UNIFORM STANDARD DETAILS
for PUBLIC WORKS CONSTRUCTION
SPONSORED and DISTRIBUTED by the
MARICOPA ASSOCIATION of GOVERNMENTS
2012 EDITION
ARIZONA
(Includes all previous revisions)
100 SERIES: GENERAL INFORMATION

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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, AND AT OTHER SPECIAL POINTS IF REQUIRED BY ENGINEER, AS SHOWN ON PLANS.

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

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

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

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

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

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

DETAIL NO. 120-1
STANDARD DETAIL
ENGLISH
SURVEY MARKER

REVISED 01-01-2001
DETAIL NO. 120-1
NOTES:

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

2. TYPE "E" NORMALLY USED ON SECTION CORNERS, 1/4 CORNERS AND AT THE CENTER OF SECTIONS (PER ARS 33-103). CONCRETE POST IS CHAMFERED 3/4" AT TOP.

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

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

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

6. IN ALL CASES WHEN MONUMENTS ARE SET A CORNER RECORD OR RESULTS OF SURVEY SHALL BE RECORDED. (PER BTR)
NOTES:
1. 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.
FLANGED STEEL 'U' CHANNEL (2 LBS. OR 3 LBS. PER SQUARE FOOT AS SPECIFIED)

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

2" DIA. STANDARD PIPE GALVANIZED

NOTES

TYPE 'A'

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

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

TYPE 'B' & TYPE 'C'

CONCRETE BASE FOUNDATIONS SHALL BE CLASS 'C' CONCRETE AS PER SECT. 505 AND 725.
**TYPE 1 PERMANENT**

- 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

**TYPE 2 REMOVABLE**

- ¾" x 5¾" diameter cap plate
- Seal weld all around
- 5" dia. steel guard post sch. 40
- ½" A-36 steel collar
- 5¾" id x 7¾" od, fillet weld to guard post both sides, all around
- 1" sleeve projection

**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 ½ the overall post length from top.
3. Removable post - Grind smooth all sharp edges prior to galvanization. Galvanize per ASTM A54 after fabrication.
**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. SHOP 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.

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

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

TYPE A

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

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

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'

SAFETY CURB
INSTALLATION ON DIRT

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.
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 722, RESPECTIVELY. SEE TABLE 722 FOR WEIGHTS OF MEMBERS.

DETAIL NO. 160

STANDARD DETAIL
ENGLISH

6' CHAIN LINK FENCE AND GATE

REVISED 01-01-2003

DETAIL NO. 160
NOTES:
1. PAVEMENT MATCHING AND SURFACE REPLACEMENT SHALL BE IN ACCORDANCE WITH SECTION 336.
2. TYPE OF BACKFILL AND BASE (IF APPLICABLE) SHALL BE AS NOTED HEREIN UNLESS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS. IF NOT SPECIFIED, CLSM SHALL BE 1/2-SACK PER SECTIONS 604 AND 728.
3. TRENCHES LESS THAN 24" WIDE SHALL BE BACKFILLED FROM TOP OF BEDDING TO BOTTOM OF SURFACING MATERIALS WITH 1/2-SACK CLSM PER SECTIONS 604 AND 728.
4. BACKFILL, BEDDING AND FOUNDATION COMPACTING REQUIREMENTS SHALL BE IN ACCORDANCE WITH SECTION 601.
5. ASPHALT CONCRETE SURFACE AND BASE COURSES SHALL COMPLY WITH SECTION 336.2.4.1 UNLESS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS.
6. USE TYPE "A" FOR LONGITUDINAL TRENCH REPAIR AND USE "T-TOP" FOR TRANSVERSE TRENCH REPAIR (SEE DETAIL 200-2) UNLESS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS. TYPE "B" TRENCH REPAIR MAY BE USED FOR TRANSVERSE TRENCH REPAIR IF SPECIFIED BY THE AGENCY.
7. PROVIDE MINIMUM 12" WIDE SHELF AS SHOWN IN "T-TOP" TRENCH REPAIR AT ENDS OF TYPE "A" TRENCH REPAIR EXCEPT WHERE EDGE ABUTS EXISTING CONCRETE.
8. USE "T-TOP" PAVEMENT REPLACEMENT WHERE A TRENCH IS NOT PARALLEL TO A STREET OR GOES THROUGH AN INTERSECTION.
9. SEE DETAIL 200-2 FOR REMOVAL REQUIREMENTS.
10. EXPOSED COPPER OR POLYETHYLENE WATER PIPE UP TO 2" IN DIAMETER IN TRENCHES TO BE BACKFILLED WITH CLSM SHALL BE WRAPPED WITH MINIMUM 3/4" THICK PREFORMED PIPE-COVERING FOAM INSULATION BEFORE PLACING CLSM.

DETAIL NO. 200-1
STANDARD DETAIL ENGLISH

BACKFILL, PAVEMENT AND SURFACE REPLACEMENT

REVISED
01-01-2010
DETAIL NO. 200-1
LONGITUDINAL TRENCH
(TRENCH IN PAVEMENT PARALLEL TO TRAFFIC)

EXISTING S/W TYP.

EXISTING PAVEMENT

TRENCH

q' OF STREET

EXISTING C/G TYP.

TRANSVERSE TRENCH
(TRENCH IN PAVEMENT NOT PARALLEL TO TRAFFIC)

EXISTING S/W TYP.

TRENCH

EXISTING PAVEMENT

q' OF STREET

EXISTING C/G TYP.

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

TOP OF PIPE, CONDUIT
OR CONCRETE-ENCASED
DUCT BANK

FOUNDATION
PER SECT. 601

12" MIN

BEDDING: GRANULAR MATERIAL
PER SECT. 601.4

BACKFILL

EXIST. AC

REMOVE IF REMNANT
IS 48" WIDE OR LESS AND
RESTORE PER DETAIL 200-1

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

BEDDING DETAIL

REMNANT PAVEMENT REMOVAL

NOTES:

1. SEE MAG DETAIL 200–1 FOR DETAILED TRENCH REPAIR REQUIREMENTS FOR TRENCH TYPES NOTED HEREIN.

2. 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.
A.C. PAVEMENT

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

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

TYPE 'A'

A.C. PAVEMENT

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

TYPE 'B'
PAVED ALLEY DETAIL

2" ASPHALTIC
CONC. SECT. 710

6" A.B.C.
SECT. 702

3% GRADING
SECT. 301

BRUSH
FINISH

CLASS 'A'
CONCRETE

CONC. GUTTER REQUIRED WHERE
LONGITUDINAL GRADE LESS THAN 0.20%

TROWEL
SMOOTH

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

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

LESS THAN 20'

RESIDENTIAL ALLEY DETAIL

2" ASPHALTIC
CONC. SECT. 710

6" A.B.C.
SECT. 702
3/8" FLATHEAD STAINLESS STEEL CAP SCREW COUNTERSINK (6 EACH MIN.)

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.

SECTION 'A-A'

SECTION 'B-B'

DETAIL C

NO. 4 REINFORCEMENT BAR, 4" LONG 3 EACH SIDE, MIN.
PLAN OF CONCRETE EQUIPMENT CROSSING

NOTES:

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

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

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

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

5. DETAIL 'C' TO BE USED ONLY WHEN FULL WIDTH CAN NOT BE POURED IN ONE POUR. USE DETAIL 'D' IF FULL WIDTH IS POURED IN ONE POUR.
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: WxLxR-SURFACE-TYPE: (12' x 30' x 0'-A.C.-TYPE "A" 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.

TYPICAL VALLEY GUTTER TURNOUT

TYPICAL STRAIGHT TURNOUT

* 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. 1/2" 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 ≥ 3” x 4” x 1/2”

STANDARD CURB BATTER

CONCRETE EDGE

1/4”x3-1/2”x5-1/2” ft

NO. 4 REINF. BAR (TYP)

RAIL POST

WELD PLATE

SAFETY RAIL SEE DETAIL 145 & NOTE 5

5” SAFETY RAIL OFFSET

SEE DETAIL ABOVE LEFT

SEE PLAN VIEW

SEE NOTE 6

S = 1.5%

S = 3.4%

MIN

MIN

WELD PLATE

SECTION D-D

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. 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 COMPACTION SHALL BE PER SECTION 321. A TACK COAT PER SECTION 713 SHALL BE APPLIED PRIOR TO APPLICATION OF PAVEMENT.
7. INSTALLATION JOINTS:
   A. STANDARD INSTALLATION:
      THE EXISTING ROADWAY SHALL BE MILLED TO A MINIMUM DEPTH OF 3/4" AROUND THE PERIMETER. CROSS SECTION DIMENSIONS DO NOT INCLUDE THE 3/4" MILLING. CONTRACTOR MUST PROVIDE VERIFICATION OF CROSS-SECTION DIMENSIONS.
   B. ALTERNATIVE INSTALLATION:
      FOR TRANSVERSE JOINTS (CROSS ROADWAY), THE EXISTING ASPHALT SHALL BE SAW CUT AND REMOVED FOR A WIDTH OF 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.
1. Use Type 1 plate installation where posted speed limit is less than 30 mph. Use Type 2 plate installation where posted speed limit is 30 mph or greater.

2. For Type 2 plate installation, the steel plate shall be recessed by milling into the existing asphalt to set flush with the surface of the existing asphalt. Full depth cutting of pavement section outside of trench is not permitted. Milling depth shall match thickness of plate. The gap between the edge of the plate and the adjacent existing asphalt pavement must be filled with temporary asphalt.

3. Trench widths are based on an analysis per the 14th edition of standard specifications for highway bridges by AASHTO. An assumed axle loading of 12 tons with a 30% impact factor was used. The axle length is 6 feet. Therefore the number of wheels carried by a plate depends on the 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).

<table>
<thead>
<tr>
<th>Longitudinal Thickness (W)</th>
<th>Transverse (L)</th>
<th>Plate Size</th>
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</thead>
<tbody>
<tr>
<td>12&quot; 18&quot; 1&quot;</td>
<td>4' 8&quot; 58&quot; 19&quot;</td>
<td>Type 1</td>
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<td>12&quot; 18&quot; 1&quot;</td>
<td>4' 10&quot; 58&quot; 31&quot;</td>
<td>Type 2</td>
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<td>36&quot; 18&quot; 1&quot;</td>
<td>6' 10&quot; 44&quot; 38&quot;</td>
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<td>48&quot; 18&quot; 1&quot;</td>
<td>7' 10&quot; 52&quot; 34&quot;</td>
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<td>60&quot; 18&quot; 1&quot;</td>
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<tr>
<td>12&quot; 18&quot; 1-1/4&quot; 15&quot;</td>
<td>4' 12&quot; 88&quot; 47&quot;</td>
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</tr>
<tr>
<td>24&quot; 18&quot; 1-1/4&quot; 12&quot;</td>
<td>5' 12&quot; 104&quot; 20&quot;</td>
<td></td>
</tr>
<tr>
<td>36&quot; 18&quot; 1-1/4&quot; 12&quot;</td>
<td>6' 12&quot; 66&quot; 39&quot;</td>
<td></td>
</tr>
<tr>
<td>36&quot; 18&quot; 1-1/4&quot; 16&quot;</td>
<td>6' 16&quot; 66&quot; 63&quot;</td>
<td></td>
</tr>
<tr>
<td>48&quot; 18&quot; 1-1/4&quot; 7&quot;</td>
<td>7' 12&quot; 76&quot; 33&quot;</td>
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<tr>
<td>48&quot; 18&quot; 1-1/4&quot; 17&quot;</td>
<td>7' 16&quot; 76&quot; 58&quot;</td>
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<tr>
<td>60&quot; 18&quot; 1-1/4&quot; 8' 12&quot;</td>
<td>8' 12&quot; 86&quot; 29&quot;</td>
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<tr>
<td>60&quot; 18&quot; 1-1/4&quot; 8' 15&quot;</td>
<td>8' 15&quot; 86&quot; 47&quot;</td>
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<tr>
<td>60&quot; 18&quot; 1-1/4&quot; 8' 16&quot;</td>
<td>8' 16&quot; 86&quot; 63&quot;</td>
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<tr>
<td>60&quot; 18&quot; 1-1/4&quot; 8' 20&quot;</td>
<td>8' 20&quot; 86&quot; 77&quot;</td>
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<tr>
<td>60&quot; 18&quot; 1-3/8&quot; 8' 20&quot;</td>
<td>8' 20&quot; 102&quot; 69&quot;</td>
<td></td>
</tr>
</tbody>
</table>
**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, WHICHEVER IS GREATER.

**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**

- BONDING MATERIAL
- PAVEMENT PLUG
- 1-1/2" TO 2" COMPACTED CRUSHED GRAVEL (ASTM C33 #8)
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.

RIBBON CURB
(TYPE B)

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.
CURB AND GUTTER
TYPES E AND F

MOUNTABLE CURB AND GUTTER (TYPE E)

MOUNTABLE CURB AND GUTTER (TYPE F)

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

NOTES: (CURB AND GUTTER TRANSITIONS)

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 SECT. 725.

4. TRANSITION BETWEEN TYPICAL SECTIONS SHALL BE ACCOMPLISHED BY THE USE OF DIRECT STRAIGHT LINE TRANSITIONS OF THE FLOW LINE AND OTHER SURFACE FEATURES.

CURB AND GUTTER TRANSITION

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

INTEGRAL ROLL CURB, GUTTER AND SIDEWALK

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

NOTES: (INTEGRAL ROLL CURB, GUTTER AND SIDEWALK)

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

2. CONTRACTION JOINT SPACING 5' MAXIMUM.

3. EXPANSION JOINTS PER SECT. 340.

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

1. ALL VERTICAL SURFACES TO BE FORMED.

2. VERTICAL SURFACES DOWN FROM 2" BELOW UNDISTURBED SOIL MAY BE PLACED AGAINST NEAT CUT IF APPROVED BY THE ENGINEER AND CONCRETE WILL NOT EXTEND MORE THAN 1" BEYOND THEORETICAL FACE.

3. ALL EXPOSED SURFACES TO BE STRIPPED GREEN AND TROWEL FINISHED.

4. CONCRETE CURBS CONFORM TO SECT. 340.

5. MAXIMUM SPACING OF CONTRACTION JOINTS IS 10’

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

7. WHEN PAVEMENT AND BASE COURSE EQUALS OR EXCEEDS 10” IN DEPTH, THE ENTIRE ROADWAY SIDE OF THE CURB SHALL BE FORMED. THE TOTAL CURB HEIGHT REMAINS 18” UNLESS NOTED OTHERWISE.

TYPICAL CURB TERMINATION
NOTE:
LENGTH OF TRANSITION SHALL BE EQUAL TO RADIUS OF MEDIAN NOSE, (5' MINIMUM). FOR LOCATION SEE PLANS.
NOTES:

1. 1/2 INCH EXPANSION JOINT, ASTM D-1751 PER SEC. 729 AND ELASTOMERIC SEALANT PER SEC. 342
2. CONTRACTION JOINTS PER SEC. 342
3. MATERIALS AND CONSTRUCTION PER SEC. 342
4. PORTLAND CEMENT CONCRETE SHALL BE CLASS A
5. DESIGN PARAMETERS FOR THE THICKNESS IS BASED ON:
   ASSUMES MODULUS OF SUBGRADE REACTION (K) = 100 pcf
   CONCRETE WORKING STRESS 10f = 300 psi
   TERMINAL SERVICABILITY INDEX 1p OF 2.5 OVER 20 YEARS AND 1 MILLION TOTAL EQUIVALENT 18-KIP SINGLE-AXLE LOAD APPLICATIONS

EXPANSION JOINT DETAIL

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

80 MM (3.15 INCH) INTERLOCKING CONCRETE PAVERS

ONE INCH MAX. SAND LAYING COURSE

Sweep Sand into all Joints

ELASTOMERIC SEALANT AND EXPANSION JOINT

SEE NOTE 5

TYPICAL HALF SECTION (AGAINST PAVEMENT)

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

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECTION 340.
2. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751.
3. LARGE AGGREGATE, IN CONTRACTION JOINT SHALL BE SEPARATED TO A DEPTH OF 1", FINISH DEPTH SHALL BE A MINIMUM OF 3/4".
4. EXPANSION JOINTS SHALL CONFORM TO SECTION 340, BE INSTALLED PRIOR TO CONCRETE PLACEMENT, AND AT A MAXIMUM SPACING OF 50'. THE EXPANSION JOINT MUST PROVIDE COMPLETE SEPARATION OF THE SIDEWALK FROM ADJOINING CONCRETE.
5. CONCRETE SHALL BE CLASS 'B' PER SECTION 725.
6. WHEN SIDEWALK AND ADJACENT CURB ARE INSTALLED MONOLITHICALLY, THE MID-POINT SCORE LINE 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 $S_G \leq 2\%$.
EXPANSION JOINT AT CURB RETURN

S₀ = MAXIMUM GUTTER SLOPE WITHIN RAMP LIMITS

<table>
<thead>
<tr>
<th>CURB HEIGHT</th>
<th>D (min)</th>
<th>S₀ ≤ 1%</th>
<th>S₀ ≤ 2%</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>4.0&quot;</td>
<td>4.0&quot;</td>
<td>4.5&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>6.0&quot;</td>
<td>6.0&quot;</td>
<td>6.5&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>7.0&quot;</td>
<td>6.5&quot;</td>
<td>7.5&quot;</td>
</tr>
</tbody>
</table>

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 S₀ ≤ 2%.

SECTION B-B

SECTION A-A
NOTES:
1. CLASS 'B' CONCRETE CONSTRUCTION PER SECTION 725.
2. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENT.
3. RAMP LONDTUDINAL SLOPE SHALL BE 12:1 OR FLATTER.
4. RAMP CROSS SLOPE SHALL BE ½%.
5. DETAIL IS ADA COMPLIANT FOR CURB RADII ≥ 20’ AND GUTTER SLOPE ≤ 2.0%.

DETAIL

SECTION B-B

SECTION A-A

TYPE 'C'

CURB MODIFICATION
SEE DETAIL 234

L (min)

<table>
<thead>
<tr>
<th>CURB HEIGHT</th>
<th>S_0 ≤ 1%</th>
<th>S_0 ≤ 2%</th>
</tr>
</thead>
<tbody>
<tr>
<td>4”</td>
<td>5.0’</td>
<td>6.0’</td>
</tr>
<tr>
<td>6”</td>
<td>7.0’</td>
<td>8.5’</td>
</tr>
</tbody>
</table>

S_0 = MAXIMUM GUTTER SLOPE WITHIN RAMP LIMITS

BOTTOM OF RAMP CURB WHEN FORMED & POURED SEPARATELY

TOP OF R/W LINE

S/W RAMP

L (min)

TOP OF LANDING

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

5’ S/W OR AS SHOWN ON PLANS

EXPANSION JOINT AT CURB RETURN (TYP)

ROUGH BROOM FINISH (TYP BOTH RAMPS)

½ Δ DETECTABLE WARNING
ROUGH BROOM FINISH, USE A RIPPLE SURFACE PATTERN

CURB AND GUTTER DETAIL 220, TYPE A

EXPANSION JOINT

DETECTABLE WARNING

S D = MAXIMUM GUTTER SLOPE WITHIN RAMP LIMITS

<table>
<thead>
<tr>
<th>CURB HEIGHT</th>
<th>CURB RAMP MINIMUM LENGTH</th>
<th>S D ≤1%</th>
<th>S D ≤2%</th>
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<tbody>
<tr>
<td>4&quot;</td>
<td>5&quot;</td>
<td>4.0'</td>
<td>4.5'</td>
</tr>
<tr>
<td>6&quot;</td>
<td>7½&quot;</td>
<td>6.0'</td>
<td>6.5'</td>
</tr>
<tr>
<td>7&quot;</td>
<td>9&quot;</td>
<td>8.5'</td>
<td>7.5'</td>
</tr>
</tbody>
</table>

D (min) VARIES

S W-LANDING 5'-0" MINIMUM

CURB RAMP MINIMUM LENGTH VARIES

12:1 OR FLATTER

S GUTTER FLOW LINE

SECTION A-A

TYPE 'D' DETACHED SIDEWALK

NOTES:
1. CLASS 'B' CONCRETE PER SECTION 725.
2. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
3. SIDEWALK SURFACE TO MATCH 1 ½ % SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY’S REQUIREMENTS.
5. DETAIL IS ADA COMPLIANT FOR S D ≤ 2%.
SECTION B-B

BOTTOM OF RAMP CURB WHEN FORMED & POURED SEPARATELY

SECTION A-A

RIGHT-OF-WAY LINE
10:1 SIDEWALK TAPER TYPICAL BOTH SIDES

D (min)

<table>
<thead>
<tr>
<th>CURB HEIGHT</th>
<th>( S_G \leq 1% )</th>
<th>( S_G \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>

\( S_G \) = 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 \( S_G \leq 2\% \).

TYPE 'E'

CURB RAMPS
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
NOTES:

1. DEPRESSED Curb SHALL BE PAID FOR AT THE UNIT PRICE BID 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. CONCRETE PER SECTION 725.

7. SUBGRADE PREPARATION, SECT. 301.

8. FLOW LINE OF GUTTER.

9. DEPRESSED CURB.

10. SECT. A–A AND ELEVATION: D/W SHOWN WITH VERTICAL CURB AND GUTTER, ROLL TYPE CURB AND GUTTER TREATED SIMILARLY.

11. ROUGH BROOM FINISH FULL WIDTH OF RAMP AND WINGS. TROWEL AND USE LIGHT HAIR BROOM FINISH FOR WALKWAY AREA.

### COMMERCIAL AND INDUSTRIAL

<table>
<thead>
<tr>
<th>DRIVeway WIDTH</th>
<th>MIN.</th>
<th>MAX.</th>
<th>CLASS</th>
<th>DEPTH 'X'</th>
</tr>
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<tbody>
<tr>
<td>COMMERCIAL</td>
<td>16'</td>
<td>40'</td>
<td>A</td>
<td>9&quot;</td>
</tr>
<tr>
<td>INDUSTRIAL</td>
<td>16'</td>
<td>40'</td>
<td>A</td>
<td>9&quot;</td>
</tr>
<tr>
<td>※ 24&quot; MIN. FOR TWO WAY TRAFFIC</td>
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### RESIDENTIAL

<table>
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<th>MAX.</th>
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<tbody>
<tr>
<td>MAJOR STREET</td>
<td>16'</td>
<td>30'</td>
<td>B</td>
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</tr>
<tr>
<td>COLLECTOR STREET</td>
<td>*12'</td>
<td>30'</td>
<td>B</td>
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<tr>
<td>LOCAL STREET</td>
<td>12'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>※ 16' DESIRABLE</td>
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<td></td>
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</tbody>
</table>

SECTION A–A
DRIVEWAY WITH SIDEWALK ATTACHED TO CURB

SECTION A–A

NOTES:
1. DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE BID 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. CONCRETE PER SECTION 725.
7. SUBGRADE PREPARATION, SECT. 301.
8. FLOW LINE OF GUTTER.
9. DEPRESSED CURB.
10. SECT. A–A AND ELEVATION: D/W SHOWN WITH VERTICAL CURB AND GUTTER, ROLL TYPE CURB AND GUTTER TREATED SIMILARLY.
11. ROUGH BROOM FINISH FULL WIDTH OF RAMP AND WINGS. TROWEL AND USE LIGHT HAIR BROOM FINISH FOR WALKWAY AREA.

COMMERCIAL AND INDUSTRIAL

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<td>40'</td>
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<tr>
<td>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>*16'</td>
<td>A</td>
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RESIDENTIAL

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<th>CLASS</th>
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<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>
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<td>*16' DESIRABLE</td>
<td>*16'</td>
<td>*16'</td>
<td>B</td>
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TABLE A

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

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<th>ZONING</th>
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<td>MIN.</td>
</tr>
<tr>
<td>MAJOR STREET</td>
<td>16'</td>
</tr>
<tr>
<td>COLLECTOR STREET</td>
<td>12'</td>
</tr>
<tr>
<td>LOCAL STREET</td>
<td>12'</td>
</tr>
<tr>
<td>* 16' WIDTH IS DESIRABLE</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
NOTES:

1. SUFFICIENT RIGHT-OF-WAY MUST BE AVAILABLE TO CONSTRUCT THE BUS BAY.

2. 1/2" BITUMINOUS PREFORMED EXPANSION JOINT FILLER ASTM D-1751 PER SPECIFICATION SECTION 729.

3. SUBGRADE PREPARATION PER SPECIFICATION SECTION 301 COMPACTED TO 95% MINIMUM DENSITY.

4. CONCRETE SHALL BE CLASS 'A' PER SPECIFICATION SECTION 725.

5. CONCRETE BUS BAY PAVEMENT SHALL BE BROOM FINISHED, EXCEPT WHERE OTHERWISE NOTED.

6. CONTRACTION JOINTS IN THE BUS BAY PAVEMENT SHALL MATCH THOSE IN THE CURB, 15 FT. MAXIMUM SPACING.

7. CONCRETE BEARING PAD (SECTION A-A) TO BE Poured SEPARATELY FROM CONCRETE BUS BAY PAVEMENT.

SECTION A-A

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

SECTION B-B

1. TROWEL FINISH

SECTION C-C

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

DETAIL NO. 252

STANDARD DETAIL
ENGLISH

BUS BAYS

REVISED
01-01-2005

DETAIL NO. 252
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.
WATER VALVE, SURVEY MONUMENT, OR SEWER
CLEAN OUT FRAME & GRADE ADJUSTMENT

1/2" ROUNDHEAD BOLT 2" LONG

3/8" CHAIN

LOCK WASHER FLATTEN BOLT END

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

CHAIN ATTACHMENT
(AS REQUIRED)

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.

DETAIL TYPICAL FOR BOTH FRAME AND COVER

COVER SECTION A-A

SEWER WATER SURVEY

REVISED 01-01-2001
DETAIL NO. 270

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

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

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

8" C. FEED FRAME AND COVER

MINIMUM WEIGHT 63#
**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.

1. All tie rods, rod couplings, turnbuckles, bolts and nuts for these joints shall be of carbon steel equivalent to A.S.T.M. A-307, grade B, with cadmium plating in accordance with A.S.T.M. A-165. Except that the min. thickness of the plating shall be .0002 of an inch. Cadmium plated bolts shall have class 2a threads and the nuts, rod couplings and turnbuckles shall have 2b threads.

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.

4. In certain assemblies of rods and clamps shown, rods run from a lug on the fitting (or a clamp behind the hub of a bell) to a clamp against a face of a bell. Note that this arrangement anchors only one joint. The stability of the joint where the clamp is against the face of the bell depends on having soil above a relatively long piece of pipe on both sides of the joint. Consequently, if the distance between the first and second joints is less than 12 feet, the second joint shown shall be anchored by a clamp behind the hub of the bell and rods to a clamp at the face of the next bell.

5. Coating type: A.H.D. asphaltic primer 719(A.) — All exposed metal.
LRN = SHORTEST LENGTH OF PIPE RESTRAINED TO THE RUN OF THE TEE FITTING (BOTH SIDES OF TEE).
### RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE

<table>
<thead>
<tr>
<th>Nominal Pipe Size Inches</th>
<th>Horizontal Bends</th>
<th>Vertical Offsets</th>
<th>Dead Ends</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2°</td>
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<tr>
<td></td>
<td>Down</td>
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<td>Down</td>
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<tr>
<td>4</td>
<td>18</td>
<td>7</td>
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<td>14</td>
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<td>24</td>
<td>79</td>
<td>33</td>
<td>16</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal Pipe Size Inches</th>
<th>Horizontal Bends</th>
<th>Vertical Offsets</th>
<th>Dead Ends</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2°</td>
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<tr>
<td></td>
<td>Down</td>
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<td>Down</td>
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<tr>
<td>4</td>
<td>26</td>
<td>11</td>
<td>5</td>
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<td>36</td>
<td>15</td>
<td>7</td>
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<tr>
<td>24</td>
<td>113</td>
<td>47</td>
<td>22</td>
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### NOTES:
1. ALL JOINTS WITHIN THE SPECIFIED LENGTH LR MUST BE RESTRAINED. ALL LENGTHS ARE GIVEN IN FEET.
2. THE MAXIMUM TEST PRESSURE SHALL NOT EXCEED 200 PSI
3. THE MINIMUM DEPTH OF BURY SHALL BE 3' TO TOP OF PIPE.
4. RESTRAINED LENGTHS MAY BE REDUCED WHEN SUPPORTED BY ENGINEERING CALCULATIONS.
SECTION A–A

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

1. FOR CASTING SPECIFICATIONS, SEE SECT. 787.
2. THE BEARING EDGES OF THESE CASTINGS SHALL BE MACHINED TO INSURE A FULL BEARING ON A FLAT SURFACE.
CAST IRON WATER METER BOX
LID FITTING BOX NO. 1, 2, 3 OR 4 AS REQUIRED.

SEE APPLICABLE DETAIL

NOTES:
1. THE METER BOXES SHALL CONFORM TO THE DIMENSIONS AS SHOWN AND SHALL BE MADE OF PORTLAND CEMENT CONCRETE POURED AND TAMPED (OR VIBRATED) IN TRUE FORMS.

2. USE CLASS 'AA' CONCRETE PER SECT. 725.

METER BOX DIMENSIONS

<table>
<thead>
<tr>
<th>DIMS</th>
<th>BOX NUMBER</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
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<tr>
<td>A</td>
<td>19&quot;</td>
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<td>B</td>
<td>12&quot;</td>
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<tr>
<td>C</td>
<td>11&quot;</td>
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<td>D</td>
<td>14&quot;</td>
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<td>E</td>
<td>16&quot;</td>
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<td>G</td>
<td>7&quot;</td>
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<tr>
<td>H</td>
<td>9&quot;</td>
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<tr>
<td>I</td>
<td>6&quot;</td>
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<tr>
<td>J</td>
<td>1-1/2&quot;</td>
</tr>
<tr>
<td>K</td>
<td>3/4&quot;</td>
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<tr>
<td>L</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>M</td>
<td>16&quot;</td>
</tr>
<tr>
<td>N</td>
<td>2-1/2&quot;</td>
</tr>
</tbody>
</table>

5/8" OR 3/4" METER 1" METER 1-1/2" METER 2" METER

SECTION A--A

SECTION B--B
ALTERNATE: 3/8" STEEL PLATE (ASPHALT COATED) WITH 2" x 2" HINGED ACCESS DOOR

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

PRE-CAST VAULT SECTION

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

CAST-IN-PLACE OR PRECAST TOP SECTION

CLASS "A" CONCRETE AS PER SECT. 725
FINISH GRADE

REMOVABLE SUPPORT

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

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

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

FOOTING FOR CAST-IN-PLACE VAULT

CAST-IN-PLACE FOOTING FOR PRE-CAST VAULT

CAST-IN-PLACE VAULT SECTION

BLOCK MASONRY MAY BE USED IN LIEU OF CAST-IN-PLACE VAULT WALLS, NO. 4 REBAR IN EVERY OTHER CORE.
NOTES:
1. TAPPING SLEEVE TO BE PLACED A MINIMUM OF 18" FROM ANY BELL COUPLING, VALVE, FITTING OR OTHER OBSTRUCTION.

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

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

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

5. CONCRETE THRUST BLOCKS SHALL BE CLASS 'B' PER SECT. 725. NORMALLY, CURE TIME FOR CONCRETE IS 24 HOURS BEFORE BACKFILLING.

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

7. THIS DETAIL COVERS TAPPING SLEEVES 4" THROUGH 16" IN SIZE ON DUCTILE IRON, CAST IRON AND ASBESTOS CEMENT PIPE. ANY OTHER SIZE OR TYPE OF PIPE WILL REQUIRE A SEPARATE SUBMITTAL AND APPROVAL BY THE ENGINEER.

<table>
<thead>
<tr>
<th>SIZE OF PIPE BEING CONNECTED</th>
<th>MINIMUM THRUST AREA REQUIRED EQUALS (AxB) (SQUARE FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; AND LESS</td>
<td>3</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4</td>
</tr>
<tr>
<td>8&quot;</td>
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<td>10&quot;</td>
<td>9</td>
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<tr>
<td>12&quot;</td>
<td>13</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23</td>
</tr>
</tbody>
</table>
FOR VAULT CONSTRUCTION
SEE DETAIL 321

FINISH GRADE

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

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

SOLDER 2" COPPER TO MALE THREAD ADAPTERS

6" MIN. TYP.

INSULATE WATER MAIN FROM CONCRETE BOX WITH EXPANSIVE MATERIAL

18" MIN

(A) - VARIES, SEE TABLE OF VAULT SIZES

2" GALV. PIPE SUPPORT

CONCRETE SUPPORT UNDER NO. 4 5 11 12

CRUSHED ROCK

6"x6"x6" CONCRETE BASE

SECTION A–A

VAULT DIMENSION DETAILS

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

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

LEGEND

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

NOTES

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

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

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

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

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

5. CHECK VALVE TO BE GLOBE MODEL "A" GRINNELL, HERSEY MODEL D.C., VIKING MODEL "A" OR 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>
</tr>
</thead>
<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>
</tr>
<tr>
<td>6&quot;</td>
<td>66&quot;</td>
<td>72&quot;</td>
<td>49&quot;</td>
<td>5/8&quot; x 3/4&quot;</td>
<td>30&quot;</td>
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<tr>
<td>8&quot;</td>
<td>72&quot;</td>
<td>72&quot;</td>
<td>58&quot;</td>
<td>1&quot;</td>
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<tr>
<td>10&quot;</td>
<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>

SECTION B-B

SECTION A-A
NOTES:

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

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

3. FOR CONCRETE THRUST BLOCKS, SEE DETAIL 380.

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

5. SEE DETAIL 362 FOR LOCATION OF HYDRANT.

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

7. IN LIEU OF THRUST BLOCKS, AN APPROVED JOINT RESTRAINT SYSTEM MAY BE USED.

6" SHORT BODY 90° BEND SEE NOTE NO. 2
PUMPER CONNECTION TO FACE CURB

6" VALVE
WATER VALVE BLOCKING, SEE DETAIL 301
CRUSHED ROCK TRENCH MINIMUM OF 8 CU. FT. ALONG PIPE AND ABOVE DRAIN HOLE

SEE DETAIL 391 FOR VALVE BOX INSTALLATION

WATER MAIN
VARIES

D.I.P.

WATER MAIN
VARIES

1" MIN
4" MAX.
SEE NOTE #6

FINISH GRADE OR ADJACENT GRADE, SEE NOTE #6

COREY TYPE
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

**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 16" SHALL BE CALCULATED FOR EACH PROJECT.
3. FORM ALL NON-BEARING VERTICAL SURFACES.
4. THRUST BLOCKS ARE TO EXTEND TO UNDISTURBED GROUND. CONCRETE TO BE CLASS 'C', SECT. 725.

<table>
<thead>
<tr>
<th>MINIMUM THRUST BLOCK AREA REQUIRED (YxW) (SQ. FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPE SIZE</td>
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</tbody>
</table>
NOTES:

1. EITHER THIS DETAIL OR RERAINT 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.

[Table with dimensions for different pipe sizes and hook lengths]

* FOR 125 P.S.I. WORKING PRESSURE.
ENLARGED "A"

POURED CONCRETE COLLAR 8" THICK AND 40" SQUARE OR ROUND, VALVE BOX CENTER. CLASS 'AA' CONCRETE AS PER SECTION 725. RADIANALLY SCORE JOINTS (4" MIN) MEDIUM BROOM FINISH

FINISH PARKWAY GRADE

TAPPED TEE OR CROSS AS PER PLANS

BUILDING BRICK OR SOLID CONCRETE BLOCK

TYPE 'A'

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

TYPE 'B'

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

GROUND LEVEL

CONCRETE WATER METER BOX NO. 2 PER DETAIL 320

2" ADAPTER BRASS OR COPPER

CAP

6" GRAVEL BED

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

2" BRONZE CURB STOP

TAPPED PLUG OR CAP

WATER LINE

CONCRETE THRUST BLOCK PER DETAIL 380

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

TYPE 'A'

TYPE 'B'

2" P.E. OR COPPER PIPE

2" CORP STOP

2" BRASS COUPLING

WATER MAIN

2" TAPPED CAP (CAST IRON)

2" BRASS ELL

CAST IRON WATER METER BOX COVER PER DETAIL 311

CONCRETE WATER METER BOX NO. 2 PER DETAIL 320

2" COPPER PIPE

2" COPPER PIPE

BRONZE OR BRASS FITTING

WATER LINE

CONCRETE THRUST BLOCK PER DETAIL 380

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

TYPE 'A'

TYPE 'B'
NOTES:

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

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

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

1. EXTENSION STEM: WITH SQUARE SOCKET ON BOTTOM TO FIT 2" SQUARE VALVE NUT. EXTENSION TO VALVE STEMS REQUIRED ON ALL VALVES INSTALLED WHERE OPERATING NUT IS OVER 5' BELOW SURFACE. LENGTH TO FIT EACH INSTALLATION. OPERATING NUT TO BE HELD ON TOP OF EXTENSION WITH STOP NUT.

2. IF TWO OR MORE JOINTS OF A.C.P. ARE USED TO MAKE RISER, USE STANDARD A.C. PIPE RUBBER GASKET COUPLING TO JOIN PIPE, WHERE RISER LENGTH EXCEEDS 10' USE 12" A.C. PIPE.

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

1. The debris cap shall be designed and installed to prevent debris such as dirt, dust sand, etc., from passing around the cap and down into the valve housing. The cap shall be held in place by a mechanism which will not damage the valve housing. Once installed the cap must withstand, without slipage, a minimum vertical force of 50 pounds at a loading rate of 1 inch/minute.

2. The cap shall be manufactured of corrosive resistant materials.

3. Debris cap shall be installed as close under the cast iron cover without interfering with cover operation.

4. The cap shall be capable of securely holding a standard locating coil, "Scotch mark" 4 disk marker by 3m or equal.

5. The cap shall be constructed to allow the device to be secured by a lock. The lock (pad, barrel, etc.) shall be supplied by the agency.

6. The handle and/or body of the cap shall be integrally colored if required by the agency. If required, the color shall conform to the one call locating service (blue stake) colors (ARS 40–360.21).

7. The cap shall be installed in all valve housings as required by the contract documents or by the agency's policies.

8. The debris cap shall be manufactured by SW Services, Inc. Phoenix, Arizona or Equal.
### TABLE

<table>
<thead>
<tr>
<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>
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<td>Y</td>
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**PIPE O.D.+2"**

SEE NOTE 2

NO. 6 REBAR FOR PRECAST BEAM ONLY

MIN. BEARING SHALL BE 1/2 O.D. OF PIPE

4" O.C. SPACING, SEE TABLE FOR BAR SIZE

**SECTION D-D**

CLASS 'C' CONC. BEDDING WITH PRECAST BEAM ONLY (CONC. AS PER SECT. 725)

SEE SECT. 601 FOR BACKFILL & COMPACTION

**SECTION C-C**

(4) REBARS (EQUAL TO BEAM REINFORCEMENT)

12" OR 'Y' WHICHEVER IS GREATER, SEE TABLE

3/4 O.D.

(4) NO. 5 REBARS

2" O.C.

CLR

12"

12" OR 'Y'

PLAN FOR TYPE 'B' SUPPORT

INTERMEDIATE SUPPORT FOR TYPE 'B' CROSSINGS
WATER LINE EXCLUSION AND EXTRA PROTECTION ZONES*

**GRAVITY SANITARY SEWER**

- 4' varies
- 2' varies
- 2' varies
- 4' varies

**PRESSURIZED SANITARY SEWER**

- 6' varies
- 6' varies
- 4' varies
- 2' varies

**NOTES:**

ZONE A: NO WATER LINES ALLOWED/MINIMUM SEPARATION.
ZONE B: EXTRA PROTECTION REQUIRED FOR WATER LINES.

* REFER TO STANDARD 610, WATER LINE CONSTRUCTION.
WATER LINE EXTRA PROTECTION

DUCTILE IRON PIPE WITH RESTRAINED OR MECHANICAL JOINTS*

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

NOTES:

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

NOTES:
1. CLASS "C" CONCRETE AS PER SECTION 725.
*REFER TO MAG STANDARD SPECIFICATION SECTION 610.
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

12" MIN. SOLID BEARING ON EACH SIDE

SAW SOUND PIPE SQUARE

REPLACEMENT WHEN NEW TRENCH
2' WIDE OR LESS

12" MIN. SOLID BEARING ON EACH SIDE

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

DIAMETER AT BELL

CONC. PER SECT. 725, CLASS 'C'

SECTION 'A-A'

NOTES:

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

DETAIL NO. 405

MARICOPA ASSOCIATION OF GOVERNMENTS

STANDARD DETAIL
ENGLISH

BROKEN SEWER LINE REPLACEMENT

REVISED 01-01-1998

DETAIL NO. 405
NOTES:

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

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

3. USE LOW ALKALI CEMENT ONLY.
FOUR STEEL SPACERS, 4"x2" THICKNESS AS REQUIRED FROM 1/2" to 2" WHEN THICKNESS IS LESS THAN 1/2" USE MORTAR. WHEN GREATER THAN 1/2", USE BRICK.

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

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

M.H. FRAME AND COVER PER SECT. 625

EXISTING OR RECENTLY INSTALLED PAVEMENT

M.H. WALL THICKNESS AND MATERIAL VARIES

SUBGRADE PREPARATION TO CONFORM TO SECT. 301 OR 601

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

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

BRICK SHALL BE IN ACCORDANCE WITH SECT. 775

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

CLASS 'A' CONCRETE PER SECT. 725, 505

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

M.H. WALL TO 3/4" DEPTH

8' WALL TO 1/2" DEPTH

24" MAX.

12" MIN.

12" MAX.

12"

5" VARIABLE

3 TO 5' BRICKS

26-3/4" ROWLOCK RADIAL COURSE

44" MIN.

40" MAX.

12"

2" FLOW

48" I.D. PIPE < 5'

60" I.D. PIPE ≥ 5' PIPE SIZE & ELEVATION AS SHOWN ON PLANS
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.
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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

CONCRETE TO SPRING LINE OF PIPE

CONNECTION AS REQUIRED

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

SAME DIA.

'Y' BRANCH

45° MITERED BEND

4"

SQUARE, CONCRETE ENCASEMNT CLASS 'C' SECT. 725 OR MASONRY ENCASEMNT GROUTED SOLID

CONCRETE FOUNDATIONS ON NEW MANHOLES TO EXTEND UNDER DROP CONNECTION

MANHOLE WALL

'Y' BRANCH

OF SEWER

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

OF SEWER

POURED INVERT

TOP OF SEWER CL

MANHOLE FOUNDATION

2.5' MIN. TO 5' MAX.

OF SEWER

TOP OF SEWER C

TYPE A
2.5' TO 5' DROP

TYPE B
5' OR MORE

DETAIL NO. 426
STANDARD DETAIL ENGLISH
DROP SEWER CONNECTIONS
REvised 01-01-2007 DETAIL NO. 426
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".

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

VIT. CLAY PIPE

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

VIT. CLAY OR PLASTIC PLUG

PREFORMED JOINT

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

VIT. CLAY PIPE

BAND SEAL COUPLING

VIT. CLAY PIPE

DRY PACK FOR PRECAST CONCRETE MANHOLE

MANHOLE FOUNDATION

SEWER MANHOLE WALL

INVERT ELEVATION ACCORDING TO PLAN

SIZE ACCORDING TO PLAN

PLUG (SEE DETAIL RIGHT)

BELL END

TYPICAL STUB OUT

NOTES:

1/2" LAYER CEMENT PLASTER (WATERTIGHT)

BLOCK OR BRICK AND MORTAR PLUG (SEE NOTE)

2"

PIPE SIZE

PLUG THICKNESS 'A'

12" - 36"  8"

39" - 48"  12"

51" - 72"  18"

75" - 90"  24"

96" - 114" 32"

120" - 132" 36"

138" - 150" 40"

DRAIN LINE

GROUND LINE

SEWER LINE

STUB OUT AND PLUGS

ENGLISH

STANDARD DETAIL

MARICOPA ASSOCIATION OF GOVERNMENTS

DETAIL NO.

427

01-01-1998

REvised

DETAIL NO.

427
NOTES
1. ALL DIMENSIONS ARE MINIMUM EXCEPT WHERE NOTED.
2. CASTING AS PER SECT. 787.

CAST IRON MANHOLE STEP

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

POLYPROPYLENE MANHOLE STEP
NOTE: WITH COVER REMOVED.

NOTES:

1. THIS CONTROL VAULT WITH MANHOLE AND COVER SHALL BE USED ON 6" AND 8" DIAMETER SEWER WITH FLOWS IN THE RANGE OF 40 TO 340 GPM.

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

3. THE PALMER BOWLUS FLUME SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS.

4. THE PRECAST 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 REQUIRESS, 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/ID [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.

DETAIL NO. 440-2

STANDARD DETAIL
ENGLISH

TYPE 'B' – SEWER BUILDING CONNECTION
TWO-WAY CLEANOUT AND METER BOX AT R/W
( WHEN SPECIFIED BY LOCAL AGENCY)
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.
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.
7. ELECTRONIC MARKER SHALL BE A 3M MODEL 1424—XR/ID [4" DIAMETER SELF LEVELING MARKER BALL GREEN IN COLOR] OR APPROVED EQUIVALENT 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 GPQK PRODUCTS MODEL #228—0004 DM OR APPROVED EQUIVALENT.
9. STAMP OR WELD THE LETTER "S" ON LID OF METER BOX.
NOTES:
1. STAMP TOP OF CURB WITH 4" TALL BY 1/4" DEEP "S" TO DESIGNATE SEWER SERVICE LINE CROSSING.
CLEANOUT INSTALLATION

UNPAVED STREETS AND ALLEYS

THE WORD 'SEWER' ON COVER

PAVED STREETS AND ALLEYS

CLASS 'AA' CONC. PER SECT. 725, 6"-8" THICK, 40" DIA.

SIZE OF PIPE AS SHOWN ON PLANS

STANDARD 45° BEND

FLOW LINE ELEVATION SHOWN ON PLANS TO THIS POINT

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

MIN. 1/4" MAX.

PAVED STREETS AND ALLEYS

COMPACTED BACKFILL OR UNDISTURBED EARTH

STANDARD 45° BEND

VIT. CLAY PIPE PER SECT. 743

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

STATION AND LENGTH SHOWN ON PLANS TO THIS POINT

NOTE:

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

8" V.C.P.

ONE FULL LENGTH OF PIPE

4" OR 6" V.C.P. TAP TO PROPERTY LINE

6"x8" OR 4"x8" VITRIFIED CLAY INCREASE "WYE

8"x8" WYE

SEWER TAP AT CLEANOUT
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

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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.
2 - NO. 6 BARS BEND TO CONFORM TO PIPE

NOTES:

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

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

3. 30° WING WALL FLARE SHOWN; 45° NORMALLY DESIRABLE.
### 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.

### PIPE DIMENSIONS

<table>
<thead>
<tr>
<th>I.D.</th>
<th>W SINGLE</th>
<th>W DOUBLE</th>
<th>A</th>
<th>B</th>
<th>E</th>
<th>F</th>
<th>J</th>
<th>K</th>
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<td>2'-8&quot;</td>
<td>1'-3&quot;</td>
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<td>3'-6&quot;</td>
<td>1'-7.1/2</td>
<td>1'-1.1/2</td>
<td>1'-11.3/8&quot;</td>
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<td>2'-3&quot;</td>
<td>3'-10.3/4&quot;</td>
<td>1'-6&quot;</td>
<td>4'-6&quot;</td>
</tr>
</tbody>
</table>
POURED WALLS

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

BLOCK WALLS

BLOCK HEADWALL TO HAVE ONE NO. 4 REINF. BAR CENTERED IN EACH CORE FOR FULL HEIGHT AND CORES FILLED WITH CONCRETE OR CEMENT GROUT (3:1 RATIO). ALL BLOCKS TO BE JOINTED WITH MORTAR. PLASTERED ON EXPOSED SURFACES THEN SPRAY WITH WHITE PIGMENTED CURING COMPOUND. SECT. 510, 727 & 776.

TRASH RACK

3"x3"x1/4"

6 - 5/8" O.C. TYP.

PLATE 1/4" x 14"

RACK BARS SEE DETAIL

SECTION A-A

EL = A

TOP HAND PLASTER EL = B

EL = C

EL = D

6" PLASTER FLOOR

3" MIN. PLASTER WITH 4"x4" W1.4x1.4

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.

45° BLOCK CORNER

BAR 2" x 1/2"

SPECIAL 'U' LINTEL

SPECIAL OPEN END

RACK BARS

1 - 3/8"

J - 2"

K - 2"

(2) 5/8" HOLES

1/4" 1" TYP.

PLATE 1/4" x 14"
### Type Based on Pipe Size

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Pipe Size</th>
<th>No. of Bars</th>
<th>Length of Bars</th>
<th>Dimensions</th>
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</tbody>
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**Shale Based on Pipe Size**

- **A**: 18" or 24"
- **B**: 30" or 36"
- **C**: 42" or 48"

**Dimensions:**

- **X**: 1'-9" - 3'-1"
- **Y**: 2'-5" - 4'-5"
- **Z**: 2'-5" - 5'-1"

**Notes:**

- **'U' Type**
- **CONCRETE MASONRY UNITS (BLOCK)**
- **Reinforced Concrete Class 'A' per Sect. 725**
- **Straight Type**
- **1/4" x 2" Steel Bar Plate**
- **3" Galv. Pipe**
- **1" Galv. Pipe**
- **1/2" x 4-1/2" Galv. Bolt Sunk in Plaster with Brass Nut**
- **Provide Plastic Sleeve 3/4" Dia.**
- **Top Bank**
- **Lock Type Washer and 5/8" Nut**

---

**Section A-A**

- **WALL**
- **EYE BOLT**
- **10" for Block Headwalls 8" for Rein. Conc. Headwall**

---

**Trash Rack**

- **Maricopa Association of Governments**
- **Standard Detail**
- **English**
- **Detail No. 502-2**
- **Revised 01-01-2004**
- **Detail No. 502-2**
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 outer 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.

Form conc. around end of pipe behind headgate frame.

Type 'A'

Type 'B'

See Note 2

See Note 3

(4) 3/8" bolts to be groused into standpipe equidistant with 1-1/2" x 3" rectangular washers and nuts

GALVANIZED EXPANDED METAL LID (9 GAUGE)

REINF. CONC. PIPE

VARIABLE, 50" MAX.

FINISH GRADE

HEADGATE TO BE SWANSON 800 SERIES OR APPROVED EQUAL

1" C.R.S. LIFT ROD

FORM CONC. AROUND END OF PIPE BEHIND HEADGATE FRAME

GROUT JOINTS WATER TIGHT

GROUT JOINTS WATER TIGHT

SIZE OF PIPE AS SHOWN ON PLANS

SIZE OF PIPE AS SHOWN ON PLANS

(2) 5/16" holes 4" O.C.

1/4" rod handle

Handle extends 6" below top when gate is open

10 guage sheet steel cover

Paint cover both sides one prime coat, two finish coats, Sect. 790, Paint No. 9

Detail No. 503

Maricopa Association of Governments

English

01-01-1998

Detail No. 503

Irrigation Standpipe
SECTION A-A

- Class 'B' Concrete per Section 725

- Size of Pipe as shown on Plans

- Min. 6" Variance

- 2" Min. to Elevation of Bottom of Pavement Subgrade

- Min. 6" Subgrade

SECTION B-B

- 2" Min. to Elevation of Bottom of Pavement Subgrade

- 9-3/4" Min.

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

- (2) 1-1/2"x1-1/2"x1/8" Angles welded to 1-1/2" No. 9 Expanded Metal (Pennmetal or Equal)

- Weld Eyebolt to Angle

- Finish Edges with 18 Gauge 1" Binding, Pennmetal No. 501 or Equal

- To Secure Cover to Structure, use 1/4"x3" Galvanized Eyebolt and 1/4"x6" Galvanized Eyebolt Bent to Form Anchor, and 3/16" Galvanized Chain 2" Long
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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<th>T</th>
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NOTE:
CONTRACTOR MAY USE PRECUT FITTINGS IF DESIRED.
BID ITEM INCLUDES LATERAL PIPE, RISER, PAD, VALVE,
LABOR AND INCIDENTAL MATERIAL REQUIRED FOR
INSTALLATION.

CONSTRUCT OPTIONAL
CONCRETE SCOURING
BASIN AROUND VALVE
ASSEMBLY WHERE SPECIFIED

CLASS 'C' CONCRETE
PER SECTION 725
WITH TROWEL FINISH

BREAK PIPE
AND MAKE
WATERTIGHT
JOINTS PER
DETAIL 524

12"

1/2"

1/2"

CONCRETE PIPE
SECT. 735 & 736

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

PLUG END PER
DETAIL 427

SNOw, IDEAL,
WATERMAN ALFALFA
VALVE OR EQUAL

GROUT AS PER
DETAIL 524

CONCRETE TEE
OR ELBOW

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

BID ITEM

VARIABLE

VARIABLE
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 OVEREXCAVATED TO ALLOW SUFFICIENT ROOM TO OPERATE PROPER MECHANICAL COMPACTION EQUIPMENT.

4. CONCRETE WHICH SPILLS BEYOND 12" FROM THE SIDES OF THE PIPE FOR ANY REASON SHALL BE REMOVED BACK TO THE PROPER LINE PRIOR TO BACKFILLING.

5. SEE SECTION 601 FOR TRENCH PREPARATION.

6. CONCRETE TO BE CLASS 'A' PER SECT. 725.

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

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

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**T-BOLT**

- 2 HOLE(s) 9/16" DIA.
- O.D. + 24"
- O.D. + 24"
- 2"
- 2"
- 12 GAUGE BITUMINOUS COATED GALVANIZED METAL PLATE

---

**C.M.P. MAIN STORM DRAIN**

- 1:2 MORTAR
- 2"x2"x12" GAUGE WELDED WIRE FABRIC WITH 12" CIRCUMFERENTIAL OVERLAP
- MIN. 6" 2-1/2"
- MIN. 8" 6" 6" (TYP.)

---

**BAND DETAIL**

- SELECT MATERIAL
- C.M.P. PER A.A.S.H.T.O. SPEC. M-36.
- EXTERIOR COATING AND INTERIOR COATING PER A.A.S.H.T.O. SPEC.
- M-190, MAY BE TYPE 'A' OR 'D'
- TYP. BOTH SIDES AND BOTTOM
- 1/2" STANDARD THREAD (COARSE)
- 2-1/2"
- 6" MIN (TYP.)
- 1/2"

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**C.M.P. CONNECTION TO MAIN STORM DRAIN 24" PIPE AND SMALLER**
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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MAN HOLE SHAFT PER DETAIL 522

SECTION A-A

PRECAST PIPE WITH VERTICAL STUB

ENCASEMENT

SECTION B-B

STORM DRAIN MANHOLE BASE (51" OR LARGER)
NOTE:
1. PRECAST CONCRETE CONES AND SECTIONS TO BE A.S.T.M. C-474.
2. BRICK MAY BE USED IN LIEU OF OR IN COMBINATION WITH CONCRETE ADJUSTING RINGS.
3. PRECAST CONCRETE SECTIONS 48" DIA PIPE MAY BE FURNISHED IN STANDARD LENGTHS.
4. UNLESS OTHERWISE SHOWN ON PLANS, USE (2) 2-1/2" PRECAST CONCRETE ADJUSTING RINGS ON IMPROVED STREETS AND (4) 2-1/2" RINGS ON UNIMPROVED STREETS.
5. MANHOLE STEPS SHALL BEGIN 2'-0" BELOW FINISHED GRADE AND CONTINUE AT 12" INTERVALS TO APPROXIMATELY 2' ABOVE MANHOLE SHELF. (AS REQUIRED BY AGENCY.)
6. CONCRETE SHALL BE CLASS A PER SECTION 725 AND 505.

VERTICAL SECTION OF ECCENTRIC MANHOLE SHAFT

SHALLOW MANHOLE

REINFORCED CONCRETE ADJUSTING RING

2-1/2" RINGS SHALL BE REINFORCED WITH TWO 1/4" ROUND STEEL HOOPS; 6" AND 8" RINGS SHALL BE REINFORCED WITH FOUR 1/4" HOOPS, TIED WITH NO. 14 A.S.& W. GAUGE WIRE 8" O.C.
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 ACCOMMODATE CAPSCREW AND SOCKET WRENCH. SPACE EQUALLY.

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

3. DRILL, TAP AND COUNTERBORE (2) HOLES FOR 1/2" CAPSCREWS TO BE USED FOR LIFTING COVER. PLUG WITH CAPSCREWS.

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

5. CASTING DIMENSIONS GIVEN ABOVE ARE FROM DET. 424, 24" MANHOLE FRAME AND COVER. BOTH 24" AND 30" FRAMES TO BE ANCHORED AS FOLLOWS:

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

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

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

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

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

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

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

2. DRILL (6) HOLES IN 30" FRAME (4 HOLES IN 24" FRAME) AND TAP FOR 1/2" - NATIONAL COARSE BOLT (HEX HEAD).

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

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

5. REFER TO DETAIL 523-1 FOR INSTALLATION PROCEDURES.
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.
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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</table>

T=6" IF V=4" OR LESS
T=8" IF V IS BETWEEN 4" AND 8"
T=10" IF V IS 8" OR MORE (IF V EXCEEDS 10" SPECIAL DESIGN IS REQUIRED)
V=3"-6" UNLESS OTHERWISE SPECIFIED.

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

** 4" LOCATIONS WHERE 4" S/W IS REQUIRED.
NOTES:

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

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

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

4. FLOOR OF BASIN SHALL BE 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

<table>
<thead>
<tr>
<th>CURB</th>
<th>A</th>
<th>4&quot;</th>
<th>3'-3&quot;</th>
<th>6&quot;</th>
<th>1'-9&quot;</th>
<th>7&quot;</th>
<th>1'-0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>6&quot;</td>
<td>8&quot;</td>
<td>10&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>3'-6&quot;</td>
<td>3'-6&quot;</td>
<td>3'-6&quot;</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

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

** 4' LOCATIONS WHERE 4' S/W IS REQUIRED.
NOTES:
1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
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6. CONCRETE SHALL BE CLASS A PER SECTION 725.

DIMENSIONS

<table>
<thead>
<tr>
<th>CURB</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
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<tr>
<td>6&quot;</td>
<td>1&quot;–9&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>1&quot;–0&quot;</td>
</tr>
</tbody>
</table>

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

* SEE DETAILS 536–1 AND 536–2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.
** 4" LOCATIONS WHERE 4" S/W IS REQUIRED.
GRATE AND FRAME  
SEE DETAIL 533-3  
& 533-4 

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

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.

DIMENSIONS
V = 3'-3" MIN. WHEN L = 3'
V = 3'-5" MIN. WHEN L = 6'
V = 3'-7" MIN. WHEN L = 10'
V = 4'-0" MIN. WHEN L = 17'
T = 6" WHEN V IS LESS THAN 8'
T = 8" WHEN V IS EQUAL TO OR  
   GREATER THAN 8'
H = CURB HEIGHT PRIOR TO THE  
   TRANSITION

REINFORCEMENT DETAIL
SECTION D–D

FOR S/W INSTALLATION BEHIND CATCH BASIN SEE DETAIL 230

SECTION E–E

APRON NOTES:

9. APRON IS CONSTRUCTED ONLY WHEN SPECIFIED ON PLANS.

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

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

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

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

PLAN VIEW

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

DETAIL NO. 533–2
STANDARD DETAIL ENGLISH APRON FOR TYPE 'D' CATCH BASIN

REVISED 01–01–1999 DETAIL NO. 533–2

MARICOPA ASSOCIATION OF GOVERNMENTS
FRAME AND GRATE NOTES

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

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

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

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

18. ALL PARTS SHALL BE OF STRUCTURAL GRADE STEEL.

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

SECTION F-F

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

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

CROSS BARS:
1/2" DIA. x 26-1/2" ROD 
4" C. TO C., 9 EACH

FRAME DETAIL

GRATE DETAIL

ANCHOES - TOTAL 6 
SEE NOTE NO. 17
**Grate Detail**

Grate Opening: 4.344 sq. ft.

**Cross Bars:**
1/2 Dia. x 24-7/8" Rod, 4" C. to C., 9 Each

**Bearing Bars:**
3-1/2" x 1/2" x 39-1/2"
1-7/8" C. to C., 14 Each

**End Bars:**
2-1/2" x 1/4" x 24-7/8"
2 Each.

Section B-B
DIMENSION
V=3'-0" UNLESS OTHERWISE SPECIFIED.
* DIMENSIONAL CHANGE WITH DETAIL 534-3 AND DETAIL 534-4.

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.
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

FLOW

DATE

SECTION B-B

CROSS-SECTIONAL AREA: 1.53 SQ. IN.

3-1/4" R

VANE DETAIL

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.

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

36-1/2"

35-1/2"

12 EQUAL SPACES AT 2-13/16"

33"

36"

43"

DATE

FLOW

DATE

3/4

2"

5/8"

5/8"

1/2"

60°

1"

6"

2"

1-1/4" R

17-3/4"

15-1/8"

3/4

24"

3"

6"

4"

1-1/4"

1-1/4" R
BOLT CURB BOX TO FRAME WITH 1/2" x 13" x 2-1/2" STEEL HEX HEAD BOLTS, NUTS AND WASHERS

SECTION A-A

DOUBLE UNIT CAST IRON FRAME — GRATE — CURB BOX

SECTION B-B

CROSS-SECTIONAL AREA: 1.53 SQ. IN.

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

VANE DETAIL
NOTES:

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

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

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

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

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

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

NOTE:

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

NOSE ANGLE 2 3"x 4"x 1/2"

VARES

1/4" DIAMOND FLOOR & COVER

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

EQUAL DISTANCE

1" GALVANIZED BAR

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

SECTION C-C FOR DETAILS 531, 532 AND 533

PROTECTION BAR SEE THIS DETAIL

SECTION D-D

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

NOTES:

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

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

PLAN VIEW

STEEL FILLER BLOCKS WELDED TO FRAME

# 3 REINF. STEEL DOWEL BARS

DOWEL BAR

1/4" DIAMOND FLOOR & COVER

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

D D

21-1/2" 21-1/2"

1-1/4" 19"

1-1/4" 19"
FURNISH FOR EACH SIDE OF HANDLE:
1. EACH 304-SS 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  
4. EACH 1/2" LOCK WASHER

NOTES:
1. FRAME SHALL BE NON-LOCKING.
2. FRAME AND COVER SHALL BE CAST IRON OR ASTM A-36 SRDL. HORIZONTAL SURFACE OF COVER IN CONTACT WITH FRAME SHALL BE MACHINED. ASA B-46 ROUGHNESS SHALL NOT EXCEED 1/32".
3. COVER SHALL BE FILLED WITH CONCRETE AND BROOM FINISHED.
4. SMALL VARIATIONS IN DIMENSIONS OF FEATURES OF A MINOR NATURE THAT ARE PART OF THE FOUNDRY'S CASTING ARE PERMISSIBLE.
ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725. EXPOSED EDGES SHALL BE FINISHED WITH A 1/2" RADIUS.

DETAIL OF ANGLE FRAME

GRATE SUPPORT

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

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

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

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

PIPE SIZE AS REQUIRED BY PLANS

SLOPE FLOOR TO OUTLET

BAR GRATE
SEE DETAIL 539

DOUBLE GRATE

SECTION A-A

PLAN

SINGLE GRATE

SECTION B-B

PLAN

29" x 29" I.D. GRATE FRAME

29" x 53" I.D. GRATE FRAME

8" 24"

537

REVIEWED 01-03-2002

DETAIL NO. 537

STANDARD DETAIL ENGLISH

CATCH BASIN - TYPE 'G'
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)

8" MIN.

D=(VARIABLE)
NOTES:

2. WELDING SHALL BE IN ACCORDANCE WITH A.W.S. SPECIFICATIONS.
3. FRAME AND GRATE SHALL BE TESTED FOR ACCURACY OF FIT AND SHALL BE MARKED IN SETS BEFORE DELIVERY.
4. THE COMPLETED ASSEMBLY SHALL BE GIVEN ONE SHOP COAT OF NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECTION 790.
5. THE GRATE SHALL BE FABRICATED TO WITHIN 1/8" SPECIFIED DIMENSIONS.
NOTES:
1. GRATING UNITS AND FRAMES SHALL BE FABRICATED FROM STRUCTURAL STEEL EXCEPT AS NOTED.
2. WELDING SHALL BE IN ACCORDANCE WITH STD. WELDING SPECS.
3. THE COMPLETED ASSEMBLY SHALL BE GIVEN TWO SHOP COATS OF NO. 1 PAINT AS PER SECT. 790.
4. FRAME AND GRATE SHALL FIT TO A MAX. ROCK OF 0.093" AT ANY POINT.
5. RESTRICT USE TO GRADES OF 3% OR LESS.

BAR TABLE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>CLEAR SPACING</th>
<th>NO. BARS</th>
<th>X</th>
<th>GRADE OPENING ft²</th>
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<td>TW OR TB-1.0</td>
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<td>26</td>
<td>1&quot;</td>
<td>3.21</td>
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<td>16</td>
<td>1&quot;</td>
<td>2.65</td>
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</tbody>
</table>

TW INDICATES TRANSVERSE WELDED
TB INDICATES TRANSVERSE BOLTED
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.
### PIPE Dimensions - Inches

<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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<td>1520</td>
<td>3</td>
<td>9 1/2</td>
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<td>3</td>
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<td>27&quot;</td>
<td>1930</td>
<td>3 1/4</td>
<td>10 1/2</td>
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<td>54</td>
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<td>12</td>
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<td>73 3/4</td>
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<td>3</td>
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<td>98 1/4&quot;</td>
<td>90</td>
<td>2 1/2</td>
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### NOTES

1. Design of end section shall conform to standard for reinforced concrete pipe.
2. End section joint conformation shall match the pipe joints.
3. Embankment slope shall be warped to match slope of end section.
4. Culvert length is as shown on plans.

---

**PLAN**

**SECTION A-A**

**FRONT ELEVATION**

**LENGTH OF PIPE PER PLANS**

**RIGHT ANGLE CULVERT**

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

SECTION A-A

SPILLWAY SECTION

SECTION ON SPILLWAY C
DOUBLE INLET

SPILLWAY INLET AND OUTLET
NOTES:

1. FORD WALLS SHALL BE CLASS 'A' CONCRETE PER SECT. 725.
2. DEPTH GAUGE SHALL BE PAINTED 2 COATS WHITE ENAMEL. NUMERALS AND MARKERS SHALL BE 1 COAT BLACK ENAMEL.
3. NUMBERS ON DEPTH GAUGE TO BE 2" HIGH.
4. HEIGHT OF DEPTH GAUGE OPTIONAL.
5. TWO DEPTH GAUGES MAY BE USED. ONE ON EACH END OF UPSTREAM WALL. START WITH 2' INSTEAD OF 1'.
TYPICAL GABIONS

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

CUT BANK TO DEPTH "C" BEFORE PLACING GABIONS

EXIST GROUND LINE OR STREAM BED

GABIONS FILLED WITH STONE

2'-6"

N.N.

PLAN

ELEVATION

NOMINAL SIZE COMBINATIONS

<table>
<thead>
<tr>
<th>LENGTH</th>
<th>WIDTH</th>
<th>DEPTH</th>
</tr>
</thead>
<tbody>
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<td>3'</td>
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<td>1'</td>
</tr>
<tr>
<td>12'</td>
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<td>1'</td>
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NOTE:
OTHER SIZES AVAILABLE FROM MANUFACTURER.