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

1998 ARIZONA

(Includes Revisions Through 2007)
100 SERIES: GENERAL INFORMATION

101 GENERAL INFORMATION
110 PLAN SYMBOLS
112 DIMENSIONING FOR ROAD IMPROVEMENT PLANS
120-1 SURVEY MARKER
120-2 SURVEY MARKER (FOR UNINCORPORATED AREAS
     OF THE COUNTY)
130 BARRICADES
131 STREET SIGN BASE
135-1 STEEL GUARD RAIL
135-2 STEEL GUARD RAIL
135-3 STEEL GUARD RAIL
135-4 STEEL GUARD RAIL
140 SAFETY POST
145 SAFETY RAIL
150 PRECAST SAFETY CURB
160 6' CHAIN LINK FENCE AND GATE
170 TYPICAL RUNWAY OR TAXIWAY LIGHTING DETAIL
190 ROCK CORRECTION PROCEDURE FOR MAXIMUM
     DENSITY DETERMINATION

200 SERIES: STREET INFORMATION

200 BACKFILL, PAVEMENT AND SURFACE REPLACEMENT
201 PAVEMENT SECTION AT TERMINATION
202 ALLEY DETAILS (PAVED AND UNPAVED)
203 SCUPPERS
204 EQUIPMENT CROSSING
205 PAVED TURNOUTS
206-1 CONCRETE SCUPPER
206-2 CONCRETE SCUPPER
206-3 CONCRETE SCUPPER
210 RESIDENTIAL SPEED HUMP
211 STANDARD TRENCH PLATING DETAIL
212 UTILITY POT-HOLE REPAIR
220-1 CURB AND GUTTER - TYPES 'A', 'B', 'C', AND 'D'
220-2 CURB AND GUTTER - TYPES 'E' AND 'F'
221 CURB AND GUTTER (TRANSITION, INTEGRAL AND
     WARNING BEACON)
222 SINGLE CURB - TYPES 'A', 'B' AND TERMINATION
223 MEDIAN NOSE TRANSITION
224 JOINT FOR DRAINAGE INLETS AND MANHOLE COVERS
225 CONCRETE PAVERS
230 SIDEWALKS
231 SIDEWALK RAMPS - TYPE 'A'

200 SERIES: STREET INFORMATION (CONTINUED)

232 SIDEWALK RAMPS - TYPE 'B'
233 SIDEWALK RAMPS - TYPE 'C'
234 SIDEWALK RAMPS - TYPE 'D'
240 VALLEY GUTTER
250 DRIVEWAY ENTRANCES
251 RETURN TYPE DRIVEWAYS
252 BUS AND PARKING BAYS
260 ALLEY ENTRANCE (WITH COMBINED CURB AND GUTTER)
261 ALLEY ENTRANCE (WITH ROLL CURB AND GUTTER)
262 WING TYPE ALLEY ENTRANCE (WITH COMB. CURB & GUTTER)
263 WING TYPE ALLEY ENTRANCE (WITH ROLL CURB & GUTTER)
270 FRAME AND COVER (AND GRADE ADJUSTMENTS)

300 SERIES: WATER INFOMATION

301 BLOCKING FOR WATER GATE AND BUTTERFLY VALVES
302-1 JOINT RESTRAINT WITH TIE RODS
302-2 JOINT RESTRAINT WITH TIE RODS
303-1 JOINT RESTRAINT FOR DUCTILE IRON AND POLYETHYLENE
     WRAPPED DUCTILE IRON WATER PIPES
303-2 JOINT RESTRAINT FOR DUCTILE IRON AND POLYETHYLENE
     WRAPPED DUCTILE IRON WATER PIPES
310 CAST IRON WATER METER BOX COVER NO. 1
311 CAST IRON WATER METER BOX COVER NO. 2
312 CAST IRON WATER METER BOX COVER NO. 3
313 CAST IRON WATER METER BOX COVER NO. 4
314 CAST IRON WATER METER BOX COVER NO. 5
320 CONCRETE WATER METER BOXES
321 STANDARD WATER METER VAULT
340 INSTALLING TAPPIING SLEEVES AND VALVES
342 CONCRETE PRESSURE PIPE TAPPING SLEEVE
345-1 3", 4", 6" WATER METER
345-2 4", 6", WATER METER WITH ON-SITE FIRE HYDRANTS
346 FIRE LINE DETECTOR CHECK VAULT
360 FIRE HYDRANT INSTALLATION
362 LOCATIONS FOR NEW HYDRANTS
370 VERTICAL REALIGNMENT OF WATER MAINS
380 THRUH BLOCKS FOR WATER LINES
381 ANCHOR BLOCKS FOR VERTICAL BENDS
389 CURB STOP WITH VALVE BOX AND COVER
390 CURB STOP WITH FLUSHING PIPE
391-1 VALVE BOX INSTALLATION AND GRADE ADJUSTMENT
391-2 VALVE BOX INSTALLATION
392 DEBRIS CAP INSTALLATION
400 SERIES: SEWER INFORMATION

402 ENCASED PIPE FOR CANAL CROSSINGS
403-1 PIPE SUPPORTS ACROSS TRENCHES
403-2 PIPE SUPPORTS ACROSS TRENCHES
403-3 ALTERNATE TO PIPE SUPPORT
404-1 WATER AND SANITARY SEWER SEPARATION/PROTECTION
404-2 WATER AND SANITARY SEWER SEPARATION/PROTECTION
404-3 WATER AND SANITARY SEWER SEPARATION/PROTECTION
405 BROKEN SEWER LINE REPLACEMENT
420-1 PRECAST CONCRETE SEWER MANHOLE
420-2 PRECAST CONCRETE SEWER MANHOLE
421 OFFSET MANHOLE FOR 8” - 30” PIPE
422 BRICK SEWER MANHOLE & COVER FRAME ADJUSTMENT
423 WATER TIGHT 30” MANHOLE FRAME AND COVER
424 24” AND 30” MANHOLE FRAME AND COVER
425 24” ALUMINUM MANHOLE FRAME AND COVER
426 DROP SEWER CONNECTIONS
427 STUB OUT AND PLUGS
428 MANHOLE STEPS
429 INDUSTRIAL WASTE CONTROL VAULT WITH MANHOLE
440-1 SEWER BUILDING CONNECTIONS - TYPE 'A'
  ELECTRONIC BALL MARKERS (STANDARD)
440-2 SEWER BUILDING CONNECTIONS - TYPE 'B'
  TWO-WAY CLEANOUT AND METER BOX AT R/W
440-3 SEWER BUILDING CONNECTIONS - TYPE 'C'
  ONE-WAY CLEANOUT AND METER BOX
440-4 SEWER SERVICE CURB CROSSING STAMP DETAIL
441 SEWER CLEANOUT

500 SERIES: IRRIGATION AND STORM DRAIN INFORMATION

501-1 HEADWALL
501-2 HEADWALL
501-3 HEADWALL - 42” TO 84” PIPE
501-4 HEADWALL IRRIGATION 18” TO 60” PIPE
501-5 HEADWALL - DROP INLET
502-1 TRASH RACK
502-2 TRASH RACK

500 SERIES: IRRIGATION AND STORM DRAIN INFORMATION (CONTINUED)

503 IRRIGATION STANDPIPE
504 CONCRETE BLOCK JUNCTION BOX
505 CONCRETE PIPE COLLAR
506 IRRIGATION VALVE INSTALLATION
507 ENCASED CONCRETE PIPE (SHALLOW INSTALLATION)
510 CORRUGATED METAL PIPE AND INSTALLATION
520 STORM DRAIN MANHOLE BASE (48” OR SMALLER)
521 STORM DRAIN MANHOLE BASE (51” OR LARGER)
522 STORM DRAIN MANHOLE SHAFT
523-1 PRESSURE MANHOLE
523-2 PRESSURE MANHOLE
524 STORM DRAIN LATERAL PIPE CONNECTIONS
530 3”-6” CURB OPENING CATCH BASIN - TYPE 'A'
531 5”-6” CURB OPENING CATCH BASIN - TYPE 'B'
532 8” CURB OPENING CATCH BASIN - TYPE 'C'
533-1 CATCH BASIN TYPE 'D'
533-2 CATCH BASIN TYPE 'D'
533-3 CATCH BASIN TYPE 'D'
534-1 CATCH BASIN - TYPE 'E'
534-2 CATCH BASIN - TYPE 'E' (DETAILS)
534-3 CATCH BASIN - TYPE 'E' (DETAILS)
534-4 CATCH BASIN - TYPE 'E' (DETAILS)
534-5 ALTERNATE GRADE STYLES - SUMP LOCATION
535 CATCH BASIN - TYPE 'F' - FOR USE WITHOUT CURB
536-1 COMMON DETAILS AND SECTIONS FOR CURB OPENING
  CATCH BASINS
536-2 ALTERNATE COVER FOR CURB OPENING CATCH BASINS
537 CATCH BASIN - TYPE 'G'
538 CATCH BASIN - TYPE 'H'
539 GRATES FOR CATCH BASINS - TYPE 'G' AND 'H'
540-1 CATCH BASIN GRATES
540-2 CATCH BASIN GRATES
541 CATCH BASIN SUBGRADE DRAIN
545 END SECTION - REINFORCED CONCRETE PIPE
550 SPILLWAY INLET AND OUTLET
552 CONCRETE CUT-OFF WALLS
555 EROSION PROTECTION/RIPRAP
1. THESE DETAILS HAVE BEEN PREPARED IN AN EFFORT TO STANDARDIZE THE CONSTRUCTION DETAILS USED BY VARIOUS CONTRACTING AGENCIES IN MARICOPA COUNTY. THEY ARE TO BE USED IN CONJUNCTION WITH THE CURRENT METRIC EDITION OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION" SPONSORED AND DISTRIBUTED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS.

2. MANY NOTES WITHIN THESE DETAILS REFER TO VARIOUS SECTIONS OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION." WHERE THIS REFERENCE IS MADE, ONLY THE ABBREVIATION "SECT." IS USED. AN EXAMPLE OF THIS REFERENCE WOULD BE: "CLASS 'A' CONCRETE PER SECT. 725."

3. MANY NOTES WITHIN THESE DETAILS REFER TO OTHER DETAILS WITHIN THIS BOOK. WHERE THIS REFERENCE IS MADE, THE ABBREVIATION "DETAIL" IS USED. AN EXAMPLE OF THIS WOULD BE: "SEE DETAIL 391 FOR VALVE BOX INSTALLATION."


5. AN EFFORT HAS BEEN MADE TO INCLUDE THE MOST COMMONLY USED CONSTRUCTION DETAILS IN THIS BOOK. ITEMS WHICH REQUIRE DESIGN CONSIDERATION BY THE DESIGNING ENGINEER HAVE NOT BEEN INCLUDED.

6. SOME OF THE DETAILS PRINTED HEREIN MAY BE USED BY SOME OF THE AGENCIES BUT NOT OTHERS. THE DESIGNING ENGINEER SHOULD THEREFORE CONTACT THE AGENCY WITHIN WHOSE JURISDICTION HE IS WORKING FOR DIRECTION AS TO WHICH DETAIL OR PORTIONS OF DETAILS SHOULD BE USED.

7. DETAIL DRAWINGS ARE NOT TO SCALE.
DIMENSION SHOULD BE GIVEN ONCE ON EACH SHEET AND SHOULD BE PLACED NEAR THE CENTER OF THE SHEET. IF ANY OF THE GIVEN CONDITIONS CHANGE, THEY SHOULD BE REDIMENSIONED AT THE POINT OF CHANGE.

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

GIVE COMPLETE DIMENSIONS.

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

1. TYPE 'A' TO BE USED AT INTERSECTIONS OF MAJOR STREETS & COLLECTOR STREETS, AND AT OTHER SPECIAL PONTS IF REQUIRED BY ENGINEER, AS SHOWN ON PLANS.

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

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

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

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

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

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

CAP DETAIL

TYPE 'A'
(WITH FRAME PER DETAIL 270)

TYPE 'B'
(WITHOUT FRAME)

TYPE 'C'

CLASS 'B' CONCRETE AS PER SECT. 725

CLASS 'B' CONC. AS PER SECT. 725

SUBGRADE PREPARATION AS PER SECT. 301 OR 601

NO. 5 REBAR AS PER SECT. 727

ROUND OR SQUARE 6" (MIN.) - 8" (MAX.)

CLASS 'B' CONC. AS PER SECT. 725

STD. WROUGHT WASHER

STD. WROUGHT WASHER

SAND OR EARTH

CYLINDER - 6" DIA. (MIN.)
8" DIA. (MAX.)

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

FOR UNPAVED STREETS AND ALLEYS

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

SAND OR EARTH

BRASS CAP, SEE DETAIL

CLASS 'B' CONCRETE AS PER SECT. 725

SEE NOTE 1

SEE NOTE 2

SEE NOTE 3

SEE NOTE 5

SEE NOTE 6

SEE NOTE 4

FINISH GRADE

5/8" DEFORMED REINFORCING ROD AS PER SECT. 727

1/2" 1/2" 1/2" 1/2"

1/2" 1/2" 1/2" 1/2"

30"

30"

30"

30"

30"

30"

30"

1/16" 1/16" 1/16" 1/16" 1/16" 1/16"

3/16" 1/8" 1/8" 1/8" 1/8" 1/8"
NOTES:

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

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

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

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

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

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

1. FASTEN WITH 1/2" x 5" LAG SCREWS WITH 2 FLAT WASHERS OR (2) 5/8" BOLTS, WITH 4 FLAT WASHERS.

2. 2" x 8" DOUGLAS FIR PLANK (LENGTH TO BE DETERMINED ON PLANS.)

3. WHEN BARRICADE (TYPE "A") IS CONSTRUCTED ON BASES INSTEAD OF POSTS SET INTO THE GROUND, IT MAY BE DESIRABLE TO BALLAST THE BASES WITH SAND BAGS OR BY STAKING TO PROVIDE RESISTANCE TO OVERTURNING DURING PERIODS OF HIGH WINDS.

4. TWO COATS OF WHITE PAINT PER SECTION 790 SHALL BE APPLIED TO ALL EXPOSED SURFACES OF THE BARRICADE. AN ADDITIONAL TWO COATS OF ORANGE PAINT PER SECTION 790 SHALL BE APPLIED TO CREATE THE ALTERNATE ORANGE AND WHITE STRIPES FOR TEMPORARY BARRICADES AND TWO COATS OF RED PAINT PER SECTION 790 SHALL BE APPLIED TO CREATE ALTERNATE RED AND WHITE STRIPES FOR PERMANENT BARRICADES. HIGHWAY SAFETY SPHERES (BEADS) PER ADOT 708-2.02 SHALL BE APPLIED BY HAND TO ALL CROSS MEMBERS, FRONT AND BACK AND ON BOTH COLORS, IMMEDIATELY AFTER PAINTING. THE STRIPES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS.
FLANGED STEEL 'U' CHANNEL (2 LBS. OR 3 LBS. PER SQUARE FOOT AS SPECIFIED)

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

2" DIA. STANDARD PIPE GALVANIZED

NOTES

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

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

TYPE 'B' & TYPE 'C'
CONCRETE BASE FOUNDATIONS SHALL BE CLASS 'C' CONCRETE AS PER SECT. 505 AND 725.
1. Posts and blocks shall be 8" x 8" rough wood, pressure treated and unpainted. Holes shall be bored before treatment. See Sect. 415.
2. All guard rail plate, fittings, hardware, etc. shall be galvanized.
3. Type 'A' guard rail installed on normal shoulder line.
4. Type 'B' guard rail installed on widened roadway shoulder line.
5. Type 'B' installation shown. Type 'A' installation same except that inside face of guard rail shall fall on the normal shoulder line as indicated by plan drawing.
6. Install lap plates so that exposed edges are away from approaching traffic.
W SECTION BACK-UP PLATE
FOR STEEL POSTS

STEEL W SECTION, 12 GAUGE

W BEAM (STEEL POST)
NOTES:
1. TOP AND RUB RAIL SHALL NOT PROJECT MORE THAN 1" IF ADJUSTMENT SHORTENING IS REQUIRED, THREADS SHALL BE LEFT IN FUNCTIONAL CONDITION.

2. HORIZONTAL DISTANCE BETWEEN TOP RAIL AND MEDIAN CURB SHALL NOT EXCEED 12"

DETAIL NO. 2 - MEDIAN BARRIER

DETAIL NO. 3 - RUB RAIL SPLICE (SPLICE AT POSTS ONLY)
SECTION

DETAIL NO. 4
ATTACHMENT OF GUARD RAIL TO STRUCTURES

ELEVATION

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

SECTION

DETAIL NO. 1
GUARD RAIL POST INSTALLATION ON STRUCTURES

DETAIL NO. 5
BUFFER END SECTION
EXISTING CONCRETE OR ASPHALT PAVEMENT

4" OR 6" DIA. POST

FILL WITH GROUT AND CROWN TOP

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

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

EXISTING GRADE

CLASS B CONCRETE PER SECT. 725

SAFETY POST SECTION
NOTES:

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

2. PAINT RAIL PER MAG SPECIFICATIONS SECTION 530 WHEN REQUIRED BY PLANS. 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.

ELEVATION

TYPE 1
ANCHOR PLATE DETAIL

1/4" X 5" X 5" MILD STEEL PLATE
1/2" X 6" ANCHOR BOLTS (2 EACH PLATE)

TYPE 2
EXPANSION BOLT DETAIL

1/4" X 5" X 5" MILD STEEL PLATE
4-3/8" X 5" EXPANSION BOLTS IN SHRINK PROOF EPOXY

TYPE 3
PIPE SLEEVE DETAIL

1/4" X 5" X 5" MILD STEEL PLATE
10" X 2-1/2" DIA. STANDARD PIPE

TYPE 4
GROUND INSTALLATION DETAIL

CLASS C CONCRETE
PIECE TO EXTEND 1/2" ABOVE TOP OF CONCRETE
This Page Is Reserved for Future Use.
5/8" HOLE FOR 1/2" DIA. PIN, 24" LONG, HOT ROLLED STEEL

TYPE A

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

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

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.

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

SAFETY CURB
INSTALLATION ON DIRT

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

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

TYPICAL SECTION
NOTES
1. ALL CONCRETE SHALL BE CLASS 'C' PER SECT. 725.
2. FITTINGS NOT SPECIFICALLY DETAILED SHALL BE HEAVY DUTY DESIGN.
3. STRAIN POSTS SHALL BE SPACED AT 500' MAXIMUM SPACING.
4. BOTH CORNER AND STRAIN POSTS SHALL HAVE STRAIN PANELS.
5. ALL POSTS SHALL BE CAPPED.
6. MEMBER SIZES SHALL BE THE FOLLOWING:

<table>
<thead>
<tr>
<th>MEMBER</th>
<th>AISC SIZE</th>
<th>OUTSIDE DIA.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORNER POST</td>
<td>2-1/2&quot;</td>
<td>2.875&quot;</td>
</tr>
<tr>
<td>LINE POST</td>
<td>1-1/2&quot;</td>
<td>1.900&quot;</td>
</tr>
<tr>
<td>STRAIN POST</td>
<td>1-1/2&quot;</td>
<td>1.900&quot;</td>
</tr>
<tr>
<td>BRACE</td>
<td>1-1/4&quot;</td>
<td>1.666&quot;</td>
</tr>
<tr>
<td>STRETCH BAR</td>
<td>3/16&quot;x3/4&quot;</td>
<td>3/16&quot;x3/4&quot;</td>
</tr>
<tr>
<td>GATE POST</td>
<td>3-1/2&quot;</td>
<td>4.000&quot;</td>
</tr>
<tr>
<td>TOP RAIL</td>
<td>1-1/4&quot;</td>
<td>1.666&quot;</td>
</tr>
</tbody>
</table>

7. CONSTRUCTION AND MATERIALS SHALL CONFORM TO SECT. 420 AND 722, RESPECTIVELY. SEE TABLE 722 FOR WEIGHS OF MEMBERS.
NOTE:
L-xxx NUMBERS DESIGNATES FAA SPECIFICATION NO.

MINIMUM 4" CONCRETE BACKFILL PER SECTION 725, CLASS "A".

PROVIDE 2" SLACK FOR CONNECTIONS.

GROUND CLAMP
CONDUIT (IF SPECIFIED)

3/4" DIA. DRAIN HOLE

12" x 12" x 12"
ABC PER SECTION 702

BUILDING BLOCK (BRICK OR CONC. BLOCK)

BARE COPPER COUNTERPOISE WIRE (IF SPECIFIED)

L-824 CABLE I/C, #8, 5 KV, (5.6 AMP ONLY)

L-830 TRANSFORMER

L-823 CONNECTOR

L-867 BASE W/COVER

FRANIGIBLE COUPLING AND DISCONNECT PLUG

FINISHED GRADE

14" STANDARD

L-86__ FIXTURE
DRY DENSITY, LBS. PER CU. FT. (d)

POINT 1

POINT 5

POINT 4

POINT 3

POINT 2

100
110
120
130
140

60
50
40
30
20
10
0

18
19
20
21
22
23
24
25

BULK SPECIFIC GRAVITY OF ROCK (S)

USE THE FOLLOWING FORMULA TO DETERMINE MAXIMUM DENSITY:

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

WHERE:
- \( D \) = dry density of sample containing R percent rock, lbs. per cu. ft.
- \( R \) = percent rock retained on a No. 4 sieve.
- \( d \) = dry density of portion passing No. 4 sieve, lbs. per cu. ft.
- \( S \) = bulk specific gravity of rock.

SOLUTION:

Given a material that has a dry density of 114 lbs per cu. ft., a specific gravity of 2.5, and given that only 29% of a portion passes through a No. 4 sieve, what is the dry density of the sample?

Example:

Step 1: Plot the dry density of material passing a No. 4 sieve (d) on left side of graph (Point 1).

Step 2: Plot the percent of Rock Passing No. 4 Sieve (R) on right side of graph (Point 2).

Step 3: Connect points 1 and 2 to form line 1-2.

Step 4: Plot the percent of Rock Retained on a No. 4 Sieve (100-R) on left side of graph (Point 3).

Step 5: Draw horizontal line from point 4 to let side of graph (Point 5).

Step 6: Read point 5 for the value of the dry density (D). Example: Point 5 shows \( D = 121.6 \) lbs per cu. ft.
A.C. PAVEMENT MATCH GRADATION AND THICKNESS OF EXISTING PAVEMENT AND COURSES

SAWCUT & TACK

24" A.B.C.

12" TYP

A.B.C., GRANULAR BACKFILL OR NATIVE BACKFILL PER SECT. 702 & 601 OR CLSM PER SECT. 604 & 728

TRENCH WIDTH

EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

60" CLASS A CONCRETE PER SECT. 725

TRENCH WIDTH

A.B.C., GRANULAR BACKFILL OR NATIVE BACKFILL PER SECT. 702 & 601 OR CLSM PER SECT. 604 & 728

TYPE A

TYPE C

CHIP SEAL COAT PER SECT. 330 & 336

COMPACTED BACKFILL DENSITY PER SECT. 601

12" A.B.C. OR EXISTING SUBGRADE WHICHEVER IS GREATER

VARIES

2"

A.B.C. PER SECT. 702 AND 601 OR CLSM PER SECT. 604 & 728

TRENCH WIDTH

TOTAL THICKNESS TO MATCH EXISTING

SURFACE OUTSIDE OF TRENCH LINES DAMAGED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL THICKNESS AND CONDITION.

COMPACTED BACKFILL DENSITY PER SECT. 601

A.B.C. OR DECOMPOSED GRANITE PER SECT. 702

TYPE B

TYPE E

ASPHALT CONCRETE

COMPACTED BACKFILL DENSITY PER SECT. 601

OIL CAKE

TYPE D

TYPE F

NOTES:
1. BEDDING PER SECTION 601.
2. ASPHALT CONCRETE SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 321.
3. TRENCHES IN ASPHALT PAVEMENTS LESS THAN 18" WIDE SHALL BE BACKFILLED WITH CLSM OR ABC SLURRY (NO CEMENT) AS SPECIFIED BY THE SPECIAL PROVISIONS, PLANS OR ENGINEER.
4. TYPES 'D' AND 'E' REQUIRE 9" OF A.B.C. AT TOP OF TRENCH WHEN THERE IS AN EXISTING BASE.
5. THE TYPE OF CLSM SHALL BE 1/2 SACK OR 1 SACK AS SPECIFIED BY THE SPECIAL PROVISIONS, PLANS OR ENGINEER.
**TYPE 'A'**

A.C. PAVEMENT

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

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

**TYPE 'B'**

A.C. PAVEMENT

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

**TYPE 'C'**

A.C. PAVEMENT

AGGREGATE BASE PER STANDARD SECT. 310

GRADING PER STANDARD SECT. 301

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

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

UNPAVED ALLEY DETAIL

RESIDENTIAL ALLEY DETAIL
NOTES:

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

DETAIL C

SECTION 'A-A'

SECTION 'B-B'

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

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

STEEL DIAMOND
PLATE A-36

EXPANSION
JOINT

EXPANSION
JOINT

SLOPE=1.5%

DIAMOND
PLATE

GUTTER
FLOW LINE

LIP OF
GUTTER

EXPANSION
JOINT

EXPANSION
JOINT

4"

SEE NOTE 2

4"

SEE NOTE 1

SEE NOTE 5
PLAN OF CONCRETE EQUIPMENT CROSSING

NOTES:

1. When equipment crossing lies adjacent to bridge or box culvert, construct the equipment crossing to the width of bridge roadway.

2. All dowels in center joints shall be deformed bars and shall have unbroken bond. They shall be held securely in place, parallel to the subgrade and perpendicular to the center line of the road.

3. The edging tool used for all longitudinal joints shall be so constructed as to provide a smooth troweled surface 3" wide on each side of the joint.

4. If approved by the engineer, other deformations may be used in longitudinal joint — detail 'c'.

5. Detail 'c' to be used only when full width can not be poured in one pour. Use detail 'd' if full width is poured in one pour.
NOTES:

1. W = INDICATES WIDTH OF PAVED SURFACE OF TURNOUT.
   L = INDICATES LENGTH OF PAVED SURFACE OF TURNOUT.
   R = RADIUS.

2. SIZE AND TYPE OF TURNOUT SHALL BE NOTED ON PLANS AS FOLLOWS:
   90° - NO RADIUS: WxL=SURFACE-TYPE; (12' x 30'-A.C.-TYPE "B" TURNOUT).
   90° - WITH A RADIUS: WxLxR=SURFACE-TYPE; (12' x 20' x 15'-A.C.-TYPE "C"
   TURNOUT). OTHER THAN 90° WITH 2 RADIUS-TYPE "S": WxLxR; xR2=SURFACE-TYPE;
   (12' x 20' x 15'-A.C.-TYPE "S" TURNOUT).
   OR IT MAY BE NOTED ON PLANS IN CONVENTIONAL TERMS.

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

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

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

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

* UNLESS OTHERWISE NOTED ON PLANS
SECTION A-A

SECTION B-B

SECTION C-C SPILLWAY

NOTES:

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

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

3. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED
   EXPANSION JOINT FILLER, ASTM D-1751.

4. CONCRETE FOR THE SCUPPER SHALL BE CLASS 'A' PER SECTION 725.
   CONCRETE FOR THE SPILLWAY SHALL BE CLASS 'A' OR CLASS 'B'.

5. 12" OFFSET DISTANCE SHALL BE INCREASED TO 2'-6" FOR DESIGNATED
   BICYCLE PATHS.
NOTES:

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

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

3. EXPANSION JOINT FILLER SHALL BE 1/2” BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, ASTM D-1751.


5. SAFETY RAIL SHALL BE CONTINUOUS BETWEEN THE SPILLWAY EXTERIOR WALLS.

6. USE WELD PLATES FOR SAFETY RAIL ANCHORS LOCATED IN THE 5” THICK CONCRETE.
SAFETY RAIL EXTENSIONS BEYOND SCUPPER PER DETAIL 145.
NOTES:
1. HUMPS MUST BE THE FULL 3'" FOR MAXIMUM EFFECT BUT SHALL NOT EXCEED 3.25'.
2. HUMPS CONSTRUCTED OVER 3.25" SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.
3. CROSS-SECTION ELEVATIONS SHALL HAVE A MAXIMUM TOLERANCE OF +0.25".
4. SPEED HUMPS SHALL NOT BE PLACED OVER MANHOLE, WATER VALVES, SURVEY MONUMENTS, JUNCTION CHAMBERS, ETC. OR IN CONFLICT WITH DRIVEWAYS.
5. SPEED HUMPS MUST BE PLACED AT LOCATIONS APPROVED BY THE AGENCY.
6. HUMP TO BE CONSTRUCTED WITH ASPHALT MIX APPROVED BY THE AGENCY. ASPHALT COMPACTION SHALL BE PER SECTION 321. A TACK COAT PER SECTION 713 SHALL BE APPLIED PRIOR TO APPLICATION OF PAVEMENT.
7. INSTALLATION JOINTS:
   A. STANDARD INSTALLATION:
      THE EXISTING ROADWAY SHALL BE MILLED TO A MINIMUM DEPTH OF 3/4" AROUND THE PERIMETER. CROSS SECTION DIMENSIONS DO NOT INCLUDE THE 3/4" MILLING. CONTRACTOR MUST PROVIDE VERIFICATION OF CROSS-SECTION DIMENSIONS.
   B. ALTERNATIVE INSTALLATION:
      FOR TRANSVERSE JOINTS (CROSS ROADWAY), THE EXISTING ASPHALT SHALL BE SAWED AND REMOVED FOR A WIDTH OF 18". THE ASPHALT SHALL BE REPLACED WITH THE SAME ASPHALT AND AT THE SAME TIME AS THE HUMP ASPHALT. FOR LONGITUDINAL JOINTS, THE EXISTING ASPHALT SHALL BE OVERLAID AND TAPERED TO 12" CROSS-SECTION DIMENSIONS REFLECT DISTANCES FROM THE SURFACE OF EXISTING ASPHALT.
8. CONTACT THE AGENCY (OR INSPECTOR) ONE WEEK PRIOR TO INSTALLATION TO COORDINATE PAVEMENT MARKINGS AND SIGNING.
NOTES:

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

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

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

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

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

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

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
COLD JOINT
PAVEMENT FLUSH WITH LIP OF GUTTER
SIDEWALK
PARKWAY OR SIDEWALK
SLATE - SEE NOTE 3
ROADWAY WIDTH
8" 24"
1/2" BATTER OPTIONAL

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 B)

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

MOUNTABLE CURB AND GUTTER (TYPE F)

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

5' CURB TRANSITION

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

RADIUS AS SHOWN ON PLANS

TYPE 'C'

CURB TRANSITION TYPE 'A' TO TYPE 'C'

TYPE 'C' ROLL CURB AND GUTTER

TYPE 'A' VERTICAL CURB AND GUTTER

24" 24"

CURB WARNING BEACON

SLOPE TO 6" IN 8"

5-3/8" DIA. AMBER LENS

GALVANIZED SEMI-STEEL HOUSING

10-1/4" 7/8" MIN.

ELECTRICAL CONDUIT

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

GLASS MIRROR REFLECTOR IN ALUMINUM MOUNTING

REMOVING RING

PAVEMENT

INTEGRAL ROLL CURB, GUTTER AND SIDEWALK

4' 7" 17"

ROADWAY WIDTH

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

1.5% 24" R

7-1/2" 11-1/4" 1/2" BATTER

OPTIONAL

NOTES: (CURB AND GUTTER TRANSITIONS)


2. WHERE PROPOSED CONSTRUCTION IS TO BE CONNECTED TO EXISTING CURB AND GUTTER, THE TRANSITION SHALL BE INDICATED ON PLANS.

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

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

NOTES: (INTEGRAL ROLL CURB, GUTTER AND SIDEWALK)

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

2. CONTRACTION JOINT SPACING 5' MAXIMUM.

3. EXPANSION JOINTS PER Sect. 340.

4. CLASS 'B' CONCRETE PER Sect. 725.
NOTES:
1. ALL VERTICAL SURFACES TO BE FORMED.
2. VERTICAL SURFACES DOWN FROM 2" BELOW UNDISTURBED SOIL MAY BE PLACED AGAINST NEAT CUT IF APPROVED BY THE ENGINEER AND CONCRETE WILL NOT EXTEND MORE THAN 1" BEYOND THEORETICAL FACE.
3. ALL EXPOSED SURFACES TO BE STRIPPED GREEN AND TROWEL FINISHED.
4. CONCRETE CURBS CONFORM TO SECT. 340.
5. MAXIMUM SPACING OF CONTRACTION JOINTS IS 10’
6. CONCRETE TO BE CLASS 'B' PER SECT. 725.
NOTE:
LENGTH OF TRANSITION SHALL BE
EQUAL TO RADIUS OF MEDIAN NOSE,
(5' MINIMUM). FOR LOCATION
SEE PLANS.

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

MEDIAN LANDSCAPING
OR SURFACE AS REQUIRED

ROAD MEDIAN

WIDTH

AS SHOWN ON PLANS

NOSE P.C.

FACE OF CURB

CURB HEIGHT,
SEE PLANS

CURB HEIGHT VARIES
(5' MINIMUM)

2-1/2"

CURB
NOTES:

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

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECT. 340.
2. EXPANSION JOINTS SHALL BE 1/2" RITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751.
3. LARGE AGGREGATE, IN CONTRACTION JOINT, SHALL BE SEPARATED TO A DEPTH OF 1", FINISH DEPTH SHALL BE A MINIMUM OF 3/4".
4. EXPANSION JOINT 50' MAXIMUM SPACING PER SECT. 340.
5. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECT. 725.
NOTES:

1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADially. GUTTER ELEVATION=0.
2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECTION 725.
3. WHEN CURB HEIGHTS OF 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]S.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY’S REQUIREMENTS.

SECTION B-B

SECTION A-A

SIDEWALK RAMPS - TYPE 'A'
NOTES:

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

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

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

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

SECTION B–B

BOTTOM OF RAMP CURB WHEN FORMED AND POURED SEPARATELY

SECTION A–A

MATCH GUTTER FLOW LINE

SUBGRADE PREPARATION, SEE SECT. 301

CONSTRUCTION JOINT 1” DEEP OR FORMED SEPARATELY

DETECTABLE WARNING
NOTES:

1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER. GUTTER ELEVATION=0.
2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECT. 725.
3. WHEN CURB HEIGHTS OF 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]S.
4. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
5. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
NOTES:

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

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

3. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
NOTES:

1. ALL CONCRETE TO BE CLASS 'A' UNLESS OTHERWISE APPROVED. (SECT. 725).
2. 4' ON PROJECTS UNDER THE JURISDICTION OF THE COUNTY ENGINEER AND THE CITY OF MESA.
3. EITHER CONSTRUCTION JOINT OR CONTRACTION JOINT IS REQUIRED AT CENTERLINE OF STREET.
4. A SEPARATE CONCRETE PAD IS REQUIRED WHEN VALLEY GUTTER IS Poured HALF AT A TIME.
5. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
NOTES:

1. DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE BID FOR THE TYPE OF CURB USED AT THAT LOCATION.

2. WHEN WIDTH EXCEEDS 22' PROVIDE A CONTRACTION JOINT ON D/W CENTERLINE.

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

4. EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.

5. BACK OF CURB – CONSTRUCTION JOINT OR SCORE MARK.

6. CLASS 'B' CONCRETE, SECT. 725.

7. SUBGRADE PREPARATION, SECT. 301.

8. FLOW LINE OF GUTTER.

9. DEPRESSED CURB.

10. SECT. A-A AND ELEVATION, D/W VERTICAL CURB AND GUTTER OR ROLL TYPE CURB AND GUTTER.

11. ROUGH BROOM FINISH FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF DRIVEWAY.

### COMMERCIAL AND INDUSTRIAL

<table>
<thead>
<tr>
<th>DRIVEWAY WIDTH</th>
<th>MIN.</th>
<th>MAX.</th>
<th>CLASS</th>
<th>DEPTH X</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMERCIAL</td>
<td>16'</td>
<td>40'</td>
<td>B</td>
<td>6&quot;</td>
</tr>
<tr>
<td>INDUSTRIAL</td>
<td>16'</td>
<td>40'</td>
<td>B</td>
<td>6&quot;</td>
</tr>
<tr>
<td>*24' MIN. FOR TWO WAY TRAFFIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### RESIDENTIAL

<table>
<thead>
<tr>
<th>DRIVEWAY WIDTH</th>
<th>MIN.</th>
<th>MAX.</th>
<th>CLASS</th>
<th>DEPTH X</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAJOR STREET</td>
<td>16'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>COLLECTOR STREET</td>
<td>*12'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>LOCAL STREET</td>
<td>12'</td>
<td>30'</td>
<td>B</td>
<td>5&quot;</td>
</tr>
<tr>
<td>*16' DESIRABLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1/2" R MATCH FLOWLINE

1.5% SLOPE

3/4"±1/4"

DEPT X

SECTION A-A
### TABLE A

<table>
<thead>
<tr>
<th>ZONING</th>
<th>MIN.</th>
<th>MAX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMERCIAL AND INDUSTRIAL</td>
<td>16'</td>
<td>40'</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>16'</td>
<td>40'</td>
</tr>
<tr>
<td>INDUSTRIAL</td>
<td>16'</td>
<td>40'</td>
</tr>
<tr>
<td><em>24&quot; WHERE 2-WAY TRAFFIC IS ANTICIPATED</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TABLE B

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

### NOTES:

1. EXPANSION JOINTS SHALL COMPLY TO SECTION 340.
2. THIS TYPE D/W TO BE USED ONLY UPON APPROVAL OF ENGINEER.
3. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECT. 725

---

**SECTION A-A**

- PROVIDE EXPANSION JOINTS IN S/W WHEN COMMERCIAL AND INDUSTRIAL D/W'S ARE USED
- WHEN WIDTH EXCEEDS 16’ PROVIDE CONTRACTION JOINT ON D/W CENTERLINE
- FLOW LINE TROWEL 12” WIDE
- 5” THICK = RESIDENTIAL
- 6” THICK = COMMERCIAL AND INDUSTRIAL
- SUBGRADE PREPARATION AS PER SECT. 301
NOTES:
1. SUFFICIENT RIGHT-OF-WAY MUST BE AVAILABLE TO CONSTRUCT THE BUS BAY.
2. 1/2" BITUMINOUS PREFORMED EXPANSION JOINT FILLER ASTM D-1751 PER SPECIFICATION SECTION 729.
3. SUBGRADE PREPARATION PER SPECIFICATION SECTION 301 COMPACTED TO 95% MINIMUM DENSITY.
4. CONCRETE SHALL BE CLASS 'A' PER SPECIFICATION SECTION 725.
5. CONCRETE BUS BAY PAVEMENT SHALL BE BROOM FINISHED, EXCEPT WHERE OTHERWISE NOTED.
6. CONTRACTION JOINTS IN THE BUS BAY PAVEMENT SHALL MATCH THOSE IN THE CURB, 15 FT. MAXIMUM SPACING.
7. CONCRETE BEARING PAD (SECTION A–A) TO BE Poured SEPARATELY FROM CONCRETE BUS BAY PAVEMENT.

SECTION A–A

SECTION B–B

SECTION C–C

STD. DET. 222 TYPE 'A' MODIFIED SINGLE CURB
NOTES:
1. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
2. CLASS 'B' CONCRETE, PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. ROUGH BROOM FINISH FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE.

ELEVATION

SECTION A-A

MATCH FLOWLINE 1/34 ±1/4"
NOTES:

1. ROUGH BROOM FINISH FULL WIDTH OF 4' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE.
2. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
THICKEN CONCRETE FROM 6" TO 8" IN 18" AT BACK OF ALLEY ENTRANCE

SECTION A—A

NOTES:
1. IF ALLEY ENTRANCE IS USED FOR DRAINAGE, THE CENTER BACK OF ALLEY ENTRANCE MAY BE DEPRESSED 2" FOR 4" CURB OR 3" FOR 6" CURB.
2. ROUGH BROOM FINISH FULL WIDTH OF 5' WARP SECTION, EACH SIDE SIDE OF ALLEY ENTRANCE.
3. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.
4. SUBGRADE PREPARATION, PER SECT. 301.
5. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
NOTES:

1. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.
2. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
3. SUBGRADE PREPARATION PER SECTION 301.
WATER VALVE, SURVEY MONUMENT, OR SEWER
CLEAN OUT FRAME & GRADE ADJUSTMENT

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

CHAIN ATTACHMENT
(AS REQUIRED)
CASTING TO CONFORM TO SECT. 787. MINIMUM WEIGHT 16 LBS. FOR COVER.

DETAIL NO. 270
STANDARD DETAIL
ENGLISH
FRAME AND COVER

REVISED 01-01-2001
DETAIL NO. 270
NOTE:
THIS DETAIL COVERS WATER GATE VALVES, 4" TO 12" INCLUSIVE REGARDLESS OF TYPE OF PIPE USED. LARGER LINES TO BE DETAILED ON PLANS.

WATER GATE VALVE

CONCRETE FOOTING EQUIL TO TRENCH WIDTH

BUTTERFLY VALVE

CEMENT GROUTING UNDER VALVE (NON-SHRINKING)

NOTES:
1. THIS DETAIL COVERS BUTTERFLY VALVE INSTALLATION, 3" TO 12" INCLUSIVE, REGARDLESS OF TYPE OF PIPE OR JOINT USED. LARGER LINES TO BE DETAILED ON PLANS.

2. VALVE BOX AND COVER REQUIRED PER DETAILS 270 AND 391.
RODS ARE ATTACHED TO LUGS CAST ON BELL OF HYDRANT. IF HYDRANT IS NOT FITTED WITH LUGS, RODS ARE ATTACHED AS SHOWN BY THE DOTTED LINES.
THIS DETAIL IS FOR USE ONLY ON UNDERGROUND INSTALLATIONS WHERE THE USE OF CONCRETE THRUST BLOCKING PER DETAIL 380 CANNOT BE USED BECAUSE OF OBSTRUCTIONS, OR REQUIREMENTS OF THE SPECIFICATIONS...

- **CLAMPS** SHALL BE 1/2 BY 2 INCHES FOR PIPE 4 AND 6 INCHES IN DIAMETER; 5/8 BY 2-1/2 INCHES FOR PIPE 8 AND 10 INCHES; 5/8 BY 3 INCHES FOR PIPE 12 INCHES. BOLT HOLES SHALL BE 1/16 INCH IN DIAMETER LARGER THAN BOLTS.
- **RODS** SHALL BE 3/4 INCHES IN DIAMETER FOR PIPES 4, 6 AND 8 INCHES IN DIAMETER; 7/8 INCHES FOR PIPE 10 INCHES AND 1 INCH IN DIAMETER FOR PIPE 12 INCHES.
- **BOLTS** SHALL BE 5/8 INCHES IN DIAMETER FOR PIPE 4, 6 AND 8 INCHES IN DIAMETER; 3/4 INCHES FOR PIPE 10 INCHES AND 7/8 INCHES IN DIAMETER FOR PIPE 12 INCHES.
- **WASHERS** MAY BE CAST IRON OR STEEL, ROUND OR SQUARE, DIMENSIONS FOR CAST IRON WASHERS ARE 5/8 BY 3 INCHES FOR PIPE 4, 6, 8 AND 10 INCHES IN DIAMETER AND 3/4 BY 3-1/2 INCHES FOR PIPE 12 INCHES. DIMENSIONS FOR STEEL WASHERS ARE 1/2 BY 3 INCHES FOR PIPE 4, 6, 8 AND 10 INCHES IN DIAMETER AND 1/2 BY 3-1/2 INCHES FOR PIPE 12 INCHES IN DIAMETER. HOLES SHALL BE 1/8 INCH LARGER THAN THE RODS.

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


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

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


5. **COATING TYPE: A.H.D. ASPHALTIC PRIMER 719(A).** - ALL EXPOSED METAL.
LRN = SHORTEST LENGTH OF PIPE RESTRAINED TO THE RUN OF THE TEE FITTING (BOTH SIDES OF TEE).

DEAD ENDS

HORIZONTAL BENDS

UNDISTURBED SOIL

TEES

VERTICAL UP BEND

VERTICAL DOWN BENDS
### RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE INCHES</th>
<th>HORIZONTAL BENDS</th>
<th>TEES</th>
<th>VERTICAL OFFSETS</th>
<th>DEAD ENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2’</td>
<td>LRN=0’</td>
</tr>
<tr>
<td></td>
<td>DOWN BEND</td>
<td>UP BEND</td>
<td>DOWN BEND</td>
<td>UP BEND</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td>7</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>43</td>
</tr>
<tr>
<td>8</td>
<td>32</td>
<td>13</td>
<td>6</td>
<td>56</td>
</tr>
<tr>
<td>10</td>
<td>38</td>
<td>16</td>
<td>8</td>
<td>68</td>
</tr>
<tr>
<td>12</td>
<td>45</td>
<td>19</td>
<td>9</td>
<td>80</td>
</tr>
<tr>
<td>14</td>
<td>51</td>
<td>21</td>
<td>10</td>
<td>91</td>
</tr>
<tr>
<td>16</td>
<td>57</td>
<td>24</td>
<td>11</td>
<td>103</td>
</tr>
<tr>
<td>18</td>
<td>62</td>
<td>26</td>
<td>12</td>
<td>113</td>
</tr>
<tr>
<td>20</td>
<td>68</td>
<td>28</td>
<td>14</td>
<td>125</td>
</tr>
<tr>
<td>24</td>
<td>79</td>
<td>33</td>
<td>16</td>
<td>145</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE INCHES</th>
<th>HORIZONTAL BENDS</th>
<th>TEES</th>
<th>VERTICAL OFFSETS</th>
<th>DEAD ENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2’</td>
<td>LRN=0’</td>
</tr>
<tr>
<td></td>
<td>DOWN BEND</td>
<td>UP BEND</td>
<td>DOWN BEND</td>
<td>UP BEND</td>
</tr>
<tr>
<td>4</td>
<td>26</td>
<td>11</td>
<td>5</td>
<td>69</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>15</td>
<td>7</td>
<td>99</td>
</tr>
<tr>
<td>8</td>
<td>47</td>
<td>19</td>
<td>9</td>
<td>130</td>
</tr>
<tr>
<td>10</td>
<td>56</td>
<td>23</td>
<td>11</td>
<td>157</td>
</tr>
<tr>
<td>12</td>
<td>65</td>
<td>27</td>
<td>13</td>
<td>185</td>
</tr>
<tr>
<td>14</td>
<td>74</td>
<td>31</td>
<td>15</td>
<td>211</td>
</tr>
<tr>
<td>16</td>
<td>82</td>
<td>34</td>
<td>16</td>
<td>238</td>
</tr>
<tr>
<td>18</td>
<td>90</td>
<td>37</td>
<td>18</td>
<td>263</td>
</tr>
<tr>
<td>20</td>
<td>98</td>
<td>41</td>
<td>20</td>
<td>289</td>
</tr>
<tr>
<td>24</td>
<td>113</td>
<td>47</td>
<td>22</td>
<td>337</td>
</tr>
</tbody>
</table>

**NOTES:**

1. All joints within the specified length LR must be restrained. All lengths are given in feet.
2. The maximum test pressure shall not exceed 200 psi.
3. The minimum depth of bury shall be 3’ to top of pipe.
4. Restrained lengths may be reduced when supported by engineering calculations.
NUMBER "2", 1-1/4" HIGH, RAISED 1/8"

SEE SLOT DETAIL BELOW

RADIUS 1"

1/4"

TOP OF COVER

SLOT DETAIL

WATER

SECTION B—B

SECTION A—A

NOTE:

FOR CASTING SPECIFICATIONS SEE SECT. 787.
SECTION A–A

NOTES:
1. INSPECTION PLATE IS SAME AS USED WITH METER BOX COVER NO. 4.
2. FOR CASTING SPECIFICATIONS, SEE SECTION 757.
3. THE BEARING EDGES OF THESE CASTINGS SHALL BE MACHINED TO INSURE A FULL BEARING ON A FLAT SURFACE.

LETTERING DETAIL

DETAIL

TOP OF COVER & PLATE

PLAN OF COVER

CAST IRON WATER METER BOX COVER NO. 3
NOTES:

1. FOR CASTING SPECIFICATIONS, SEE SECT. 787. THE BEARING

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

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

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

<table>
<thead>
<tr>
<th>DIMS</th>
<th>BOX NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>19&quot;</td>
</tr>
<tr>
<td>B</td>
<td>12&quot;</td>
</tr>
<tr>
<td>C</td>
<td>11&quot;</td>
</tr>
<tr>
<td>D</td>
<td>14&quot;</td>
</tr>
<tr>
<td>E</td>
<td>16&quot;</td>
</tr>
<tr>
<td>F</td>
<td>9&quot;</td>
</tr>
<tr>
<td>G</td>
<td>7&quot;</td>
</tr>
<tr>
<td>H</td>
<td>9&quot;</td>
</tr>
<tr>
<td>I</td>
<td>6&quot;</td>
</tr>
<tr>
<td>J</td>
<td>1-1/2&quot;</td>
</tr>
<tr>
<td>K</td>
<td>3-4&quot;</td>
</tr>
<tr>
<td>L</td>
<td>1-4&quot;</td>
</tr>
<tr>
<td>M</td>
<td>16&quot;</td>
</tr>
<tr>
<td>N</td>
<td>2-1/2&quot;</td>
</tr>
<tr>
<td>5/8&quot; OR</td>
<td>1&quot;</td>
</tr>
<tr>
<td>3/4&quot; METER</td>
<td>METER</td>
</tr>
</tbody>
</table>
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

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.
NOTES:

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>SIZE OF PIPE BEING CONNECTED</th>
<th>MINIMUM THRUST AREA REQUIRED EQUALS (AxB) (SQUARE FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; AND LESS</td>
<td>3</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4</td>
</tr>
<tr>
<td>8&quot;</td>
<td>6</td>
</tr>
<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>
CONCRETE PRESSURE PIPE TAPPING SLEEVE

- DRAW FLANGE
- GLAND FLANGE
- DRAW STUD AND NUTS
- PRESSURE PLATE
- INNER NECK
- VALVE STUD AND NUT
- BODY PLATE
- LOAD BEARING SET SCREW 3-REQ'D.
- OUTER NECK
- BODY PLATE
- CENTERLINE LENGTH
- LUG BOLT NUT & WASHER

* DIMENSIONS TO BE FIELD VERIFIED

EXIST. MAIN

SADDLE LENGTH

4" (TYP.)

MARICOPA ASSOCIATION OF GOVERNMENTS

DETAIL NO. 342

STANDARD DETAIL
ENGLISH

CONCRETE PRESSURE PIPE TAPPING SLEEVE

REvised

DETAIL NO. 342
VAULT DIMENSION DETAILS

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

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

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

**NOTES**

1. FOR LARGER METERS, SPECIAL VAULT DESIGN IS REQUIRED.
2. USE OF REMOTE READING DEVICE AT OPTION OF UTILITY.
3. CERTAIN AGENCIES AND/OR UTILITIES PREFER TO CONSTRUCT VAULT, CONTACT AGENCY INVOLVED PRIOR TO VAULT CONSTRUCTION.
NOTES:
1. FIRELINE FROM CITY MAIN TO PROPERTY LINE SHALL BE CONSTRUCTED OF CAST IRON PIPE.
2. REINFORCING TO BE 1/2" DIAMETER REBAR ON 6" CENTERS EACH WAY ON TOP AND 12" CENTERS EACH WAY ON THE SIDES.
3. COVERS TO CONSIST OF TWO METER BOX COVERS DET. 314.
4. BY-PASS METER TO BE ACCORDING TO GOVERNING AGENCY.
5. CHECK VALVE TO BE GLOBE MODEL "A" GRINNELL, HERSEY MODEL D.C., VIKING MODEL "A" OR APPROVED EQUAL.
6. VAULT SHALL BE CONSTRUCTED IN OWNERS PROPERTY AGAINST THE FRONT PROPERTY LINE OR ANOTHER APPROVED LOCATION. WALLS AND FENCES SHALL NOT OBSTRUCT ACCESS.
7. CITY CONTROL VALVE TO BE REQUIRED AT MAIN.
8. PARTS OF PIPE TO BE EMBEDDED IN CONC. SHALL BE WRAPPED WITH 30 LB ASPHALT ROOFING FELT.
9. REMOTE READING DEVICE SHALL BE OF SELF GENERATING ELECTRICAL TYPE.
10. CONCRETE TO BE CLASS "B" PER SECT. 725.

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

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

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

3. FOR CONCRETE THRUST BLOCKS, SEE DETAIL 380.

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

5. SEE DETAIL 362 FOR LOCATION OF HYDRANT.

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

SEE DETAIL 391 FOR VALVE BOX INSTALLATION

FINISH GRADE OR ADJACENT GRADE, SEE NOTE #6

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

6" VALVE

WATER MAIN

WATER VALVE BLOCKING, SEE DETAIL 301

6" SHORT BODY 90° BEND SEE NOTE NO. 2

PUMPER CONNECTION TO FACE CURB

1" MIN
4" MAX.
SEE NOTE #6

6" TEE

WATER MAIN 

VARES

SEE DETAIL NO. 2
NOTES:

1. OBSTRUCTIONS SUCH AS UTILITY POLES, STREET SIGNS, IRIGATION BOXES, FENCES, ETC., MUST NOT BE PLACED BETWEEN CURB AND HYDRANT AND WITHIN THE RADIUS FOR FIRE DEPT. ACCESS.

2. DIMENSIONS SHOWN ON CONSTRUCTION DRAWINGS SUPERSEDE LOCATIONS SHOWN HERE.

3. ON LOCATIONS IN MIDBLOCK, THE FIRE HYDRANT WILL BE ALIGNED WITH A PROPERTY LINE.

PARKWAY AREA OR NO SIDEWALK

AREA WITH SIDEWALK
CAST IRON

REMAINDER OF TRENCH TO BE BACKFILLED PER SECT. 601

EXIST. C.I. PIPE

NEW PIPE

SOLID SLEEVE

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

C.I. B. & S. OFFSET

CAST IRON MECHANICAL JOINT

REMAINDER OF TRENCH TO BE BACKFILLED PER SECT. 601

EXIST. PIPE

NEW PIPE

SOLID SLEEVE

BELL & SPIGOT

BELL & BELL

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

6" MIN CLEARANCE BACKFILLED WITH SELECTED FINE MATERIAL OR SAND

BELL & BELL

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.

ASBESTOS CEMENT

REMAINDER OF TRENCH TO BE BACKFILLED PER SECT. 601

NEW PIPE

SOLID SLEEVE

6'-6" MAX. 1'-6" MIN.

C.I. B. & S. OFFSET

C.I. B. & S. OFFSET

6'-6" MAX. 1'-6" MIN.
TYPICAL LOCATIONS OF THRUST BLOCKS

NOTES:

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

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

3. FORM ALL NON-BEARING VERTICAL SURFACES.

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

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>WATER PIPE TEE, DEAD END, 90° BEND</th>
<th>45° &amp; 22 1/2° BEND</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; OR LESS</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>8&quot;</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>10&quot;</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>12&quot;</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>16&quot;</td>
<td>24</td>
<td>12</td>
</tr>
</tbody>
</table>

MINIMUM THRUST BLOCK AREA REQUIRED (YxW) (SQ. FT.)
### Pipe Size Table

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>#6</td>
<td>6&quot;</td>
<td>3' x 3' x 3'</td>
</tr>
<tr>
<td>8&quot;</td>
<td>#6</td>
<td>9&quot;</td>
<td>4' x 4' x 2.5'</td>
</tr>
<tr>
<td>12&quot;</td>
<td>#8</td>
<td>9&quot;</td>
<td>4' x 4' x 5'</td>
</tr>
</tbody>
</table>

* For 125 P.S.I. Working Pressure.

### Notes:

1. Either this detail or restraint rods can be used when it is allowed to relocate a water line upward or downward to cross a conflict.

2. Ductile iron pipe may be used.

3. Bars to concrete thrust block to be coated with 2 coats coal tar, epoxy or by other approved method. Bars to have 90° hook on lower end, as per table.
NOTES:

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

NOTE:

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

CONCRETE WATER METER BOX NO. 2 PER DETAIL 320

GROUND LEVEL

CAST IRON WATER METER BOX COVER NO. 2 PER DETAIL 311

6" GRAVEL BED

CONCRETE WATER METER BOX NO. 2 PER DETAIL 320

2" ADAPTER BRASS OR COPPER

2" COPPER PIPE

2" COPPER PIPE

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" TAPPED CAP (CAST IRON)

WATER MAIN

2" BRASS ELL

2" BRASS COUPLING

2" P.E. OR COPPER PIPE

2" CORP STOP

TYPE 'A'

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

TYPE 'B'
NOTES:

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

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

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

TYPE 'A'
(TO BE USED IN AREAS SUBJECT TO VEHICULAR TRAFFIC)

TYPE 'B'
(NOT SUBJECT TO VEHICULAR TRAFFIC)
NOTES:

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

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

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

1. THE DEBRIS CAP SHALL BE DESIGNED AND INSTALLED TO PREVENT DEBRIS SUCH AS DIRT, DUST SAND, ETC., FROM PASSING AROUND THE CAP AND DOWN INTO THE VALVE HOUSING. THE CAP SHALL BE HELD IN PLACE BY A MECHANISM WHICH WILL NOT DAMAGE THE VALVE HOUSING. ONCE INSTALLED THE CAP MUST WITHSTAND, WITHOUT SLIPAGE, A MINIMUM VERTICAL FORCE OF 50 POUNDS AT A LOADING RATE OF 1 INCH/MINUTE.

2. THE CAP SHALL BE MANUFACTURED OF CORROSIVE RESISTANT MATERIALS.

3. DEBRIS CAP SHALL BE INSTALLED AS CLOSE UNDER THE CAST IRON COVER WITHOUT INTERFERING WITH COVER OPERATION.

4. THE CAP SHALL BE CAPABLE OF SECURELY HOLDING A STANDARD LOCATING COIL, "SCOTCH MARK" 4 DISK MARKER BY 3M OR EQUAL.

5. THE CAP SHALL BE CONSTRUCTED TO ALLOW THE DEVICE TO BE SECURED BY A LOCK. THE LOCK (PAD, BARREL, ETC.) SHALL BE SUPPLIED BY THE AGENCY.


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

8. THE DEBRIS CAP SHALL BE MANUFACTURED BY SW SERVICES, INC. PHOENIX, ARIZONA OR EQUAL.
NOTES:
1. LAY PIPE TO LINE AND GRADE ON BRICK CRADLE.
2. PLACE CLASS 'C' CONCRETE PER SECT. 725 & 505, IN SUCH A MANNER AS NOT TO FLOAT THE PIPE.
NOTES:

1. TYPE 'A' PIPE SUPPORT MAY BE USED FOR ANY TYPE CROSSING CONDITION.

2. TYPE 'C' PIPE SUPPORT MAY BE USED FOR CROSSING PIPES WITH A BELL DIAMETER OF 18" OR LESS IF SUFFICIENT CLEARANCE OVER STORM SEWER IS AVAILABLE AND TOTAL SPAN IS LESS THAN 34'.

3. INTERMEDIATE PIPE SUPPORT SHALL BE USED IN CONJUNCTION WITH TYPE 'C' PIPE SUPPORT IF TOTAL SPAN EXCEEDS MAX. 'W' IN TABLE.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL SUPPORTS BOTH PERMANENT AND TEMPORARY. TEMPORARY SUPPORTS SHALL NOT BE A SEPARATE PAY ITEM.

5. PERMANENT PIPE SUPPORTS MAY BE DECREASED FROM PLAN QUANTITIES OR EXTENDED TO INCLUDE SOME LISTED BELOW AS TEMPORARY SUPPORTS IF CONDITIONS WARRANT THESE CHANGES AT THE TIME OF CONSTRUCTION. DECISION SHALL BE MADE BY THE ENGINEER.


7. USE TYPE 'B' PIPE SUPPORT INSTEAD OF TYPE 'C' WHEN CLEARANCE IS LESS THAN 'Y' IN TABLE, BETWEEN PIPES.

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

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

SECTION A-A

SECTION B-B

PIPE CONDUIT

TYPE 'A'

(2) NO. 4 REBARS

TYPE 'B'

SEE SECT. 601 FOR BACKFILL & COMPACTION

OPTIONAL BEARING WALL CONSTRUCTION FOR LARGE DIAMETER (D) PIPE TO BE FORMED IN TRENCH.
JOINT METHOD WILL VARY DEPENDING ON EXISTING PIPE MATERIAL

NOT TO EXCEED ONE PIPE LENGTH

VARIES

5'-0" MIN

VARIES

5'-0"

MIN

BACKFILL AND COMPACT PER SECTION 601

NEW DUCTILE IRON PIPE CLASS 52 SIZE TO MATCH EXISTING PIPE

EXISTING CROSSING PIPE

5'-0" MIN

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

GRAVITY SANITARY SEWER

ZONE A

ZONE B

PRESSURIZED SANITARY SEWER

ZONE A

ZONE B

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

DUCTILE IRON PIPE WITH RESTRAINED OR MECHANICAL JOINTS*

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

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

NO. 3 STIRRUPS
36" O.C.
(4) NO.4 BARS

SEPARATION DISTANCE

10' MIN. PERPENDICULAR

4"

VARES

4"

2"

STIRRUPS
EDGE SPACING
24"

STIRRUPS
SPACING
36"

HIGHER WATER OR SEWER MAIN

LOWER WATER OR SEWER MAIN

SECTION A–A

NOTES:
1. CLASS 'C' CONCRETE AS PER SECTION 725.
*REFER TO MAG STANDARD SPECIFICATION SECTION 610.
This Page Is Reserved for Future Use.
REPLACE ALL PAVING ACCORDING TO SECTION 3.36

PLAN VIEW OF REPLACEMENT

COMPACATION SHALL BE DONE IN ACCORDANCE WITH SECT. 601

6" MIN. WHEN USING CAULDER CONNECTION

EXCAVATE 6" BEYOND UNBROKEN BELL TO ALLOW ROOM FOR INSPECTION

18" MIN. WHEN USING BELL CONNECTION

COMPACATION SHALL BE DONE IN ACCORDANCE WITH SECT. 601

NEW CONSTRUCTION

12" MIN. SOLID BEARING ON EACH SIDE

SAW SOUND PIPE SQUARE

NEW CONSTRUCTION

REPLACEMENT WHEN NEW TRENCH MORE THAN 2' WIDE

6" MIN. WHEN USING CAULDER CONNECTION

SAW SOUND PIPE SQUARE

12" MIN. SOLID BEARING ON EACH SIDE

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

DIAMETER AT BELL

CONC. PER SECT. 725, CLASS 'C'

NOTES:

1. BROKEN PIPE SHALL BE REPLACED WITH A MINIMUM OF ONE FULL JOINT AND TWO SHORT LENGTHS WITH UNBROKEN BELLS. CONSTRUCTION AND JOINTS TO BE MADE AS PER SECTION 615.
24" OR 30" FRAME & COVER
PER DET. 423, 424, 425
6" MIN. — 8" MAX.
REINFORCED CONC.
ADJUSTING RINGS
M.H. STEPS,
SEE NOTE 2
BELL UP OR
DOWN, CONT.
OPTION
24" TO 26-3/4"
ON 48" M.H.,
30" ON 60" M.H.
8"
12" MAX.
12" TYP.
8" RING
"RAM NEK" PLASTIC
GASKET OR EQUAL
FLOW
TYPE 'A' TOP
(PRE-CAST ECCENTIC CONICAL TOP M.H.)

** ALTERNATE BASE
WITH KNOCKOUTS FOR PIPES.
CLEARANCE AROUND PIPES
1" MIN. — 3" MAX.
EXCEPT LOWER CORNERS

8" IF M.H. IS 13' OR LESS
12" IF M.H. IS OVER 13'

NOTES:

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

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

3. USE LOW ALKALI CEMENT ONLY.
FOR INSTALLATION IN PVT'MT. SEE DETAIL 422

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

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

FLAT REINFORCED CONC. TOP

BELL UP OR DOWN, CONT. OPTION

"RAM NEK" PLASTIC GASKET OR EQUAL

RUBBER GASKET W/ EXPANDED BELL JOINT

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

1/4"

2-1/8"

1-5/8"

1-3/4"

1/4"

1/2"

1/4"

6"

2-1/4"

2-1/4"

6"

3/8"

1-1/4"

1-1/4"

ADJUSTING RING DETAIL

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

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

5" TYP.

M.H. STEPS, SEE NOTE 2

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

24" MAX.

4" TYP.

FLOW

CIMENT MORTAR CONC.

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

FLOW

PRESS INTO BASE

CAST IN PLACE

BOTTOM M.H. REQUIRED

SAME M.H. AS REQUIRED

STD M.H. SEC. AS REQUIRED

"B" TYPE TOP

VARIIES

ROUND OR SQUARE BASE OPTIONAL
FACE OF COVER
CAST IRON

BACK OF COVER

CAST IRON
MANHOLE RING

SECTION OF COVER
APPROX. WEIGHT 276 LBS.

NOTES:
1. WEIGHT OF CASTING SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED.
2. CASTINGS SHALL CONFORM TO SECT. 787.
**24" MANHOLE FRAME AND COVER**

**BOTTOM VIEW - TOP VIEW**
- WT. (CL. 30) = 205 LBS
- WT. (CL. 35) = 170 LBS

**COVER**
- TOP VIEW
- 7/8" DRILL, 11" DIA O.C.
- 2 HOLES AS NECESSARY FOR MACHINING

**FRAME**
- BEAD 1/16" HIGH
- 3/4" 1-1/2" 2-1/8"

**BATTER**
- 3/16"

**SECTION 'A-A' OF COVER**
- 33-1/4" 3-3/4"

**SECTION OF FRAME**
- 1-3/8" 23-1/8"

**NOTE:**
Lettering on manhole cover to contain name of agency and utility for which manhole is needed, (i.e. "Phoenix Sanitary Sewer"). Or as directed. The total width of individual letters to be such that letters and words are equally spaced and balanced to form a complete circle with spacers before and after the word identifying the agency involved. Letters to be 2" in height and raised 1/8" above level of cover. Type of letters to be submitted for approval. Weight of castings shall be no more than 2% less than the approximate weight specified. Castings shall conform to section 787.

**30" MANHOLE FRAME AND COVER**

**BOTTOM VIEW - TOP VIEW**
- WT. (CL. 30) = 224 LBS
- WT. (CL. 35) = 219 LBS

**COVER**
- TOP VIEW
- BEAD 1/8" HIGH
- 3/4" 1-1/2" 1/2"

**FRAME**
- 2" (MAX.) SPACING
- 10"

**BATTER**
- 1/8"

**SECTION 'B-B' OF COVER**
- 31-1/2"

**SECTION OF FRAME**
- 31-1/8"

**FRAME**
- 2" 4"

**MACHINE**
- 3-1/2" 2-1/2"

**BATTER**
- 3/16" 24" 3-1/6"
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''.
**NOTES**

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

**CAST IRON MANHOLE STEP**

**NOTES**

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

**POLYPROPYLENE MANHOLE STEP**
NOTES:

1. THIS CONTROL VAULT WITH MANHOLE AND COVER SHALL BE USED ON 6" AND 8" DIAMETER SEWER WITH FLOWS IN THE RANGE OF 40 TO 340 GPM.
2. VAULT TO BE CONSTRUCTED ON STRAIGHT RUN OF BUILDING SEWER, ACCESSIBLE AND SAFELY LOCATED ON THE OWNERS PROPERTY ADJACENT TO A PUBLIC RIGHT-OF-WAY.
3. THE PALMER BOWLUS FLUME SHALL BE INSTALLED PER THE MANUFACTURERS RECOMMENDATIONS.
4. THE PRE-CAST CONCRETE VAULT SHALL BE RECTANGULAR WITH MINIMUM INSIDE DIMENSIONS OF 4" WIDE AND 6" LONG AND AT A DEPTH OF THE DESIGN OF THE BUILDING SEWER.
5. A SHOP DRAWING SHALL BE SUBMITTED TO THE CONTRACTING AGENCY FOR APPROVAL BEFORE INSTALLATION OF THE VAULT AND THE PALMER BOWLUS FLUME WILL BE ALLOWED.

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/D [4" DIAMETER SELF LEVELING MARKER BALL GREEN IN COLOR] OR APPROVED EQUAL OR AS REQUIRED BY THE LOCAL AGENCY.

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

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

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

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

6. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.

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

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

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

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

2. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.

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

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

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

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

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

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

9. STAMP OR WELD THE LETTER "S" ON LID OF METER BOX.
4" OR 6" 45° WYE BRANCH

R/W LINE OR PROPERTY LINE

2"x4" METAL STUD ON SURFACE TO END OF TAP

#1 METER BOX PER DETAIL 320

THREADED CAP W/ ELECTRONIC MARKER SEE NOTE 8

1-WAY CLEANOUT TOWARDS MAIN

4" OR 6" SEWER PIPE

SLOPE:
MIN: 4" OR 6" = 1/4" PER FT.
MAX: 4" = 1-1/2" PER FT.
MAX: 6" = 7/8" PER FT.

FLOW

4" OR 6" 45° BENDS

ELECTRONIC MARKER

2' MIN

4' MAX

4" MIN

ELECTRONIC MARKER SEE NOTE 7.

INVERT OF SERVICE LINE TO BE AT OR ABOVE CROWN OF MAIN

LEVEL

MAIN (SIZE VARIABLE)

NOTES:
1. CONSTRUCTION DETAIL APPLIES WHERE CONTRACTOR BUILDS HOUSE CONNECTION. TAP EXTENDS TO PROPERTY LINE IN ALLEYS OR STREETS OR TO EASEMENT LINE.
2. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.
3. CONSTRUCT TAP AT MIN. SLOPE IF COVER WILL BE LESS THAN 5' AT PROPERTY LINE.
4. IF DEPTH REQUIRES, MINIMUM SLOPE CAN BE REDUCED TO 1/8" PER FOOT PROVIDED STUB IS STAKED TO GRADE.
5. ALL FITTINGS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D-2321. THE CONTRACTOR MAY VARY FROM THE DRAWING TO USE THE APPROPRIATE WYES, TEE-WYES AND BENDS TO ENSURE NO MISALIGNMENT OF THE PIPE AND FITTINGS. BLOCK OR BRACE FITTING JOINTS TO ENSURE ZERO DEGREES ANGULAR JOINT DEFLECTION.
6. END OF TAP TO BE SEALED AND MARKED.
7. ELECTRONIC MARKER SHALL BE A 3M MODEL 1424-XR/ID [4" DIAMETER SELF LEVELING MARKER BALL GREEN IN COLOR] OR APPROVED EQUAL OR AS REQUIRED BY THE LOCAL AGENCY.
8. INSTALL RAISED 4" THREADED PLUG IN CLEANOUT INCORPORATING 3M MODEL 1414 ELECTRONIC DISC MARKER, GREEN IN COLOR. LOCATOR PLUG TO BE GPK 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
NOTES:

1. STAMP TOP OF CURB WITH 4" TALL BY 1/4" DEEP "S" TO DESIGNATE SEWER SERVICE LINE CROSSING.
This Page Is Reserved for Future Use.
DOUBLE PIPE HEADWALL

HEADWALL DIMENSIONS

<table>
<thead>
<tr>
<th>*Nominal Pipe Size</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>1'-4&quot;</td>
<td>2'-0&quot;</td>
<td>3'-8&quot;</td>
<td>0'-10&quot;</td>
<td>2'-10&quot;</td>
</tr>
<tr>
<td>15&quot;</td>
<td>2'-0&quot;</td>
<td>2'-8&quot;</td>
<td>4'-0&quot;</td>
<td>1'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>2'-0&quot;</td>
<td>3'-8&quot;</td>
<td>4'-0&quot;</td>
<td>1'-2&quot;</td>
<td>3'-4&quot;</td>
</tr>
<tr>
<td>21&quot;</td>
<td>2'-8&quot;</td>
<td>4'-0&quot;</td>
<td>5'-4&quot;</td>
<td>1'-3&quot;</td>
<td>3'-8&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>2'-8&quot;</td>
<td>4'-0&quot;</td>
<td>5'-4&quot;</td>
<td>1'-6&quot;</td>
<td>3'-11&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>2'-8&quot;</td>
<td>5'-4&quot;</td>
<td>6'-8&quot;</td>
<td>1'-10&quot;</td>
<td>4'-7&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>3'-4&quot;</td>
<td>6'-8&quot;</td>
<td>8'-0&quot;</td>
<td>1'-10&quot;</td>
<td>5'-2&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>4'-0&quot;</td>
<td>8'-0&quot;</td>
<td>9'-4&quot;</td>
<td>2'-2&quot;</td>
<td>5'-9&quot;</td>
</tr>
</tbody>
</table>

* Nominal pipe size given for reinforced conc. pipe.

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

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

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

NOTES:
1. ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725.
2. ALL REINFORCING BARS SHALL BE NO. 4 EXCEPT NO. 6 BARS OVER PIPE. BAR SPACING APPROXIMATELY 12'' C TO C UNLESS OTHERWISE NOTED.
3. 30° WING WALL FLARE SHOWN; 45° NORMALLY DESIRABLE.
### PIPE DIMENSIONS

<table>
<thead>
<tr>
<th>I.D.</th>
<th>W</th>
<th>A</th>
<th>B</th>
<th>E</th>
<th>F</th>
<th>J</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2'-6&quot;</td>
<td>5'-2&quot;</td>
<td>2'-8&quot;</td>
<td>1'-3&quot;</td>
<td>0'-9&quot;</td>
<td>1'-3.5/8&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td></td>
<td>3'-0&quot;</td>
<td>6'-6&quot;</td>
<td>3'-6&quot;</td>
<td>1'-7.1/2&quot;</td>
<td>1'-1.1/2&quot;</td>
<td>1'-11.3/8&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td></td>
<td>3'-6&quot;</td>
<td>7'-10&quot;</td>
<td>4'-4&quot;</td>
<td>2'-0&quot;</td>
<td>1'-6&quot;</td>
<td>2'-7.1/4&quot;</td>
<td>1'-1&quot;</td>
</tr>
<tr>
<td></td>
<td>4'-0&quot;</td>
<td>9'-2&quot;</td>
<td>5'-2&quot;</td>
<td>2'-4.1/2&quot;</td>
<td>1'-10.1/2&quot;</td>
<td>3'-3&quot;</td>
<td>1'-4&quot;</td>
</tr>
<tr>
<td></td>
<td>4'-6&quot;</td>
<td>10'-6&quot;</td>
<td>6'-0&quot;</td>
<td>2'-9&quot;</td>
<td>2'-3&quot;</td>
<td>3'-10.3/4&quot;</td>
<td>1'-6&quot;</td>
</tr>
</tbody>
</table>

### 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.
NOTE:

1. REMOVE ALL SCALE FROM RACK BARS. METAL SPRAY OR PAINT WITH ONE COAT ZINC CHROMATE OR RED LEAD PRIMER (INDUSTRIAL QUALITY). OVERCOAT WITH GREY INDUSTRIAL ENAMEL SECT. 790.

2. SHAPE, COMPACT AND PLASTER NEW DITCH FROM HEADWALL TO UNDISTURBED EXISTING DITCH. PLASTER TO EXTEND TO MINIMUM ELEVATION NOTED 3 FEET BEYOND CONNECTION TO UNDISTURBED EXISTING DITCH.


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

STANDARD
CONCRETE PIPE

CONCRETE AS
REQUIRED TO
SECURE GATE

FINISH
GRADE

VARIABLE

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

1/4" ROD
HANDLE

2-1/2"

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

SEE NOTE 3

SEE NOTE 2

SEE NOTE 1

PAINT ARROW ON OUTSIDE OF
STANDPIPE INDICATING DIRECTION
"TO OPEN" HEADGATE.

PAINT ARROW ON OUTSIDE OF
STANDPIPE INDICATING DIRECTION
"TO OPEN" HEADGATE.

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

GROUN JOINTS
WATER TIGHT

FORM CONC. AROUND
END OF PIPE BEHIND
HEADGATE FRAME

TYPE 'A'

TYPE 'B'

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.
PLAN OF COVER

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

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

1. A concrete collar is required where pipes of different diameters or materials are joined, or where the change in alignment or grade exceeds that allowed for on ordinary joints.

2. Where pipes of different diameters are joined with a concrete collar, L and T should be those of the larger pipe. D = D - 1, or D - 2 whichever is greater.

3. For pipe sizes not listed and less than 66" use next size larger.

4. Omit reinforcing on pipe 24" or less in diameter.

5. Where reinforcing is required, the diameter of the circular ties shall be...
   outside diameter of pipe + T.

6. Field closures of pipe of the same diameter and without change in grade or alignment shall be made with a concrete collar.

7. Concrete shall be Class B per Sect. 725.

A = angle of deflection

<table>
<thead>
<tr>
<th>D</th>
<th>L</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>1.0'</td>
<td>4&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>1.0'</td>
<td>5&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>1.0'</td>
<td>6&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>1.5'</td>
<td>8&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>1.5'</td>
<td>10&quot;</td>
</tr>
<tr>
<td>57&quot;</td>
<td>1.5'</td>
<td>10&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>1.75'</td>
<td>11&quot;</td>
</tr>
<tr>
<td>66&quot;</td>
<td>1.75'</td>
<td>11&quot;</td>
</tr>
</tbody>
</table>
CONSTRUCT OPTIONAL CONCRETE SCOURING BASIN AROUND VALVE ASSEMBLY WHERE SPECIFIED

BREAK PIPE AND MAKE WATERTIGHT JOINTS PER DETAIL 524

CLASS 'C' CONCRETE PER SECTION 725 WITH TROWEL FINISH

PIPE DIAMETER TO BE SAME AS VALVE SIZE

CONCRETE PIPE SECT. 735 & 736

BID ITEM

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

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

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

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

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

5. SEE SECTION 601 FOR TRENCH PREPARATION.

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

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

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

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

C.M.P. MAIN STORM DRAIN

BAND DETAIL

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

STANDARD DETAIL
ENGLISH

CORRUGATED METAL PIPE AND INSTALLATION

DETAIL NO. 510

REvised DETAIL NO. 510
NOTES

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

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

3. CUT PIPES TO ALLOW SETTING OF 4" DIA. CYLINDRICAL FORM FROM 6" ABOVE MAIN LINE PIPE TO SPRING LINE. CUT PIPE 2" LARGER THAN FORM TO ALLOW 2" CONCRETE OVER ENDS OF ALL CUT PIPE.

4. INVERT AND BASE OF MANHOLE TO BE Poured AND INVERT TO BE SHAPED BY HAND TO MAKE SMOOTH TRANSITION. FINISH WITH RUBBER FLOAT.

5. CENTER MANHOLE ON PIPE JOINT WHERE PIPE CHANGES SIZES, LEAVING A GAP OF 12" MINIMUM, 24" MAXIMUM.
**NOTES:**

1. **LINE PIPE AND STUB MAY BE CAST MONOLITHICALLY OR STUB MAY BE CAST ON TO LINE PIPE SECTION PRIOR TO COMPLETE CURING.**

2. **ALL LINE PIPE REINFORCEMENT SHALL BE TURNED UP INTO STUB.**

3. **THE VERTICAL STUB TO BE A.S.T.M. C-76 CLASS II WALL 'A' AND THE HORIZONTAL PIPE TO BE EQUAL TO STRENGTH OF PIPE ENTERING MANHOLE.**

4. **ALL REINFORCING STEEL SHALL CLEAR FACE OF CONCRETE BY 1-1/2" UNLESS SHOWN OTHERWISE.**

5. **CONCRETE ENCASEMENT SHALL BE CLASS 'A' PER SECT. 725 AND 505.**

**TABLE OF VALUES FOR 'F' & 'D'**

<table>
<thead>
<tr>
<th>D</th>
<th>51&quot;</th>
<th>54&quot;</th>
<th>57&quot;</th>
<th>60&quot;</th>
<th>63&quot;</th>
<th>66&quot;</th>
<th>69&quot;</th>
<th>72&quot;</th>
<th>78&quot;</th>
<th>84&quot;</th>
<th>90&quot;</th>
<th>96&quot;</th>
</tr>
</thead>
</table>

**SECTIONS**

**PLAN**

**SECTION A-A**

**SECTION B-B**

**MAN HOLE SHAFT**

**PER DETAIL 522**

**PRECAST PIPE WITH VERTICAL STUB**

**ENCASEMENT**

**48" DIA.**

**4'-0" MIN.**

**8'-8" MIN.**

**2'-0" MIN.**
NOTES:
1. PRECAST CONCRETE CONES AND SECTIONS TO BE A.S.T.M. C-478.
2. BRICK MAY BE USED IN LIEU OF OR IN COMBINATION WITH CONCRETE ADJUSTING RINGS.
3. PRECAST CONCRETE SECTIONS 48" DIA PIPE MAY BE FURNISHED IN STANDARD LENGTHS.
4. UNLESS OTHERWISE SHOWN ON PLANS, USE (2) 2-1/2" PRECAST CONCRETE ADJUSTING RINGS ON IMPROVED STREETS AND (4) 2-1/2" RINGS ON UNIMPROVED STREETS.
5. MANHOLE STEPS SHALL BEGIN 2'-0" BELOW FINISHED GRADE AND CONTINUE AT 12" INTERVALS TO APPROXIMATELY 2' ABOVE MANHOLE SHELF. (AS REQUIRED BY AGENCY.)
6. CONCRETE SHALL BE CLASS A PER SECTION 725 AND 505.

SECTION B-B

SHALLOW MANHOLE

REINFORCED CONCRETE ADJUSTING RING

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

VERTICAL SECTION OF ECCENTRIC MANHOLE SHAFT

BASE STRUCTURE PER DETAIL 520 OR 521

GROUT

1 SECTION 48" PIPE IF APPLICABLE

PIPE

NO. 4 HOOP

NO. 4 BARS

MANHOLE FRAME AND COVER PER DETAIL 423 AND 424

MANHOLE STEPS

ECCENTRIC PRECAST CONCRETE CONE

MANHOLE FRAME AND COVER PER DETAIL 423 AND 424

1:2 MORTAR

3'-10" MINIMUM

ALL JOINTS SHALL BE FILLED WITH 1:2 MORTAR AND NEATLY POINTED OR WIPED ON INSIDE OF SHAFT.

USE WHERE THERE IS 3'-10" OR LESS COVER OVER PIPE

PLN

6"

2-1/8"

1-5/8"

1-3/4"

6"

2-1/4"

1-1/4"

3/4"

1/4"

1-1/4"
FOR A 30" M.H. OPENING, USE THE STD. WATER TIGHT 30" M.H. FRAME & COVER, AND ANCHOR THE FRAME AS OUTLINED IN THE INSTRUCTIONS NOTED ON THIS SHEET.

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

NOTES:

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

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

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

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

5. CASTING DIMENSIONS GIVEN ABOVE ARE FROM DET. 424, 24" MANHOLE FRAME AND COVER.

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

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

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

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

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

10. INSTALL THREE CABLES PER 24" COVER (FOUR CABLES FOR 30" COVERS). EYEBOULTS 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 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. 720.

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'−6&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>1'−9&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>1'−0&quot;</td>
</tr>
</tbody>
</table>

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

* SEE DETAILS 536−1 AND 536−2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.
** 4' LOCATIONS WHERE 4' S/W IS REQUIRED.
NOTES:
1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
4. FLOOR OF BASIN SHALL BE TROWELED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 D PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
6. CONCRETE SHALL BE CLASS A PER SECTION 725.

DIMENSIONS

<table>
<thead>
<tr>
<th>CURB</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>3&quot;–3&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>1&quot;–9&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>1&quot;–0&quot;</td>
</tr>
</tbody>
</table>

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

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

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
   OTHER THAN WALL ADJACENT TO A WING
   BASIN. PIPE SHALL BE TRIMMED TO
   FINAL SHAPE AND LENGTH BEFORE
   CONCRETE IS PLACED.
4. SUMP FLOOR SHALL HAVE A WOOD
   TROWEL FINISH AND A MIN. SLOPE
   OF 4:1 IN ALL DIRECTIONS TOWARD
   OUTLET PIPE.
5. ALL REINFORCING BARS SHALL BE NO.4
   18" C TO C BOTH WAYS AND 1-1/2" CLEAR
   TO INSIDE OF WALLS AND
   OUTSIDE OF WING BASIN FLOOR EXCEPT
   AS SHOWN. SEE SECT. 727.
6. ALL CONCRETE SHALL BE CLASS 'A',
   PER SECT. 725.
7. CONSTRUCTION JOINTS SHALL BE
   PLACED TO MEET FIELD CONDITIONS.
8. ALL EXPOSED STEEL SHALL BE
   GALVANIZED OR PAINTED WITH ONE
   SHOP COAT OF #1 PAINT AND TWO
   FIELD COATS OF #10 PAINT.

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

SECTION A-A

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

REINFORCEMENT DETAIL
SECTION D-D

FOR S/W INSTALLATION BEHIND CATCH BASIN SEE DETAIL 230

SECTION E-E

APRON NOTES:

9. APRON IS CONSTRUCTED ONLY WHEN SPECIFIED ON PLANS.

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

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

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

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

PLAN VIEW

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

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

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

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

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

18. ALL PARTS SHALL BE OF STRUCTURAL GRADE STEEL.

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

FRAME DETAIL

4" x 3" x 1/2" L

3/16"

8"

2"

2"

4"

1"

2-1/2"

3-1/2"

1/4"

4"

1/4"

1/4"

40-1/2"

CROSS BARS

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

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

SECTION F-F

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

GRATE DETAIL

FRAME AND GRATE
FOR TYPE 'D' CATCH BASIN

DETAIL NO. 533-3
STANDARD DETAIL ENGLISH

REvised 01-01-2007
DETAIL NO. 533-3
This Page Is Reserved for Future Use.
**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.
DIMENSION
V = 3'-0" UNLESS OTHERWISE SPECIFIED.
* DIMENSIONAL CHANGE WITH DETAIL 534-3 AND DETAIL 534-4.

NOTES:
1. ADJUSTABLE CURB, FRAME AND GRATING UNITS SHALL BE STRUCTURAL STEEL OR CAST IRON
2. PIPES MAY ENTER OR LEAVE ANY WALL. BOTTOM OF BOX TO BE SLOPED TO OUTLET PIPE FROM ALL DIRECTIONS AND TROWELLED TO A HARD SMOOTH SURFACE.
3. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
4. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
6. ALL CONCRETE, CLASS 'A' AS PER SECTION 725.
CROSS SECTION

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

1/2" RODS THREADED BOTH ENDS

12" x 1/4" BOND PLATE
NOTE: WELD ALL PLATES TO 6" x 6" ANGLES.

13" x 3/8" BACK PLATE
6" x 6" x 3/8" x 13-3/8"
6" 2-1/2"

1/4" WELD

2" x 1/4" END

1/4" WELD

8" 1/4"

5" x 3" x 3/8"

1/4" WELD

GRATE

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

1-1/2" LONG x 1/2" PIPE SPACER

ADJUSTABLE CURB

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

CURB BOX ADJUST.
TO 9" HIGH

DATE

SECTION B-B

CROSS-SECTIONAL
AREA: 1.53 SQ. IN.

3-1/4" R

VANE DETAIL

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

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

36-1/2"
35-1/2"
12 EQUAL SPACES AT 2-13/16"

33" 36" 43"

1/2"
60°
5/8"
BOLT CURB BOX TO FRAME
WITH 1/2" x 13" x 2-1/2" STEEL HEX
HEAD BOLTS, NUTS AND WASHERS

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

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

NOTE:
DIMENSIONAL CHANGE REQUIRED FROM 3'-5"
WIDTH TO 6'-2", AND 1'-9" DEPTH TO 2'-0"
Requires one center steel i-beam 4" x 7.7 lbs.
Material cast gray iron ASTM A-48-83 Class 35B.
Frame weight 197 LBS.; grate 140 LBS.; curb box 92 LBS.
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.
SECTION C–C
FOR DETAILS 531, 532 AND 533

SECTION D–D

NOTES:
1) HORIZONTAL PLAIN ROUND GALVANIZED STEEL PROTECTION BAR SHALL BE USED WHEN CURB FACE IS 9” OR MORE.
2) THE BAR SHALL BE EMBEDDED 5” AT EACH END.
FURNISH FOR EACH SIDE OF HANDLE
1  EACH 304—S.STL. SPRING
   2-1/2" x 17/32" I.C. x 3/32"
2  EACH 1/2" HEX NUT
3  EACH 1/2" FLAT WASHER
1  EACH 1/2" LOCK WASHER

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

DETAIL OF ANGLE FRAME GRATE SUPPORT

WELD INTO 2ND SPACE

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

BAR GRATE SEE DETAIL 539

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

PIPE SIZE AS REQUIRED BY PLANS

SLOPE FLOOR TO OUTLET

29" x 29" I.D. GRATE FRAME

29" x 53" I.D. GRATE FRAME

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

SECTION B-B

SECTION A-A

SECTION C-C

PLAN

SINGLE GRATE

DOUBLE GRATE

CATCH BASIN – TYPE 'G'
WHEN DOUBLE GRATE IS USED INCREASE THE LENGTH OF THE STRUCTURE ACCORDINGLY.

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

SEE DETAIL 539 FOR GRATE

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

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

FOR PIPE LARGER THAN 24" DIA. (NOMINAL)

D=(VARIES)

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

2. SEE PROJECT PLANS FOR CATCH BASIN DETAILS AND PAVEMENT STRUCTURAL SECTION.
This Page Is Reserved for Future Use.
NOTES
1. DESIGN OF END SECTION SHALL CONFORM TO STANDARD FOR REINFORCED CONCRETE PIPE.
2. END SECTION JOINT CONFORMATION SHALL MATCH THE PIPE JOINTS.
3. EMBANKMENT SLOPE SHALL BE WARPED TO MATCH SLOPE OF END SECTION.
4. CULVERT LENGTH IS AS SHOWN ON PLANS.
NOTES:
1. WHERE ROCK IS ENCOUNTERED THE OUTLET MAY BE OMITTED.
2. ALL PORTIONS OF SPILLWAY TO BE TROWEL FINISHED.
3. CONCRETE FOR THE SPILLWAY INLET, SPILLWAY AND OUTLET SHALL BE CLASS 'B' PER SECT. 725.
4. WHEN THE OUTLET IS USED, THE WIRE MESH SHALL EXTEND THROUGH THE JOINT INTO THE OUTLET IN LIEU OF BENDING INTO THE KEY.

DEPRESS CURB ENDS WITH 10:1 SLOPE

EMBANKMENT CURB/EXTRUDED (OPTIONAL)

COLD JOINT OR CONSTRUCTION JOINT
CONCRETE SURFACE FORD CONCRETE WALLS

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

**PLAN**

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.

**NOMINAL SIZE COMBINATIONS**

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

*OTHER SIZES AVAILABLE FROM MANUFACTURER.*

**NOTES:**

1. PLAIN ROCK OR GROUTED ROCK MAY BE SUBSTITUTED FOR SACKED CONCRETE.
2. GROUT FOR RIPRAP MAY BE PNEUMATICALLY PLACED MORTAR.