UNIFORM STANDARD DETAILS for PUBLIC WORKS CONSTRUCTION

SPONSORED and DISTRIBUTED by the MARICOPA ASSOCIATION of GOVERNMENTS

2012 EDITION

ARIZONA

(Includes 2013 revisions)
400 SERIES: SEWER INFORMATION

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500 SERIES: IRRIGATION AND STORM DRAIN INFORMATION

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* NEWLY REVISED.
1. THESE DETAILS HAVE BEEN PREPARED IN AN EFFORT TO STANDARDIZE THE CONSTRUCTION DETAILS USED BY VARIOUS CONTRACTING AGENCIES IN MARICOPA COUNTY. THEY ARE TO BE USED IN CONJUNCTION WITH THE CURRENT EDITION OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION" SPONSORED AND DISTRIBUTED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS.

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

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


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

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

7. DETAIL DRAWINGS ARE NOT TO SCALE.
SEWER CLEANOUT
SURVEY MONUMENT
CELLULAR TOWER

FIRE HYDRANT
SURVEY MONUMENT IN HANDHOLE
BITUMINOUS (SECTION)

WATER METER
MAIL BOX
CONCRETE (SECTION)

UTILITY MANHOLE
SIGNAL POLE
AGGREGATE BASE COURSE (SECTION)

IRRIGATION STANDPIPE
SINGLE POST SIGN
RIPRAP (PLAN & SECTION)

UTILITY VALVE
DOUBLE POST SIGN
OBLITERATE PAVEMENT

SEWER SERVICE CONNECTION
STREET NAME SIGN
TAPERED MILL

MONITORING WELL
VIDEO DETECTION CAMERA
UNIFORM MILL

REDUCER
PULL BOX
EARTH (SECTION)

WOOD UTILITY POLE

STEEL UTILITY POLE

CONCRETE UTILITY POLE

STREET LIGHT ON MAST ARM

POLE MOUNTED LIGHT

ELECTRIC, GAS METER

TRANSFORMER

DOWN GUY & ANCHOR

NOTES:
1. PLAN SYMBOLS FOR EXISTING FEATURES ARE TO BE DASHED, GRAY SCALDED, OR DRAWN USING THIN LINETHROW.
2. ADD LABELS TO PLAN SYMBOLS AS NEEDED FOR CLARITY.
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* Scale to actual width.
DIMENSION SHOULD BE GIVEN ONCE ON EACH SHEET AND SHOULD BE PLACED NEAR THE CENTER OF THE SHEET. IF ANY OF THE GIVEN CONDITIONS CHANGE, THEY SHOULD BE REDIMENSIONED AT THE POINT OF CHANGE.

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

GIVE COMPLETE DIMENSIONS.

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

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

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

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

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

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

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

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

8. REMOVE BURRS AND SAND FROM TOP FOR UNPAVED STREETS AND ALLEYS

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

10. SAND OR EARTH

11. STD. WROUGHT WASHER

12. BRASS CAP, SEE DETAIL

13. CLASS 'B' CONCRETE AS PER SECT. 725

14. SEE NOTE 1

15. CYLINDER - 6" DIA. (MIN.)

16. 8" DIA. (MAX.)

17. MEDIUM BROOM FINISH WITH RADIAL SCORED MARKS (4 MIN.)

18. SEE NOTE 7

19. 8" C.I. FRAME AND COVER

20. 1/16" MAX

21. 1/16" MIN

22. 8" MIN

23. 8" MAX

24. 1/16" MAX

25. 1/16" MIN

26. 3/4" MIN

27. 3/4" MAX

28. TYPE 'C'

29. TYPE 'B'

30. TYPE 'A'

31. WITH FRAME PER DETAIL 270

32. WITHOUT FRAME

SEE NOTE 5

SEE NOTE 6

SEE NOTE 1

SEE NOTE 2

SEE NOTE 3

SEE NOTE 4

FINISH GRADE

BRASS CAP

5/8"

DEFORMED ROD AS PER SECT. 727

REINFORCING ROD AS PER SECT. 727

CYLINDER - 6" DIA. (MIN.)

6" DIA. (MAX.)

CLASS 'B' CONCRETE AS PER SECT. 725

ASPHALT PAVEMENT

STD. WROUGHT WASHER

BRASS CAP WASHER

NO. 5 REBAR AS PER SECT. 727

ROUND OR SQUARE 8" (MIN.)

8" (MAX.)

CLASS 'B' CONCRETE AS PER SECT. 725

TYPE 'A'

TYPE 'B'

TYPE 'C'

CAP DETAIL

SURVEY MARKER

DETAIL NO.

120-1

STANDARD DETAIL

ENGLISH

REvised

01-01-2001

DETAIL NO.

120-1
NOTES:
1. TYPE "D" NORMALLY USED AT STREET INTERSECTIONS, AS SUBDIVISION MONUMENTS AND 1/16 CORNERS.

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

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

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

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

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

1. LOCATE PAVEMENT MARKER IN CENTER OF TRAVEL LANE AND ALIGN WITH HYDRANT.
2. FOR MULTIPLE LANE ROADS LOCATE PAVEMENT MARKER IN LEFT MOST THROUGH TRAFFIC LANE.
3. ADJUST MARKER LOCATION TO BE LOCATED OUTSIDE OF ANY DELINEATED CROSSWALK AREA.
4. FOR HYDRANT LOCATED ON FAR SIDE OF RAISED MEDIAN, LOCATE PAVEMENT MARKER ON TOP OF MEDIAN CURB ALIGNED WITH HYDRANT.
5. OMIT FOR CUL-DE-SAC GREATER THAN 250' IN LENGTH.
6. FIRE HYDRANT PAVEMENT MARKERS SHALL BE 2-WAY RETROREFLECTIVE BLUE: ADOT TYPE B8, 911A-BLUE BY FIRE LITE AMERACE CORPORATION, OR APPROVED EQUAL.
NOTES:

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

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

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

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

TYPE 'A'

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

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

TYPE 'B' & TYPE 'C'

CONCRETE BASE FOUNDATIONS SHALL BE CLASS 'C' CONCRETE AS PER SECT. 505 AND 725.
FILL WITH GROUT AND CROWN TOP

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

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

⅛" x 5⅛" DIAMETER CAP PLATE SEAL WELD ALL AROUND

5" DIA. STEEL GUARD POST SCH. 40

⅝" A-36 STEEL COLLAR 5⅛" ID x 7⅛" OD, FILLET WELD TO GUARD POST BOTH SIDES, ALL AROUND

1" SLEEVE PROJECTION

CLASS B CONCRETE PER SECT. 725

3" MIN. TYP.

3" CLEAR

6" DIA. x 34" SCH. 40 GROUND SLEEVE WITH ⅝" x 6⅛" CAP PLATE SEAL WELD ALL AROUND

FILL WITH GROUT AND CROWN TOP

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

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

⅛" x 5⅛" DIAMETER CAP PLATE SEAL WELD ALL AROUND

5" DIA. STEEL GUARD POST SCH. 40

⅝" A-36 STEEL COLLAR 5⅛" ID x 7⅛" OD, FILLET WELD TO GUARD POST BOTH SIDES, ALL AROUND

1" SLEEVE PROJECTION

CLASS B CONCRETE PER SECT. 725

3" MIN. TYP.

3" CLEAR

6" DIA. x 34" SCH. 40 GROUND SLEEVE WITH ⅝" x 6⅛" CAP PLATE SEAL WELD ALL AROUND

TYPE 1 PERMANENT

TYPE 2 REMOVABLE

NOTES

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

2. REMOVABLE POSTS SHALL HAVE 1" DIA. HOLES DRILLED THROUGH AT A DISTANCE ⅜ THE OVERALL POST LENGTH FROM TOP.

3. REMOVABLE POST – GRIND SMOOTH ALL SHARP EDGES PRIOR TO GALVANIZATION. GALVANIZE PER ASTM A54 AFTER FABRICATION.
"HIGH INTENSITY GRADE" RETROREFLECTIVE SHEETING

HIGH IMPACT RESISTANT PLASTIC MATERIAL

36" - 48" POST

BASE

CONCRETE OR AC PAVEMENT

BLACK HIGH IMPACT RESISTANT PLASTIC MATERIAL

TYPE 1 SURFACE MOUNT

TYPE 2 GROUND MOUNT

NOTES

1. CONTRACTOR SHALL CLEAN ROADWAY SURFACE PRIOR TO PLACEMENT OF FLEXIBLE TUBULAR MARKER.
2. FLEXIBLE TUBULAR MARKERS SHALL BE CEMENTED TO THE PAVEMENT SURFACE WITH AN EPOXY ADHESIVE IN ACCORDANCE WITH THE TUBULAR MARKER MANUFACTURER'S SPECIFICATIONS.
3. YELLOW TUBULAR MARKERS SHALL HAVE A YELLOW POST AND YELLOW "HIGH INTENSITY GRADE" RETROREFLECTIVE SHEETING. ORANGE TUBULAR MARKERS SHALL HAVE AN ORANGE POST AND WHITE HIGH INTENSITY RETROREFLECTIVE SHEETING.
4. POST SHALL BE FLEXIBLE, HIGH IMPACT RESISTANT PLASTIC MATERIAL.
NOTES:
1. POSTS AND RAILS SHALL BE 1.5" SCHEDULE 40 HOT-DIPPED GALVANIZED STEEL PIPE ASTM A 53, GRADE B (2.72#/LF, 1.9" O.D.). GALVANIZING SHALL BE IN ACCORDANCE WITH SECTION 771.
2. PAINT RAIL PER MAG SPECIFICATIONS SECTION 530 WHEN REQUIRED BY PLANS. SHOP PRIME WITH RUST INHIBITING PRIMER (FIELD REPAIR PRIMER AS NEEDED). COLOR PER PLANS.
3. VERTICAL POSTS TO BE EVENLY SPACED.
4. REMOVE ALL SHARP EDGES.
5. INSTALL SAFETY RAIL AS REQUIRED BY PLANS OR SPECIFICATIONS.
6. THE EMBEDMENT FOR ANCHOR TYPES 1, 2 AND 3 SHALL BE LOCATED INSIDE THE WALL REINFORCEMENT CAGE.
7. SAFETY RAIL IS NOT TO BE USED AS A PEDESTRIAN BRIDGE RAIL.

ELEVATION

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

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'

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

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

NOTES:
1. DIMENSIONAL AND REINFORCEMENT CHANGES WILL BE PERMITTED UPON PRIOR WRITTEN APPROVAL OF THE ENGINEER.
2. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE CLASS 'A' PER SECTION 725.

SAFETY CURB
INSTALLATION ON DIRT

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; FLAT</td>
<td>3/16&quot;x3/4&quot; FLAT</td>
</tr>
<tr>
<td>GATE POST</td>
<td>3-1/2&quot;</td>
<td>4.000&quot;</td>
</tr>
<tr>
<td>TOP RAIL</td>
<td>1-1/4&quot;</td>
<td>1.666&quot;</td>
</tr>
</tbody>
</table>

7. CONSTRUCTION AND MATERIALS SHALL CONFORM TO SECT. 420 AND 772, RESPECTIVELY. SEE TABLE 772-1 FOR WEIGHTS OF MEMBERS.
NOTES:

1. PAVEMENT MATCHING AND SURFACE REPLACEMENT SHALL BE IN ACCORDANCE WITH SECTION 336.

2. TYPE OF BACKFILL AND BASE (IF APPLICABLE) SHALL BE AS NOTED HEREIN UNLESS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS. IF NOT SPECIFIED, CLSM SHALL BE 1/2-SACK PER SECTIONS 604 AND 728.

3. TRENCHES LESS THAN 24" WIDE SHALL BE BACKFILLED FROM TOP OF BEDDING TO BOTTOM OF SURFACING MATERIALS WITH 1/2-SACK CLSM PER SECTIONS 604 AND 728.

4. BASE, BACKFILL, BEDDING AND FOUNDATION COMPACTION REQUIREMENTS SHALL BE IN ACCORDANCE WITH SECTION 601.

5. ASPHALT CONCRETE SURFACE AND BASE COURSES SHALL COMPLY WITH SECTION 336.2.4.1 UNLESS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS.

6. USE TYPE "A" FOR TRANSVERSE TRENCH REPAIR AND USE "T-TOP" FOR TRANSVERSE TRENCH REPAIR (SEE DETAIL 200-2) UNLESS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS. TYPE "B" TRENCH REPAIR MAY BE USED FOR TRANSVERSE TRENCH REPAIR IF SPECIFIED BY THE AGENCY.

7. PROVIDE MINIMUM 12" WIDE SHELF AS SHOWN IN "T-TOP" TRENCH REPAIR AT ENDS OF TYPE "A" TRENCH REPAIR EXCEPT WHERE EDGE ABUTS EXISTING CONCRETE.

8. USE "T-TOP" PAVEMENT REPLACEMENT WHERE A TRENCH IS NOT PARALLEL TO A STREET OR GOES THROUGH AN INTERSECTION.

9. "T-TOP" PAVEMENT REPLACEMENT WHERE A TRENCH IS NOT PARALLEL TO A STREET OR GOES THROUGH AN INTERSECTION.

10. EXPOSED COPPER OR POLYETHYLENE WATER PIPE UP TO 2" IN DIAMETER IN TRENCHES TO BE BACKFILLED WITH CLSM SHALL BE WRAPPED WITH MINIMUM 3/4" THICK PREFORMED PIPE-COVERING FOAM INSULATION BEFORE PLACING CLSM.
LONGITUDINAL TRENCH
(TRENCH IN PAVEMENT PARALLEL TO TRAFFIC)

TRANSVERSE TRENCH
(TRENCH IN PAVEMENT NOT PARALLEL TO TRAFFIC)

EXISTING S/W TYP.

EXISTING PAVEMENT

OF STREET

EXISTING C/G TYP.

TRENCH

EXISTING S/W TYP.

EXISTING PAVEMENT

OF STREET

EXISTING C/G TYP.

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

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

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

TRENCH REPAIR

EXIST. AC

BEDDING DETAIL

FOUNDATION PER SECT. 601

BACKFILL

TOP OF PIPE, CONDUIT
OR CONCRETE-ENCASED
DUCT BANK

12" MIN

BEDDING:
GRANULAR MATERIAL
PER SECT. 601.4

NOTES:
1. SEE MFG DETAIL 200-1 FOR DETAILED TRENCH REPAIR REQUIREMENTS FOR TRENCH TYPES NOTED HEREIN.
2. SEE MFG DETAIL 211 FOR REQUIREMENTS REGARDING THE USE OF PLATING TRANSVERSE TRENCHES. USE OF STEEL PLATES SHALL NOT EXCEED 72 HOURS AFTER COMPLETION OF BACKFILL AND PRIOR TO FINAL PATCHING.
TYPE 'A'

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

12"

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

TYPE 'B'

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

12"

SAFETY EDGE

OVERLAY OR FINISHING COURSE
TACK COAT
EXISTING PAVEMENT OR NEW PAVEMENT
AGGREGATE BASE PER STANDARD SECT. 310
GRADING PER STANDARD SECT. 301

30°± 5°

EDGE ROADWAY PAVEMENT
UNPAVED SHOULDER RECOMPACT TO 95%

COMPACTED SUBGRADE
PAVED ALLEY DETAIL

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

UNPAVED ALLEY DETAIL

LESS THAN 20'

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'
NOTES:

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

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

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

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

5. DETAIL 'C' TO BE USED ONLY WHEN FULL WIDTH CAN NOT BE POURED IN ONE POUR. USE DETAIL 'D' IF FULL WIDTH IS POURED IN ONE POUR.
NOTES:

1. W = Indicated width of paved surface of turnout.
   L = Indicates length of paved surface of turnout.
   R = Radius.

2. Size and type of turnout shall be noted on plans as follows:
   90° = No radius: W x L = surface type: (12' x 30' = A.C. = type "B" turnout).
   90° = With a radius: W x L x R = surface type: (12' x 20' x 15' = A.C. = type "C"
   turnout). Other than 90° with 2 radii = type "S": W x L x R x R = 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
NOTES:

1. TRANSITION TO SPILLWAY/CHANNEL AS PER APPROVED PLANS.
2. A CENTER WALL SHALL BE INSTALLED IN SCUPPERS WIDER THAN 4’ OR IF MORE THAN 1 SCUPPER IS BUILT IN SERIES.
3. EXPANSION JOINT FILLER SHALL BE 1/2” BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, ASTM D-1751.
4. CONCRETE FOR THE SCUPPER SHALL BE CLASS ‘A’ PER SECTION 725.
   CONCRETE FOR THE SPILLWAY SHALL BE CLASS ‘A’ OR CLASS ‘B’.
5. 12” OFFSET DISTANCE SHALL BE INCREASED TO 2’-6” FOR DESIGNATED BICYCLE PATHS.
NOTES:
1. TRANSITION TO SPILLWAY/CHANNEL AS PER APPROVED PLANS.
2. A CENTER WALL SHALL BE INSTALLED IN SCUPPERS WIDER THAN 4’ OR IF MORE THAN 1 SCUPPER IS BUILT IN SERIES.
3. EXPANSION JOINT FILLER SHALL BE 1/2” BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, ASTM D-1751.
4. CONCRETE FOR THE SCUPPER SHALL BE CLASS 'A' PER SECTION 725. CONCRETE FOR THE SPILLWAY SHALL BE CLASS 'A' OR CLASS 'B'.
5. SAFETY RAIL SHALL BE CONTINUOUS BETWEEN THE SPILLWAY EXTERIOR WALLS.
6. USE WELD PLATES FOR SAFETY RAIL ANCHORS LOCATED IN THE 5” THICK CONCRETE.
SAFETY RAIL EXTENSIONS BEYOND SCUPPER PER DETAIL 145.
NOTES:

1. HUMPS MUST BE THE FULL 3" FOR MAXIMUM EFFECT BUT SHALL NOT EXCEED 3.25".

2. HUMPS CONSTRUCTED OVER 3.25" OR LESS THAN 3.00" SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.

3. CROSS-SECTION ELEVATIONS SHALL HAVE A MAXIMUM TOLERANCE OF +0.25".

4. SPEED HUMPS SHALL NOT BE PLACED OVER MANHOLES, WATER VALVES, SURVEY MONUMENTS, JUNCTION CHAMBERS, ETC. OR IN CONFLICT WITH DRIVEWAYS.

5. SPEED HUMPS MUST BE PLACED AT LOCATIONS APPROVED BY THE AGENCY.

6. HUMP TO BE CONSTRUCTED WITH ASPHALT MIX APPROVED BY THE AGENCY. ASPHALT COMPACTATION SHALL BE PER SECTION 321. A TACK COAT PER SECTION 713 SHALL BE APPLIED PRIOR TO APPLICATION OF PAVEMENT.

7. INSTALLATION JOINTS:
   A. STANDARD INSTALLATION:
      THE EXISTING ROADWAY SHALL BE MILLED TO A MINIMUM DEPTH OF 3/4" AROUND THE PERIMETER. CROSS SECTION DIMENSIONS DO NOT INCLUDE THE 3/4" MILLING. CONTRACTOR MUST PROVIDE VERIFICATION OF CROSS-SECTION DIMENSIONS.
   B. ALTERNATIVE INSTALLATION:
      FOR TRANSVERSE JOINTS (CROSS ROADWAY), THE EXISTING ASPHALT SHALL BE SAW CUT AND REMOVED FOR A WIDTH OF 24". THE ASPHALT SHALL BE REPLACED WITH THE SAME ASPHALT AND AT THE SAME TIME AS THE HUMP ASPHALT. FOR LONGITUDINAL JOINTS, THE EXISTING ASPHALT SHALL BE OVERLAI D AND TAPERED IN 12". CROSS-SECTION DIMENSIONS REFLECT DISTANCES FROM THE SURFACE OF EXISTING ASPHALT.

8. CONTACT THE AGENCY (OR INSPECTOR) ONE WEEK PRIOR TO INSTALLATION TO COORDINATE PAVEMENT MARKINGS AND SIGNING.
NOTES:

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

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

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

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

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

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

ASPHALT VARIABLE THICKNESS

BACKFILL MATERIAL OPTIONS:
- NATIVE SOIL PER SECTION 601.4.3 (TYPE B ONLY)
- ABC PER SECTION 702 (TYPE B ONLY)
- 1/2-SACK CLSM PER SECTION 728

HIGHEST EXISTING UTILITY(S)

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

SECTION VIEW

TYPE A PAVEMENT REPAIR

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

PLAN VIEW

TACK EDGES

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

SECTION A–A

TYPE B PAVEMENT REPAIR

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

PLAN VIEW

DRILLED/CORED PILOT HOLE

18"–24"

SECTION A–A

BONDING MATERIAL

PAVEMENT PLUG

1–1/2" TO 2" COMPACTED CRUSHED GRAVEL (ASTM C33 #8)
**NOTES: (TYPE A)**
1. ALL EXPOSED SURFACES TO BE TROWEL FINISHED EXCEPT AS SHOWN. SEE SECT. 340.
2. H=6" OR AS SPECIFIED ON PLANS.
3. CONTRACTION JOINT SPACING 10" MAXIMUM.
4. EXPANSION JOINTS AS PER SECT. 340.
5. CLASS 'B' CONCRETE PER 725.
6. WHEN THE ADJACENT PAVEMENT SECTION SLOPES AWAY FROM THE GUTTER, THE SLOPE OF THE GUTTER PAN SHALL MATCH PAVEMENT CROSS SLOPE.

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

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

MOUNTABLE CURB AND GUTTER (TYPE F)

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

Type 'C' Roll Curb and Gutter

Type 'A' Vertical Curb and Gutter

5' Curb Transition

24"

Notes: (Curb and Gutter Transitions)

1. Transitions will be paid for as the predominant type of curb and gutter being transitioned. When type 'A' curb and gutter are used at curb returns and type 'C' curb and gutter is predominately used elsewhere, the type 'A' to type 'C' transitions shall be measured and paid for as type 'C' curb and gutter.

2. Where proposed construction is to be connected to existing curb and gutter, the transition shall be indicated on plans.

3. Class 'B' concrete per sect. 725.

4. Transition between typical sections shall be accomplished by the use of direct straight line transitions of the flow line and other surface features.

Curb and Gutter Transition

1/2" Expansion Joint Filler shall be Bituminous Type Preformed, A.S.T.M. D-1751

Radius as shown on plans

Integral Roll Curb, Gutter and Sidewalk

Score mark 1/8" wide x 1/2" deep - tool both edges

Notes: (Integral Roll Curb, Gutter and Sidewalk)

1. Concrete to be monolithic pour, exposed surface finish as per sidewalk and gutter detail.

2. Contraction joint spacing 5' maximum.


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

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

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

FACE OF CURB

CURB HEIGHT VARIES (5' MINIMUM)

2'-1/2" CURB

CURB HEIGHT

SEE PLANS

WIDTH AS SHOWN ON PLANS

ROAD MEDIAN

NOSE P.C.
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 psi
   CONCRETE WORKING STRESS 1f = 300 psi
   TERMINAL SERVICABILITY INDEX 1p OF 2.5 OVER 20 YEARS
   AND 1 MILLION TOTAL EQUIVALENT 18-KIP SINGLE-AXLE LOAD APPLICATIONS
NOTES:
1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECTION 340.
2. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS TYPE PREFORMED
   EXPANSION JOINT FILLER, A.S.T.M. D-1751.
3. LARGE AGGREGATE, IN CONTRACTION JOINT SHALL BE SEPARATED TO A
   DEPTH OF 1", FINISH DEPTH SHALL BE A MINIMUM OF 3/4".
4. EXPANSION JOINTS SHALL CONFORM TO SECTION 340, BE INSTALLED
   PRIOR TO CONCRETE PLACEMENT, AND AT A MAXIMUM SPACING OF 50'.
   THE EXPANSION JOINT MUST PROVIDE COMPLETE SEPERATION OF THE
   SIDEWALK FROM ADJOINING CONCRETE.
5. CONCRETE SHALL BE CLASS 'B' PER SECTION 725.
6. WHEN SIDEWALK AND ADJACENT CURB ARE INSTALLED MONOLITHICALLY,
   THE MID-POINT SCORE LINE SHALL EXTEND ACROSS THE CURB.
**NOTES:**
1. CLASS 'B' CONCRETE PER SECTION 725.
2. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
3. SIDEWALK SURFACE TO MATCH 1½% SLOPE FROM TOP OF CURB.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.
5. DETAIL IS ADA COMPLIANT FOR $S_G \leq 2\%$.

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

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

DETAIL

SECTION B-B

SECTION A-A

TYPE 'C'

DETATABLE WARNING

RAMP CURB HEIGHT TO MATCH SW ELEVATION @ EACH END

5' SW OR AS SHOWN ON PLANS

EXPANSION JOINT AT CURB RETURN (TYP)

ROUGH BROOM FINISH (TYP BOTH RAMPS)

CURB AND GUTTER DETAIL 220, TYPE 'A'

CURB MODIFICATION SEE DETAIL 234

CURB HEIGHT

\[ L \text{ (min)} \]

<table>
<thead>
<tr>
<th>CURB HEIGHT</th>
<th>( S_0 \leq 1% )</th>
<th>( S_0 \leq 2% )</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>5.0'</td>
<td>6.0'</td>
</tr>
<tr>
<td>6&quot;</td>
<td>7.0'</td>
<td>8.5'</td>
</tr>
</tbody>
</table>

\( S_0 \) - MAXIMUM GUTTER SLOPE WITHIN RAMP LIMITS

CONTRACTION JOINT 1” DEEP OR FORMED SEPARATELY

SUBGRADE PREPARATION PER MAG SEC 301

DETECTABLE WARNING

MATCH GUTTER FLOW LINE

VARIES

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

<table>
<thead>
<tr>
<th>CURB HEIGHT</th>
<th>CURB RAMP MINIMUM LENGTH</th>
<th>S_0 ≤ 1%</th>
<th>S_0 ≤ 2%</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>5&quot;</td>
<td>4.0'</td>
<td>4.5'</td>
</tr>
<tr>
<td>6&quot;</td>
<td>7 1/2&quot;</td>
<td>6.0'</td>
<td>6.5'</td>
</tr>
<tr>
<td>7&quot;</td>
<td>9&quot;</td>
<td>6.5'</td>
<td>7.5'</td>
</tr>
</tbody>
</table>

S_0 = MAXIMUM GUTTER SLOPE WITHIN RAMP LIMITS

SECTION A-A

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

- **S/W RAMP**
  - Top of S/W
  - Expansion Joint
  - Bottom of Ramp Curb When Formed & Poured Separately

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

- **ROUGH BROOM FINISH, USE A RIPPLE SURFACE PATTERN**
  - Expansion Joint

- **CURB AND GUTTER DETAIL 220, TYPE A**

- **S/CURR WIDTH AS SHOWN ON PLANS**

- **RIGHT-OF-WAY LINE**
  - 10:1 Sidewalk Taper Typical Both Sides

- **D (min)**
  - **CURB HEIGHT**
    - 4"  |  4.0’   |  4.5’
    - 6"  |  6.0’   |  6.5’
    - 7"  |  6.5’   |  7.5’

**S_G** = Maximum Gutter Slope Within Ramp Limits

**NOTES:**

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

**SECTION A-A**

- **R RIGHT-OF-WAY LINE**
  - Varies 6’
  - 5’-0” Landing
  - 2’ Curb Ramp
  - 2’ Curb

- **LANDING @ 1/2 % SLOPE**
  - 12”

- **CONTRACTION JOINT**
  - 1” Deep Or Formed Separately

- **DETECTABLE WARNING**

- **SUBGRADE PREPARATION, SEE SECTION 301**

**TYPE 'E'**
NOTES:

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

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

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

4. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.

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

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

THIS AREA INDICATES LIMITS OF VALLEY GUTTER MEASUREMENT

EXPANSION JOINT

FLOW LINE

CONCRETE PAD REQUIRED AT CONSTRUCTION JOINTS

SECTION A-A
VALLEY GUTTER
NOTES:

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

2. CONTRACTION JOINT ON D/W CENTERLINE.

3. CONTRACTION JOINT.

4. 1/2-INCH EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.

5. BACK OF CURB – CONSTRUCTION JOINT.

6. CONCRETE CLASS AS NOTED IN TABLE. CONCRETE PER SECTION 725.

7. SUBGRADE PREPARATION, SECT. 301.

8. FLOW LINE OF GUTTER.

9. DEPRESSED CURB.

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

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

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

<table>
<thead>
<tr>
<th>RESIDENTIAL</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DRIVEWAY WIDTH</td>
<td>MIN.</td>
<td>MAX.</td>
<td>CLASS</td>
<td>DEPTH 'X'</td>
</tr>
<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>

SECTION A–A
NOTES:
1. DEPRESSED CURB SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE TYPE OF CURB USED AT THAT LOCATION.
2. CONTRACTION JOINT(S) FOR DRIVEWAY ENTRANCE: WIDTH LESS THAN 22' NONE REQUIRED; WIDTH GREATER THAN 22' AND LESS THAN 30' LOCATE SINGLE JOINT ON D/W CENTERLINE; WIDTH OF 30' OR GREATER LOCATE TWO JOINTS TO EQUALLY DIVIDE THE DRIVEWAY ENTRANCE WIDTH.
3. DETAIL GEOMETRICS ARE BASED ON A CURB HEIGHT OF SIX INCHES (6'), AN ATTACHED SIDEWALK WIDTH OF FIVE FEET (5'), AND A DRIVEWAY RAMP LENGTH NOT EXCEEDING SIX FEET (6'). GEOMETRIC MODIFICATIONS MAY BE REQUIRED WHEN CONDITIONS ARE MODIFIED.
4. 1/2-INCH EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.
5. BACK OF CURB - CONSTRUCTION JOINT.
6. CONCRETE CLASS AS NOTED IN TABLE. CONCRETE PER SECTION 725.
7. SUBGRADE PREPARATION, SECT. 301.
8. FLOW LINE OF GUTTER.
9. DEPRESSED CURB.
10. SECT. A-A AND ELEVATION: D/W SHOWN WITH VERTICAL CURB AND GUTTER, ROLL TYPE CURB AND GUTTER TREATED SIMILARLY.
11. ROUGH BROOM FINISH FULL WIDTH OF RAMP AND WINGS.
12. TROWEL AND USE LIGHT HAIR BROOM FINISH FOR WALKWAY AREA.
13. 'DRIVEWAY ENTRANCE WIDTH' IS THE DRIVEWAY WIDTH PLUS ADDITIONAL WIDENING REQUIRED BY THE LOCAL JURISDICTION.
14. ELEVATION AT TOP OF DRIVEWAY RAMP SHALL BE EQUAL TO OR HIGHER THAN NORMAL CURB ELEVATION.

SECTION A-A

COMMERCIAL AND INDUSTRIAL

<table>
<thead>
<tr>
<th>DRIVEWAY ENTRANCE WIDTH</th>
<th>MIN.</th>
<th>MAX.</th>
<th>CLASS</th>
<th>DEPTH 'X'</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMERCIAL INDUSTRIAL</td>
<td>16'</td>
<td>40'</td>
<td>A</td>
<td>9&quot;</td>
</tr>
<tr>
<td>4' 2&quot; MIN. FOR TWO WAY TRAFFIC</td>
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<td>40'</td>
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<td>9&quot;</td>
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<tr>
<td>MAJOR STREET</td>
<td>16&quot;</td>
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<td>COLLECTOR STREET</td>
<td>*12&quot;</td>
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<td>*16&quot; DESIRABLE</td>
<td></td>
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</table>

DETAIL NO. 250-2

STANDARD DETAIL ENGLISH

DRIVEWAY ENTRANCES WITH SIDEWALK ATTACHED TO CURB

REVISED 01-01-2013

DETAIL NO. 250-2
TABLE A

<table>
<thead>
<tr>
<th>ZONING</th>
<th>DRIVeway WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMERCIAL AND INDUSTRIAL</td>
<td></td>
</tr>
<tr>
<td>MIN.</td>
<td>MAX.</td>
</tr>
<tr>
<td>16’</td>
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</tr>
<tr>
<td>16’</td>
<td>40’</td>
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</table>

**COMMERCIAL**

* 24' WHERE 2-WAY TRAFFIC IS ANTICIPATED

TABLE B

<table>
<thead>
<tr>
<th>ZONING</th>
<th>DRIVeway WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL</td>
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</tr>
<tr>
<td>12’</td>
<td>30’</td>
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</table>

**RESIDENTIAL**

* 16' WIDTH IS DESIRABLE

NOTES:

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

SECTION A-A

- 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

RETURN TYPE DRIVEWAYS

REVISED
01-01-2003
DETAIL NO. 251

STANDARD DETAIL
ENGLISH
NOTES:

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

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

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

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

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

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

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

SECTION A-A

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

SECTION B-B

NEW A.C. PAVEMENT

SECTION C-C

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

1.42'

11'-9"

3'-6"

9"

NEW A.C. PAVEMENT

2% SLOPE OR AS NOTED ON PLANS

STD. DET. 230 SIDEWALK WIDTH PER PLANS

FLOW LINE

1.42'

10'

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3'-6"

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9"

NEW A.C. PAVEMENT

2% SLOPE OR AS NOTED ON PLANS

STD. DET. 230 SIDEWALK WIDTH PER PLANS

FLOW LINE

1.42'

10'
TYPE A - WITHOUT RETAINING CURB
* See plans for alley surfacing requirements

TYPE B - WITH RETAINING CURB
* See plans for retaining curb lengths, top of curb elevations, and alley surfacing requirements

NOTES:
1. Class "A" concrete per section 725.
2. Limits of heavy rough broom finish.
3. Expansion joints per section 340.
4. Subgrade preparation per section 301.
5. Single curb per detail 222, type "B".
6. Alley surfacing per plans.
7. Depressed curb shall be paid for at the contract unit price for the type of curb used at that location.
8. Control joint.
THICKEN CONCRETE FROM 6" TO 8" IN 18" AT BACK OF ALLEY ENTRANCE

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) DETAIL TYPICAL FOR BOTH FRAME AND COVER

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

LOCK WASHER FLATTEN BOLT END

SPACERS, AS REQUIRED

1/32"

2" MIN.

3/8" CHAIN

1/2"

1/2"

2" LONG

1/2" ROUNDHEAD BOLT

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

EXISTING BITUMINOUS PAVEMENT

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

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

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

8" FRAME AND COVER

10-1/4" DIA.

10-1/8" DIA.

10-1/8" DIA.

8" DIA.

1/2"

1/16"

11/16"

1/2"

1/2"

1/4" R

1/4" R

1/4" R

1-1/4" 3/4"

1/8 R

1/8 R

1/8 R

1/8 R

1/4" R

3/4"

1/4" R

8" C.I. FRAME AND COVER

COVER SECTION A-A

SEWER WATER SURVEY
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

LENGTH (APPROX. 3"

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

CONCRETE FOOTING
CLASS 'B' CONCRETE PER SECT. 725

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-HEADED 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).
### Restrainted Lengths, LR, for Ductile Iron Pipe

<table>
<thead>
<tr>
<th>Nominal Pipe Size Inches</th>
<th>Horizontal Bends</th>
<th>Tees</th>
<th>Vertical Offsets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2’</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td>7</td>
<td>4</td>
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<tr>
<td>6</td>
<td>25</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>32</td>
<td>13</td>
<td>6</td>
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<tr>
<td>10</td>
<td>38</td>
<td>16</td>
<td>8</td>
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<tr>
<td>12</td>
<td>45</td>
<td>19</td>
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<td>14</td>
<td>51</td>
<td>21</td>
<td>10</td>
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<td>16</td>
<td>57</td>
<td>24</td>
<td>11</td>
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<tr>
<td>18</td>
<td>62</td>
<td>26</td>
<td>12</td>
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<tr>
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<td>68</td>
<td>28</td>
<td>14</td>
</tr>
<tr>
<td>24</td>
<td>79</td>
<td>33</td>
<td>16</td>
</tr>
</tbody>
</table>

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### Restrainted Lengths, LR, for Ductile Iron Pipe with Polyethylene Wrap

<table>
<thead>
<tr>
<th>Nominal Pipe Size Inches</th>
<th>Horizontal Bends</th>
<th>Tees</th>
<th>Vertical Offsets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>45°</td>
<td>22-1/2’</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>26</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>47</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>56</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td>65</td>
<td>27</td>
<td>13</td>
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<tr>
<td>14</td>
<td>74</td>
<td>31</td>
<td>15</td>
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<tr>
<td>16</td>
<td>82</td>
<td>34</td>
<td>16</td>
</tr>
<tr>
<td>18</td>
<td>90</td>
<td>37</td>
<td>18</td>
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<tr>
<td>20</td>
<td>98</td>
<td>41</td>
<td>20</td>
</tr>
<tr>
<td>24</td>
<td>113</td>
<td>47</td>
<td>22</td>
</tr>
</tbody>
</table>

**Notes:**
1. All joints within the specified length LR must be restrained. All lengths are given in feet.
2. The maximum test pressure shall not exceed 200 PSI.
3. The minimum depth of bury shall be 3' to top of pipe.
4. Restrainted lengths may be reduced when supported by engineering calculations.
NOTES:
1. INSPECTION PLATE IS SAME AS USED WITH METER BOX COVER NO. 4.
2. FOR CASTING SPECIFICATIONS, SEE SECTION 787.
3. THE BEARING EDGES OF THESE CASTINGS SHALL BE MACHINED TO INSURE A FULL BEARING ON A FLAT SURFACE.
NOTES:
1. FOR CASTING SPECIFICATIONS,
SEE SECT. 787. THE BEARING EDGE
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 TAMPERED (OR VIBRATED) IN TRUE FORMS.

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

**CONCRETE WATER METER BOXES**

PLAN VIEW

SECTION A-A

SECTION B-B

METER BOX DIMENSIONS

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

DETAIL NO. 320

STANDARD DETAIL

ENGLISH

CONCRETE WATER METER BOXES

01-01-1998

DETAIL NO. 320

MADE OF PORTLAND CEMENT CONCRETE POURED AND TAMPERED (OR VIBRATED) IN TRUE FORMS.

USE CLASS 'AA' CONCRETE PER SECT. 725.
ALTERNATE: 3/8" STEEL PLATE (ASPHALT COATED)
WITH 2" x 2" HINGED ACCESS DOOR

GROUTED IN BOLT

FINISH GRADE

PRE-CAST VAULT TOP OPENING

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

PRE-CAST VAULT SECTION

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

CAST-IN-PLACE OR PRECAST TOP SECTION

CLASS "A" CONCRETE AS PER SECT. 725

FINISH GRADE

(2) CI. METER BOX COVERS
SEE DETAIL 314

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

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

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

CAST-IN-PLACE VAULT SECTION

FOOTING FOR CAST-IN-PLACE VAULT

12" MIN.

KEY
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 ASPHOS 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>
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<tr>
<td>10&quot;</td>
<td>9</td>
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<tr>
<td>12&quot;</td>
<td>13</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23</td>
</tr>
</tbody>
</table>
FOR VAULT CONSTRUCTION SEE DETAIL 321

SECTION A–A

VAULT DIMENSION DETAILS

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

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

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

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

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

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

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

7. CITY CONTROL VALVE TO BE REQUIRED AT MAIN.

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

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

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

<table>
<thead>
<tr>
<th>DIA. OF PIPE</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>BY-PASS METER SIZE</th>
<th>A</th>
</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>
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. RESTRANTS SHALL BE MECHANICAL RESTRAINT OR THRUST BLOCK PER DETAIL 380.

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

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

5. SEE DETAIL 362 FOR LOCATION OF HYDRANT.

6. PUMPER CONNECTION SHALL FACE THE STREET.

7. NO VALVES ARE TO BE LOCATED IN CURB.

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

9. SEE DETAIL 360-3 FOR CONCRETE PAD.

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

11. SEE SECTION 756 FOR HYDRANT MATERIAL.
NOTES:

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

2. RESTRANTS SHALL BE MECHANICAL RESTRAINT OR THRUST BLOCK PER DETAIL 380.

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

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

5. SEE DETAIL 362 FOR LOCATION OF HYDRANT.

6. PUMPER CONNECTION SHALL FACE THE STREET.

7. NO VALVES ARE TO BE LOCATED IN CURB.

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

9. SEE DETAIL 360-3 FOR CONCRETE PAD.

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

11. THE HYDRANT SHALL HAVE 2- 2 1/2" PORT AND 1- 4 1/2" PORT (INDUSTRIAL OR COMMERCIAL).

12. THE HYDRANT SHALL HAVE 1- 2 1/2" PORT AND 1- 4 1/2" PORT (RESIDENTIAL).
NOTES:

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

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

2. Dimensions shown on construction drawings supercede 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 MECHANICAL JOINT

NOTES:
1. THIS DETAIL COVERS MOVING OF WATER MAINS 2" TO 12" ONLY.
2. THRUST BLOCKING AS PER DET. 380 & 381.
3. IF OFFSET IS TO GO OVER OBSTRUCTION, JOINT RESTRAINTS MUST BE USED.
4. PIPE IS TO BE CAST IRON OR DUCTILE IRON.
TYPICAL LOCATIONS OF THRUST BLOCKS

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

2. AREAS FOR PIPES LARGER THAN 18" SHALL BE CALCULATED FOR EACH PROJECT.

3. FORM ALL NON-BEARING VERTICAL SURFACES.

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

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

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>WATER PIPE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TEE, DEAD END, 90° BEND</td>
</tr>
<tr>
<td>4&quot; OR LESS</td>
<td>3</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4</td>
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<td>8&quot;</td>
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<td>10&quot;</td>
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<tr>
<td>12&quot;</td>
<td>14</td>
</tr>
<tr>
<td>16&quot;</td>
<td>24</td>
</tr>
</tbody>
</table>
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.
**Type 'A'**

- **Water Main**
- **2" Tapped Cap (Cast Iron)**
- **2" Brass ELL**
- **2" Brass Coupling**
- **2" Corp Stop**
- **2" P.E. or Copper Pipe**

**Valve Box Location May Vary If Approved By The City Engineer.**

**Type 'B'**

- **Cast Iron Water Meter Box Cover Per Detail 311**
- **Concrete Water Meter Box No. 2 Per Detail 320**
- **6" Gravel Bed**
- **2" Adapter Brass or Copper**
- **2" Copper Pipe**
- **2" Bronze Curbed Stop**
- **Tapped Plug or Cap**
- **Concrete Thrust Block Per Detail 380**
- **Cast Iron Valve Box (Locking) Per Detail 391-1 Base to Rest On Thrust Block**

**Curb Stop With Flushing Pipe**
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.
THE WORD 'WATER' ON COVER (TYP.)

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

8" C.I. FRAME AND COVER AS PER DETAIL 270

GROUND

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

COMPACTED BACKFILL IN LAYERS SO AS NOT TO DISTURB THE CLASS '150' A.C.P.
RISER PIPE OR APPROVED EQUAL

SEE DETAIL OF DISC & COLLAR RIGHT

SEE NOTE 1 (THIS SHEET)

ALTERNATE BRICKS

SEE NOTE 3 SHEET 1

SEE NOTE 2 (THIS SHEET)

TOP VALVE BOX COVER

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

THIS PART OF STEM SQUARE WITH 4 SIDES TAPERED

24" (MAX.)

6" (MIN.)

-1/4"

ALL SIDES

3/16"

1/16" MIN. CLEARANCE

A.C.P.
RISER WLL

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

SEE NOTE 3 THIS SHEET

3/16" STL. PLATE

3/8" x 3" DIA. PLATE

MIN. ROD SIZE 1-1/4" DIA.
STL DESIG. A-15

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

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

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

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

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


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

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

### SCHEDULE OF REQUIRED SUPPORTS

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

<table>
<thead>
<tr>
<th>'W'</th>
<th>0' TO 8'</th>
<th>8' TO 16'</th>
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<tr>
<td></td>
<td>BAR NO.</td>
<td>BAR NO.</td>
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<tr>
<td>TO 6'</td>
<td>5</td>
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<td>7'</td>
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<tr>
<td>17'</td>
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**SECTION D-D**

**PLAN FOR TYPE 'B' SUPPORT**

**SECTION C-C**

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

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

**Provide 1:2 Mortar Bed with Precast Beam**

**Min. Bearing Shall Be 1/2 O.D. of Pipe**

**No. 2 Ties 12" O.C. (Varies)**

**12" or 'Y' Whichever is Greater, See Table**

**4" O.C. Spacing, See Table for Bar Size**

**Type 'C'**

**PIPE SUPPORTS ACROSS TRENCHES**

**DETAIL NO. 403-2**

**STANDARD DETAIL ENGLISH**

**REVISED 01-01-1998**

**DETAIL NO. 403-2**
NEW DUCTILE IRON PIPE
CLASS 52 SIZE TO MATCH
EXISTING PIPE

EXISTING CROSSING PIPE

5'-0" MIN

NEW PIPE

VARIABLE

JOINT METHOD WILL VARY
DEPENDING ON EXISTING
PIPE MATERIAL

NOT TO EXCEED ONE PIPE LENGTH

5'-0"
MIN

BACKFILL AND COMPACT
PER SECTION 601
WATER LINE EXCLUSION AND EXTRA PROTECTION ZONES*

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

DUCTILE IRON PIPE WITH RESTRAINED OR MECHANICAL JOINTS*

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

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

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

NEW CONSTRUCTION

EXISTING SEWER CONNECTION OR MAIN BROKEN DURING EXCAVATION FOR NEW CONSTRUCTION

PLAN VIEW OF REPLACEMENT

COMPACATION SHALL BE DONE IN ACCORDANCE WITH SECT. 601

6" MIN. WHEN USING CAULDER CONNECTION

SAW SOUND PIPE SQUARE

12" MIN. SOLID BEARING ON EACH SIDE

6" MIN.

A

REPLACEMENT WHEN NEW TRENCH

MORE THAN 2' WIDE

12" MORE THAN 2'

REPLACEMENT WHEN NEW TRENCH

2' WIDE OR LESS

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

SAW SOUND PIPE SQUARE

12" MIN. SOLID BEARING ON EACH SIDE

DIAMETER AT BELL

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

CONC. PER SECT. 725, CLASS 'C'

SECTION 'A-A'

NOTES:

1. BROKEN PIPE SHALL BE REPLACED WITH A MINIMUM OF ONE FULL JOINT AND TWO SHORT LENGTHS WITH UNBROKEN BELLS. CONSTRUCTION AND JOINTS TO BE MADE AS PER SECTION 615.
24" OR 30" FRAME & COVER PER DET. 423, 424, 425

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

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

M.H. STEPS;
SEE NOTE 2

BELL UP OR DOWN, CONT.
OPTION

FLOW

"RAM NEK" PLASTIC
GASKET OR EQUAL

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

CEMENT MORTAR

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.
PIPE SIZE & ELEVATION AS SHOWN ON PLANS

TROWEL FINISH

MANHOLE STEPS PER SECT. 625

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

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

MANHOLE TO BE BRICK OR PRECAST PER SECT. 625
BRICK SHALL BE IN ACCORDANCE WITH SECT. 775

CLASS 'A' CONCRETE PER SECT. 725, 505

TROWEL FINISH SMOOTH

COMBINED CURB AND GUTTER

MANHOLE RING & COVER PER DETAIL 423, 424 & 425

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

PAVEMENT

ROWLOCK RADIAL COURSE (BRICK M.H.)

VARES

4" MIN. VARIABLE

1/2 12" 12" 12" 5"

8" 10" 2"
FOUR STEEL SPACERS, 4"x2"
THICKNESS AS REQUIRED FROM
1/2" to 2" WHEN
THICKNESS IS LESS THAN 1/2"
USE MORTAR, WHEN GREATER
THAN 1/2", USE BRICK.

M.H. FRAME AND
COVER PER
SECT. 625

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

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

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

EXISTING OR RECENTLY
INSTALLED PAVEMENT

12"
12"
12"
12"
12"
12"
12"
12"

M.H. WALL THICKNESS
AND MATERIAL VARIES

SUBGRADE PREPARATION TO CONFORM
TO SECT. 301 OR 601

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

PUMP RISE &
ELEVATION
AS SHOWN ON PLANS

FLOW

48" I.D., PIPE < 65"
63" I.D., PIPE > 65"

12" MAX.
12" MAX.

26 - 3/4"

49" WIN.

3 TO 5"
VARIABLE

BRICKS

2"

1/2"

3"

2"

2"

TROWEL
SMOOTH

4"

CLASS 'A'
CONCRETE PER
SECT. 725, 505

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

BRICK SHALL BE
IN ACCORDANCE
WITH SECT. 775

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

M.H. WALL THICKNESS
AND MATERIAL VARIES

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

SUBGRADE PREPARATION TO CONFORM
TO SECT. 301 OR 601

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

PUMP RISE &
ELEVATION
AS SHOWN ON PLANS

FLOW

48" I.D., PIPE < 65"
63" I.D., PIPE > 65"

12" MAX.
12" MAX.

26 - 3/4"

49" WIN.

3 TO 5"
VARIABLE

BRICKS

2"

1/2"

3"

2"

TROWEL
SMOOTH

4"

CLASS 'A'
CONCRETE PER
SECT. 725, 505

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

BRICK SHALL BE
IN ACCORDANCE
WITH SECT. 775

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

M.H. WALL THICKNESS
AND MATERIAL VARIES

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

SUBGRADE PREPARATION TO CONFORM
TO SECT. 301 OR 601

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

PUMP RISE &
ELEVATION
AS SHOWN ON PLANS

FLOW

48" I.D., PIPE < 65"
63" I.D., PIPE > 65"

12" MAX.
12" MAX.

26 - 3/4"

49" WIN.

3 TO 5"
VARIABLE

BRICKS

2"

1/2"

3"

2"

TROWEL
SMOOTH

4"

CLASS 'A'
CONCRETE PER
SECT. 725, 505

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

BRICK SHALL BE
IN ACCORDANCE
WITH SECT. 775

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

M.H. WALL THICKNESS
AND MATERIAL VARIES

1/2"
1/2"
1/2"
1/2"
1/2"
1/2"
1/2"
1/2"
NOTE:
LETTERING ON MANHOLE COVER TO CONTAIN NAME OF AGENCY AND UTILITY FOR WHICH MANHOLE IS NEEDED, (I.E. "PHOENIX SANITARY SEWER"), OR AS DIRECTED. THE TOTAL WIDTH OF INDIVIDUAL LETTERS TO BE SUCH THAT LETTERS AND WORDS ARE EQUALLY SPACED AND BALANCED TO FORM A COMPLETE CIRCLE WITH SPACERS BEFORE AND AFTER THE WORD IDENTIFYING THE AGENCY INVOLVED. LETTERS TO BE 2" IN HEIGHT AND RAISED FLUSH W/ TOP OF RINGS. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% MORE OR LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO ASTM A-48, CLASSES 35 AND AASHTO M306. THE BEARING SURFACES OF THE FRAMES AND COVERS SHALL BE MACHINED AND THE COVERS SHALL SEAT FIRMLY WITHOUT ROCKING. ALL DIMENSIONS SHALL HAVE A 1/16" TOLERANCE.
NOTE:
LETTERING ON MANHOLE COVER TO CONTAIN NAME OF AGENCY AND UTILITY FOR WHICH MANHOLE IS NEEDED, (I.E. "PHOENIX SANITARY SEWER"), OR AS DIRECTED. THE TOTAL WIDTH OF INDIVIDUAL LETTERS TO BE SUCH THAT LETTERS AND WORDS ARE EQUALLY SPACED AND BALANCED TO FORM A COMPLETE CIRCLE WITH SPACERS BEFORE AND AFTER THE WORD IDENTIFYING THE AGENCY INVOLVED. LETTERS TO BE 2" IN HEIGHT AND RAISED FLUSH W/ TOP OF COVER. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% MORE OR LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO ASTM A-48, CLASS 35 AND AASHTO M306. THE BEARING SURFACES OF THE FRAMES AND COVERS SHALL BE MACHINED AND THE COVERS SHALL SEAT FIRMLY WITHOUT ROCKING. ALL DIMENSIONS SHALL HAVE A 1/16" TOLERANCE.
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SECTION 'A-A'

SECTION 'B-B'

SECTION 'C-C'

SECTION 'D-D'

SECTION VIEW OF FRAME AND COVER WITH CAM LOCKING DEVICE

NOTES:

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

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

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

4. CASTINGS SHALL CONFORM TO SECT. 787.

5. SHALL CONFORM TO SECT. 625.3.1 – (FRAME AND COVER).
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".

SEWER LINE

BAND SEAL COUPLING

VIT. CLAY PIPE

VIT. CLAY OR PLASTIC PLUG

PREFORMED JOINT

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

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

GROUND LINE

VIT. CLAY PIPE

TYPICAL STUB OUT

SEWER MANHOLE WALL

INVERT ELEVATION ACCORDING TO PLAN

BELL END

SIZE ACCORDING TO PLAN

DRY PACK FOR PRECAST CONCRETE MANHOLE
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 PRECAST CONCRETE VAULT SHALL BE RECTANGULAR WITH MINIMUM INSIDE DIMENSIONS OF 4" WIDE AND 6" LONG AND AT A DEPTH OF THE DESIGN OF THE BUILDING SEWER.

5. A SHOP DRAWING SHALL BE SUBMITTED TO THE CONTRACTING AGENCY FOR APPROVAL BEFORE INSTALLATION OF THE VAULT AND THE PALMER BOWLUS FLUME WILL BE ALLOWED.
1. ELECTRONIC MARKER SHALL BE A 3M MODEL 1424—XR/ID [4" DIAMETER SELF LEVELING MARKER BALL GREEN IN COLOR] OR APPROVED EQUAL OR AS REQUIRED BY THE LOCAL AGENCY.

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

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

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

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

6. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.

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

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

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

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

2. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.

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

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

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

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

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

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

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

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

2. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.

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

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

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6. END OF TAP TO BE SEALED AND MARKED.

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

8. INSTALL RAISED 4" THREADED PLUG IN CLEANOUT INCORPORATING 3M MODEL 1414 ELECTRONIC DISC MARKER, GREEN IN COLOR. LOCATOR PLUG TO BE QPK PRODUCTS MODEL #228—0004 DM OR APPROVED EQUAL.

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

CURB STAMP VERTICAL CURB

NOTES:
1. STAMP TOP OF CURB WITH 4" TALL BY 1/4" DEEP "S" TO DESIGNATE SEWER SERVICE LINE CROSSING.
The word 'sewer' on cover.

Unpaved streets and alleys.

Class 'AA' conc. per sect. 725, 6"-8" thick, 40" dia.

Size of pipe as shown on plans.

Standard 45° bend.

Compacted backfill or undisturbed earth.

VIT. CLAY PIPE per sect. 743.

To be laid on undisturbed earth or compacted select material (Type B) or A.B.C.

Flow line elevation shown on plans to this point.

Station and length shown on plans to this point.

8" C.I. frame and cover det. 270.

MIN 1/4" MAX.

Paved streets and alleys.

Cleanout installation.

Note:

End of sewer tap to be sealed and marked in accordance with det. 440.

8" V.C.P.

One full length of pipe.

4" or 6" V.C.P. tap to property line.

6"x8" or 4"x8" vitrified clay increaser.

8"x8" wye.

Sewer tap at cleanout.
DOUBLE PIPE HEADWALL

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.

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>
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<tr>
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<td>9'-4&quot;</td>
<td>2'-2&quot;</td>
<td>5'-9&quot;</td>
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</table>

*Nominal pipe size given for reinforced conc. pipe.

ELEVATION
CONCRETE MASONRY UNITS (BLOCK) HEADWALLS JOINED WITH CEMENT MORTAR PLASTERED BOTH SIDES OF WALL FULL HEIGHT AND SHALL BE CURED PER SECT. 726.
2 - NO. 6 BARS BEND TO CONFORM TO PIPE

3/4" CHAMFER, ALL EXPOSED CORNERS

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>LD</th>
<th>L</th>
<th>E</th>
<th>F (Approx)</th>
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<tr>
<td>18''</td>
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</tr>
<tr>
<td>24''</td>
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<td>42''</td>
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<td>4'-4&quot;</td>
</tr>
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<td>48''</td>
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</tr>
<tr>
<td>54''</td>
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<td>60''</td>
<td>8'-0&quot;</td>
<td>4'-0&quot;</td>
<td>6'-11&quot;</td>
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</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.
PIECE MAY ENTER WALL

(2) 1/2" TAMPINS OR INSERTS

SEE NOTE 4

A

1 - 3/8"

J - 2"

1 - 3/8"

K

4"

2

2 - 3/8"

6 - 5/8"

0. C.

TYP.

1/4" 1/8" TYP.

PLATE 1/4" x 14"

RACK BARS SEE DETAIL

TRASH RACK

6"

8"

POURED WALLS

NO. 4 REINFORCED BARS 12" O.C. both ways, class 'A' conc per sect. 505, 725 & 727.

BLOCK WALLS

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

SPECIAL 'U' SPECIAL OPEN END

RACK BARS

45° BLOCK CORNER

NOTES:

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

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


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

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

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

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

4. CONCRETE SHALL BE CLASS A PER SECT. 725.

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

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

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

SECTION A-A

CLASS 'B' CONCRETE PER SECTION 725

SECTION B-B

DETAIL NO. 504
STANDARD DETAIL ENGLISH

CONCRETE BLOCK JUNCTION BOX

REVISED 01-01-1998
DETAIL NO. 504
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 plus T.

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

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

A* = Angle of Deflection

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<tr>
<td>60&quot;</td>
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<tr>
<td>66&quot;</td>
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NOTE:
CONTRACTOR MAY USE PRECUT FITTINGS IF DESIRED.
BID ITEM INCLUDES LATERAL PIPE, RISER, PAD, VALVE,
LABOR AND INCIDENTAL MATERIAL REQUIRED FOR
INSTALLATION.

CONSTRUCT OPTIONAL
CONCRETE SCOURING
BASIN AROUND VALVE
ASSEMBLY WHERE SPECIFIED

VARIABLE

CLASS 'C' CONCRETE
PER SECTION 725
WITH TROWEL FINISH

BREAK PIPE
AND MAKE
WATERTIGHT
JOINTS PER
DETAIL 524

12"

1 1/2"

MAIN

CONCRETE PIPE
SECT. 735 & 736

PLUG END PER
DETAIL 427

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

BID ITEM

SNOW, IDEAL,
WATERMAN ALFALFA
VALVE OR EQUAL

PIPE DIAMETER
TO BE SAME AS
VALVE SIZE

GROUT AS PER
DETAIL 524

CONCRETE TEE
OR ELBOW
NOTES:

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

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

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

4. CONCRETE WHICH 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.

R=1/2 O.D.
R.C.P., C.P. OR C.M.P.

SEE BAND DETAIL
C.M.P. TYPE 'A' OR TYPE 'B'

SEE T-BOLT DETAIL
C.M.P. STORM DRAIN

SECTION A-A

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

SELECT MATERIAL

C.M.P. MAIN STORM DRAIN

WELD ALL AROUND
1/2"
2-1/2"
3/4"
1/2"
1-3/4"
1-2"

STANDARD THREAD (COARSE)

CONNECTOR CROSS SECTION

T-BOLT

O.D.+24"

O.D. + 24"

2"

12" GAUGE BITUMINOUS COATED
GALVANIZED METAL PLATE

8 HOLES
9/16" DIA.

CONNECTOR PIPE

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

BAND DETAIL

1:2 MORTAR

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

CATCH BASIN

6" MIN.
6" (TYP.)
8"

2-1/2"

6"

2-1/2"
NOTES

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

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

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

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

5. CENTER MANHOLE ON PIPE JOINT WHERE PIPE CHANGES SIZES, LEAVING A GAP OF 12” MINIMUM, 24” MAXIMUM.
NOTES:
1. LINE PIPE AND STUB MAY BE CAST MONOLITHICALLY OR STUB MAY BE CAST ON TO LINE PIPE SECTION PRIOR TO COMPLETE CURING.
2. ALL LINE PIPE REINFORCEMENT SHALL BE TURNED UP INTO STUB.
3. THE VERTICAL STUB TO BE A.S.T.M. C-76 CLASS II WALL 'A' AND THE HORIZONTAL PIPE TO BE EQUAL TO STRENGTH OF PIPE ENTERING MANHOLE.
4. ALL REINFORCING STEEL SHALL CLEAR FACE OF CONCRETE BY 1-1/2" UNLESS SHOWN OTHERWISE.
5. CONCRETE ENCASEMENT SHALL BE CLASS 'A' PER SECT. 725 AND 505.

TABLE OF VALUES FOR 'F' & 'D'

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<th>D</th>
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<th>78&quot;</th>
<th>84&quot;</th>
<th>90&quot;</th>
<th>96&quot;</th>
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</table>

MAN HOLE SHAFT PER DETAIL 522

PRECAST PIPE WITH VERTICAL STUB

ENCASEMENT
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.

VERTICAL SECTION OF ECCENTRIC MANHOLE SHAFT

PLAN

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

SECTION B-B

SHALLOW MANHOLE

REINFORCED CONCRETE ADJUSTING RING

2-1/2" RINGS SHALL BE REINFORCED WITH TWO 1/4" ROUND STEEL HOOPS; 6" AND 8" RINGS SHALL BE REINFORCED WITH FOUR 1/4" HOOPS, TIED WITH NO. 14 A.S.& W. GAUGE WIRE 8" O.C.
FOR A 30" M.H. OPENING, USE THE STD. WATER TIGHT 30" M.H. FRAME & COVER, AND ANCHOR THE FRAME AS OUTLINED IN THE INSTRUCTIONS NOTED ON THIS SHEET.

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

NOTES:

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

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

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

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

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

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

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

⑧ 1/2"x9" HOOK AND EYE TURNBUCKLE.

⑨ 1/2" EYE BOLT WITH 1" DIA. EYE.

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

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

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

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

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

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

5. REFER TO DETAIL 523–1 FOR INSTALLATION PROCEDURES.
**NOTES:**

1. D SHALL BE 24" OR LESS. FOR LARGER VALUE OF D USE MANHOLE OR JUNCTION STRUCTURE.
2. IN NO CASE SHALL THE OUTSIDE DIAMETER OF THE INLET EXCEED ONE HALF THE INSIDE DIAMETER OF THE MAIN STORM DRAIN.
3. CENTERLINE OF INLET SHALL BE ON RADIUS OF MAIN STORM DRAIN EXCEPT WHEN ELEVATION S IS SHOWN ON PLANS.
4. THE MINIMUM OPENING INTO THE STORM DRAIN SHALL BE THE OUTSIDE DIAMETER OF THE CONNECTING PIPE PLUS 1.5".
5. IF ANGLE X FROM HORIZONTAL IS 45° OR LESS USE TYPE 1. IF ANGLE X IS 45° OR OVER USE TYPE 2.
NOTES:

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

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

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

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

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

6. CONCRETE SHALL BE CLASS A PER SECTION 725.

DIMENSIONS

<table>
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<tr>
<th>CURB</th>
<th>A</th>
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<tbody>
<tr>
<td>4&quot;</td>
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</tr>
<tr>
<td>6&quot;</td>
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</tr>
<tr>
<td>T</td>
<td>6&quot;</td>
</tr>
<tr>
<td>V</td>
<td>4'</td>
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T=6" IF V=4' OR LESS
T=8" IF V IS BETWEEN 4' AND 8'
T=10" IF V IS 8' OR MORE (IF V EXCEEDS 10' SPECIAL DESIGN IS REQUIRED)
V=3'–6" UNLESS OTHERWISE SPECIFIED.

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

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

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

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

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<td>4''</td>
<td>3'-3&quot;</td>
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<tr>
<td>6''</td>
<td>1'-9&quot;</td>
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<tr>
<td>7''</td>
<td>1'-0&quot;</td>
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</table>

*T=6'' IF V=4' OR LESS
*T=8'' IF V IS BETWEEN 4' AND 8'
*T=10'' IF V IS 8' OR MORE (IF V EXCEEDS 10' SPECIAL DESIGN IS REQUIRED)

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<td>7”</td>
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<td>1”-0”</td>
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T=6” IF V=4” OR LESS
T=8” IF V IS BETWEEN 4” AND 8”
T=10” IF V IS 8” OR MORE (IF V EXCEEDS 10” SPECIAL DESIGN IS REQUIRED)

V=4” UNLESS OTHERWISE SPECIFIED.

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

** 4’ LOCATIONS WHERE 4’ S/W IS REQUIRED.
NOTES:
1. SINGLE C.B. (ILLUSTRATED), SUMP WITH WING BASIN UPSTREAM.
2. DOUBLE C.B. SUMP WITH SYMMETRICAL WING BASINS EACH SIDE.
3. PIPES CAN BE PLACED IN ANY WALL EXCEPT WALL ADJACENT TO A WING BASIN. PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS PLACED.
4. SUMP FLOOR SHALL HAVE A WOOD TROWEL FINISH AND A MIN. SLOPE OF 4:1 IN ALL DIRECTIONS TOWARD OUTLET PIPE.
5. ALL REFORCING BARS SHALL BE NO. 4 18" C TO C BOTH WAYS AND 1-1/2" CLEAR TO INSIDE OF WALLS AND OUTSIDE WING BASIN FLOOR EXCEPT AS SHOWN. SEE SECT. 727.
6. ALL CONCRETE SHALL BE CLASS 'A'.
7. CONSTRUCTION JOINTS SHALL BE PLACED TO MEET FIELD CONDITIONS.
8. ALL EXPOSED STEEL SHALL BE GALVANIZED OR PAINTED WITH ONE SHOP COAT OF #1 PAINT AND TWO FIELD COATS OF #10 PAINT.

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

REINFORCEMENT DETAIL

SECTION A-A

SECTION B-B
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 ELECTRO FORGED TO BEARING BARS.

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

18. ALL PARTS SHALL BE OF STRUCTURAL GRADE STEEL.

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

FRAME DETAIL

4" x 3" x 1/2" L

ANCHORS - TOTAL 6 SEE NOTE NO. 17

SECTION F-F

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

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

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

GRATE DETAIL

40-1/2" CROSS BARS

1/4" 4" 1/4"
GRATE DETAIL
GRATE OPENING: 4.344 SQ. FT.

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

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

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

1. ADJUSTABLE CURB, FRAME AND 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

1-7/12" 1-1/2"

5'-6" NO. 6 1-1/2"
REINF. BAR

2" x 1-1/2" x 1/4"
1/4" R

1/4" WELD

13" x 3/8" BACK PLATE

2" x 1/4" x 6" LUGS
1/2" x 8" BOLTS

1/2" x 3/8" x 3'-5" TOP

1/4" WELD

1-1/2" x 1/2" BOLTS

5" x 3" x 3/8" FRAME

6" x 10.5" 1/4" WELD

1/4" WELD

1'-9"

2-1/2"

NOTE:
WELD ALL PLATES TO
6" x 6" ANGLES.

DRILL (2) 1" HOLEs FOR BOND
AS SHOWN

1/4" WELD

2" x 1/4" END

5" x 3" x 3/8"

1/4" WELD

NO. 4 x 1'-6"

8" x 3/8" TOP PLATE

3'-5"

8"

2" x 1/4" END PIECE

12" x 1/4"
BOND PLATE

1/2" RODS
THREADED
BOTH ENDS

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

1-1/8" MAX.

3'-4"-1/2"
ROD END TO ROD ENd

GRATE

ADJUSTABLE CURB

13" x 3/8" BACK PLATE

6'-3/8"

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

2'-5"

9/16" 1-1/2"

COMPOSITE VIEW
SECTION A-A
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 3'-0" AND 1'-9" DEPTH TO 2'-0"
MATERIAL CAST GRAY IRON ASTM A-48-83 CLASS 35B,
FRAME WEIGHT 209 LBS; GRATE 140 LBS; CURB BOX 92 LBS.

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

CURB BOX ADJUST.
TO 9" HIGH

FLOW

DATE

FLOW

DIRECTION OF FLOW
SECTION A-A

DOUBLE UNIT CAST IRON FRAME — GRATE — CURB BOX

NOTE:
DIMENSIONAL CHANGE REQUIRED FROM 3'-5"
WIDTH TO 6'-2", AND 1'-9" DEPTH TO 2'-0"
REQUIRES ONE CENTER STEEL I-BEAM 4" x 7.7 LBS.
MATERIAL CAST GRAY IRON ASTM A-48-83 CLASS 35B.
FRAME WEIGHT 197 LBS.; GRATE 140 LBS.; CURB BOX 92 LBS.
NOTES:
1. PIPES MAY ENTER OR LEAVE ANY WALL. BOTTOM OF BOX TO BE SLOPED TO OUTLET PIPE FROM ALL DIRECTIONS AND TROWELLED TO A HARD SMOOTH SURFACE.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
4. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
5. ALL WELDS ON FRAME AND SIDE BARS ON GRATE SHALL BE FULL LENGTH OF JOINT.
6. TOTAL COMBINED CLEARANCE BETWEEN FRAME AND GRATE IS 1/2".

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

VARIATES

2-1/4"

6"

601

SECTION C–C

FOR DETAILS 531, 532 AND 533

SECTION D–D

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

1/4" DIAMOND FLOOR PL COVER

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

EQUAL DISTANCE

1/2"

1-3/4"

1"

4-1/2"

3/8"

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

PROTECTION BAR SEE THIS DETAIL

PLAN VIEW

STEEL FILLER BLOCKS WELDED TO FRAME

DOWEL BAR

# 3 REINF. STEEL DOWEL BARS

1/4" DIAMOND FLOOR PL COVER

L1-1/4" x 1-1/4" x 1/4"

IRON FRAME

NOTES:

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

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

REVISED 01–01–1999

DETAIL NO. 536–1

COMMON DETAILS AND SECTIONS FOR CURB OPENING CATCH BASINS
PLAN VIEW

SECTION A–A

SECTION B–B

SECTION C–C

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

1/2" DIA x 1" EYE BOLT

2-3/8" x 3-1/8" x 1/4" beveled sides for welds

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

1/4" x 1-3/4" x 24" chain to 1" x 6" eye bolt in wall. Bend bolt 1" on end.

29" x 29" I.D. grate frame

29" x 53" I.D. grate frame

SLOPE FLOOR TO OUTLET

PIPE SIZE AS REQUIRED BY PLANS

PLAN

SECTION B-B

SECTION A-A

SECTION C-C

CATCH BASIN — TYPE 'G'

DETAIL NO. 537

STANDARD DETAIL ENGLISH

REVISED 01-03-2002

DETAIL NO. 537
 WHEN DOUBLE GRATE IS USED INCREASE THE LENGTH OF THE STRUCTURE ACCORDINGLY.

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

SEE DETAIL 539 FOR GRATE

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

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

FOR PIPE LARGER THAN 24" DIA. (NOMINAL)

D=(VARIES)

C=3'-4"

SECTION A-A

SECTION A-A

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

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

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

3/16" EACH BAR & ROD

NOTES:

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

SECTION A-A
GRATE TYPES TB-1 AND TB-2

BAR TABLE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>CLEAR SPACING</th>
<th>NO. BARS</th>
<th>X</th>
<th>GRATE OPENING ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>TW OR TB-1.0</td>
<td>1&quot;</td>
<td>26</td>
<td>1&quot;</td>
<td>3.21</td>
</tr>
<tr>
<td>TW OR TB-1.1</td>
<td>1-3/8&quot;</td>
<td>21</td>
<td>1&quot;</td>
<td>3.32</td>
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<tr>
<td>TW OR TB-1.2</td>
<td>2&quot;</td>
<td>16</td>
<td>1&quot;</td>
<td>4.66</td>
</tr>
<tr>
<td>TW OR TB-2.0</td>
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<td>26</td>
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<td>2.32</td>
</tr>
<tr>
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<td>1-3/8&quot;</td>
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<td>1&quot;</td>
<td>2.41</td>
</tr>
<tr>
<td>TW OR TB-2.2</td>
<td>2&quot;</td>
<td>16</td>
<td>1&quot;</td>
<td>2.65</td>
</tr>
</tbody>
</table>

TW INDICATES TRANSVERSE WELDED
TB INDICATES TRANSVERSE BOLTED
**NOTES:***
1. **LW** indicates longitudinal welded.
2. **LB** indicates longitudinal bolted.
3. **EF** indicates electroformed.
4. Grating units and frames shall be fabricated from structural steel "A-36 except as noted.
5. All welding shall be in accordance with standard welding specifications.
6. The completed assembly shall be given one shop coat of No. 1 paint.
7. Frames and grates shall fit to a maximum roct of 0.093" at any point.
8. Grate type LW and EF restricted to slopes of 3% or less.
9. Grates type LB use longitudinal grades in excess of 3% or as an alternate to types LW or EF on grades of 3% or less.

**SECTION A-A**

**SECTION B-B**

**SECTION C-C**

**SECTION D-D**

**TABLE**

<table>
<thead>
<tr>
<th>GRATE TYPE</th>
<th>CLEAR BAR SPACING</th>
<th>NO. BARS</th>
<th>X</th>
<th>GRATE OPENING ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>LW OR LB-1.0</td>
<td>1&quot;</td>
<td>16</td>
<td>5/16&quot;</td>
<td>3.97</td>
</tr>
<tr>
<td>LW OR LB-1.1</td>
<td>1-3/8&quot;</td>
<td>13</td>
<td>5/16&quot;</td>
<td>4.34</td>
</tr>
<tr>
<td>LW OR LB-1.2</td>
<td>2&quot;</td>
<td>9</td>
<td>1-9/16&quot;</td>
<td>4.84</td>
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<td>EF-1</td>
<td>1-5/8&quot;</td>
<td>13</td>
<td>7/16&quot;</td>
<td>4.66</td>
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<td>LW OR LB-2.0</td>
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<td>5/16&quot;</td>
<td>2.98</td>
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<td>LW OR LB-2.1</td>
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<td>1-1/16&quot;</td>
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<tr>
<td>EF-2</td>
<td>1-5/16&quot;</td>
<td>10</td>
<td>1/4&quot;</td>
<td>3.48</td>
</tr>
</tbody>
</table>

**CAST IRON, CAST STEEL OR STEEL BAR STOCK**

**CROSS BARS:**
- 3/8" dia. 4" C to C.
- BEARING BARS: 3-1/2" x 1/4" x 1-7/8" C to C.
- END BARS: 2-1/2" x 1/4" cross bars may be fillet welded, resistance welded or electroformed to bearing bars.
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.

Curb Opening Inlet

Grate Opening Inlet

6" C.M.P. 18 GA.

A.B.C. AND/OR SELECT BASE

Woven wire 1/2" sq. mesh #18 wire.

Plug with class "B" concrete after installation of asphalt/concrete pavement

A.B.C. AND/OR SELECT BASE

Woven wire 1/2" sq. mesh #18 wire.

Plug with class "B" concrete after installation of asphalt/concrete pavement

PAVEMENT
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.

SECTION ON SPILLWAY C
DOUBLE INLET

SPILLWAY SECTION

SECTION A–A

SYMM. ABOUT Q. FOR DOUBLE INLET

EMBANKMENT CURB/EXTRUDED (OPTIONAL)

COLD JOINT OR CONSTRUCTION JOINT

DEPRESS CURB ENDS WITH 10:1 SLOPE

SUBGRADE SHOULDER

ROADWAY WIDTH

6" 10"

12"

FINISH GRADE

A.C.

INLET SPILLWAY

6 x 6 – W1.4 x W1.4 WIRE MESH CONT. BOTTOM AND SIDES

6 x 6 – W 1.4 x W1.4 WIRE MESH LAP 2" LAP AND TIE

OUTLET

SPILLWAY

6 x 6 – W1.4 x W1.4 WIRE MESH IN APRON

3'–0"

6"

12"

5'–6"

4'–0"

6"
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'.

BITUMINOUS SURFACE FORD CONCRETE WALLS

DEPTH GAUGE DETAIL
(OPTION OF THE CONTRACTING AGENCY)

VERTICAL ALIGNMENT TO BE AS NEAR AVERAGE TRANSVERSE GRADE OF STREAM BED AS POSSIBLE

WALL TO BE BUILT ONE FOOT ABOVE HIGH WATER LEVEL

3% MAX

WALL MAY BE BUILT TO THIS LINE

3‰ MAX

3" WEEP HOLE
20° C TO C

ELEVATION LOOKING UPSTREAM
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.

**ELEVATION**

CUT BANK TO DEPTH "C" BEFORE PLACING GABIONS

EXIST GROUND LINE OR STREAM BED

GABIONS FILLED WITH STONE

**PLAN**

**Nominal Size Combinations**

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'</td>
<td>3'</td>
<td>1'</td>
</tr>
<tr>
<td>9'</td>
<td>3'</td>
<td>1'</td>
</tr>
<tr>
<td>12'</td>
<td>3'</td>
<td>1'</td>
</tr>
</tbody>
</table>

**NOTE:**

OTHER SIZES AVAILABLE FROM MANUFACTURER.