UNIFORM STANDARD DETAILS
for
PUBLIC WORKS
CONSTRUCTION

SPONSORED and DISTRIBUTED by the

MARICOPA ASSOCIATION of GOVERNMENTS

2020 EDITION
ARIZONA
FOREWORD

Publication of these Uniform Standard Specifications and Details for Public Works Construction fulfills the goal of a group of agencies who joined forces in 1966 to produce such a set of documents. Subsequently, in the interest of promoting countywide acceptance and use of these standards and details, the Maricopa Association of Governments accepted their sponsorship and the responsibility of keeping them current and viable.

These specifications and details, representing the best professional thinking of representatives of several Public Works Departments, reviewed and refined by members of the construction industry, were written to fulfill the need for uniform rules governing public works construction performed for Maricopa County and the various cities and public agencies within Maricopa County who could not afford to promulgate such standards for themselves. Agencies in other regions or climes that desire to use these specifications may need to make adjustments for local conditions.

A uniform set of specifications and details, updated and embracing the most modern materials and construction techniques will reduce conflicts, provide clarity and lower construction costs for the benefit of the public.

Use of these standards for projects outside of the right-of-way should be reviewed by professional engineers and architects and applied with care to insure relevance to the planned work.

Specifications and details should be incorporated into project plans and specifications after careful review by the design engineer or architect of specific project needs. Not all specifications contained herein will apply to all projects. Prepared plans and specifications should clearly call out only those specific uniform specifications and details required for the project.

Uniform specifications and details are not a substitute for good engineering judgment. Unique conditions will arise that are outside the scope of these standards. When this happens, professional engineers and architects are required to use their judgment to amend these standards to best meet site-specific project needs in accordance with the rules set forth by the State of Arizona and policy statements made by the Arizona State Board of Technical Registration.

The Uniform Standard Specifications and Details for Public Works Construction are revised periodically and reprinted to reflect the changing technology of the construction industry. To this end a Specifications and Details Committee has been established as a permanent organization to continually study and recommend changes to the Specifications and Details. Interested parties may address suggested changes and questions to: Standard Specifications & Details Committee c/o Maricopa Association of Governments 302 North First Avenue, Suite 300 Phoenix, Arizona, 85003

Suggestions will be reviewed by the committee and appropriate segments of the construction industry and revisions will be published the first of each year. A copy of this publication is available for review on the internet at the website listed below. Please follow the links to the publications page and look for Uniform Standard Specifications for Public Works Construction and/or Uniform Standard Details for Public Works Construction: www.azmag.gov

In the interest of regional uniformity, it is hoped that all using agencies will adopt these standards with minimal changes. It is recognized that because of charter requirements and for other reasons, some agencies will find it necessary to modify or supplement certain requirements. In the interest of regional uniformity, it is strongly recommended that using agencies bring desired modifications to the MAG Committee for consideration and inclusion into these standards.
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<td>1998</td>
<td>SPILLWAY INLET AND OUTLET</td>
</tr>
<tr>
<td>552</td>
<td>2015</td>
<td>FORD CROSSING WITH CUT-OFF WALLS</td>
</tr>
<tr>
<td>555</td>
<td>2010</td>
<td>EROSION PROTECTION/GABIONS</td>
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</tbody>
</table>
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 "DET" 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.
NOTES:
1. PLAN SYMBOLS FOR EXISTING FEATURES ARE TO BE DASHED, GRAY SCALED, OR DRAWN USING THIN LINEWORK.
2. ADD LABELS TO PLAN SYMBOLS AS NEEDED FOR CLARITY.
<table>
<thead>
<tr>
<th>Feature</th>
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<th>Note</th>
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<tr>
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<td>Wood Fence</td>
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<td>Gas Line (12&quot; &amp; Smaller)</td>
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<td>4&quot; G (Material)</td>
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<td>15&quot; G (Material)</td>
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<td>Sewer Line (12&quot; &amp; Smaller)</td>
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<td>8&quot; S (Material)</td>
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<td>Sewer Line * (Greater Than 12&quot;)</td>
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<td>18&quot; S (Material)</td>
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<td>New Storm Drain Pipe *</td>
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<tr>
<td>Storm Drain * (Greater Than 12&quot;)</td>
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<td>18&quot; SD (Material)</td>
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<td>4&quot; IRR (Material)</td>
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<td>15&quot; IRR (Material)</td>
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<tr>
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<tr>
<td>Water Line (12&quot; &amp; Smaller)</td>
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<td>4&quot; W (Material)</td>
</tr>
<tr>
<td>Water Line * (Greater Than 12&quot;)</td>
<td></td>
<td>36&quot; W (Material)</td>
</tr>
</tbody>
</table>

* Scale to Actual Width
DIMENSION SHOULD BE GIVEN ONCE ON EACH SHEET AND SHOULD BE PLACED NEAR THE CENTER OF THE SHEET. IF ANY OF THE GIVEN CONDITIONS CHANGE, THEY SHOULD BE REDIMENSIONED AT THE POINT OF CHANGE.

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

GIVE COMPLETE DIMENSIONS.

IF THE CENTERLINE OF PAVEMENT DOES NOT FALL ON THE SECTION LINE OR MONUMENT LINE OF THE STREET, DIMENSION AS ABOVE AND SHOW THE DIFFERENCE BETWEEN THE SECTION OR MONUMENT LINE AND THE CENTERLINE.
NOTES:

1. TYPE 'A' TO BE USED AT INTERSECTIONS OF MAJOR STREETS & COLLECTOR STREETS, SECTION CORNERS, SECTION 1/4 CORNERS, CENTER OF SECTIONS, AND AT OTHER POINTS AS SHOWN ON PLANS.

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

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

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

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

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

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

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

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

10. SUBMIT TO THE ENGINEER A COPY OF THE RECORDED CORNER RECORD OR RESULTS OF SURVEY TO DOCUMENT COMPLIANCE WITH THE ARIZONA BOARD OF TECHNICAL REGISTRATION REQUIREMENTS.
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, 011A-BLUE by Fire Lite Amerace Corporation, or approved equal.
NOTES:

1. FASTEN WITH 1/2" x 5" LAG SCREWS WITH 2 FLAT WASHERS OR (2) 5/8" BOLTS, WITH 4 FLAT WASHERS.
2. 2" x 8" DOUGLAS FIR PLANK (LENGTH TO BE DETERMINED ON PLANS.)
3. WHEN BARRICADE (TYPE "A") IS CONSTRUCTED ON BASES INSTEAD OF POSTS SET INTO THE GROUND, IT MAY BE DESIRABLE TO BALLAST THE BASES WITH SAND BAGS OR BY STAKING TO PROVIDE RESISTANCE TO OVERTURNING DURING PERIODS OF HIGH WINDS.
4. TWO COATS OF WHITE PAINT PER SECTION 790 SHALL BE APPLIED TO ALL EXPOSED SURFACES OF THE BARRICADE. AN ADDITIONAL TWO COATS OF ORANGE PAINT PER SECTION 790 SHALL BE APPLIED TO CREATE THE ALTERNATE ORANGE AND WHITE STRIPES FOR TEMPORARY BARRICADES AND TWO COATS OF RED PAINT PER SECTION 790 SHALL BE APPLIED TO CREATE ALTERNATE RED AND WHITE STRIPES FOR PERMANENT BARRICADES. HIGHWAY SAFETY SPHERES (BEADS) PER ADOT 708-2.02 SHALL BE APPLIED BY HAND TO ALL CROSS MEMBERS, FRONT AND BACK AND ON BOTH COLORS, IMMEDIATELY AFTER PAINTING. THE STRIPES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS.
NOTES

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

TYPE 'B' & TYPE 'C'
CONCRETE BASE FOUNDATIONS SHALL BE CLASS 'C' CONCRETE AS PER SECT. 505 AND 725.
**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 1/2 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 1/2 INCH OUTSIDE DIAMETER, HIGH STRENGTH HEAVY INDUSTRIAL STEEL PIPE CONFORMING TO ASTM F1043 MATERIAL GROUP IA-2 (2.72 LB/FT, MINIMUM YIELD STRENGTH=50 KSI). OR MATERIAL GROUP IC GALVANIZED AFTER FORMING (2.28 LB/FT, MINIMUM YIELD STRENGTH=50 KSI).
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.
8. FOR SAFETY RAIL ON 8" BLOCK (CMU) WALLS, THE TOP COURSE SHALL BE A BOND BEAM WITH 2-#4 LONGITUDINAL REBAR AND GROUT.

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

5/8" hole for 1/2" dia. pin, 24" long, hot rolled steel

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.

Type B-1, B-2, and B-3

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

1/2" dia. pins = 24" long, hot rolled steel

A typical section

No. 3 reinforcing bar as per section 727
69" for Type 'A' and 'B-3'
45" for Type 'B-2'

6" dia. concrete cylinder
Concrete class B per Section 725

Safety curb
Installation on dirt
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”</td>
<td>2.875”</td>
</tr>
<tr>
<td>LINE POST</td>
<td>1-1/2”</td>
<td>1.900”</td>
</tr>
<tr>
<td>STRAIN POST</td>
<td>1-1/2”</td>
<td>1.900”</td>
</tr>
<tr>
<td>BRACE</td>
<td>1-1/4”</td>
<td>1.666”</td>
</tr>
<tr>
<td>STRETCH BAR</td>
<td>3/16”x3/4” FLAT</td>
<td>3/16”x3/4” FLAT</td>
</tr>
<tr>
<td>GATE POST</td>
<td>3-1/2”</td>
<td>4.000”</td>
</tr>
<tr>
<td>TOP RAIL</td>
<td>1-1/4”</td>
<td>1.666”</td>
</tr>
</tbody>
</table>

7. CONSTRUCTION AND MATERIALS SHALL CONFORM TO Sect. 420 AND 772, RESPECTIVELY, SEE TABLE 772-1 FOR WEIGHTS OF MEMBERS.
LONGITUDINAL TRENCH  
(TRENCH IN PAVEMENT PARALLEL TO TRAFFIC)

TRANSVERSE TRENCH  
(TRENCH IN PAVEMENT NOT PARALLEL TO TRAFFIC)

NOTES:
1. SEE SECTION 601 FOR TRENCH EXCAVATION, BACKFILLING AND COMPACTION REQUIREMENTS.
2. SEE DETAIL 200-1 FOR DETAILED TRENCH REPAIR REQUIREMENTS FOR TRENCH TYPES NOTED HEREIN.
3. SEE 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.

TRENCH CROSS-SECTION DETAIL

JOINT SEALANT DETAIL

REMNANT PAVEMENT REMOVAL
**A.C. PAVEMENT**

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

**TYPE ’A’**

12" SUBJECT TO VEHICULAR TRAFFIC COMPACT TO 95%

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

**A.C. PAVEMENT**

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

**TYPE ’B’**

12" SUBJECT TO VEHICULAR TRAFFIC COMPACT TO 95%

**OVERLAY OR FINISHING COURSE**

TACK COAT

EXISTING PAVEMENT OR NEW PAVEMENT

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

TACK COAT

EDGE ROADWAY PAVEMENT

30°±5° UNPAVED SHOULDER RECOMPACT TO 95%

COMPACTED SUBGRADE

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

DETAIL C

SECTION 'B-B'

SLOPE=1.5%

DIAMOND PLATE

FLOW LINE

LIP OF GUTTER

SECTION 'A-A'

EXPANSION JOINT

STEEL DIAMOND PLATE A-36

EXPANSION JOINT

SEE NOTE 2

'G'
PLATE 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: W x L = SURFACE-TYPE; (12' x 30') - A.C.-TYPE "B" TURNOUT.
   90° - WITH A RADIUS: W x L x R = SURFACE-TYPE; (12' x 20' x 15') - A.C.-TYPE "C" TURNOUT.
   OTHER THAN 90° WITH 2 RADIUS - TYPE "S": W x L x R1 x R2 = SURFACE-TYPE;
   (12' x 20' x 15') - A.C.-TYPE "S" TURNOUT.
   OR IT MAY BE NOTED ON PLANS IN CONVENTIONAL TERMS.

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

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

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

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

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.
5. 12” OFFSET DISTANCE SHALL BE INCREASED TO 2’-6” FOR DESIGNATED BICYCLE PATHS.
NOTES:
1. TRANSITION TO SPILLWAY/CHANNEL AS PER APPROVED PLANS.
2. A CENTER WALL SHALL BE INSTALLED IN SCUPPERS WIDER THAN 4' OR IF MORE THAN 1 SCUPPER IS BUILT IN SERIES.
3. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, ASTM D-1751.
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.

EXPANSION JOINT
WELD PLATE

SCORE MARK

WELD PLATE

EXPANSION JOINT
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 COMPACTATION 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.
NOTES:
1. USE TYPE 1 PLATE INSTALLATION WHERE POSTED SPEED LIMIT IS LESS THAN 30 MPH. USE TYPE 2 PLATE INSTALLATION WHERE POSTED SPEED LIMIT IS 30 MPH OR GREATER.
2. FOR TYPE 2 PLATE INSTALLATION, THE STEEL PLATE SHALL BE RECESSED BY MILLING INTO THE EXISTING ASPHALT TO SET FLUSH WITH THE SURFACE OF THE EXISTING ASPHALT. FULL DEPTH CUTTING OF PAVEMENT SECTION OUTSIDE OF TRENCH IS NOT PERMITTED. MILLING DEPTH SHALL MATCH THICKNESS OF PLATE. THE GAP BETWEEN THE EDGE OF THE PLATE AND THE ADJACENT EXISTING ASPHALT PAVEMENT MUST BE FILLED WITH TEMPORARY ASPHALT.
3. TRENCH WIDTHS ARE BASED ON AN ANALYSIS PER THE 14TH EDITION OF STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES BY AASHTO. AN ASSUMED AXLE LOADING OF 12 TONS WITH A 30% IMPACT FACTOR WAS USED. THE AXLE LENGTH IS 6 FEET; THEREFORE THE NUMBER OF WHEELS CARRIED BY A PLATE DEPENDS ON THE ROADWAY WIDTH.
4. STEEL PLATE MUST BE ABLE TO WITHSTAND H–20 TRAFFIC LOADINGS WITHOUT ANY MOVEMENT.
5. PLATES SHALL BE FABRICATED FROM ASTM A36 STEEL (MIN).
6. PLATES SHALL BE SECURED FROM LATERAL MOVEMENT AND VERTICAL VIBRATION (ASSOCIATED NOISE) WHILE IN USE BY TEMPORARY ASPHALT (COLD MIX.).
**TYPE A PAVEMENT REPAIR**

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

**SECTION A—A**

6" MIN. THICKNESS OR MATCH EXISTING, WHICHERVER 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**

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.

ROLL CURB AND GUTTER
(TYPE C)
SPECIAL SECT. USE FOR HIGH SIDE CURB WITH SHEET DRAINAGE ACROSS STREET
PAVEMENT FLUSH WITH LIP OF GUTTER

NOTES: (TYPE B)
1. CONSTRUCT CURB AND INSTALL 1/2" MASTIC EXPANSION JOINTS, A.S.T.M. D-1751, SECT. 340.
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.

RIBBON CURB
(TYPE D)
1. ALL WORK AND MATERIALS SHALL CONFORM TO SECT. 304, 505 AND 725. BROOM FINISH TO EXPOSED SURFACE.
2. CONTRACTION JOINT SPACING 10" MAXIMUM.
3. EXPANSION JOINTS AS PER SECT. 340.
4. CLASS 'B' CONCRETE PER 725.
MOUNTABLE CURB AND GUTTER (TYPE E)

MOUNTABLE CURB AND GUTTER (TYPE F)

CURB TRANSITION TYPE 'E' TO TYPE 'A'

CURB TRANSITION TYPE 'F' TO TYPE 'A'

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 TO ROLL CURB

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' TRANSITION SHALL BE MEASURED AND PAID FOR AS TYPE 'C' CURB AND GUTTER.
2. WHERE PROPOSED CONSTRUCTION IS TO BE CONNECTED TO EXISTING CURB AND GUTTER, THE TRANSITION SHALL BE INDICATED ON PLANS.
3. CLASS 'B' CONCRETE PER SECTION 725.
4. TRANSITION BETWEEN TYPICAL SECTIONS SHALL BE ACCOMPLISHED BY THE USE OF DIRECT STRAIGHT LINE TRANSITIONS OF THE FLOW LINE AND OTHER SURFACE FEATURES.

CURB AND GUTTER TRANSITION

INTEGRAL ROLL CURB, GUTTER AND SIDEWALK

NOTES: (INTEGRAL ROLL CURB, GUTTER AND SIDEWALK)
1. CONCRETE TO BE MONOLITHIC POUR. EXPOSED SURFACE FINISH AS PER SIDEWALK AND GUTTER DETAIL.
2. CONTRACTION JOINT SPACING 5' MAXIMUM.
3. EXPANSION JOINTS PER SECTION 340.
4. CLASS 'B' CONCRETE PER SECTION 725.
NOTES:

1. ALL VERTICAL SURFACES TO BE FORMED.
2. VERTICAL SURFACES DOWN FROM 2" BELOW UNDISTURBED SOIL MAY BE PLACED AGAINST NEAT CUT IF APPROVED BY THE ENGINEER AND CONCRETE WILL NOT EXTEND MORE THAN 1" BEYOND THEORETICAL FACE.
3. ALL EXPOSED SURFACES TO BE STRIPPED GREEN AND TROWEL FINISHED.
4. CONCRETE CURBS CONFORM TO SECT. 340.
5. MAXIMUM SPACING OF CONTRACTION JOINTS IS 10'
6. CONCRETE TO BE CLASS 'B' PER SECT. 725.
7. WHEN PAVEMENT AND BASE COURSE EQUALS OR EXCEEDS 10" IN DEPTH, THE ENTIRE ROADWAY SIDE OF THE CURB SHALL BE FORMED. THE TOTAL CURB HEIGHT REMAINS 18" UNLESS NOTED OTHERWISE.

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

MANHOLE COVERS

MANHOLE COVERS

JOINT FOR DRAINAGE INLETS AND MANHOLE COVERS

DETAIL NO. 224

STANDARD DETAIL
ENGLISH

REVISED 01–01–1998

DETAIL NO. 224
NOTES:

1. EXPANSION JOINTS PER SECT 342, EVERY 50'.
2. CONTRACTION JOINTS PER SECT 342, EVERY 10'.
3. MATERIALS AND CONSTRUCTION PER SECT 342.
4. HEADERS SHALL BE 12' AT CROSSWALKS.
5. 60mm PAVERS MAY BE ACCEPTED WITH AGENCY APPROVAL IN NON TRAFFIC AREAS ONLY.
NOTES:

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECTION 340.
2. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, PER SECTION 729.
3. LARGE AGGREGATE, IN CONTRACTION JOINT SHALL BE SEPARATED TO A DEPTH OF 1", FINISH DEPTH SHALL BE A MINIMUM OF 3/4".
4. EXPANSION JOINTS SHALL CONFORM TO SECTION 340, BE INSTALLED PRIOR TO CONCRETE PLACEMENT, AND AT A MAXIMUM SPACING OF 50'.
5. CONCRETE SHALL BE CLASS 'B' PER SECTION 725.
6. WHEN SIDEWALK AND ADJACENT CURB ARE CONSTRUCTED MONOLITHICALLY, ALL EXPANSION AND CONTRACTION JOINTS SHALL EXTEND ACROSS THE CURB.
CURB RAMP

DEPRESSED CURB WIDTH

BACK OF CURB

VERTICAL CURB & GUTTER

CURB RAMP CONTROL POINT @ FACE OF CURB

DEPRESSED CURB

STRAIGHT ALIGNMENT AT BACK OF DEPRESSED CURB TO MATCH EDGE OF DETECTABLE WARNING STRIP

PLAN VIEW

DETAIL NO. 234

STANDARD DETAIL
ENGLISH

CURB MODIFICATION
AT DETECTABLE WARNING

REVIS 01–01–2012

DETAIL NO. 234
NOTES:
1. CLASS 'A' CONCRETE PER SECTION 725, PC TO PT.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. WALKWAY SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
5. DISTANCE BETWEEN RAMPS MAY BE ADJUSTED TO IMPROVE ALIGNMENT WITH RECEIVING RAMP WHEN ALLOWED BY THE JURISDICTIONAL AGENCY.
6. SPECIAL DESIGN IS REQUIRED FOR GUTTER GRADES GREATER THAN 2%.
NOTES:
1. CLASS 'A' CONCRETE PER SECTION 725, PC TO PT.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. WALKWAY SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
5. DISTANCE BETWEEN RAMPS MAY BE ADJUSTED TO IMPROVE ALIGNMENT WITH RECEIVING RAMP WHEN ALLOWED BY THE JURISDICTIONAL AGENCY.
6. SPECIAL DESIGN IS REQUIRED FOR GUTTER GRADES GREATER THAN 2%.
NOTES:

1. CLASS 'A' CONCRETE PER SECTION 726, PC TO PT.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. WALKWAY SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
5. DISTANCE BETWEEN RAMPS MAY BE ADJUSTED TO IMPROVE ALIGNMENT WITH RECEIVING RAMP WHEN ALLOWED BY THE JURISDICTIONAL AGENCY.
6. SPECIAL DESIGN IS REQUIRED FOR GUTTER GRADES GREATER THAN 2%. 

SECTION A-A

01-01-2019
NOTES:
1. CLASS 'A' CONCRETE PER SECTION 726, PC TO PT.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. WALKWAY SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
5. DISTANCE BETWEEN RAMPS MAY BE ADJUSTED TO IMPROVE ALIGNMENT WITH RECEIVING RAMP WHEN ALLOWED BY THE JURISDICTIONAL AGENCY.
6. SPECIAL DESIGN IS REQUIRED FOR GUTTER GRADES GREATER THAN 2%.
NOTES:
1. CLASS A CONCRETE PER SECTION 726, PC TO PT.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. WALKWAY SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING TO COMPLY WITH THE JURISDICTIONAL AGENCY’S REQUIREMENTS.
5. DISTANCE BETWEEN RAMPS MAY BE ADJUSTED TO IMPROVE ALIGNMENT WITH RECEIVING RAMP WHEN ALLOWED BY THE JURISDICTIONAL AGENCY.
6. SPECIAL DESIGN IS REQUIRED FOR GUTTER GRADES GREATER THAN 2%.
7. TYPICALLY USED FOR RETROITS. REQUIRES AGENCY APPROVAL PRIOR TO USE.
NOTES:

1. CLASS 'A' CONCRETE PER SECTION 725, PC TO PT.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. WALKWAY SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY’S REQUIREMENTS.
5. DISTANCE BETWEEN RAMPS MAY BE ADJUSTED TO IMPROVE ALIGNMENT WITH RECEIVING RAMP WHEN ALLOWED BY THE JURISDICTIONAL AGENCY.
6. SPECIAL DESIGN IS REQUIRED FOR GUTTER GRADES GREATER THAN 2%.
7. WING SLOPE SHALL NOT EXCEED 10% MEASURED PERPENDICULAR TO RAMP.
8. RAMP ALIGNMENT SHOULD CONNECT CONTROL POINT TO CONTROL POINT OF RECEIVING RAMP WITHIN 5 FEET.
NOTES:
1. CLASS 'A' CONCRETE PER SECTION 725, PC TO PT.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. WALKWAY SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
5. DISTANCE BETWEEN RAMPS MAY BE ADJUSTED TO IMPROVE ALIGNMENT WITH RECEIVING RAMP WHEN ALLOWED BY THE JURISDICTIONAL AGENCY.
6. SPECIAL DESIGN IS REQUIRED FOR GUTTER GRADIENTS GREATER THAN 2%.
7. WING SLOPE SHALL NOT EXCEED 10% MEASURED PERPENDICULAR TO RAMPS.
8. RAMPS ALIGNMENT SHOULD CONNECT CONTROL POINT TO CONTROL POINT OF RECEIVING RAMPS WITHIN 5 FEET.

SECTION A-A

25' - 35' R - DIRECTIONAL CURB RAMP DETACHED SIDEWALK
NOTES:

1. CLASS 'A' CONCRETE PER SECTION 725, PC TO PT.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. WALKWAY SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY’S REQUIREMENTS.
5. SPECIAL DESIGN IS REQUIRED FOR GUTTER GRADES GREATER THAN 2%.
6. WING SLOPE SHALL NOT EXCEED 10% MEASURED PERPENDICULAR TO RAMP.
7. RAMP ALIGNMENT SHOULD CONNECT CONTROL POINT TO CONTROL POINT OF RECEIVING RAMP WITHIN 5 FEET.
NOTES:
1. CLASS 'B' CONCRETE PER SECTION 725.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. SIDEWALK SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.

SECTION A-A

DETAIL NO. 238-1
STANDARD DETAIL
ENGLISH
PERPENDICULAR CURB RAMP

REVISED 01-01-2018
DETAIL NO. 238-1
NOTES:
1. CLASS B' CONCRETE PER SECTION 725.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. SIDEWALK SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.

SECTION A-A
NOTES:
1. CLASS 'B' CONCRETE PER SECTION 725.
2. CONSTRUCTION INCLUDING JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. SIDEWALK SURFACE TO MATCH 1.5% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
5. TYPICALLY USED FOR RETROPTS. REQUIRES AGENCY APPROVAL PRIOR TO USE.

SECTION A-A

RIGHT-OF-WAY LINE
VARIES
6"

1.5% SLOPE
(SER NOTE 2)

CONTRACTION JOINT
1" DEEP OR FORMED SEPARATELY

THICKNESS TRANSITION
12"

DETECTABLE WARNING

SUBGRADE PREPARATION, PER SECTION 301

GUTTER FLOW LINE

7"

7/8"

5' MIN LANDING*

2'

7"

1' 5/8"

4' ALLOWED WITH AGENCY APPROVAL
NOTES:
1. CLASS 'A' CONCRETE PER SECTION 725.
2. CONSTRUCTION INCLUDING JOINTS, CONCRETE FINISH AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. SIDEWALK SURFACE TO MATCH 1.5 % SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
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 radii 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)
**NOTES:**

1. DEPRESSED CURB SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE TYPE OF CURB USED AT THAT LOCATION.
2. CONTRACTION JOINT ON D/W CENTERLINE.
3. CONTRACTION JOINT.
4. 1/2-INCH EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.
5. BACK OF CURB — CONSTRUCTION JOINT.
6. CONCRETE CLASS AS NOTED IN TABLE. 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.
12. TROWEL AND USE LIGHT HAIR BROOM FINISH FOR WALKWAY AREA.
13. DRIVEWAY ENTRANCE WIDTH IS THE DRIVEWAY WIDTH PLUS ADDITIONAL WIDENING REQUIRED BY THE LOCAL JURISDICTION.
14. ELEVATION AT TOP OF DRIVEWAY RAMP SHALL BE EQUAL TO OR HIGHER THAN NORMAL CURB ELEVATION.

### COMMERCIAL AND INDUSTRIAL

<table>
<thead>
<tr>
<th>DRIVeway Entrance Width</th>
<th>Min.</th>
<th>Max.</th>
<th>Class</th>
<th>Depth 'x'</th>
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<tr>
<td>Commercial</td>
<td>16'</td>
<td>40'</td>
<td>A</td>
<td>9'</td>
</tr>
<tr>
<td>Industrial</td>
<td>16'</td>
<td>40'</td>
<td>A</td>
<td>9'</td>
</tr>
<tr>
<td></td>
<td>+24’ MIN. FOR TWO WAY TRAFFIC</td>
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### Residential

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<th>Max.</th>
<th>Class</th>
<th>Depth 'x'</th>
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<tbody>
<tr>
<td>Major Street</td>
<td>16’</td>
<td>30’</td>
<td>B</td>
<td>5’</td>
</tr>
<tr>
<td>Collector Street</td>
<td>12’</td>
<td>30’</td>
<td>B</td>
<td>5’</td>
</tr>
<tr>
<td>Local Street</td>
<td>12’</td>
<td>30’</td>
<td>B</td>
<td>5’</td>
</tr>
<tr>
<td>*16’ Desirable</td>
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</tbody>
</table>
NOTES:
1. DEPRESSED CURB SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE TYPE OF CURB USED AT THAT LOCATION.

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

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

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.

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

13. 'driveway entrance width' is the driveway width plus additional widening required by the local jurisdiction.

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

**SECTION A-A**

<table>
<thead>
<tr>
<th>COMMERCIAL AND INDUSTRIAL</th>
<th>RESIDENTIAL</th>
</tr>
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<tbody>
<tr>
<td><strong>DRIVEWAY ENTRANCE WIDTH</strong></td>
<td><strong>DRIVEWAY ENTRANCE WIDTH</strong></td>
</tr>
<tr>
<td>MIN.</td>
<td>MAX.</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>+ 16'</td>
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<tr>
<td>INDUSTRIAL</td>
<td>+ 16'</td>
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<tr>
<td>+ 24' MIN. FOR TWO WAY TRAFFIC</td>
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<tr>
<td>*16' DESIRABLE</td>
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</tbody>
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**DETAIL NO.** 250–2

**STANDARD DETAIL**  ENGLISH

**DRIVEWAY ENTRANCES WITH SIDEWALK ATTACHED TO CURB**

**REVISED** 01–01–2013

**DETAIL NO.** 250–2
**TABLE A**

<table>
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<tr>
<th>ZONING</th>
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<td>MIN</td>
<td>MAX</td>
</tr>
<tr>
<td>16'</td>
<td>40'</td>
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</table>

*24' WHERE 2-WAY TRAFFIC IS ANTICIPATED*

<table>
<thead>
<tr>
<th>ZONING</th>
<th>DRIVEWAY WIDTH</th>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>MIN</td>
<td>MAX</td>
</tr>
<tr>
<td>16'</td>
<td>30'</td>
</tr>
<tr>
<td>12'</td>
<td>30'</td>
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<table>
<thead>
<tr>
<th>ZONING</th>
<th>DRIVEWAY WIDTH</th>
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</thead>
<tbody>
<tr>
<td>LOCAL STREET</td>
<td></td>
</tr>
<tr>
<td>MIN</td>
<td>MAX</td>
</tr>
<tr>
<td>12'</td>
<td>30'</td>
</tr>
</tbody>
</table>

*16' WIDTH IS DESIRABLE

**NOTES:**

1. EXPANSION JOINT SHALL COMPLY TO SECTION 340.
2. THIS TYPE D/W TO BE USED ONLY UPON APPROVAL OF ENGINEER.
3. CONCRETE:
   RESIDENTIAL CLASS B
   COMMERCIAL AND INDUSTRIAL CLASS A

**SECTION A-A**
NOTES:

1. SUFFICIENT RIGHT-OF-WAY SHALL BE VERIFIED TO CONSTRUCT THE BUS BAY.

2. EXPANSION JOINT FILLER PER 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.

8. PROVIDE MIN 6"X5" ADA COMPLIANT CLEAR SPACE FROM BACK–OF–CURB FOR BOARDING AND ALIGHTING AREA, AS SHOWN ON PLANS AND SHALL CONNECT TO PEDESTRIAN ACCESS ROUTE.

SECTION A–A

FLOW LINE

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

SECTION B–B

FLOW LINE

2% SLOPE OR AS NOTED ON PLANS

SECTION C–C

STD. DET. 230 SIDEWALK WIDTH PER PLANS

NEW A.C. PAVEMENT

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

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

STANDARD DETAIL

BUS BAYS

DETAIL NO.

ENGLISH

252

01–01–2019

252
**NOTES:**
1. CLASS "A" CONCRETE PER SECTION 725.
2. CONSTRUCTION INCLUDING EXPANSION JOINTS AND MAXIMUM SLOPES SHALL CONFORM TO SECTION 340.
3. LIMITS OF ROUGH BROOM FINISH.
4. SUBGRADE PREPARATION PER SECTION 301.
5. SINGLE CURB PER DETAIL 222, TYPE 'B' WHEN REQUIRED BY PLANS. SEE PLANS FOR CURB LENGTHS AND ELEVATIONS.
6. FOR RETROITS REPLACE CONCRETE TO NEAREST CONTROL JOINT OR AS DIRECTED BY AGENCY.
7. 2" ROLL CURB AND GUTTER PER DETAIL AS SHOWN.
8. CONTROL JOINT.
9. DETAIL 221 CURB AND GUTTER TRANSITION.

**SECTION A—A**

**PLAN VIEW**

**ELEVATION**

**2" ROLL CURB AND GUTTER**
THICKEN CONCRETE FROM 6" TO 8" IN 18" AT BACK OF ALLEY ENTRANCE

PROPERTY LINE 2' ALLEY RIGHT-OF-WAY 2'

BACK OF ALLEY ENTRANCE

CONSTRUCTION JOINT OR SCORE MARK

FLOW LINE GUTTER LIP OF GUTTER DEPRESSED CURB

WARP DEPRESSED CURB

WARP

ELEVATION

SECTION A-A

NOTES:

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

2. ROUGH BROOM FINISH FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE.

3. CLASS 'A' 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.
NOTES:
1. CASTING TO CONFORM TO SECT. 787.
2. LETTERS ON COVER TO BE AS FOLLOWS: "SEWER", "WATER", OR "SURVEY" AS DIRECTED. TOTAL WIDTH OF WORD "SEWER" OR "WATER" 3'-3/4", TOTAL WIDTH OF THE WORD "SURVEY" 4'-1/2". LETTER SIZE 5/8" X 3/4", RAISED 1/16" ABOVE THE LEVEL OF THE COVER.
3. #4 REINFORCING STEEL HOOP EQUALLY CENTERED HORIZONTALLY & VERTICALLY.
4. INDICATES MACHINE FINISHED SURFACE.
NOTES:
1. CASTING TO CONFORM TO SECTION 787.
2. LETTERS ON COVER TO BE AS FOLLOWS, PER AGENCY REQUIREMENTS:
   3/4" HIGH "RECLAIMED WATER" OR 1/2" HIGH "NONPOTABLE WATER".
   LETTERS TO BE RAISED 1/16".
3. / Indicates machine finished surface.
4. VALVE BOX SHALL HAVE A ROUND BOTTOM TO ACCOMMODATE RISER PIPE.
NOTE:
THIS DETAIL COVERS WATER GATE VALVES, 4" TO 12" INCLUSIVE REGARDLESS OF TYPE OF PIPE USED. LARGER LINES TO BE DETAILED ON PLANS.

WATER GATE VALVE

CONCRETE FOOTING CLASS "B" CONCRETE PER SECT. 725

6" MIN. TRENCH WIDTH

HUB-END GATE VALVE

STANDARD JOINT

FINISH GRADE

X+4" MIN.

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

SHORT LENGTH (APPROX. 3')

X

CONCRETE FOOTING UNDER VALVE (NON-SHRINKING)

CEMENT GROUTING UNDER VALVE

SIDE OPERATOR

BRICK PIER AS REQUIRED

WATER MAIN

TRENCH WALL

4" MIN.

WATER MAIN

TRENCH BOTTOM

CONCRETE FOOTING EQUAL TO TRENCH WIDTH

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 1/8 INCH IN DIAMETER LARGER THAN BOLTS.

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

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

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

For pipe larger than 12 inches in diameter, restraint details shall be submitted for approval prior to installation.


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

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


5. COATING TYPE: A.H.D. ASPHALTIC PRIMER 719(A) — ALL EXPOSED METAL.
LRN = SHORTEST LENGTH OF PIPE RESTRAINED TO THE RUN OF THE TEE FITTING (BOTH SIDES OF TEE).
# Restrained Lengths, LR, for Ductile Iron Pipe

## Table: Restrained Lengths, LR, for Ductile Iron Pipe

<table>
<thead>
<tr>
<th>Nominal Pipe Size Inches</th>
<th>Horizontal Bends</th>
<th>Tees</th>
<th>Vertical Offsets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>18</td>
<td>7</td>
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<tr>
<td>6</td>
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<td>16</td>
<td>8</td>
</tr>
<tr>
<td>12</td>
<td>45</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>14</td>
<td>51</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>16</td>
<td>57</td>
<td>24</td>
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<td>18</td>
<td>62</td>
<td>26</td>
<td>12</td>
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<tr>
<td>20</td>
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<td>28</td>
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</tr>
<tr>
<td>24</td>
<td>79</td>
<td>33</td>
<td>16</td>
</tr>
</tbody>
</table>

## Table: Restrained Lengths, LR, for Ductile Iron with Polyethylene Wrap and PVC Pipe

<table>
<thead>
<tr>
<th>Nominal Pipe Size Inches</th>
<th>Horizontal Bends</th>
<th>Tees</th>
<th>Vertical Offsets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>26</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>47</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
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<td>23</td>
<td>11</td>
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<td>65</td>
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<td>74</td>
<td>31</td>
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<td>16</td>
<td>82</td>
<td>34</td>
<td>16</td>
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<td>18</td>
<td>90</td>
<td>37</td>
<td>18</td>
</tr>
<tr>
<td>20</td>
<td>98</td>
<td>41</td>
<td>20</td>
</tr>
<tr>
<td>24</td>
<td>113</td>
<td>47</td>
<td>22</td>
</tr>
</tbody>
</table>

**Notes:**

1. All joints within the specified length LR must be restrained.
2. All lengths are given in feet.
3. The maximum test pressure shall not exceed 200 PSI.
4. The minimum depth of bury shall be 3' to top of pipe.
5. Restrained lengths may be reduced when supported by engineering calculations.
SEE NOTE NO. 4

NOTE:
1. STEEL COVER MATERIAL TO BE PER ASTM A786
2. POTABLE WATER COVER PAINTED BLACK AND RECLAIMED WATER COVER PAINTED PANTONE PURPLE 512. USE OIL BASED PAINT ALKALI RESIN PER SECTION 790
3. DIMENSIONS SHOWN SHALL NOT VARY MORE THAN A 1/16 OF AN INCH
4. ALL COVERS MADE OUT OF DIAMOND CHECKER PLATE
5. STANDARD AUTOMATIC METER READER (AMR) HOLE 2" PER AGENCY OR STANDARD SPECIFICATION
6. REFER TO DETAIL 320 FOR VERTICAL LOAD RATING

<table>
<thead>
<tr>
<th>DIMS</th>
<th>COVER NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>15-3/4&quot;</td>
</tr>
<tr>
<td>B</td>
<td>3-7/8&quot;</td>
</tr>
<tr>
<td>C</td>
<td>9&quot;</td>
</tr>
<tr>
<td>D</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>E</td>
<td>1-1/2&quot;</td>
</tr>
<tr>
<td>F</td>
<td>7-1/8&quot;</td>
</tr>
<tr>
<td>G</td>
<td>8-1/4&quot;</td>
</tr>
<tr>
<td>H</td>
<td>1/8&quot;</td>
</tr>
<tr>
<td>I</td>
<td>3-3/4&quot;</td>
</tr>
<tr>
<td>J</td>
<td>NA</td>
</tr>
<tr>
<td>K</td>
<td>NA</td>
</tr>
<tr>
<td>L</td>
<td>13-7/8&quot;</td>
</tr>
<tr>
<td>M</td>
<td>15&quot;</td>
</tr>
<tr>
<td>N</td>
<td>14 GAUGE</td>
</tr>
</tbody>
</table>

SECTION A-A

SECTION B-B

PLAN VIEW

3/8" x 1-1/4" THRU PICK HOLE

SEE NOTE NO. 5

STEEL WATER METER COVER DIMENSIONS

AMR DETAIL OPTION

STEEL WATER METER BOX COVER

DETAIL NO. 310

STANDARD DETAIL

ENGLISH

01-01-2017

DETAIL NO. 310
NOTES:

1. POTABLE WATER COVER TINTED GRAY AND RECLAIMED WATER COVER TINTED PANTONE PURPLE 512

2. DIMENSIONS SHOWN SHALL NOT VARY MORE THAN A 1/16 OF AN INCH

3. ACCEPTABLE ALTERNATIVES INCLUDE "SHEET MOLDED COMPOUND" (SMC), AND "BULK MOLDED COMPOUND" (BMC). PLASTICS ARE NOT ACCEPTABLE MATERIALS

4. SLOTTED AUTOMATIC METER READING (AMR) HOLE PER AGENCY OR STANDARD SPECIFICATION

5. MARKING PER AGENCY AND/OR UTILITY

6. REFER TO DETAIL 320 FOR VERTICAL LOAD RATING

<table>
<thead>
<tr>
<th>POLYMER CONCRETE COVER DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVERS NUMBER</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Dims</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
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<tr>
<td>C</td>
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<tr>
<td>I</td>
</tr>
<tr>
<td>J</td>
</tr>
<tr>
<td>K</td>
</tr>
</tbody>
</table>
NOTES:

1. COVER AND BOX COMBINATION SHALL MEET AASHTO H20

2. DIMENSIONS SHOWN SHALL NOT VARY MORE THAN A 1/16 OF AN INCH

3. MARKINGS PER AGENCY AND/OR UTILITY

4. STACKABLE EXTENSION AVAILABLE TO ACHIEVE DEPTH DESIRED

5. GROUND BELOW THE BOX TO BE COMPACTED TO 95% MAXIMUM DENSITY

6. 6" CONCRETE COLLAR IF REQUIRED BY AGENCY

TRAFFIC BOX DIMENSIONS

<table>
<thead>
<tr>
<th>DIMS</th>
<th>BOX NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1324)</td>
<td>(1730)</td>
</tr>
<tr>
<td>A</td>
<td>29-3/4&quot;</td>
</tr>
<tr>
<td>B</td>
<td>27-1/4&quot;</td>
</tr>
<tr>
<td>C</td>
<td>24-1/4&quot;</td>
</tr>
<tr>
<td>D</td>
<td>19&quot;</td>
</tr>
<tr>
<td>E</td>
<td>16-1/2&quot;</td>
</tr>
<tr>
<td>F</td>
<td>13-1/2&quot;</td>
</tr>
<tr>
<td>G</td>
<td>27&quot;</td>
</tr>
<tr>
<td>H</td>
<td>25-1/4&quot;</td>
</tr>
<tr>
<td>I</td>
<td>9-1/2&quot;</td>
</tr>
<tr>
<td>J</td>
<td>16-1/4&quot;</td>
</tr>
<tr>
<td>K</td>
<td>7&quot;</td>
</tr>
<tr>
<td>L</td>
<td>2-1/2&quot;</td>
</tr>
<tr>
<td>M</td>
<td>24-5/8&quot;</td>
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<tr>
<td>N</td>
<td>28-5/8&quot;</td>
</tr>
<tr>
<td>O</td>
<td>4&quot;</td>
</tr>
<tr>
<td>P</td>
<td>18&quot;</td>
</tr>
</tbody>
</table>
NOTES:

1. THE METER BOXES SHALL CONFORM TO DIMENSIONS AS SHOWN AND SHALL NOT VARY MORE THAN A 1/16 OF AN INCH

2. THE METER BOXES SHALL BE MADE OF CLASS 'AA' CONCRETE PER SECT. 725. ACCEPTABLE ALTERNATIVE MATERIALS INCLUDE "POLYMER CONCRETE", "SHEET MOLDED COMPOUND" (SMC), "BULK MOLDED COMPOUND" (BMC), AND POLYETHYLENE WITH POLYMER CONCRETE FRAME

3. MINIMUM VERTICAL LOAD RATING PER TIER 5 ANSI/SCTE77 TESTING STANDARD FOR GRADE LEVEL ENCLOSURES AND COVERS

4. FOR LOAD REQUIREMENTS ABOVE 5,000 POUNDS USE DETAIL 319, TRAFFIC RATED BOX AND COVER
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

REMOVABLE SUPPORT

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

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

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

CAST-IN-PLACE VAULT SECTION
NOTES:

1. TAPPING SLEEVE TO BE PLACED A MINIMUM OF 18" FROM ANY BELL COUPLING, VALVE, FITTING OR OTHER OBSTRUCTION.

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>SIZE OF PIPE BEING CONNECTED</th>
<th>MINIMUM THRUST AREA REQUIRED (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>
<td>6</td>
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<tr>
<td>10&quot;</td>
<td>9</td>
</tr>
<tr>
<td>12&quot;</td>
<td>13</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23</td>
</tr>
</tbody>
</table>
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" OR ANY 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 CONCRETE SHALL BE WRAPPED WITH 30 LB ASPHALT ROOFING FELT.
9. REMOTE READING DEVICE SHALL BE OF SELF GENERATING ELECTRICAL TYPE.
10. CONCRETE TO BE CLASS ‘B’ PER Sect. 725.

<table>
<thead>
<tr>
<th>DIA. OF PIPE</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>BY-PASS METER SIZE</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>4”</td>
<td>60”</td>
<td>66”</td>
<td>49”</td>
<td>5/8” x 3/4”</td>
<td>30”</td>
</tr>
<tr>
<td>6”</td>
<td>66”</td>
<td>72”</td>
<td>49”</td>
<td>5/8” x 3/4”</td>
<td>30”</td>
</tr>
<tr>
<td>8”</td>
<td>72”</td>
<td>72”</td>
<td>58”</td>
<td>1”</td>
<td>36”</td>
</tr>
<tr>
<td>10”</td>
<td>78”</td>
<td>72”</td>
<td>69”</td>
<td>1-1/2”</td>
<td>36”</td>
</tr>
</tbody>
</table>

SECTION A-A

SECTION B-B

NOTE 5. DETECTOR CHECK VALVE

NOTE: 4” x 2-5/8” I-BEAM

CONCRETE BLOCK OR BRICK
2 CURB STOP

BRASS PIPE AND FITTINGS
BY-PASS METER

CHECK VALVE

O.S.&Y. VALVE
TO CITY MAIN
C.I.P.
1. Joints between the valve and the main shall be flanged type. Joints between the valve and hydrant shall be restraint or mechanical type.

2. Restraints shall be mechanical restraint or thrust block per detail 380.

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

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

5. See detail 362 for location of hydrant.

6. Pumper connection shall face the street.

7. No valves are to be located in curb.

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

9. See detail 360-3 for concrete pad.

10. Contractor to verify correct color with agency requirements. All new fire hydrants shall be factory painted only and in new condition. Any new or relocated fire hydrants requiring paint touch-up shall be done using the manufacturer's specified system and instructions.

11. See section 756 for hydrant material.
NOTES:

1. Joints between the valve and the main shall be flanged type. Joints between the valve and hydrant shall be mechanical restraint mechanical type.

2. Restraints shall be mechanical restraint or thrust block per detail 380.

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

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

5. See detail 362 for location of hydrant.

6. Pumper connection shall face the street.

7. No valves are to be located in curb.

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

9. See detail 360-3 for concrete pad.

10. Contractor to verify correct color with agency requirements. All new fire hydrants shall be factory painted only and in new condition. Any new or relocated fire hydrants requiring paint touch-up shall be done using the manufacturer's specified system and instructions.

11. The hydrant shall have 2- 2½" port and 1- 4½" port (industrial or commercial).

12. The hydrant shall have 1- 2½" port and 1- 4½" port (residential).
NOTES:
1. CONCRETE FOR PAD SHALL BE CLASS "A".
2. SCORE LINE SHALL BISECT CONCRETE PAD AT MID POINT OF ALL SIDES.
3. CONCRETE COLOR SHALL MATCH ADJACENT CONCRETE. THE FINISHED CONCRETE SURFACE SHALL HAVE A ROUGH BROOM FINISH (SURFACE ONLY).
4. MULTIPLE OFFSET FITTINGS SHALL NOT BE ALLOWED.
5. MINIMUM 36" CLEARANCE PER NFPA-24 AROUND FIRE HYDRANT.
6. 1/2" BITUMINOUS EXPANSION SHALL BE PLACED AROUND THE BARREL OF THE FIRE HYDRANT AT THE CONCRETE PAD.
NOTES:

1. Obstructions such as utility poles, street signs, irrigation boxes, fences, etc., must not be placed between curb and hydrant and within the radius for fire dept. access.

2. Dimensions shown on construction drawings supersede locations shown here.

3. On locations in midblock, the fire hydrant will be aligned with a property line.
**NOTES:**

1. THIS DETAIL COVERS MOVING OF WATER MAINS 2" TO 12" ONLY.

2. THRUST BLOCKING AS PER DET. 380 & 381.

3. IF OFFSET IS TO GO OVER OBSTRUCTION, JOINT RESTRAINTS MUST BE USED.

4. PIPE IS TO BE CAST IRON OR DUCTILE IRON.
TYPICAL LOCATIONS OF THRUST BLOCKS

NOTES:

1. TABLE IS BASED ON 200 P.S.I. TEST PRESSURE AND 3,000 LBS/SQ FT. SOIL. IF CONDITIONS ARE FOUND TO INDICATE SOIL BEARING IS LESS, THE AREAS SHALL BE INCREASED ACCORDINGLY.

2. AREAS FOR PIPES LARGER THAN 16" SHALL BE CALCULATED FOR EACH PROJECT.

3. FORM ALL NON-BEARING VERTICAL SURFACES.

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

MINIMUM THRUST BLOCK AREA REQUIRED (YxW) (SQ. FT.)

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>WATER PIPE</th>
<th>TEE, DEAD END, 45° &amp; 22 1/2° BENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; OR LESS</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>6&quot;</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>8&quot;</td>
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<td>6</td>
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<td>10&quot;</td>
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<tr>
<td>12&quot;</td>
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<td>14</td>
</tr>
<tr>
<td>16&quot;</td>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

SECTION A-A
### NOTES:

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

2. DUCTILE IRON PIPE MAY BE USED.

3. BARS TO CONCRETE THRUST BLOCK TO BE COATED WITH 2 COATS COAL TAR, EPOXY OR BY OTHER APPROVED METHOD. BARS TO HAVE 90° HOOK ON LOWER END, AS PER TABLE.
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 ASPHALTOS CEMENT PIPE OR CAST IRON PIPE.

NOTE:

1. VALVE BOX TO BE SUPPORTED ON BRICKS TO PREVENT VERTICAL LOADS FROM BEING TRANSMITTED TO THE SMALL PIPE.
WATER METER BOX COVER PER DETAIL 310 OR 315

WATER METER BOX NO. 2 PER DETAIL 320

GROUND LEVEL

WATER METER BOX COVER PER DETAIL 310 OR 315

CAP

WATER METER BOX NO. 2 PER DETAIL 320

2" ADAPTER BRASS OR COPPER

6" GRAVEL BED

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

2" BRONZE CURB STOP

TAPPED PLUG OR CAP

WATER LINE

CONCRETE THRUST BLOCK PER DETAIL 380

2" COPPER PIPE

2" COPPER PIPE

2" P.E. OR COPPER PIPE

2" CORP STOP

2" BRASS COUPLING

2" BRASS ELL

2" TAPPED CAP (CAST IRON)

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

TYPE 'A'

TYPE 'B'

DETAIL NO. 390

STANDARD DETAIL ENGLISH

CURB STOP WITH FLUSHING PIPE

REvised 01-01-2018

DETAIL NO. 390
NOTES:

1. VALVE BOX SHALL BE ADJUSTED TO THE FINISHED GRADE PRIOR TO PLACEMENT OF CONCRETE.
2. USE DEEP SKIRTED LID (4" OR MORE) TYPE, SLIDING ADJUSTABLE CAST IRON VALVE BOX C.I. MIN. 30,000 P.S.I.
3. GROUND BELOW THE CONCRETE RISER PAD TO BE COMPACTED 95% MAXIMUM DENSITY.
4. CUT RISER PIPE TO LENGTH IN FIELD. CAUTION: IF EXISTING RISER IS ASBESTOS-CEMENT PIPE (ACP) FOLLOW OSHA GUIDELINES FOR WORKING WITH ACP.
5. #4 REINFORCING STEEL HOOP EQUALLY CENTERED HORIZONTALLY & VERTICALLY.
6. CONCRETE SHALL BE CLASS "AA" PER SECTION 725.
7. WATER VALVE EXTENSIONS SHALL BE INSTALLED WHEN THE DIMENSION FROM FINISH GRADE TO THE TOP OF THE OPERATING NUT EXCEEDS 5 FEET. SEE DETAIL 393 FOR VALVE EXTENSION.
NOTES:

1. IF TWO OR MORE SECTIONS OF PIPE ARE USED TO MAKE THE VALVE BOX RISER, THEY SHALL BE COUPLED OR BONDED TO FORM DEBRIS-TIGHT JOINTS.
2. VALVE BOX SHALL BE PLUMB AND CENTERED AROUND THE OPERATING NUT.
3. THE TOP OF THE VALVE SHALL BE KEPT CLEAN.
4. THE TOP OF THE RISER SHALL BE A MINIMUM OF 1 INCH ABOVE UNDISTURBED OR COMPACTED SOIL AND SHALL HAVE A MINIMUM CLEARANCE OF 2" FROM THE RISER TO THE LID SKIRT.
NOTES:

1. The debris cap shall be designed and installed to prevent debris such as dirt, dust, sand, etc., from passing around the cap and down into the valve housing. The cap shall be held in place by a mechanism which will not damage the valve housing.

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

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

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

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

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

MATERIAL: STEEL PER ASTM A513

2" SQUARE OPERATING NUT (WITH STAINLESS STEEL FLAT WASHER - 0.43 ID x 1 OD x 0.1 THICK STAINLESS STEEL HEX BOLT - 3/8-16 x 1") NUT TO BE HELD DOWN WITH NUT ON THREADED SHAFT AS STD VALVE STEM ATTACHMENT.

NOTES:
1. EXTENSION STEM: WITH A SQUARE SOCKET ON THE BOTTOM TO FIT A 2" SQUARE VALVE OPERATING NUT. VALVE EXTENSIONS ARE REQUIRED ON ALL VALVES INSTALLED WHERE THE OPERATING NUT IS OVER 5' BELOW THE SURFACE. LENGTH TO FIT EACH INSTALLATION. OPERATING NUT TO BE HELD ON TOP OF EXTENSION WITH STOP NUT.
2. PAINTING: ALL STEEL TO HAVE A PRIME COAT OF PAINT NO. 1-D AND ONE HEAVY APPLICATION (FINISH COAT) OF PAINT NO. 9 AS PER SECTION 790.
3. DIRT RING TO FLOAT FREELY ON THE TOP OF THE SUPPORT PLATE.
4. PIPE SLEEVE SHALL BE SECURELY WELDED TO THE UPPER AND LOWER PORTION OF THE 1-1/4" EXTENSION ROD.
Optional bearing wall construction for large diameter (D) pipe to be formed in trench.

Section A-A

Type 'A'

(2) No. 4 rebars

See Sect. 601 for backfill & compaction

Section B-B

Type 'B'

Trench Walls

Conc. poured against wall of trench

Pipe Conduit

Notes:

1. Type 'A' pipe support may be used for any type crossing condition.

2. Type 'C' pipe support may be used for crossing pipes with a bell diameter of 18" or less if sufficient clearance over storm sewer is available and total span is less than 34'.

3. Intermediate pipe support shall be used in conjunction with Type 'C' pipe support if total span exceeds max. 'W' in Table.

4. The contractor shall be responsible for furnishing all supports both permanent and temporary. Temporary supports shall not be a separate pay item.

5. Permanent pipe supports may be decreased from plan quantities or extended to include some listed below as temporary supports if conditions warrant these changes at the time of construction. Decision shall be made by the Engineer.

6. When Type 'A' pipe support is used and whenever so directed by the Engineer, the contractor shall pierce the wall with suitable openings to prevent unequal pressure resulting from flooding of the backfill. The volume of the pierced opening shall not exceed 1/2 the volume of the supporting wall.

7. Use Type 'B' pipe support instead of Type 'C' when clearance is less than 'Y' in Table, between pipes.

8. Class 'A' concrete as per Sect. 725 unless otherwise noted.

Schedule of Required Supports

<table>
<thead>
<tr>
<th>Permanent</th>
<th>Temporary</th>
</tr>
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<tbody>
<tr>
<td>Sewer lines</td>
<td>Cast iron pipe</td>
</tr>
<tr>
<td>Other utilities as</td>
<td>Conc. irreg. pipe</td>
</tr>
<tr>
<td>noted on the plans</td>
<td>Buried telco.</td>
</tr>
<tr>
<td>or as required</td>
<td>Gas pipes</td>
</tr>
<tr>
<td>by the Engineer at</td>
<td>Conc. storm drain</td>
</tr>
<tr>
<td>time of construction.</td>
<td>Conc. box culvert</td>
</tr>
<tr>
<td></td>
<td>Traffic control conduit</td>
</tr>
<tr>
<td></td>
<td>Water &amp; sewer lines</td>
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TABLE

<table>
<thead>
<tr>
<th>'W'</th>
<th>0' TO 8'</th>
<th>8' TO 16'</th>
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<tbody>
<tr>
<td>BAR NO.</td>
<td>Y</td>
<td>BAR NO.</td>
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<tr>
<td>TO 6'</td>
<td>5</td>
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<td>18''</td>
</tr>
<tr>
<td>17'</td>
<td>8</td>
<td>19''</td>
</tr>
</tbody>
</table>

PLAN FOR TYPE 'B' SUPPORT

SECTION D-D

SECTION C-C

INTERMEDIATE SUPPORT FOR TYPE 'B' CROSSINGS

PIECE SUPPORTS ACROSS TRENCHES

DETAIL NO. 403-2

STANDARD DETAIL ENGLISH

MARICOPA ASSOCIATION OF GOVERNMENTS

REvised 01-01-1998

DETAIL NO. 403-2
JOINT METHOD WILL VARY DEPENDING ON EXISTING PIPE MATERIAL

NOT TO EXCEED ONE PIPE LENGTH

5'-0" MIN

VARIES

5'-0" MIN

VARIES

BACKFILL AND COMPACT PER SECTION 601

NEW DUCTILE IRON PIPE CLASS 52 SIZE TO MATCH EXISTING PIPE

5'-0" MIN.
WATER LINE EXCLUSION AND EXTRA PROTECTION ZONES*

GRAVITY SANITARY SEWER

PRESSURIZED SANITARY SEWER

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

DUCTILE IRON PIPE WITH RESTRAINED OR MECHANICAL JOINTS*

MECHANICAL OR RESTRAINED JOINTS (OR NO JOINTS)

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

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

NOTES:
1. CLASS 'C' CONCRETE AS PER SECTION 725.
*REFER TO SECTION 610, WATER LINE CONSTRUCTION.
REPLACE ALL PAVING ACCORDING TO SECTION 336

NEW CONSTRUCTION

EXISTING SEWER CONNECTION OR MAIN BROKEN DURING EXCAVATION FOR NEW CONSTRUCTION

PLAN VIEW OF REPLACEMENT

COMPACtion SHALL BE DONE IN ACCORDANCE WITH SECT. 601

6" MIN. WHEN USING CAULDER CONNECTION

REPLACEMENT WHEN NEW TRENCH
MORE THAN 2' WIDE

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

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.
**TYPE 'A' TOP**
(POLYMER CONCRETE ECCENTRIC CONICAL TOP MANHOLE)

24" OR 30" FRAME & COVER PER DETAIL 423, 424, 425 (TYP)

OVERALL ADJUSTMENT RING HEIGHT SHALL BE 12" MIN. TO 18" MAX. (TYP)

USE JOINT SEALANT PER MANUFACTURER ON ALL JOINTS

PRECAST RISER SECTIONS AS REQUIRED

POLYMER CONCRETE SHELF SHALL BE PER DETAIL 419–3 SECTION A–A

CAST-IN-PLACE BASE THICKNESS BASED ON MANUFACTURER REQUIREMENTS

GRANULAR BEDDING AND FOUNDATION AS REQUIRED

24" TO 26–3/4" ON 48" MANHOLE 30" ON 60" MANHOLE (TYP)

24" MAX. ADJUSTING RINGS PER DETAIL 422 (TYP)

FINISH GRADE (TYP)

24" MAX. 30" MIN. 8" MIN.

DIA. PER PLANS

**NOTES:**

1. PRECAST REINFORCED POLYMER CONCRETE MANHOLE SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH SECTION 744.

2. SEE DETAIL 422 FOR FINAL ADJUSTMENT TO GRADE.

3. ALL MANHOLES SHALL REQUIRE ENGINEER (STRUCTURAL) CALCULATIONS.

4. THE MANHOLE ACCESS POINT SHALL BE ORIENTED IN SUCH A WAY THAT THE OPENING IS DIRECTLY ABOVE THE LOWEST INVERT, OR AS OTHERWISE DIRECTED BY THE PLANS OR ENGINEER.

5. FOR PRECAST BASE SEE DETAIL 419–2.

6. FLAT TOPS SHALL ONLY BE USED WITH APPROVAL FROM THE ENGINEER.
NOTES:

1. MANHOLE CONSTRUCTION SHALL BE PER SECTION 744.
2. JOINTS SHALL BE COMPATIBLE WITH CAST-IN-PLACE MANHOLE CONSTRUCTION.
3. ALL POLYMER PRECAST MANHOLE BASES SHALL BE PLACED ON 8" MINIMUM OF ABC PER SECTION 702 COMPACTED TO 100% MAXIMUM DENSITY.
4. ALL MODIFICATIONS SHALL BE APPROVED BY THE ENGINEER.
5. WALL THICKNESS SHALL BE 2" MINIMUM BASED ON MANUFACTURER REQUIREMENTS.
6. REINFORCEMENT SHALL BE REQUIRED PER THE MANUFACTURER RECOMMENDATIONS AND CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.
7. CHANNEL TRANSITION SHALL BE CONSTANT FROM INLET TO OUTLET OF MANHOLE TO FACILITATE SMOOTH TRANSITIONS AND ACCOMMODATE CORRESPONDING MANDREL.
8. THERE SHALL BE NO HARD CONNECTIONS (GRouted) INTO THE MANHOLE BASE UNLESS APPROVED BY THE ENGINEER.
9. ALL SEWER SERVICE CONNECTIONS SHALL HAVE THE SAME CONNECTION TYPES IN THE PRECAST MANHOLE BASE.
10. EXTENDED BOTTOM SLAB WILL BE A DESIGN OPTION BASED UPON ENGINEERING AND FIELD REQUIREMENTS.
11. ALL PIPE CONNECTIONS SHALL BE IN COMPLIANCE WITH ASTM F477 OR ASTM C425. AN EXTRA STRENGTH VCP BELL WITH A POLYURETHANE JOINT THAT MEETS ASTM C425 MAY BE USED WITH VCP.
12. JOINT CONNECTION DESIGN WILL BE BASED ON THE MANUFACTURER'S RECOMMENDATIONS.
OUTLET PIPE PER APPROVED PLANS

90° MIN. ANGLE

IF NO SIDE SEWERS, FORM ONE CONTINUOUS CHANNEL

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

TYPICAL CHANNEL

2"± RADIUS

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

NOTES:
SEE DETAIL 419-2 FOR NOTES.
NOTES:
1. PRECAST STEEL REINFORCED MANHOLE SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 478 EXCEPT AS MODIFIED HEREIN.
2. CAST-IN-PLACE MANHOLE BASE TO BE CONSTRUCTED IN ONE PLACEMENT.
3. CAST-IN-PLACE MANHOLE BASE SHELF AND CHANNEL TO RECEIVE SMOOTH TROWEL FINISH.
4. MANHOLE COATINGS PER AGENCY.
5. SEE MAG DETAIL 422 FOR FINAL ADJUSTMENT TO GRADE.
6. ANY MANHOLE OVER 20' SHALL REQUIRE ENGINEER (STRUCTURAL) CALCULATIONS.
7. THE MANHOLE ACCESS POINT SHALL BE ORIENTED IN SUCH A WAY THAT THE OPENING IS DIRECTLY ABOVE THE LOWEST INVERT, OR AS OTHERWISE DIRECTED BY THE PLANS OR ENG.
8. FOR PRECAST BASE SEE DETAIL 420-2.
9. FLAT TOPS SHALL ONLY BE USED WITH APPROVAL FROM THE ENGINEER.
NOTES:

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

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

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

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

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

6. ALL MODIFICATIONS SHALL BE APPROVED BY THE ENGINEER.

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

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

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

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

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

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

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

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

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

90° MIN ANGLE

FLOW

IF NO SIDE SEWERS, FORM ONE CONTINUOUS CHANNEL

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

TYPICAL CHANNEL

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

FLOW

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

SECTIONS A-A

SEE DETAIL 420-2 FOR NOTES

DETAIL NO. 420-3

STANDARD DETAIL
ENGLISH

CONCRETE MANHOLE BASE

REVISED 01-01-2015

DETAIL NO. 420-3
1. Contractors shall adjust all manhole rings and covers, including manholes outside of the pavement.
2. Adjustment shall be constructed per MAG Section 345.
3. Manhole coatings per agency
4. Grout shall be used between frame and adjusting ring to achieve water tightness.

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

OUT OF PAVEMENT—FINISH GRADE

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

SUBGRADE PREPARATION TO
CONFORM TO SECT. 301 OR 601

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

EXISTING OR
RECENTLY
INSTALLED
PAVEMENT

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

ADJUSTING RINGS

SURFACE OF
ADJUSTMENT RINGS
CONTINUOUS

GROUT INTERIOR

12” MIN.
BOTH SIDES
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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SECTION 'A--A'

SECTION 'B--B'

SECTION 'C--C'

SECTION VIEW OF FRAME AND COVER
WITH CAM LOCKING DEVICE

NOTES:

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

2. LETTERING ON MANHOLE COVER TO CONTAIN NAME
   OF AGENCY AND UTILITY FOR WHICH MANHOLE IS
   NEEDED. (I.E. "PHOENIX SANITARY SEWER"), OR AS
   DIRECTED. THE TOTAL WIDTH OF INDIVIDUAL LETTERS
   TO BE SUCH THAT LETTERS AND WORDS ARE
   EQUALLY SPACED AND BALANCED TO FORM A
   COMPLETE CIRCLE WITH SPACERS BEFORE AND
   AFTER THE WORD IDENTIFYING THE AGENCY
   INVOLVED. LETTERS TO BE 2" RAISED 1/8"
   ABOVE LEVEL OF COVER. TYPE OF LETTERS TO BE
   SUBMITTED FOR APPROVAL.

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

4. CASTINGS SHALL CONFORM TO SECT. 787.

5. SHALL CONFORM TO SECT. 625.3.1 - (FRAME
   AND COVER).
**TYPICAL STUB OUT**

**NOTES:**

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

2. IF DEPTH OF COVER IS LESS THAN 5' OR GREATER THAN 10', INCREASE PLUG THICKNESS A MIN. OF 4'.

**STUB OUT AND PLUGS**
NOTES:

1. This control vault with manhole and cover shall be used on 6" and 8" diameter sewer with flows in the range of 40 to 340 GPM.

2. Vault to be constructed on straight run of building sewer, accessible and safely located on the owner's property adjacent to a public right-of-way.

3. The Palmer Bowlus flume shall be installed per the manufacturer's recommendations.

4. The pre-cast concrete vault shall be rectangular with minimum inside dimensions of 4' wide and 6' long and at a depth of the design of the building sewer.

5. A shop drawing shall be submitted to the contracting agency for approval before installation of the vault and the Palmer Bowlus flume will be allowed.

MANHOLE FRAME AND COVER PER DETAIL NO. 423

PALMER BOWLUS FLUME OR EQUAL

ADDITIONAL BRACE AT MEASURING POINT

FINISHED GRADE

MANHOLE COVER

GASKETS

LEVEL

LEVEL

CAST IN PLACE BASE
CLASS 'B' CONCRETE

MANHOLE & COVER SLAB

PLAN VIEW

NOTE: WITH COVER REMOVED.

SECTION A-A

NOTE: LADDER NOT SHOWN IN SECTION VIEW. SECTION SHOWN WITH COVER IN PLACE.
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-2321. THE CONTRACTOR MAY VARY FROM THE DRAWING TO USE THE APPROPRIATE WYES, TEE-WYES AND BENDS TO ENSURE NO MISALIGNMENT OF THE PIPE AND FITTINGS. BLOCK OR BRACE FITTINGS JOINTS TO ENSURE ZERO DEGREES ANGULAR JOINT DEFLECTION.

9. END OF TAP TO BE SEALED AND MARKED AS NOTED.
NOTES:

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

2. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.

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

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

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

6. END OF TAP TO BE SEALED AND MARKED AS NOTED.

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

8. #14 BARE COPPER LOCATOR WIRE ACCESSIBLE AT R/W AND AT PROPERTY OWNER CLEANOUT BOX NO GREATER THAN 4' DEEP.

9. STAMP OR VELD THE LETTER "S" ON LID OF METER BOX.
NOTES:
1. CONSTRUCTION DETAIL APPLIES WHERE CONTRACTOR BUILDS HOUSE CONNECTION. TAP EXTENDS TO PROPERTY LINE IN ALLEYS OR STREETS OR TO EASEMENT LINE.
2. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.
3. CONSTRUCT TAP AT MIN. SLOPE IF COVER WILL BE LESS THAN 5' AT PROPERTY LINE.
4. IF DEPTH REQUIRES, MINIMUM SLOPE CAN BE REDUCED TO 1/8" PER FT 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/D [4" DIAMETER SELF LEVELING MARKER BALL GREEN IN COLOR] OR APPROVED EQUAL OR AS REQUIRED BY THE LOCAL AGENCY.
8. INSTALL RAISED 4" THREADED PLUG IN CLEANSOUT INCORPORATING 3M MODEL 1414 ELECTRONIC DISC MARKER. GREEN IN COLOR. LOCATOR PLUG TO BE OPK PRODUCTS MODEL #228--0004 DM OR APPROVED EQUAL.
9. STAMP OR WELD THE LETTER "S" ON LID OF METER BOX.

DETAIL NO. 440-3
STANDARD DETAIL ENGLISH

TYPE 'C' -- SEWER BUILDING CONNECTION
ONE-WAY CLEANOUT AND METER BOX
(WHEN SPECIFIED BY LOCAL AGENCY)

REVISED 01-01-2007
DETAIL NO. 440-3
CURB STAMP ROLLED CURB

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

- THE WORD 'SEWER' ON COVER
- UNPAVED STREETS AND ALLEYS
- CLASS 'AA' CONCRETE 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

SEWER TAP AT CLEANOUT

- 8" C.I. FRAME AND COVER DET. 270
- PAVED STREETS AND ALLEYS
- COMPACTED BACKFILL OR UNDISTURBED EARTH
- STANDARD 45° BEND
- VIT. CLAY PIPE PER Sect. 743
- TO BE LAID ON UNDISTURBED EARTH OR COMPACTED SELECT MATERIAL (TYPE B) OR A.B.C.
- STATION AND LENGTH SHOWN ON PLANS TO THIS POINT

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

ONE FULL LENGTH OF PIPE
4" OR 6" V.C.P. TAP TO PROPERTY LINE

8"x8" WYE
6"x8" OR 4"x8" VITRIFIED CLAY INCREASER
NOTES:
1. FOR WALLS REQUIRING SAFETY RAIL, MIN. WALL THICKNESS IS 8".
   SEE DETAIL 145 FOR ADDITIONAL REQUIREMENTS.
2. FOR BLOCK WALLS REQUIRING SAFETY RAIL, SEE DETAIL 145, NOTE 8.
DOUBLE PIPE HEADWALL

NOTES:
1. ALL CONCRETE SHALL BE CLASS 'A' PER SECTION 505 AND 725.
2. CONCRETE MASONRY UNITS (BLOCK) PER SECTIONS 510, 775 AND 776.
3. CONCRETE REINFORCEMENT SHALL BE NO.4 BAR 12" O.C. BOTH WAYS.
4. FOR WALLS REQUIRING SAFETY RAIL, MIN. WALL THICKNESS IS 8". SEE DETAIL 145 FOR ADDITIONAL REQUIREMENTS.
5. FOR BLOCK WALLS REQUIRING SAFETY RAIL, SEE DETAIL 145, NOTE 6.

HEADWALL DIMENSIONS

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE</th>
<th>$L_1$</th>
<th>$L_2$</th>
<th>$L_3$</th>
<th>$L_4$</th>
<th>$L_5$</th>
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<td>9'-4&quot;</td>
<td>2'-2&quot;</td>
<td>5'-9&quot;</td>
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</table>

* NOMINAL PIPE SIZE GIVEN FOR REINFORCED CONC. PIPE.

ELEVATION
CONCRETE MASONRY UNITS (BLOCK) HEADWALLS JOINED WITH CEMENT MORTAR PLASTERED BOTH SIDES OF WALL FULL HEIGHT AND SHALL BE CURED PER SECT. 726.
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.
4. FOR WALLS REQUIRING SAFETY RAIL, MIN. WALL THICKNESS IS 8”. SEE DETAIL 145 FOR ADDITIONAL REQUIREMENTS.
**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.
4. FOR WALLS REQUIRING SAFETY RAIL, MIN. WALL THICKNESS IS 8". SEE DETAIL 145 FOR ADDITIONAL REQUIREMENTS.
TRASH RACK

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. 750.

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.

5. FOR WALLS REQUIRING SAFETY RAIL, MIN. WALL THICKNESS IS 8". SEE DETAIL 145 FOR ADDITIONAL REQUIREMENTS.

6. FOR BLOCK WALLS REQUIRING SAFETY RAIL, SEE DETAIL 145, NOTE 8.
NOTE:
PAINT COVER BOTH SIDES
ONE PRIME COAT, TWO
FINISH COATS, SECT.
790, PAINT NO. 9

10 GAUGE SHEET
STEEL COVER

HANDLE EXTENDS
6" BELOW
TOP WHEN GATE
IS OPEN

TYPE 'A'

NOTES:
1. BRACE TO BE INSTALLED EVERY 2'
FROM TOP OF HEADGATE FRAME. BOTTOM
BRACE TO BE HIGH ENOUGH TO ENABLE
FULL OPENING OF HEADGATE.

2. INSTALL 1/2" BOLTS INTO LEAD
PLUG DRILLED TO WITHIN 1" OF
OUT SIDE OF STANDPIPE. SPACERS
TO BE INSTALLED AT EACH BOLT
BETWEEN HEADGATE FRAME AND INSIDE
OF STAND PIPE.

3. LOCATION OF 2" HOLE FOR GATE
STEM TO BE DETERMINED AFTER
INSTALLATION OF GATE.

4. CONCRETE SHALL BE
CLASS A PER SECT. 725.
PAINT ARROW ON OUTSIDE OF
STANDPIPE INDICATING DIRECTION
"TO OPEN" HEADGATE.

(2) 5/16"
H OLES
4" O.C.

1/4" ROD
HANDLE

SEE NOTE 1

SEE NOTE 2

SEE NOTE 3

SEE NOTE 4

GALVANIZED EXPANDED
METAL LID (9 GAUGE)

(4) 3/8" BOLTS TO BE
GROUTED INTO STANDPIPE
EQUI-DISTANT WITH
1-1/2"x3" RECTANGULAR
WASHERS AND NUTS

FORM CONC. AROUND
END OF PIPE BEHIND
HEADGATE FRAME

TYPE 'B'

DETAIL NO.
503

STANDARD DETAIL
ENGLISH

IRRIGATION STANDPIPE

REVISED
01–01–2018

DETAIL NO.
503
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

ELEV. OF BOTTOM OF PAVEMENT SUBGRADE

SECTION A—A

SECTION B—B

NOTES:
1. SIZE OF JUNCTION BOX TO BE DETERMINED BY THE ENGINEER.
2. GATE TYPE, SIZE AND NUMBER REQUIRED AS SHOWN ON PLANS OR AS SPECIFIED.
3. CONCRETE MASONRY UNITS (BLOCK) PER SECT. 510, 775 & 776
NOTES:

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

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

3. OMIT REINFORCING ON PIPE 24" OR LESS IN DIAMETER.


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

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

7. ALL REBAR SHALL HAVE 3" MINIMUM CLEAR COVER.

8. PIPE ENDS TO BE TRIMMED SUCH THAT THE MAXIMUM DISTANCE BETWEEN PIPES AT ANY POINT IS 2".

9. AN ENGINEER APPROVED WATER STOP IS REQUIRED ON ALL PIPES EXCEPT CONCRETE PIPE.

<table>
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<tr>
<th>D</th>
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<tr>
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<tr>
<td>66&quot;</td>
<td>1.75'</td>
<td>11&quot;</td>
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FOR PIPE SIZES NOT LISTED AND LESS THAN 66" USE THE NEXT SIZE LARGER.
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

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

PLUG END PER
DETAIL 427

CONCRETE PIPE
SECT. 735 & 736

BREAK PIPE
AND MAKE
WATERTIGHT
JOINTS PER
DETAIL 524

12"

1/2

CONCRETE TEE
OR ELBOW

SPOUT, IDEAL,
WATERMAN ALFALFA
VALVE OR EQUAL

GROUT AS PER
DETAIL 524
NOTES:

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

2. FOR PIPE OVER 18” I.D. WOOD, METAL OR GYPSUM BOARD FORMS MUST BE USED TO FORM THE SIDES OF THE ENCASEMENT. GYPSUM BOARD FORMS MAY BE LEFT IN THE GROUND BELOW THE TOP OF THE ENCASEMENT. THIS SHALL BE OPTIONAL WITH POURING AGAINST TRENCH WALLS FOR ENCASEMENT OF 18” AND SMALLER PIPE.

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

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

5. SEE SECTION 601 FOR TRENCH PREPARATION.

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

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

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

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

C.M.P. MAIN STORM DRAIN

BAND DETAIL

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'

SELECT MATERIAL

STANDARD THREAD (COARSE)

WELD ALL AROUND

1/2"

6" MIN.
(TYP.)

6"

8 HOLEs 9/16" DIA.

1/2"

1:2 MORTAR

CATCH BASIN

6"

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

R=1/2 O.D.

SEE BAND DETAIL

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

SEE T-BOLT DETAIL

1/2"

1/4"

3/8"

1/2"

6"

12"

12"

T-BOLT

O.D.+24"

O.D.+24"

O.D.+24"

O.D.+24"

O.D.+24"
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'

| D   | 51" | 54" | 57" | 60" | 63" | 66" | 69" | 72" | 75" | 78" | 80" | 82" | 84" | 86" | 88" | 90" | 92" | 94" | 96" |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

PLAN

SECTION A-A

MANHOLE SHAFT PER DETAIL 522

PRECAST PIPE WITH VERTICAL STUB

ENCASEMENT

SECTION B-B

STORM DRAIN MANHOLE BASE (51" OR LARGER)

REVISED: 01-01-1998

DETAIL NO.: 521

STANDARD DETAIL: ENGLISH

MARICOPA ASSOCIATION OF GOVERNMENTS

DETAIL NO.: 521
NOTES:

1. PRECAST CONCRETE CONES AND SECTIONS TO BE A.S.T.M. C-478.
2. BRICK MAY BE USED IN LIEU OF OR IN COMBINATION WITH CONCRETE ADJUSTING RINGS.
3. PRECAST CONCRETE SECTIONS 48" DIA PIPE MAY BE FURNISHED IN STANDARD LENGTHS.
4. UNLESS OTHERWISE SHOWN ON PLANS, USE (2) 2-1/2" PRECAST CONCRETE ADJUSTING RINGS ON IMPROVED STREETS AND (4) 2-1/2" RINGS ON UNIMPROVED STREETS.
5. CONCRETE SHALL BE CLASS A PER SECTION 725 AND 505.

VERTICAL SECTION OF ECCENTRIC MANHOLE SHAFT

SHALLOW MANHOLE

SECTION B-B

REINFORCED CONCRETE ADJUSTING RING

1 SECTION 48" PIPE IF APPLICABLE

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 ACCOMODATE CAPSCREW AND SOCKET WRENCH. SPACE EQUALLY.
2. DRILL (8) HOLES AND TAP FOR 1/2" - 13 THREAD NATIONAL COARSE BOLT.
3. DRILL, TAP AND COUNTERBORE (2) HOLES FOR 1/2" CAPSCREWS TO BE USED FOR LIFTING COVER. PLUG WITH CAPSCREWS.
4. COVER AND FRAME MUST BE MATCHED, DRILLED AND TAPPED IN SETS.
5. CASTING DIMENSIONS GIVEN ABOVE ARE FROM DET. 424, 24" MANHOLE FRAME AND COVER.
6. BOTH 24" AND 30" FRAMES TO BE ANCHORED AS FOLLOWS:
7. DRILL 1/2" HOLE IN FILLET. DO NOT USE ADJACENT FILLETS.
8. 1/4" STAINLESS STEEL CABLE. SECURED WITH CABLE CLAMPS.
9. 1/2"x9" HOOK AND EYE TURNBUCKLE.
10. 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.
NOTES:

1. THE ENTRIE 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 TROWLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 D PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECTION 790.
6. CONCRETE SHALL BE CLASS A PER SECTION 725.

DIMENSIONS

<table>
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<tr>
<th>CURB A</th>
<th>T=6' IF V=4' OR LESS</th>
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<tr>
<td>V=3'-6&quot; UNLESS OTHERWISE SPECIFIED.</td>
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* SEE DETAILS 536-1 AND 536-2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.
** 4' LOCATIONS WHERE 4' S/W IS REQUIRED.
NOTES:

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

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

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

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

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

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>
<td>3-3&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>3-3&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>1-0&quot;</td>
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</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=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
\[
T = 6' \text{ IF } V = 4' \text{ OR LESS} \\
T = 8' \text{ IF } V \text{ IS BETWEEN 4' AND 8'} \\
T = 10' \text{ IF } V \text{ IS 8' OR MORE (IF V EXCEEDS 10' SPECIAL DESIGN IS REQUIRED)} \\
V = 4' \text{ UNLESS OTHERWISE SPECIFIED.}
\]

* 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 A REQUIRED.
GRATE AND FRAME
SEE DETAIL 533-3
& 533-4

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
1/8" 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'-0" 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 = 6" WHEN V IS EQUAL TO OR
GREATER THAN 8'
H = CURB HEIGHT PRIOR TO THE
TRANSITION

SECTION A-A

SECTION B-B

REINFORCEMENT DETAIL

CONSTRUCTION JOINT
SEE NOTE NO. 7

C & G TRANSITION

CURB SUPPORT ANCHORS
3'-6" MAX. SPACING
SEE DETAIL 536-1, SECTION C-C

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

9. APRON IS CONSTRUCTED ONLY WHEN SPECIFIED ON PLANS.

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

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

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

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

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

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

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

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

18. ALL PARTS SHALL BE OF STRUCTURAL GRADE STEEL.

19. ALL EXPOSED STEEL SHALL BE GALVANIZED OR PAINTED WITH ONE COAT #1 PAINT AND TWO FIELD COATS OF #10 PAINT.
CROSS BARS:
1/2 DIA. x 24-7/8" ROD, 4" C. TO C., 9 EACH

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

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

GRATE DETAIL
GRATE OPENING: 4.344 SQ. FT.

SECTION B-B
**NOTES:**

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

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

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

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

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

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

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.
DOUBLE UNIT CAST IRON FRAME — GRATE — CURB BOX

SECTION A-A

SECTION B-B

NOTE:
DIMENSIONAL CHANGE REQUIRED FROM 3-1/5" WIDTH TO 6-2", AND 1-9/16" DEPTH TO 2-0".
REQUIRES ONE CENTER STEEL I-BEAM 4" x 7.7 LBS.
MATERIAL CAST GRAY IRON ASTM A-48-83 CLASS 358.
FRAME WEIGHT 197 LBS.; GRATE 140 LBS.; CURB BOX 92 LBS.

VANE DETAIL

CURB BOX ADJUST. TO 3" HIGH

CROSS-SECTIONAL AREA: 1.53 SQ. IN.

3-1/4" R

1/2" (TYP.)

DIRECTION OF FLOW

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

DATE

24"
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.
**SECTION C-C**

- Protection Bar
  - See this detail for details 531, 532, and 533.

- Curb Support Anchor
  - 1” Dia. Bar with 3” 90° Bend, 3”-6” Max. Spacing

**SECTION D-D**

- 1/4” Diamond Floor Cover
- Nose Angle: $\angle 3'' \times 4'' \times 1/2''$
- Standard Curb Batter
- Curb Height
- 3/8” Flat Head Stainless Steel Cap Screws – Countersink

**NOTES:**
1. Horizontal plain round galvanized steel protection bar shall be used when curb face is 9” or more.
2. The bar shall be embedded 5” at each end.

**PLAN VIEW**
- 1/4” Diamond Floor Cover
- Steel Filler Blocks Welded to Frame
- L1-1/4” x 1-1/4” x 1/4” Iron Frame

**DOWEL BAR**
- 3”

**DETAIL NO.**
- 536-1

**STANDARD DETAIL**
- ENGLISH

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

**REVISED**
- 01-01-1999
PLAN VIEW

DROPN HANDLE

SECTION A-A

SECTION C-C

SECTION B-B

NOTES:
1. FRAME SHALL BE NON-LOCKING.
2. FRAME AND COVER SHALL BE CAST IRON OR ASTM A-36 STLR. 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.
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)

SECTION A-A

SECTION A-A

SECTION A-A

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

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

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

3/16" EACH BAR & ROD

NOTES:


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

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

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

5. THE GRATE SHALL BE FABRICATED TO WITHIN 1/8" SPECIFIED DIMENSIONS.
NOTES:
1. GRATING UNITS AND FRAMES SHALL BE FABRICATED FROM STRUCTURAL STEEL EXCEPT AS NOTED.
2. WELDING SHALL BE IN ACCORDANCE WITH STD. WELDING SPECS.
3. THE COMPLETED ASSEMBLY SHALL BE GIVEN TWO SHOP COATS OF NO. 1 PAINT AS PER SECT. 790.
4. FRAME AND GRATE SHALL FIT TO A MAX. ROCK OF 0.093" AT ANY POINT.
5. RESTRICT USE TO GRADES OF 3% OR LESS.
NOTES:
1. LW INDICATES LONGITUDINAL WELDED.
2. LB INDICATES LONGITUDINAL BOLTED.
3. EF INDICATES ELECTROFORGED.
4. GRATING UNITS AND FRAMES SHALL BE FABRICATED FROM STRUCTURAL STEEL "A"-36 EXCEPT AS NOTED.
5. ALL WELDING SHALL BE IN ACCORDANCE WITH STANDARD WELDING SPECIFICATIONS.
6. THE COMPLETED ASSEMBLY SHALL BE GIVEN ONE SHOP COAT OF NO. 1 PAINT.
7. FRAMES AND GRATES SHALL FIT TO A MAXIMUM ROCK OF 0.093" AT ANY POINT.
8. GRATE TYPE LW AND EF RESTRICTED TO SLOPES OF 3% OR LESS.
9. GRATES TYPE LB USE LONGITUDINAL GRADES IN EXCESS OF 3% OR AS AN ALTERNATE TO TYPES LW OR EF ON GRADES OF 3% OR LESS.

SECTION C-C

SECTION D-D

SECTION A-A

SECTION B-B

<table>
<thead>
<tr>
<th>GRATE TYPE</th>
<th>CLEAR BAR SPACING</th>
<th>NO. BARS</th>
<th>X</th>
<th>GRATE OPENING ft²</th>
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<tbody>
<tr>
<td>LW OR LB-1.0</td>
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<td>16</td>
<td>5/16&quot;</td>
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<td>1/4&quot;</td>
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BAR SPACER DETAIL
CAST IRON, CAST STEEL OR STEEL BAR STOCK
NOTES:

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

2. SEE PROJECT PLANS FOR CATCH BASIN DETAILS AND PAVEMENT STRUCTURAL SECTION.
<table>
<thead>
<tr>
<th>PIPE DIA.</th>
<th>APPROX. WEIGHT (LBS.)</th>
<th>DIMENSIONS – INCHES</th>
<th>APPROX. SLOPE</th>
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<td>1520</td>
<td>T 3 9-1/2 A 43-1/2 B 30 C 73-1/2 E 48 F 3</td>
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<td>5-1/2 27 65 33-1/4 98-1/4 90 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.
CONCRETE SURFACE FORD CONCRETE WALLS

FINISHED GRADE PER PLANS

DEPTH GAUGE SEE DETAIL (OPTIONAL)

3" WEEP HOLES

COURSE AGGREGATE FLOW

0.015'/FT OR AS NOTED

FINISHED Q. GRADE

SEE PLANS FOR BASE MATERIAL

2-#4 BARS TOP AND BOTTOM

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

*MIN. DISTANCE BELOW STREAM BED

FINISHED GRADE PER PLANS

SEE PLANS

DEPTH GAUGE SEE DETAIL (OPTIONAL)

3" WEEP HOLES

COURSE AGGREGATE FLOW

0.015'/FT OR AS NOTED

FINISHED Q. GRADE

SEE PLANS FOR BITUMINOUS SURFACE AND BASE MATERIAL

2-#4 BARS TOP AND BOTTOM

BITUMINOUS SURFACE FORD CONCRETE WALLS

NOTES:
1. FORD WALLS SHALL BE CLASS 'A' CONCRETE PER SECT. 725.
2. DEPTH GAUGE SHALL BE PAINTED 2 COATS WHITE ENAMEL. NUMERALS AND MARKERS SHALL BE 1 COAT BLACK ENAMEL.
3. NUMBERS ON DEPTH GAUGE TO BE 2" HIGH.
4. HEIGHT OF DEPTH GAUGE PER PLANS.
5. REINFORCING BARS SHALL BE SET 3" CLEAR FROM SIDES OF CUT-OFF WALLS.
6. COURSE AGGREGATE AT WEEP HOLES SHALL BE ASTM C33 SIZE 57, ENCLOSED IN FILTER FABRIC (SECTION 796, CLASS B), AND EXTENDED LATERALLY A MINIMUM OF SIX-INCHES (6") ON EACH SIDE OF THE WEEP HOLE.

ELEVATION LOOKING UPSTREAM

WALL MAY BE BUILT TO THIS LINE

3" WEEP HOLE

20° C TO C


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.**

**NOTE:**
OTHER SIZES AVAILABLE FROM MANUFACTURER.

**NOMINAL SIZE COMBINATIONS**

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<th>WIDTH</th>
<th>DEPTH</th>
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<tbody>
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<td>B</td>
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<tr>
<td>12'</td>
<td>3'</td>
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**PLAN**

**ELEVATION**

- **CUT BANK TO DEPTH "C" BEFORE PLACING GABIONS.**
- **EXIST GROUND LINE OR STREAM BED.**
- **GABIONS FILLED WITH STONE.**

**MIN. 2'-0'**