69&quot;</td>
<td>1-1/2&quot;</td>
<td>36&quot;</td>
</tr>
</tbody>
</table>

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SEE NOTE 2

CHECK VALVE

O.S.&Y VALVE

TO CITY MAIN

C.I.P.

SECTION A-A

SECTION B-B

CONCRETE BLOCK OR BRICK

2 CURB STOP

BRASS PIPE AND FITTINGS

BY-PASS METER

NOTE 5. DETECTOR CHECK VALVE

1"-BEAM

4" x 2-5/8"

12-5/8"

BUILD TO FINISH GRADE

BADGER METER CO. READ-O-MATIC REGISTER OR APPROVED EQUAL

---

PLAN VIEW—BELLOW COVER

FLEXIBLE COUPLING

5/8" FORD GULFBOX WITH LOCKING LID OR APPROVED EQUAL

3/4" CONDUIT

---

DETAIL NO. 346

STANDARD DETAIL ENGLISH

FIRE LINE DETECTOR CHECK VAULT

REVISED 01-01-1998

DETAIL NO. 346
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. Restraints shall be mechanical restraint or thrust block per detail 380.

3. A flange joint by mechanical joint valve shall be used as the transition between the joint types.

4. Piping between water valve and hydrant shall be ductile iron.

5. See detail 362 for location of hydrant.

6. Pumper connection shall face the street.

7. No valves are to be located in curb.

8. National standard threads required on all connections unless otherwise directed.

9. See detail 360-3 for concrete pad.

10. Fire hydrant shall be freshly painted prior to final acceptance.

11. See section 756 for hydrant material.

See detail 391 for valve box installation.

1" to 3" crushed rock minimum of 8 cu. ft. covering 2" above upper shoe flange connection and below drain hole.

Lowest port: 18" min to 24" max.

1'-0" min. from hydrant nozzle to back of S/W.

See detail 390-3 for concrete pad.

Finish grade.

Alternate location for concrete pad depending on municipality.
NOTES:

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

2. RESTRAINTS SHALL BE MECHANICAL RERAINT OR THRUST BLOCK PER DETAIL 380.

3. A FLANGE JOINT BY MECHANICAL JOINT VALVE SHALL BE USED AS THE TRANSITION BETWEEN THE JOINT TYPES.

4. PIPING BETWEEN WATER VALVE AND HYDRANT SHALL BE DUCTILE IRON.

5. SEE DETAIL 362 FOR LOCATION OF HYDRANT.

6. PUMPER CONNECTION SHALL FACE THE STREET.

7. NO VALVES ARE TO BE LOCATED IN CURB.

8. NATIONAL STANDARD THREADS REQUIRED ON ALL CONNECTIONS UNLESS OTHERWISE DIRECTED.

9. SEE DETAIL 360-3 FOR CONCRETE PAD.

10. FIRE HYDRANT SHALL BE FRESHLY PAINTED PRIOR TO FINAL ACCEPTANCE.

11. THE HYDRANT SHALL HAVE 2- 2½" PORT AND 1- 4½" PORT (INDUSTRIAL OR COMMERCIAL).

12. THE HYDRANT SHALL HAVE 1- 2½" PORT AND 1- 4½" PORT (RESIDENTIAL).
TYP MAIN CONNECTION (PREFERRED)

6" SHORT BODY 90° BEND

PUMPER CONNECTION TO FACE CURB

ALT MAIN CONNECTION

CONCRETE PAD LOCATION DETAIL

NOTES:
1. CONCRETE FOR PAD SHALL BE CLASS "A".
2. SCORE LINE SHALL BISECT CONCRETE PAD AT MID POINT OF ALL SIDES.
3. CONCRETE COLOR SHALL MATCH ADJACENT CONCRETE. THE FINISHED CONCRETE SURFACE SHALL HAVE A ROUGH BROOM FINISH (SURFACE ONLY).
4. MULTIPLE OFFSET FITTINGS SHALL NOT BE ALLOWED.
5. MINIMUM 36" CLEARANCE PER NFPA-24 AROUND FIRE HYDRANT.
6. 1/2" BITUMINOUS EXPANSION SHALL BE PLACED AROUND THE BARREL OF THE FIRE HYDRANT AT THE CONCRETE PAD.
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

ASBESTOS CEMENT

REMINDER OF TRENCH TO BE BACKFILLED PER SECT. 601

6" MIN. CLEARANCE BACKFILLED WITH SELECTED FINE MATERIAL OR SAND

NOTE:
DROP SECTION IS TO BE PREFABRICATED AND INSTALLED AS A SINGLE UNIT.

6" MIN. CLEARANCE BACKFILLED WITH SELECTED FINE MATERIAL OR SAND

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/50 FT. SOIL. IF CONDITIONS ARE FOUND TO INDICATE SOIL BEARING IS LESS, THE AREAS SHALL BE INCREASED ACCORDINGLY.

2. AREAS FOR PIPES LARGER THAN 18" 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>
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<td>4&quot; OR LESS</td>
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<td>12&quot;</td>
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<td>16&quot;</td>
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</tbody>
</table>

SECTION A–A
### NOTES:

1. EITHER THIS DETAIL OR RESTRAINT RODS CAN BE USED WHEN IT IS ALLOWED TO RELOCATE A WATER LINE UPWARD OR DOWNWARD TO CROSS A CONFLICT.

2. DUCTILE IRON PIPE MAY BE USED.

3. BARS TO CONCRETE THRUST BLOCK TO BE COATED WITH 2 COATS COAL TAR, EPOXY OR BY OTHER APPROVED METHOD. BARS TO HAVE 90° HOOK ON LOWER END, AS PER TABLE.
POURED CONCRETE COLLAR 8” THICK AND 40” SQUARE OR ROUND, VALVE BOX CENTER. CLASS ‘AA’ CONCRETE AS PER SECTION 725. RADIA LLY SCORE JOINTS (4” MIN) MEDIUM BROOM FINISH

TAPPED TEE OR CROSS AS PER PLANS

BUILDING BRICK OR SOLID CONCRETE BLOCK

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.
**TYPE 'A'**

- **2" P.E. or Copper Pipe**
- **2" Brass Coupling**
- **2" Brass Ell**
- **2" Tapped Cap (Cast Iron)**
- **Water Main**
- **Valve Box Location May Vary If Approved by the City Engineer.**

**TYPE 'B'**

- **2" Copper Pipe**
- **2" Adapter Brass or Copper**
- **2" Corp Stop**
- **6" Gravel Bed**
- **Concrete Thrust Block Per Detail 380**
- **Concrete Water Meter Box No. 2 Per Detail 320**
- **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**

---

**Detail No.**

MARICOPA ASSOCIATION OF GOVERNMENTS

**Standard Detail**

ENGLISH

**Curb Stop with Flushing Pipe**

**Revised**

01-01-1998

**Detail No.**

390
NOTES:

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

2. USE PARKSON TYLER, APCO OR EQUAL DEEP SKIRTED LID (4" OR MORE) TYPE, SLIDING ADJUSTABLE CAST IRON VALVE BOX C.I. MIN. T.S. 30,000 P.S.I.

3. GROUND BELOW CONCRETE PAD TO BE COMPACTED 95% MAXIMUM DENSITY.

4. CUT RISER PIPE TO LENGTH IN FIELD. CAUTION: IF EXISTING RISER IS ASBESTOS-CEMENT PIPE (ACP) FOLLOW OSHA GUIDELINES FOR WORKING WITH ACP.

TYPE 'C'

FINISH GRADE
SEE NOTE 1

CONCRETE RING
NOT REQUIRED
WHEN ADJUSTED
IN UNPAVED AREAS

1/4" MAX

8" THICK CONCRETE RING
W/ 30" OUTSIDE DIA

SEE NOTE 2

8" (TOP)

16" (TOP)

VIEW A-A

TYPE 'B'

(Æ NOT SUBJECT TO VEHICULAR TRAFFIC)

FINISH GRADE
CLASS 'B' CONCRETE AS PER SECT 725

COVER ONLY

SEENOTE 3

2-1/2"
THE WORD 'WATER' ON COVER (TYP)

CENTER LINE OF VALVE BOX TO BE PLUMB OVER QL OF OPERATING NUT

8" CI FRAME AND COVER AS PER DETAIL 270

GROUND

2" SQUARE OPER. NUT TO BE HELD DOWN WITH NUT ON THREADED SHAFT AS STD VALVE STEM NUT ATTACHMENT

POURED CONC. COLLAR 6"-8" THICK AND 40" SQUARE OR ROUND VALVE BOX CENTERED

COMPACTED BACKFILL IN LAYERS SO AS NOT TO DISTURB THE RISER PIPE. DENSITY PER TABLE 601-2 IN SPEC SECT 601

RISER 8" C-900 PVC PER AWWA C900 OR APPROVED EQUAL SEE NOTE 2

SEE NOTE 3 SHEET 1

SEE NOTE 3

1/4" ALL SIDES

3/16"

1/16" MIN. CLEARANCE

PVC RISER

(2) 1/2" DIA. HOLES OPPOSITE SIDES.

3/16" STL. PLATE

3/8" x 3" DIA. PLATE

MIN SIZE 1-1/4" DIA ASTM A108 COLD ROLLED STEEL ROD

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 6' BELOW SURFACE. LENGTH TO FIT EACH INSTALLATION. OPERATING NUT TO BE HELD ON TOP OF EXTENSION WITH STOP NUT.

2. IF TWO OR MORE SECTIONS OF PIPE ARE USED TO MAKE THE VALVE BOX RISER, THEY SHALL BE COUPLED OR BONDED TO FORM DEBRIS-TIGHT JOINTS.

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.

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.

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

<table>
<thead>
<tr>
<th>SCHEDULE OF REQUIRED SUPPORTS</th>
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<tr>
<td>PERMANENT</td>
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<tr>
<td>SEWER LINES</td>
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<td>OTHER UTILITIES AS NOTED ON</td>
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<tr>
<td>THE PLANS OR AS REQUIRED BY</td>
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<tr>
<td>THE ENGINEER AT TIME OF</td>
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<td>CONSTRUCTION.</td>
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SECTION A-A

SECTION B-B
**TABLE**

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<th>'W'</th>
<th>DEPTH OF COVER ON SUPPORTS</th>
<th>0' TO 8'</th>
<th>8' TO 16'</th>
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<td></td>
<td>BAR NO.</td>
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<td>BAR NO.</td>
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<td>17'</td>
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<td>19''</td>
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**SECTION D-D**

- PROVIDE 1:2 MORTAR BED WITH PRECAST BEAM
- CLASS 'C' CONC. BEDDING WITH PRECAST BEAM ONLY (CONC. AS PER SECT. 725)
- SEE SECT. 601 FOR BACKFILL & COMPACTION

**SECTION C-C**

- 12" O.C.
- 3/4 O.D. (VARIES)
- (4) NO. 5 REBARS

**INTERMEDIATE SUPPORT FOR TYPE 'B' CROSSINGS**

- 12" OR 'Y' WHICHEVER IS GREATER, SEE TABLE
- 3/4 O.D.
- (4) REBARS (EQUAL TO BEAM REINFORCEMENT)
WATER LINE EXCLUSION AND EXTRA PROTECTION ZONES*

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*

MECHANICAL OR
RESTRAINED JOINTS
(OR NO JOINTS)

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

NOTES:

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

No. 3 stirrups
36" O.C.
(4) No. 4 bars

Higher water or
sewer main

Lower water or
sewer main

Section A-A

Notes:
1. Class 'C' concrete as per section 725.
*Refer to MAR Standard Specification Section 610.
REPLACE ALL PAVING ACCORDING TO SECTION 336

NEW CONSTRUCTION

EXISTING SEWER CONNECTION OR MAIN BROKEN DURING EXCAVATION FOR NEW CONSTRUCTION

PLAN VIEW OF REPLACEMENT

EXCAVATE 6" BEYOND UNBROKEN BELL TO ALLOW ROOM FOR INSPECTION

18" MIN. WHEN USING BELL CONNECTION

COMPACTION SHALL BE DONE IN ACCORDANCE WITH SECT. 601

6" MIN. WHEN USING CAULDER CONNECTION

SIX" MIN. WHEN USING BELL CONNECTION

NEW CONSTRUCTION

SAW SOUND PIPE SQUARE

12" MIN. SOLID BEARING ON EACH SIDE

REPLACEMENT WHEN NEW TRENCH

2' WIDE OR LESS

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

DIAMETER AT BELL

CONC. PER SECT. 725, CLASS 'C'

SECTION 'A-A'

NOTES:

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

REPLACEMENT WHEN NEW TRENCH

MORE THAN 2' WIDE

6" MIN.

SAW SOUND PIPE SQUARE

12" MIN. SOLID BEARING ON EACH SIDE
**TYPE 'A' TOP**
(PRECAST ECCENTRIC CONICAL TOP MANHOLE)

- **24" OR 30" FRAME & COVER PER DET.**
  - 423, 424, 425 (TYP)
- **OVERALL ADJUSTMENT RING**
  - HEIGHT SHALL BE 12" MIN TO 18" MAX (TYP)
- **USE BUTYL RUBBER MASTIC JOINT SEALANT ON ALL JOINTS; EXCEPT TOP ADJUSTMENT RINGS**
- **PRECAST RISER SECTIONS AS REQUIRED**
- **CONCRETE SHELF SHALL BE PER DETAIL 420-3 SECTION A-A**
- **Diameter per plan**
- **Cement Mortar**
- **KEYWAY PRESSED INTO BASE TO MATCH PRECAST RISER**
  - 8" IF MANHOLE IS 13' OR LESS
  - 12" IF MANHOLE IS OVER 13'

**NOTES:**

1. PRECAST STEEL REINFORCED MANHOLE SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 476 EXCEPT AS MODIFIED HEREIN.
2. CAST-IN-PLACE MANHOLE BASE TO BE CONSTRUCTED IN ONE PLACEMENT.
3. CAST-IN-PLACE MANHOLE BASE SHELF AND CHANNEL TO RECEIVE SMOOTH TROWEL FINISH.
4. MANHOLE COATINGS PER AGENCY.
5. SEE MAG DETAIL 422 FOR FINAL ADJUSTMENT TO GRADE.
6. ANY MANHOLE OVER 20' SHALL REQUIRE ENGINEER (STRUCTURAL) CALC.
7. THE MANHOLE ACCESS POINT SHALL BE ORIENTED IN SUCH A WAY THAT THE OPENING IS DIRECTLY ABOVE THE LOWEST INVERT, OR AS OTHERWISE DIRECTED BY THE PLANS OR ENG.
8. FOR PRECAST BASE SEE DETAIL 420-2.
9. FLAT TOPS SHALL ONLY BE USED WITH APPROVAL FROM THE ENGINEER.
NOTES:

1. PRECAST, MANUFACTURER SHALL BE AN NATIONAL PRECAST CONCRETE ASSOCIATION (NPCA) CERTIFIED PLANT. ENTIRE PRECAST BASE SHALL BE MANUFACTURED AT THE PLANT PER ASTM C478.

2. MAG "AA" 4000 PSI CONCRETE SHALL BE USED FOR PRECAST MANHOLE BASES.

3. SPRING LINE OF CAST-IN-PLACE BELL SHALL STOP AT INSIDE FACE OF MANHOLE.

4. JOINTS FOR BARREL SECTION SHALL BE TONGUE AND GROOVE TYPE. ALL LIFTING HOLES SHALL BE SEALED WITH GROUT.

5. ALL PRECAST MANHOLE BASES SHALL BE PLACED ON 8" MINIMUM OF ABC PER SECTION 702 COMPACTED TO 100% MAXIMUM DENSITY.

6. ALL MODIFICATIONS SHALL BE APPROVED BY THE ENGINEER.

7. MINIMUM WALL THICKNESS SHALL BE PER ASTM C478 (MIN 5").

8. REINFORCEMENT SHALL BE DESIGNED BY AN ARIZONA REGISTERED PROFESSIONAL ENGINEER.

9. CHANNEL TRANSITION SHALL BE CONSTANT FROM INLET TO OUTLET OF MANHOLE TO FACILITATE SMOOTH TRANSITIONS AND ACCOMMODATE CORRESPONDING MANDREL.

10. THERE SHALL BE NO HARD CONNECTIONS (GROUTED) INTO THE MANHOLE BASE UNLESS APPROVED BY THE ENGINEER.

11. ALL SEWER SERVICE CONNECTIONS SHALL HAVE THE SAME CONNECTION TYPES IN THE PRECAST MANHOLE BASE.

12. ALL CORE HOLES INTO THIS STRUCTURAL PRECAST BASE SHALL BE COATED WITH AN APPROVED COATING MATERIAL.

13. THE MANHOLE BOTTOM SHALL EXTEND OUTSIDE THE MANHOLE WALL A MINIMUM 6" WIDE ON 48" BASES, 7" WIDE ON 60" BASES, AND 8" WIDE ON 72" BASES. EXTENDED BOTTOM SHALL BE A MINIMUM OF 5" THICK.

14. ALL PIPE CONNECTIONS SHALL BE IN COMPLIANCE WITH ASTM F477 OR ASTM C425. AN EXTRA STRENGTH VCP BELL WITH A POLYURETHANE JOINT THAT MEETS ASTM C425 MAY BE USED WITH VCP.
OUTLET PIPE PER APPROVED PLANS

CHANNEL, FORMED WITH PRECAST AND CAST IN PLACE BASE, (TYP).

90° MIN ANGLE

IF NO SIDE SEWERS, FORM ONE CONTINUOUS CHANNEL

OUTLET PIPE PER APPROVED PLANS

PROVIDE A ±12 INCH TANGENT AT ALL PIPE CONNECTIONS (TYP)

A

FLOW

FLOW

SECTION A–A

SEE DETAIL 420–2 FOR NOTES

CHANNEL TRANSITION SHALL BE CONSISTENT FROM INLET TO OUTLET OF MANHOLE TO FACILITATE SMOOTH TRANSITIONS AND ACCOMMODATE CORRESPONDING TRANSITIONS MANDREL.

TYPICAL CHANNEL

2"± RADIUS

TOP OF SHELF TO TOP OF PIPE (MIN 2% SLOPE) NOT TO EXCEED 3"

DETAIL NO. 420-3

STANDARD DETAIL ENGLISH

CONCRETE MANHOLE BASE

01-01-2015

DETAIL NO. 420-3
PIPE SIZE & ELEVATION AS SHOWN ON PLANS

48" I.D. FOR 8" - 14" PIPE
60" I.D. FOR 15" - 30" PIPE

MANHOLE TO BE PRECAST PER SECT. 625

PRECAST RISER PER ASTM C-478

Cement Mortar (Typ)

2% Min. not to exceed 3"

4" Typ

Class A Concrete Per Sect. 725, 505

Trowel Finish Smooth

8" if Manhole is 13' or less
12" if Manhole is over 13'

COMBINED CURB AND GUTTER

SEE DETAIL 420-1 FOR ADJUSTMENT REQUIREMENTS

MANHOLE ADJUSTMENT PER DETAIL 422
NOTES:

1. CONTRACTORS SHALL ADJUST ALL MANHOLE RINGS AND COVERS, INCLUDING MANHOLES OUTSIDE OF THE PAVEMENT.
2. ADJUSTMENT SHALL BE CONSTRUCTED PER MAG SECTION 345.
3. MANHOLE COATINGS PER AGENCY
4. GROUT SHALL BE USED BETWEEN FRAME AND ADJUSTING RING TO ACHIEVE WATER TIGHTNESS.

<table>
<thead>
<tr>
<th>SPACER TYPE</th>
<th>REQUIRED THICKNESS</th>
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<tbody>
<tr>
<td>BRICK</td>
<td>GREATER THAN 2”</td>
</tr>
<tr>
<td>4”X2” STEEL SPACER</td>
<td>1/2” TO 2”</td>
</tr>
<tr>
<td>GROUT</td>
<td>LESS THAN 1/2”</td>
</tr>
</tbody>
</table>

OUT OF PAVEMENT—FINISH GRADE

12” MIN. BOTH SIDES

EXISTING OR RECENTLY INSTALLED PAVEMENT

CONCRETE COLLAR, CLASS 'AA' CONCRETE PER SECT. 725 & 505

SUBGRADE PREPARATION TO CONFORM TO SECT. 301 OR 601

#4 REINFORCING STEEL HOOP EQUALLY CENTERED HORIZONTALLY & VERTICALLY (IF REQUIRED BY AGENCY)

ADJUSTING RINGS

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

(2) NO.2 HOOPS FOR 4” RING TIED WITH NO. 4 A.S. & W. GAUGE WIRE. 6” & 8” RING REQUIRE (4) NO. 2 HOOPS.
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 FLUSH W/ TOP OF RINGS. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% MORE OR LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO ASTM A-48, CLASS 35 AND AASHTO M306. THE BEARING SURFACES OF THE FRAMES AND COVERS SHALL BE MACHINED AND THE COVERS SHALL SEAT FIRMLY WITHOUT ROCKING. ALL DIMENSIONS SHALL HAVE A 1/16" TOLERANCE.
NOTE:
LETTERING ON MANHOLE COVER TO CONTAIN NAME OF AGENCY AND UTILITY FOR WHICH MANHOLE IS NEEDED, (IE. "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 FLUSH W/TOP OF COVER. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% MORE OR LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO ASTM A-48, CLASS 35 AND AASHTO M306. THE BEARING SURFACES OF THE FRAMES AND COVERS SHALL BE MACHINED AND THE COVERS SHALL SEAT FIRMLY WITHOUT ROCKING. ALL DIMENSIONS SHALL HAVE A 1/16" TOLERANCE.
FRAME WT. (CL. 35) – 180 LBS

COVER WT. (CL. 35) – 188 LBS

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 FLUSH W/ TOP OF COVER. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% MORE OR LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO ASTM A-48, CLASS 35 AND AASHTO M306. THE BEARING SURFACES OF THE FRAMES AND COVERS SHALL BE MACHINED AND THE COVERS SHALL SEAT FIRMLY WITHOUT ROCKING. ALL DIMENSIONS SHALL HAVE A 1/16" TOLERANCE.
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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).
PIPE MATERIAL OF DROP CONNECTION TO MATCH NEW CONSTRUCTION

MASONRY ANCHORS MIN. ONE TIE PER 2 SQ FT OF CONTACT AREA FOR DROP CONNECTIONS TO EXISTING BRICK MANHOLE ONLY (TYP)

CONCRETE TO SPRING LINE OF PIPE

CONNECTION AS REQUIRED

SAME DIA.

45° MITERED BEND

'Y' BRANCH

TOP OF SEWER CL

POURED INVERT

CONCRETE FOUNDATIONS ON NEW MANHOLE TO EXTEND UNDER DROP CONNECTION

TYPE A
2.5’ TO 5’ DROP

MANHOLE WALL

STUB PIPE

OF SEWER

TOP OF SEWER

CLASS 'C' CONCRETE WIDTH OF TRENCH SECT. 505 & 725

MANHOLE FOUNDATION

TYPE B
5’ OR MORE

MANHOLE WALL

4" 45° MITERED BEND

SAME DIA.

'S' BRANCH

OF SEWER

POURED INVERT

CONCRETE FOUNDATIONS ON NEW MANHOLE TO EXTEND UNDER DROP CONNECTION

SQUARE, CONCRETE ENCASMENT CLASS 'C' SECT. 725 OR MASONRY ENCASMENT GRouted SOLID

DETAIL NO. 426

STANDARD DETAIL ENGLISH

DROP SEWER CONNECTIONS

REVISED 01-01-2007

DETAIL NO. 426
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. 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 OWNER'S 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/ID [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–2331. 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.

4. IF DEPTH REQUIRES, MINIMUM SLOPE CAN BE REDUCED TO 1/8" PER FOOT PROVIDED STUB IS STAKED TO GRADE.

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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 EQUAL 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 QPK PRODUCTS MODEL #228-0004 DM OR APPROVED EQUAL.

9. STAMP OR WELD THE LETTER "S" ON LID OF METER BOX.

**DETAIL NO.:** 440-3

**STANDARD DETAIL:** ENGLISH

**TYPE 'C' — SEWER BUILDING CONNECTION**

**ONE-WAY CLEANOUT AND METER BOX**

**(WHEN SPECIFIED BY LOCAL AGENCY)**

**REVISED:** 01-01-2007

**DETAIL NO.:** 440-3

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**Detail Description:**

- **4" OR 6" 45° WYE BRANCH**
- **Electronic Marker**
- **FLOW**
- **2" x 4" Metal Stud on Surface to End of Tap**
- **Threaded Cap w/ Electronic Marker**
- **One-Way Cleanout Towards Main**
- **Electronic Marker See Note 7.**
- **Slope:** Min: 4" or 6" = 1/4" per ft. Max: 4" = 1-1/2" per ft. Max: 6" = 7/8" per ft.
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.
SECTION B-B

CLASS "A" CONC. AS PER SECT. 725

ANGLE OF HEADWALL TO MEET O.D. OF PIPE

SPRAY BANDS WITH CURING COMP.

NO. 4 REINF. BAR FULL LENGTH IN EACH CORE, CORES TO BE FILLED WITH GROUT MIX 1:3

CLASS "A" CONC. AS PER SECT. 725

STRAIGHT TYPE

'L' TYPE

PLAN

'U' TYPE

HEADWALL
DOUBLE PIPE HEADWALL

ELEVATION

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

HEADWALL DIMENSIONS

<table>
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<tr>
<th>*Nominal Pipe Size</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
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<td>5'-9&quot;</td>
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</table>

* 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.

DETAIL "A"
NOTES:

1. ALL CONCRETE SHALL BE CLASS ‘A’ PER SECT. 725.

2. ALL REINFORCING BARS SHALL BE NO. 4 EXCEPT NO. 6 BARS OVER PIPE. BAR SPACING APPROXIMATELY 12” C TO C UNLESS OTHERWISE NOTED.

3. 30’ WING WALL FLARE SHOWN; 45’ NORMALLY DESIRABLE.
**NOTES:**

1. **HIGH POINT OF HEADWALL SHALL NOT PROJECT MORE THAN 3” ABOVE SLOPE.**

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

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

Type 'B'

SEE NOTE 1

SEE NOTE 2

SEE NOTE 3

(4) 3/8” bolts to be grouted into standpipe equi-distance with 1-1/2” x 3” rectangular washers and nuts.

GALVANIZED EXPANDED METAL LID (9 GAUGE)

FINISH GRADE

1” C.R.S. LIFT ROD

HEADGATE TO BE SWANSON 800 SERIES OR APPROVED EQUAL

FORM CONC. AROUND END OF PIPE BEHIND HEADGATE FRAME

SIZE OF PIPE AS SHOWN ON PLANS

GROUT JOINTS WATER TIGHT

GATE TYPE, SIZE AND NO. REQUIRED AS GIVEN ON PLANS

SIZE OF PIPE AS SHOWN ON PLANS

GROUT JOINTS WATER TIGHT

REINF. CONC. PIPE

VARIES, 52” MAX.

48” MIN.

Finishing grade

Terminal grade

N.B. MIN.

1/4” ROD HANDLE

HANDLE EXTENDS 6” BELOW TOP WHEN GATE IS OPEN

10 GAUGE SHEET STEEL COVER

NOTE:

PAINT COVER BOTH SIDES ONE PRIME COAT, TWO FINISH COATS, SECT. 790, PAINT NO. 9

(2) 5/16” HOLES 4” O.C.
SECTION A-A

CLASS 'B' CONCRETE PER SECTION 725

SIZE OF PIPE AS SHOWN ON PLANS

VARIABLE

6" MIN.

S/W OR GROUND GRADE

SECTION B-B

ELEV. OF BOTTOM OF PAVEMENT
SUBGRADE

2" MIN.

9-3/4"

2" 6" 2" 6"

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

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

WELD EYEBOLT TO ANGLE

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

FINISH EDGES WITH 18 GAUGE 1" BINDING, PENMETAL NO. 501 OR EQUAL

VARIABLE

9-1/4"

9-1/4"

14"

2-1/4"

VARIABLE

12"

9-1/4"

1-1/4"

A

A

B

B

PLASTER INSIDE WITH FLOAT FINISH

3/8" Dia. Handles Welded To Mesh

GROUT SOLID, FLOAT FINISH TOP

CONCRETE MORTAR

BLOCKS

PIPE CROSSING STREET

PIPE TO DITCH

VARIABLE

VARIABLE

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

CONSTRUCT OPTIONAL CONCRETE SCOURING BASIN AROUND VALVE ASSEMBLY WHERE SPECIFIED

CLASS 'C' CONCRETE PER SECTION 725 WITH TROWEL FINISH

BREAK PIPE AND MAKE WATERTIGHT JOINTS PER DETAIL 524

12"

PIPE DIAMETER TO BE SAME AS VALVE SIZE

PLUG END PER DETAIL 427

CONCRETE PIPE SEC. 735 & 736

BID ITEM

PIPE DIAMETER TO BE SAME AS VALVE SIZE

GROUT AS PER DETAIL 524

CONCRETE TEE OR ELBOW

SNOW, IDEAL WATERMAN ALFALFA VALVE OR EQUAL
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.

LONGITUDINAL SECTION

END SECTION
CONNECTOR CROSS SECTION

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

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

C.M.P. STORM DRAIN
CONNECTOR PIPE
12 GAUGE BITUMINOUS COATED GALVANIZED METAL PLATE

R=1/2 O.D.
SEE BAND DETAIL
C.M.P. TYPE 'A' OR TYPE 'B'
SEE T-BOLT DETAIL

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

SECTION A-A

TYP. BOTH SIDES AND BOTTOM

SELECT MATERIAL

STANDARD THREAD (COARSE)
2-1/2"
1/4"
1/8"

1/2"

WELD ALL AROUND

O.D. + 24"

8 HOLES
9/16" DIA.

T-BOLT

C.M.P. MAIN STORM DRAIN

CATCH BASIN

6" MIN (TYP.)

1:2 MORTAR

2" x 2" x 12" GAUGE WELDED WIRE FABRIC WITH 12" CIRCUMFERENTIAL OVERLAP

BAND DETAIL

REVISED
01-01-1998

DETAIL NO. 510
NOTES

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

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

3. CUT PIPES TO ALLOW SETTING OF 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.

TABLE OF VALUES FOR 'F' & 'D'

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PLAN

PRECAST PIPE WITH VERTICAL STUB

MAN HOLE SHAFT PER DETAIL 522

48" DIA.

ENCASEMENT

SECTION A--A

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 FURNISHED IN STANDARD LENGTHS.
4. UNLESS OTHERWISE SHOWN ON PLANS, USE (2) 2-1/2" PRECAST CONCRETE ADJUSTING RINGS ON IMPROVED STREETS AND (4) 2-1/2" RINGS ON UNIMPROVED STREETS.
5. 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). EYEBOLTS 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.
**CATCH BASIN ABOVE STORM DRAIN TYPE 2**

**NOTES:**

1. D SHALL BE 24" OR LESS, FOR LARGER VALUE OF D USE MANHOLE OR JUNCTION STRUCTURE.
2. IN NO CASE SHALL THE OUTSIDE DIAMETER OF THE INLET EXCEED ONE HALF THE INSIDE DIAMETER OF THE MAIN STORM DRAIN.
3. CENTERLINE OF INLET SHALL BE ON RADIUS OF MAIN STORM DRAIN EXCEPT WHEN ELEVATION S IS SHOWN ON PLANS.
4. THE MINIMUM OPENING INTO THE STORM DRAIN SHALL BE THE OUTSIDE DIAMETER OF THE CONNECTING PIPE PLUS 1".
5. IF ANGLE X FROM HORIZONTAL IS 45° OR LESS USE TYPE 1.
   IF ANGLE X IS 45° OR OVER USE TYPE 2.
**NOTES:**

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

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

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

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

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

6. CONCRETE SHALL BE CLASS A PER SECTION 725.

**DIMENSIONS**

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<tr>
<td>T=6&quot; IF V=4’ OR LESS</td>
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<td>T=8&quot; IF V IS BETWEEN 4’ AND 8’</td>
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<td>T=10&quot; IF V IS 8’ OR MORE (IF V EXCEEDS 10’ SPECIAL DESIGN IS REQUIRED)</td>
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<td>V=3’-6” UNLESS OTHERWISE SPECIFIED.</td>
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* SEE DETAILS 536-1 AND 536-2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.

* **4’ LOCATIONS WHERE 4’ S/W IS REQUIRED.
NOTES:
1. 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.
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DIMENSIONS

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| 4"   | 3'-3"
| 6"   | 1'-9"
| 7"   | 1'-0"

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

* SEE DETAILS 536-1 AND 536-2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.
** 4' LOCATIONS WHERE 4' S/W IS REQUIRED.
**NOTES:**

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

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

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

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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 Sect. 725.

**DIMENSIONS**

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

** 4" LOCATIONS WHERE 4" S/W IS REQUIRED.
NOTES:
1. SINGLE C.B. (ILLUSTRATED), SUMP WITH WING BASIN UPSTREAM.
2. DOUBLE C.B. SUMP WITH SYMMETRICAL WING BASINS EACH SIDE.
3. PIPES CAN BE PLACED IN ANY WALL EXCEPT WALL ADJACENT TO A WING BASIN. PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS PLACED.
4. SUMP FLOOR SHALL HAVE A WOOD TROWEL FINISH AND A MIN. SLOPE OF 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.

PLAN VIEW

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

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
APRON NOTES:

9. APRON IS CONSTRUCTED ONLY WHEN SPECIFIED ON PLANS.

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

11. CURB FACES AT CATCH BASIN OPENING AND POINT G SHALL BE THAT OF THE EXISTING CURB FACE PLUS 2" OR AS OTHERWISE SHOWN.

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

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

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

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

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

17. ANCHORS SHALL BE 3/8" DIA. STEEL ROD, NO. 3 REBAR, 3/8" DIA. X 8" BOLTS OR 8" NELSON STUDS.

18. ALL PARTS SHALL BE OF STRUCTURAL GRADE STEEL.

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

GRATE DETAIL
GRATE OPENING: 4.344 SQ. FT.
NOTES:

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

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

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

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

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

6. ALL CONCRETE, CLASS 'A' AS PER SECTION 725.
SECTION A-A
CAST IRON FRAME - GRATE - CURB BOX

SECTION B-B

NOTE:
DIMENSIONAL CHANGE REQUIRED FROM 3'-5" WIDTH TO 3'-0" AND 1'-9" DEPTH TO 2'-0"
MATERIAL CAST GRAY IRON ASTM A-48-83 CLASS 35B
FRAME WEIGHT 209 LBS; GRATE 140 LBS; CURB BOX 92 LBS.

BOLT CURB BOX TO FRAME WITH 1/2" x 13" x 2-1/2" STEEL HEX BOLTS, NUTS AND WASHERS
CURB BOX ADJUST. TO 9" HIGH

CROSS-SECTIONAL AREA: 1.53 SQ. IN.

12 EQUAL SPACES AT 2-13/16"

FLOW
SECTION A-A

DOUBLE UNIT CAST IRON FRAME — GRATE — CURB BOX

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.
NOTE:
SEE DETAIL 534-1 FOR THICKNESS AND SLOPE DIMENSIONS OF BOTTOM.

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".
**SECTION C–C**

1. **NO. 4 REINFORCEMENT BARS, 12" SPACING, WELDED TO NOSE ANGLE WITH 3/8" WELDS BOTH SIDES**
2. **CURB SUPPORT ANCHOR**
   - 1" dia. bar with 3" 90° bend, 3"–6" max. spacing
3. **PROTECTION BAR**
   - SEE THIS DETAIL FOR DETAILS 531, 532 AND 533

**SECTION D–D**

1. **1/4" DIAMOND FLOOR & COVER**
2. **NOSE ANGLE**
   - 2 3/4" x 4 1/2" x 3/4"
3. **3/8" FLAT HEAD STAINLESS STEEL CAP SCREWS - COUNTERSINK**
4. **1" GALVANIZED BAR**
5. **EQUAL DISTANCE**
6. **1/4" DIAMOND FLOOR & COVER**
7. **NO. 3 REINF. STEEL - ANCHOR BARS, WELDED TO FRAME**
8. **STANDARD CURB BATTER**
9. **CURB HEIGHT**
10. **PROTECTION BAR**
    - SEE THIS DETAIL FOR DETAILS 531, 532 AND 533

**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.

**PLAN VIEW**

1. **1/4" DIAMOND FLOOR & COVER**
2. **STEEL FILLER BLOCKS WELDED TO FRAME**
3. **L1-1/4" x 1-1/4" x 1/4" IRON FRAME**

**DOWEL BAR**

1. **# 3 REINF. STEEL DOWEL BARS**
2. **3"**
3. **9"**

**COMMON DETAILS AND SECTIONS FOR CURB OPENING CATCH BASINS**

**DETAIL NO.** 536–1

**STANDARD DETAIL**

**ENGLISH**

**MARICOPA ASSOCIATION OF GOVERNMENTS**

**REVISED** 01–01–1999

**DETAIL NO.** 536–1
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

NOTES:
1. FRAME SHALL BE NON-LOCKING.
2. FRAME AND COVER SHALL BE CAST IRON OR ASTM A-36 STRL. HORIZONTAL SURFACE OF COVER IN CONTACT WITH FRAME SHALL BE MACHINED. ASA B-46 ROUGHNESS SHALL NOT EXCEED 1/32”.
3. COVER SHALL BE FILLED WITH CONCRETE AND BROOM FINISHED.
4. SMALL VARIATIONS IN DIMENSIONS OF FEATURES OF A MINOR NATURE THAT ARE PART OF THE FOUNDRY’S CASTING ARE PERMISSIBLE.
29" x 29" I.D. GRATE FRAME

PLAN

SINGLE GRATE

29" x 53" I.D. GRATE FRAME

PLAN

DOUBLE GRATE

SECTION B-B

DETAIL OF ANGLE FRAME GRATE SUPPORT

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 2ND SPACE

1/8" BOTH SIDES

1/2" DIA x 1" EYE BOLT

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

SECTION A-A

PIPE SIZE AS REQUIRED BY PLANS

SLOPE FLOOR TO OUTLET

SECTION C-C

BAR GRATE
SEE DETAIL 539

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

ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725.
EXPOSED EDGES SHALL BE FINISHED WITH A 1/2" RADIUS.
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 - 1 ON EACH CORNER OF FRAME

FOR PIPE LARGER THAN 24" DIA. (NOMINAL)

D=(VARIES)

SECTION A–A

8" MIN.

SECTION A–A

24" PIPE (NOMINAL)

C=3'-4"

B=(VARIES)

CUT

CUT

SECTION A–A
(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

28-1/2" SINGLE GRATE

52-1/2" DOUBLE GRATE

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.
### Grate Details

<table>
<thead>
<tr>
<th>Grate Type</th>
<th>Clear Bar Spacing</th>
<th>No. Bars</th>
<th>X</th>
<th>Grate Opening ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>LW or LB-1.0</td>
<td>1&quot;</td>
<td>16</td>
<td>5/16&quot;</td>
<td>3.97</td>
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<tr>
<td>LW or LB-1.1</td>
<td>1-3/8&quot;</td>
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<td>5/16&quot;</td>
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<td>1-9/16&quot;</td>
<td>4.84</td>
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<tr>
<td>LW or LB-2.0</td>
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<td>12</td>
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<tr>
<td>LW or LB-2.1</td>
<td>1-3/8&quot;</td>
<td>9</td>
<td>1-1/16&quot;</td>
<td>3.35</td>
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<tr>
<td>LW or LB-2.2</td>
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<td>7</td>
<td>1-1/16&quot;</td>
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<tr>
<td>EF-2</td>
<td>1-5/16&quot;</td>
<td>10</td>
<td>1/4&quot;</td>
<td>3.48</td>
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</table>

**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 rock 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.

**Catch Basin Grates**

**Section D-D**

- 2" x 3-1/2" bars
- 3/16" x 4" bars

**Section C-C**

- 2" x 3-1/2" bars
- 3/16" x 4" bars

**Section A-A**

- 1/2" rod threaded ends
- Nut and cut washer
- Spot weld or peen

**Section B-B**

- 2-1/2" x 3-1/2" bars
- 9/16" holes

**Bar Spacer Detail**

- 1" and 1-3/8" or 2" bars
- Cast iron, cast steel or steel bar stock
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.
<table>
<thead>
<tr>
<th>PIPE DIA.</th>
<th>APPROX. WEIGHT (LBS.)</th>
<th>T</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>APPROX. SLOPE</th>
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<tr>
<td>24&quot;</td>
<td>1520</td>
<td>3</td>
<td>9-1/2</td>
<td>43-1/2</td>
<td>30</td>
<td>73-1/2</td>
<td>48</td>
<td>3</td>
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<td>27&quot;</td>
<td>1930</td>
<td>3-1/4</td>
<td>10-1/2</td>
<td>49-1/2</td>
<td>24</td>
<td>73-1/2</td>
<td>54</td>
<td>3</td>
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<tr>
<td>30&quot;</td>
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<td>54</td>
<td>19-3/4</td>
<td>73-3/4</td>
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<td>15</td>
<td>63</td>
<td>34-3/4</td>
<td>97-3/4</td>
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<td>3</td>
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<td>21</td>
<td>63</td>
<td>35</td>
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<td>78</td>
<td>3</td>
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<td>24</td>
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<td>98</td>
<td>84</td>
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<td>54&quot;</td>
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<td>65</td>
<td>33-1/4</td>
<td>98-1/4</td>
<td>90</td>
<td>2-1/2</td>
</tr>
</tbody>
</table>

**NOTES**

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

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

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

4. CULVERT LENGTH IS AS SHOWN ON PLANS.

---

**PLAN**

**SECTION A−A**

**FRONT ELEVATION**

**RIGHT ANGLE CULVERT**

**SKewed CULVERT**

**LENGTH OF PIPE**

**PER PLANS**

**SPACING FOR MULTIPLE INSTALLATION**

**DIA.**

**1/2" R**

**NORMAL TOE OF SLOPE**

**CULVERT LENGTH**

**E mbankment Slope**
NOTES:
1. WHERE ROCK IS ENCOUNTERED THE OUTLET MAY BE OMITTED.
2. ALL PORTIONS OF SPILLWAY TO BE TROWEL FINISHED.
3. CONCRETE FOR THE SPILLWAY INLET, SPILLWAY AND OUTLET SHALL BE CLASS 'B' PER SECT. 725.
4. WHEN THE OUTLET IS USED, THE WIRE MESH SHALL EXTEND THROUGH THE JOINT INTO THE OUTLET IN LIEU OF BENDING INTO THE KEY.

SECTION A-A

SPILLWAY SECTION

SECTION ON SPILLWAY C
DOUBLE INLET
CONCRETE SURFACE FORD CONCRETE WALLS

8" CLASS 'A' CONCRETE PER
SECTIONS 505 AND 725
(SECTION 324 DOES NOT APPLY)

2-#4 BARS
TOP AND BOTTOM

FINISHED GRADE
PER PLANS

DEPTH GAUGE SEE
DETAIL (OPTIONAL)

3" WEEP HOLES

0.015'/FT OR AS NOTED

SEE PLANS

FINISHED Q. GRADE

SEE PLANS

FINISHED GRADE
PER PLANS

2" PIPE


c

20' C TO C

3" WEEP HOLE

WALL MAY BE BUILT
TO THIS LINE

ELEVATION LOOKING UPSTREAM

BITMINOUS SURFACE FORD CONCRETE WALLS

SEE PLANS

FINISHED GRADE
PER PLANS

DEPTH GAUGE SEE
DETAIL (OPTIONAL)

3" WEEP HOLES

0.015'/FT OR AS NOTED

SEE PLANS FOR
BITUMINOUS SURFACE
AND BASE MATERIAL

2-#4 BARS
TOP AND BOTTOM

2-#4 BARS
TOP AND BOTTOM

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 PER PLANS.
5. REINFORCING BARS SHALL BE SET 3" CLEAR FROM SIDES OF CUT-OFF WALLS.
6. COURSE AGGREGATE AT WEEP HOLES SHALL BE ASTM C33 SIZE 57, ENCLOSED IN
FILTER FABRIC (SECTION 796, CLASS B), AND EXTENDED LATERALLY A MINIMUM
OF SIX-INCHES (6") ON EACH SIDE OF THE WEEP HOLE.
1. HEAVY GAUGE FRAME WIRE.
2. HEAVY GAUGE TRIPLE-TWIST HEXAGONAL MESH (OR EQUAL) FASTENED TO FRAME WIRE.
3. CONTINUOUS HEAVY GAUGE WRAPPED AROUND FRAMES TO FASTEN GABIONS TO EACH OTHER.
4. PARTITIONS TO PREVENT SHIFTING, NORMALLY ONE PER 3' LENGTH, INSTALLED AT FACTORY.

CUT BANK TO DEPTH "C" BEFORE PLACING GABIONS

NOTE:
OTHER SIZES AVAILABLE FROM MANUFACTURER.

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