

**UNIFORM STANDARD  
DETAILS**

**for**

**PUBLIC WORKS  
CONSTRUCTION**

**SPONSORED and DISTRIBUTED  
by the**



**MARICOPA ASSOCIATION  
OF  
GOVERNMENTS**

**1979  
ARIZONA**

**(Includes Revisions Through 1997)**

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DETAIL NO.



STANDARD DETAIL

INDEX

NO.

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MANHOLE  
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**INFORMATION**

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501-5 HEADWALL - DROP INLET  
502-1 TRASH RACK  
502-2 TRASH RACK  
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504 CONCRETE BLOCK JUNCTION BOX  
505 CONCRETE PIPE COLLAR  
506 IRRIGATION VALVE INSTALLATION  
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INSTALLATION)  
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533 CATCH BASIN-TYPE D  
533-1 7' CURB OPENING CATCH BASIN-TYPE D  
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534-5 ALTERNATE GRATE STYLES-SUMP LOCATION  
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552 CONCRETE CUT-OFF WALLS  
555 EROSION PROTECTION/RIPRAP

539 GRATES FOR CATCH BASINS,  
TYPE G AND H

DETAIL NO.



**STANDARD DETAIL**

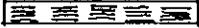
**INDEX**

DETAIL NO.

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 "STD. DETAIL" IS USED. AN EXAMPLE OF THIS WOULD BE: "SEE STD. DETAIL 391 FOR VALVE BOX INSTALLATION."
4. MANY DETAILS COVER MORE THAN ONE SHEET. THESE SHEETS HAVE BEEN GIVEN THE SAME NUMBER WITH A SUFFIX NUMBER EXAMPLE: 391-1 & 391-2.
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 HERE-IN MAY BE USED BY SOME OF THE AGENCIES AND NOT BY 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.

DETAIL NO. 101	 <b>STANDARD DETAIL</b>	GENERAL INFORMATION	APPROVED PUBLIC WORKS COMMITTEE _____ CHAIRMAN                      DATE	DETAIL NO. 101
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CONCRETE PVMT. SEC. 

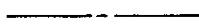
SUBGRADE SEAL SEC. 

SELECT MATERIAL SEC. 

AGGREGATE BASE SEC. 

BITUMINOUS PVMT. SEC. 

SECTION LINE 

ROADWAY  $\text{C}$  

SURVEY MONUMENT 

FIRE HYDRANT 

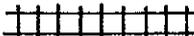
WATER METER 

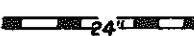
WATER OR GAS VALVE 

GAS METER 

MANHOLE 

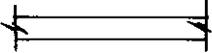
SEWER CLEANOUT 

RAILROAD 

IRRIGATION LINE 

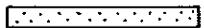
IRRIGATION STANDPIPE 

"L" HEADWALL 

EXISTING PAVEMENT 

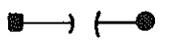
OBLITERATE PAVEMENT 

CONCRETE PAVEMENT 

BITUMINOUS PAVEMENT 

TEL. OR TEL. LINE 

POWER OR JOINT LINE 

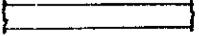
DOWN GUY & ANCHOR 

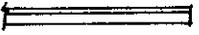
STREET LIGHT 

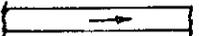
STREET SIGN 

TRAFFIC SIGN 

TRAFFIC SIGNAL LIGHT 

SIDEWALK 

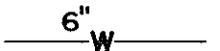
CURB & GUTTER 

VALLEY GUTTER 

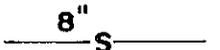
SINGLE GUTTER 

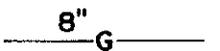
SINGLE CURB 

MAIL BOX 

EXISTING WATER LINE 

EXISTING TELEPHONE LINE 

EXISTING SEWER LINE 

EXISTING GAS LINE 

EXISTING STORM DRAIN LINE 

EXISTING IRRIGATION LINE 

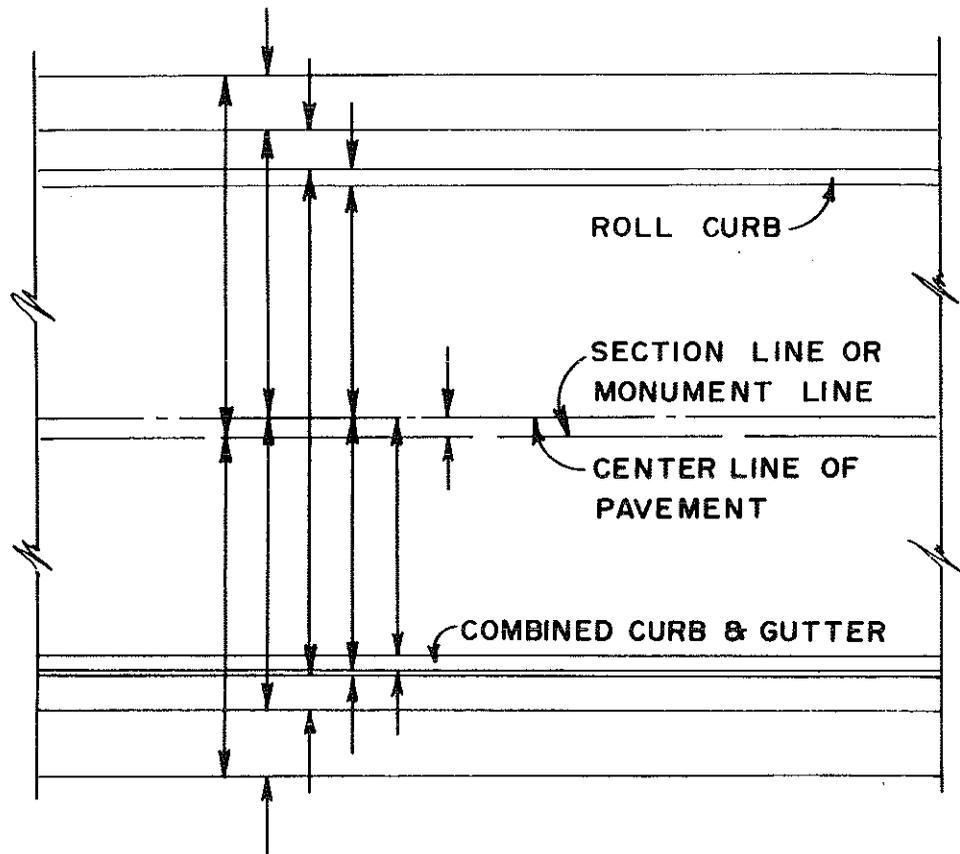
DETAIL NO.  
110



STANDARD DETAIL

PLANS SYMBOLS

DETAIL NO.  
110



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 OF 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 ALSO SHOW DIFFERENCE BETWEEN  $\mathcal{L}$  AND  $\mathcal{C}$ .

DETAIL NO.

112



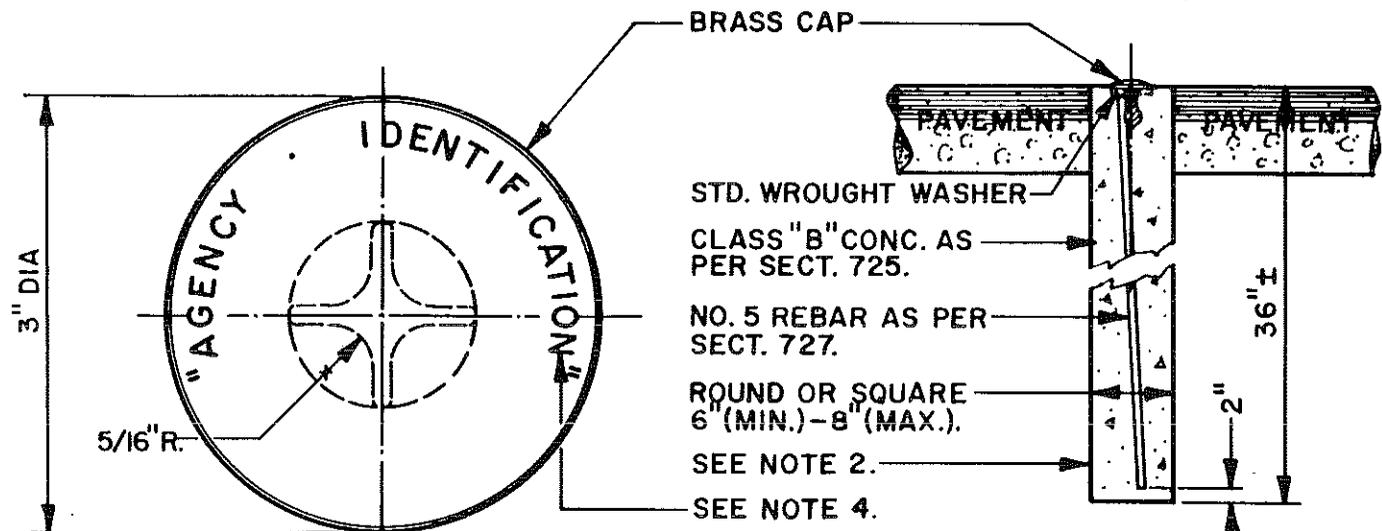
STANDARD DETAIL

DIMENSIONING FOR ROAD IMPROVEMENT PLANS

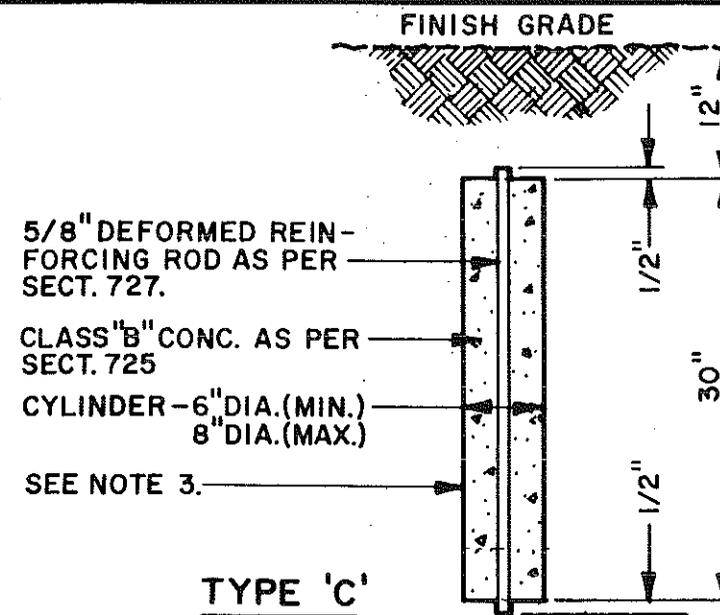
DETAIL NO.

112





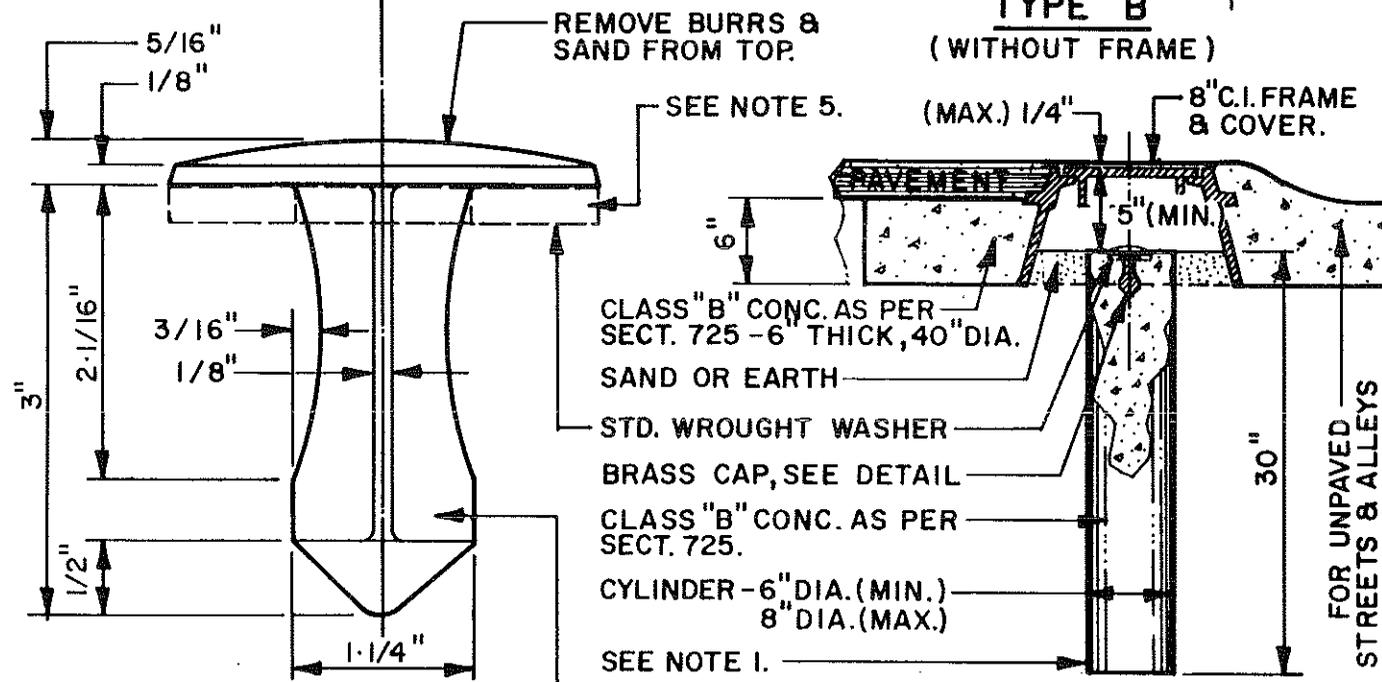
**TYPE 'B'**  
(WITHOUT FRAME)



**TYPE 'C'**

**NOTES**

1. TYPE 'A' TO BE USED AT INTERSECTIONS OF MAJOR STREETS & COLLECTOR STREETS, & AT OTHER SPECIAL POINTS IF REQUIRED BY ENGINEER, AS SHOWN ON PLANS.
2. TYPE 'B' TO BE USED AT INTERSECTION OF STREET C'S (EXCEPT WHERE TYPE 'A' IS SPECIFIED), CORNERS OR CHANGES IN ALIGNMENT OF SUBDIVISION BOUNDARIES (WHEN THEY FALL IN PAVEMENT), P.C.'S & 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, & 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 STD. DET. 270. (OPTIONAL PER AGENCY REQUIREMENT).



**CAP DETAIL**

**TYPE 'A'** (WITH FRAME PER STD. DETAIL 270)

DETAIL NO.  
120-1

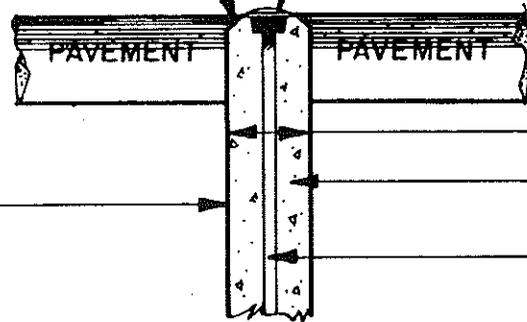


**STANDARD DETAIL**

**SURVEY MARKER**

DETAIL NO.  
120-1

CHAMFERED 3/4" AT TOP OF POST.



BRASS CAP

6" DIA. (CYLINDER).

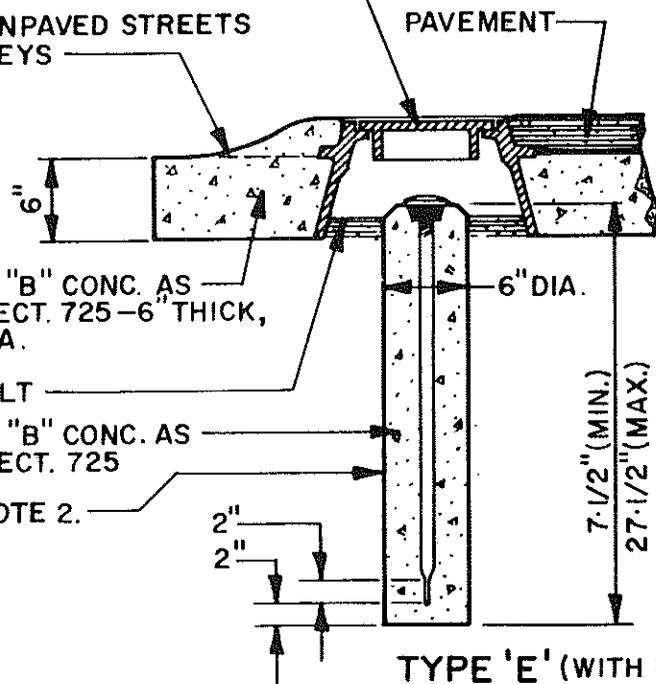
CLASS "B" CONC. AS PER SECT. 725.

3/4" GALV. PIPE, FROM 6" TO 30" LONG, FLATTENED 2" AT END, LENGTH DEPENDS ON SUBSURFACE OBSTRUCTIONS.

SEE NOTE 1.

**TYPE 'D' (WITHOUT FRAME)**

8" C.I. FRAME & COVER FOR UNPAVED STREETS & ALLEYS



CLASS "B" CONC. AS PER SECT. 725 - 6" THICK, 40" DIA.

ASPHALT

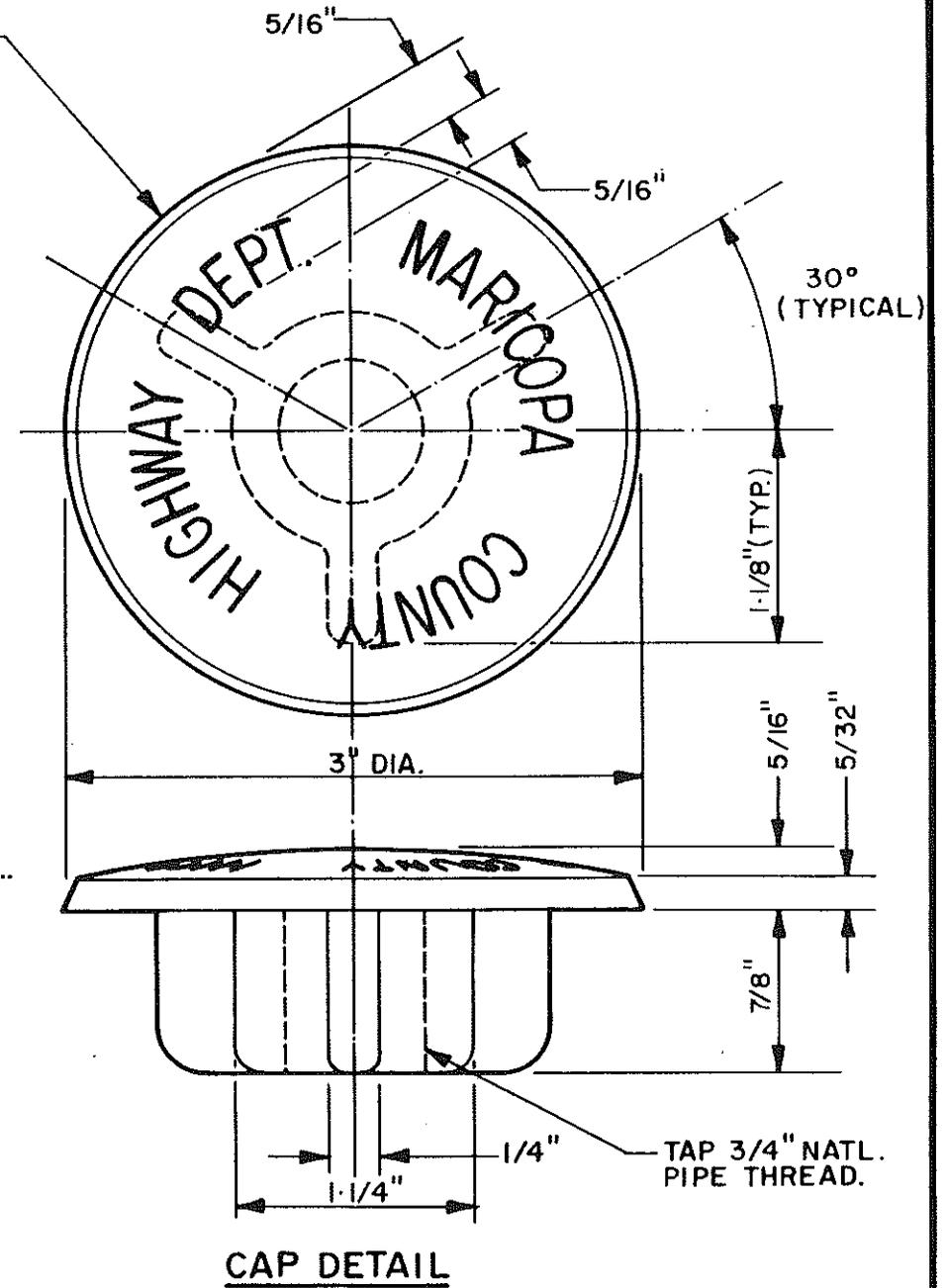
CLASS "B" CONC. AS PER SECT. 725

SEE NOTE 2.

**TYPE 'E' (WITH FRAME)**

**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. CONCRETE POST IS CHAMFERED 3/4" AT TOP, MIN. LENGTH OF POST 7-1/2", MAX. LENGTH 27-1/2", LENGTH DEPENDS ON SUBSURFACE OBSTRUCTIONS SUCH AS OLD CONCRETE PAVING, ROCK, ETC... 3/4" GALV. PIPE SET IN THIS POST SHALL BE A MIN. OF 6" LONG AND A MAX. OF 24" EXCLUSIVE OF COUPLING, SEE PLANS.
3. CAP TO BE CONSTRUCTED OF RED BRASS OR BRONZE.
4. FRAME & COVER TO INCLUDE CHAIN PER STD. DETAIL 270.



**CAP DETAIL**

DETAIL NO. 120-2

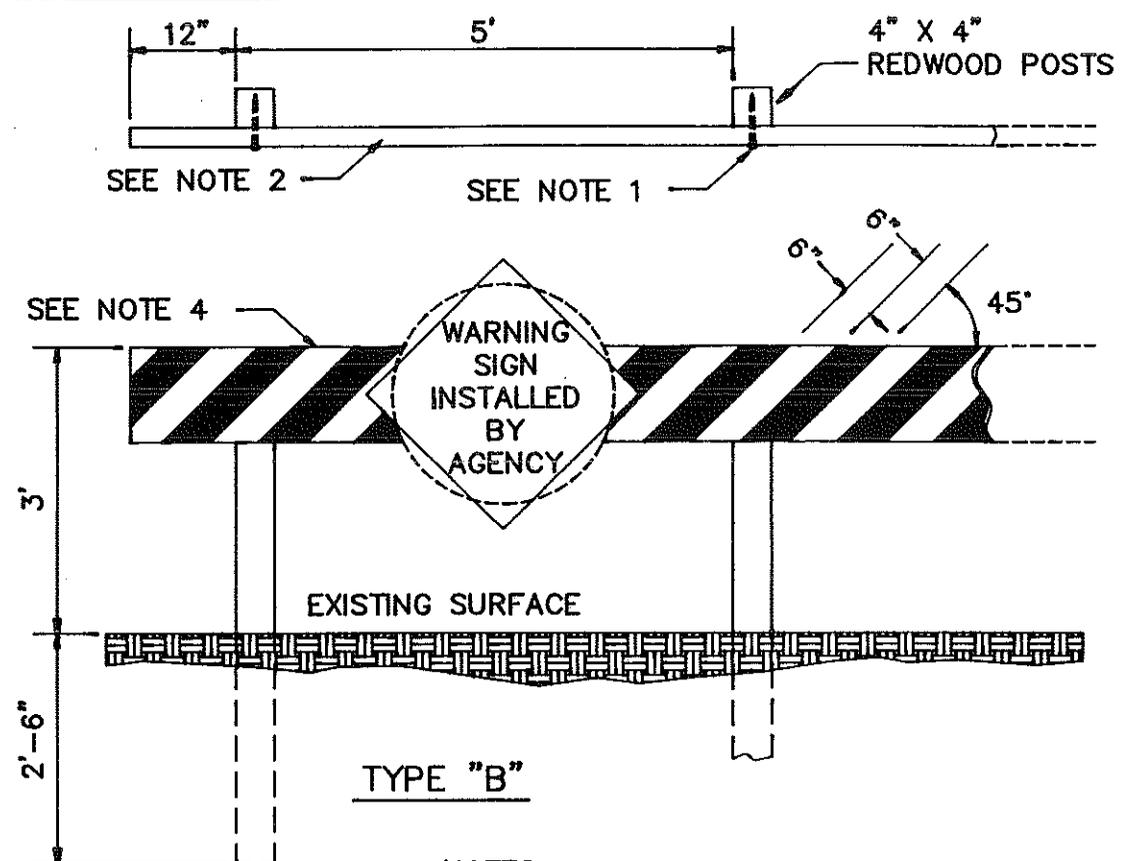
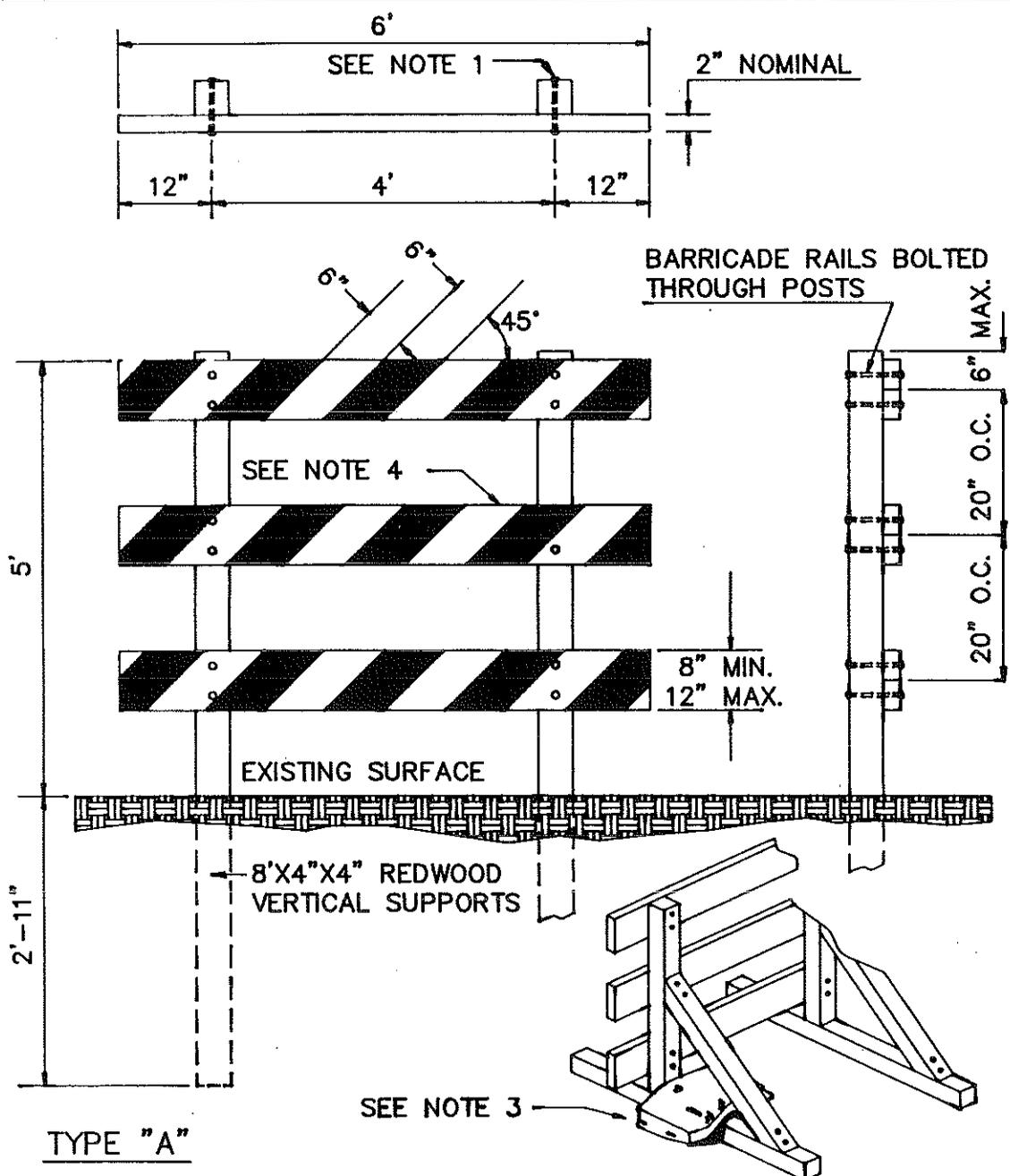


**STANDARD DETAIL**

**SURVEY MARKER**

(SURVEY MARKER FOR UNINCORPORATED AREAS OF COUNTY)

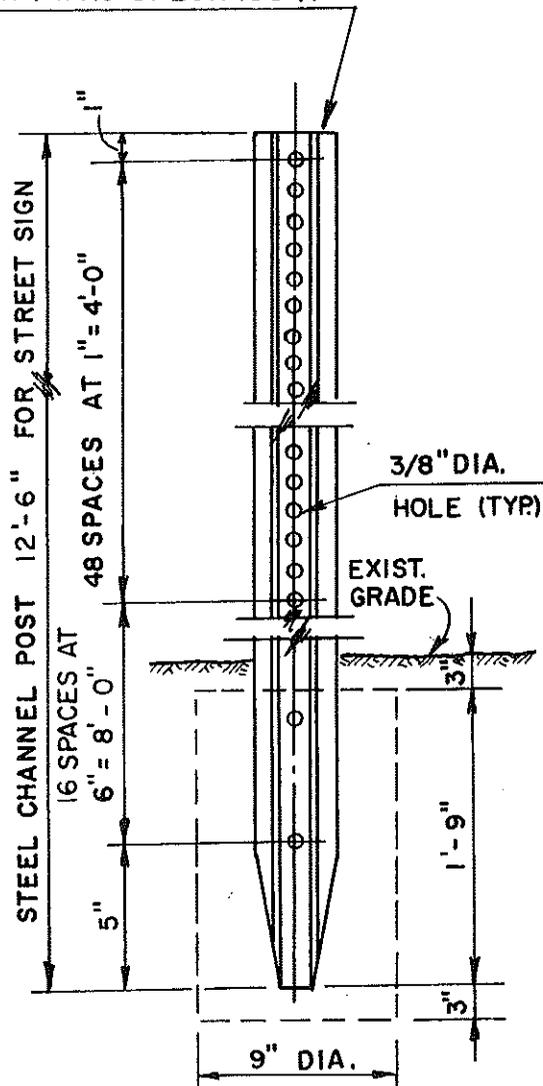
DETAIL NO. 120-2



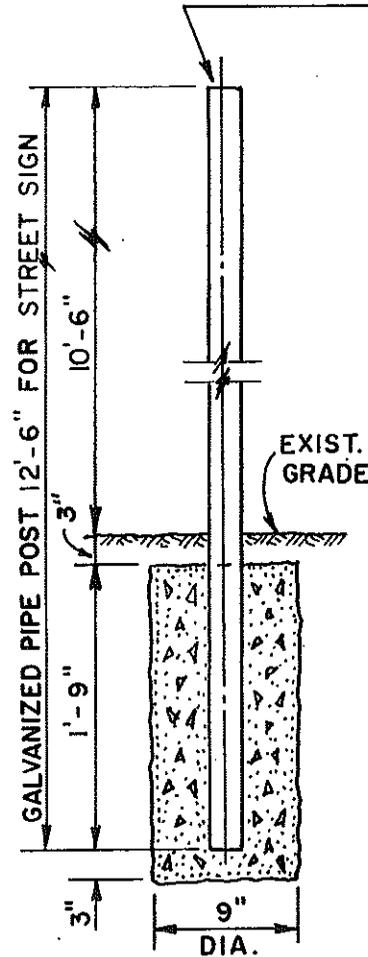
1. FASTEN WITH 1/2" X 5" LAG SCREWS WITH 2 FLAT WASHERS OR (2) 5/8" BOLTS, WITH 4 FLAT WASHERS.
2. 2" X 8" DOUGLAS FIR PLANK (LENGTH TO BE DETERMINED ON PLANS.)
3. WHEN BARRICADE (TYPE "A") IS CONSTRUCTED ON BASES INSTEAD OF POSTS SET INTO THE GROUND, IT MAY BE DESIRABLE TO BALLAST THE BASES WITH SAND BAGS OR BY STAKING TO PROVIDE RESISTANCE TO OVERTURNING DURING PERIODS OF HIGH WINDS.
4. TYPE "A" AND "B" MARKINGS SHALL BE ALTERNATE RED AND WHITE ENGINEERING GRADE REFLECTIVE STRIPES (SLOPING DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS).

FLANGED STEEL "U"  
CHANNEL (2 lbs. or 3 lbs.  
PER FT. AS SPECIFIED).

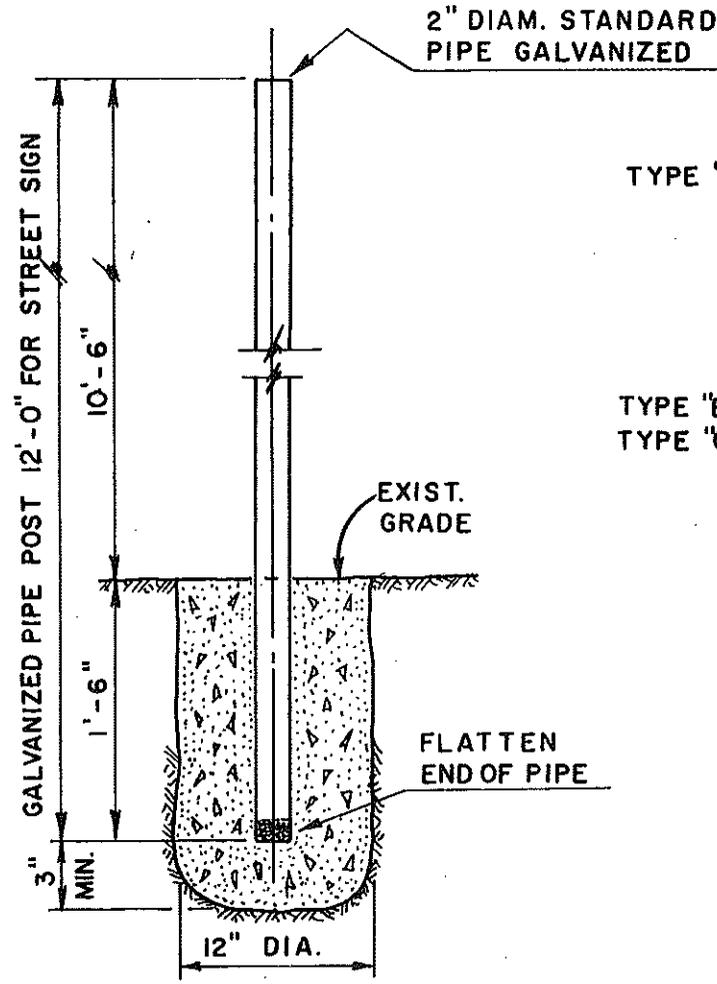
2-1/2" DIAM. STANDARD PIPE  
GALVANIZED OR 2-3/8" O.D.  
ST'D. PIPE GALV. (AS SPECIFIED)



TYPE "A"



TYPE "B"



TYPE "C"

**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 & 725.

DETAIL NO.

131

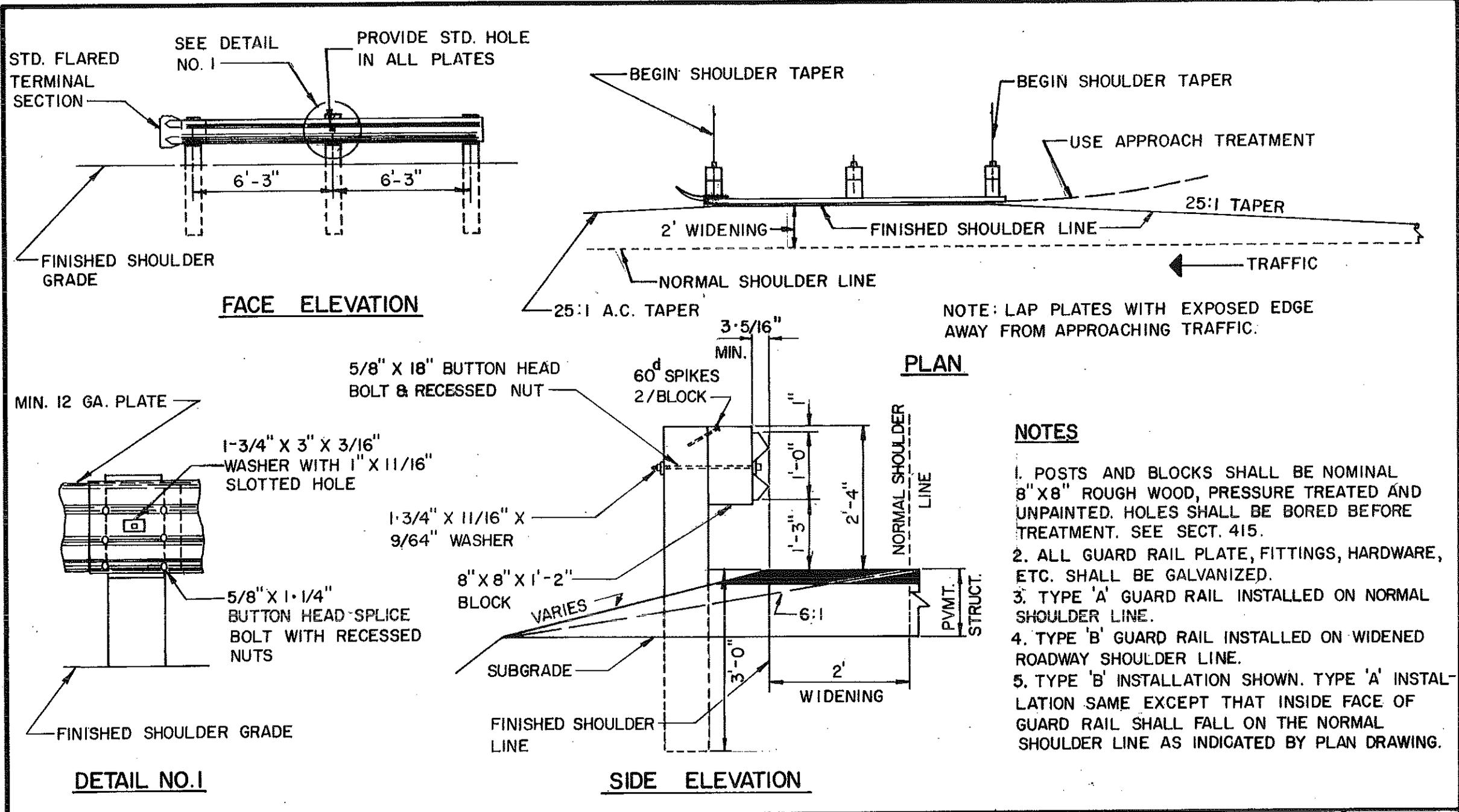


STANDARD DETAIL

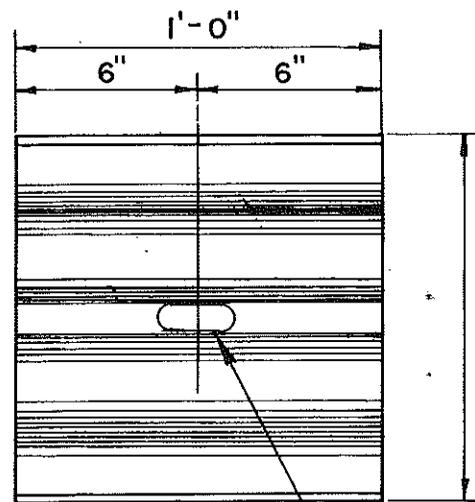
STREET SIGN BASE

DETAIL NO.

131

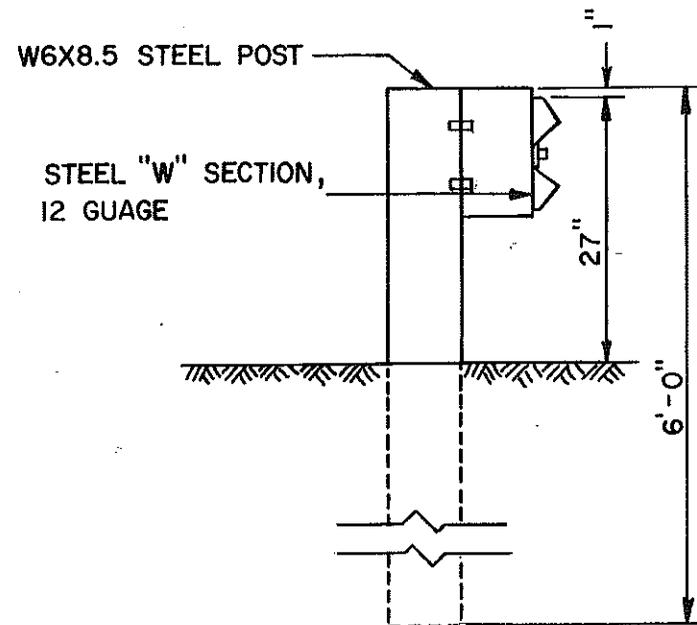


DETAIL NO. 135-1	 <b>STANDARD DETAIL</b>	<b>STEEL GUARD RAIL</b>	DETAIL NO. 135-1
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SLOT 3/4" X 2-1/2"

"W" SECTION BACK-UP PLATE FOR STEEL POSTS



"W" BEAM (STEEL POST)

DETAIL NO.  
135-2



STANDARD DETAIL

STEEL GUARD RAIL

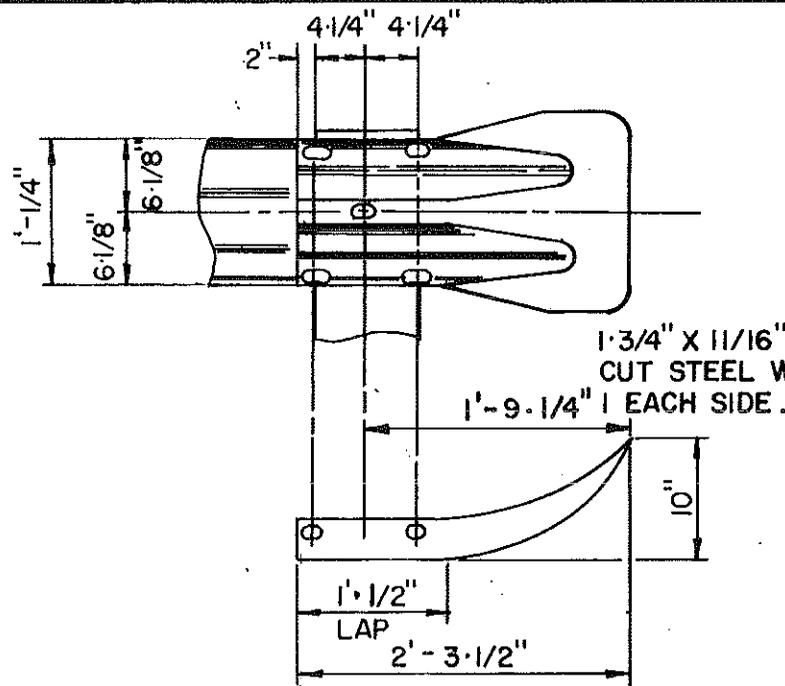
APPROVED PUBLIC WORKS COMMITTEE

CHAIRMAN

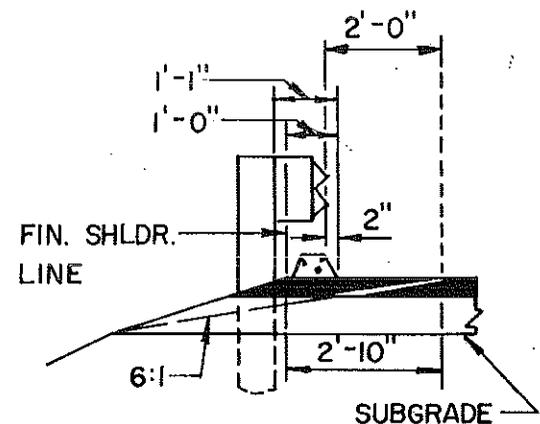
DATE

DETAIL NO.

135-2

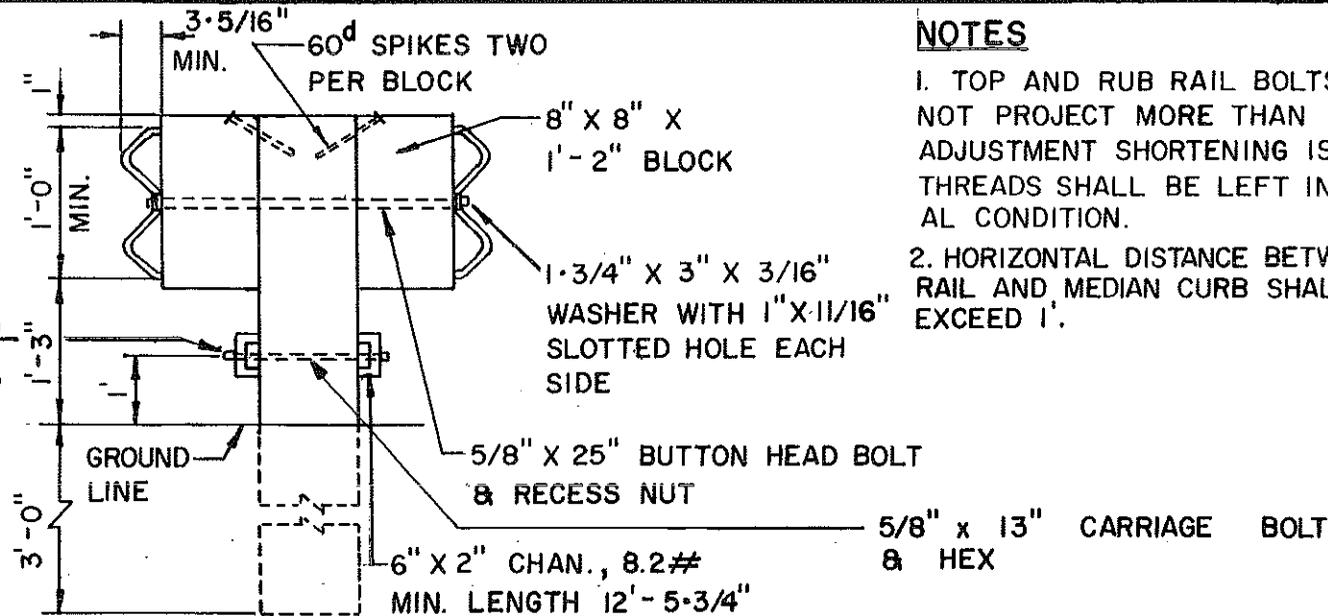


**STANDARD FLARED TERMINAL SECTION**



**INSTALLATION OF GUARD RAIL IN EMBANKMENT CURB SECTIONS**

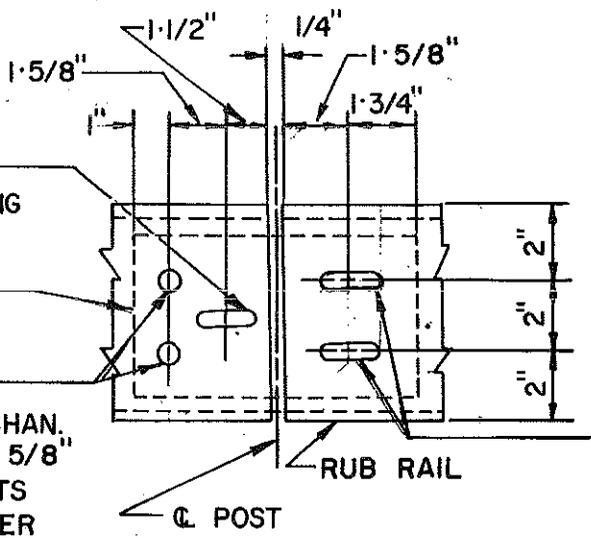
2" x 3/4" SLOT IN CHAN. & R. FOR POST FASTENING  
 7-3/4" x 4-1/2" x 3/8" SPLICE R.  
 2-11/16" ROUND OR SQUARE HOLES IN CHAN. & R. FOR 1-1/4" x 5/8" BUTTON HEAD BOLTS WITH NUT & WASHER



**DETAIL NO.2 - MEDIAN BARRIER**

**NOTES**

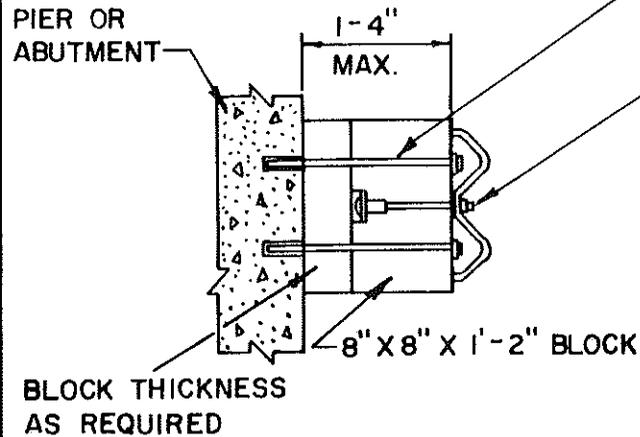
1. TOP AND RUB RAIL BOLTS SHALL NOT PROJECT MORE THAN 1". IF ADJUSTMENT SHORTENING IS REQUIRED, THREADS SHALL BE LEFT IN FUNCTIONAL CONDITION.
2. HORIZONTAL DISTANCE BETWEEN TOP RAIL AND MEDIAN CURB SHALL NOT EXCEED 1'.



**DET. NO.3 - RUB RAIL SPLICE (SPLICE AT POSTS ONLY)**

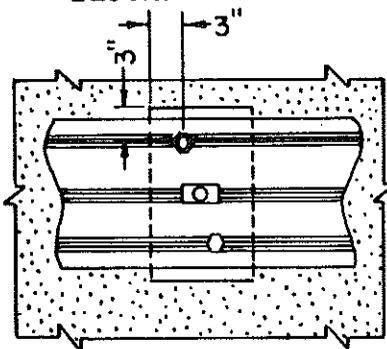
DETAIL NO. 135-3	 <b>STANDARD DETAIL</b>	<b>STEEL GUARD RAIL</b>	DETAIL NO. 135-3
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5/8" MACH. BOLT & 1-3/4" X 11/16" X 9/64" WASHER. LENGTH DETERMINED BY TOTAL BLOCK THICKNESS AND SELF DRILLING ANCHOR.



SECTION

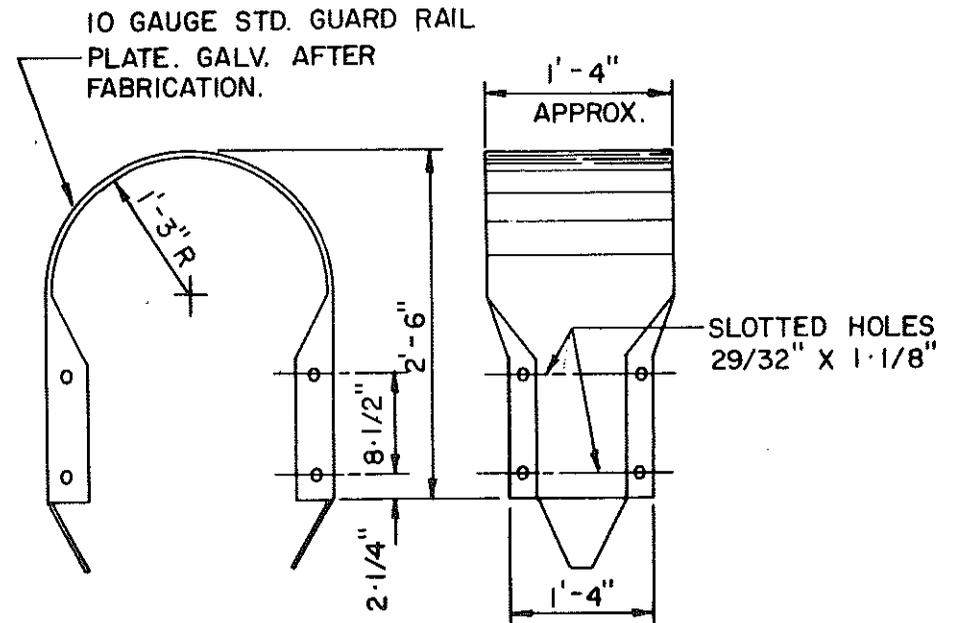
5/8" X 8-1/2" CARRIAGE BOLT. USE 2-1-3/4" X 3" X 3/16" WASHERS WITH 1 X 11/16" SLOTTED HOLES, ONE OF WHICH SHALL BE RECESSED 1" INTO BACK OF BLOCK.



ELEVATION

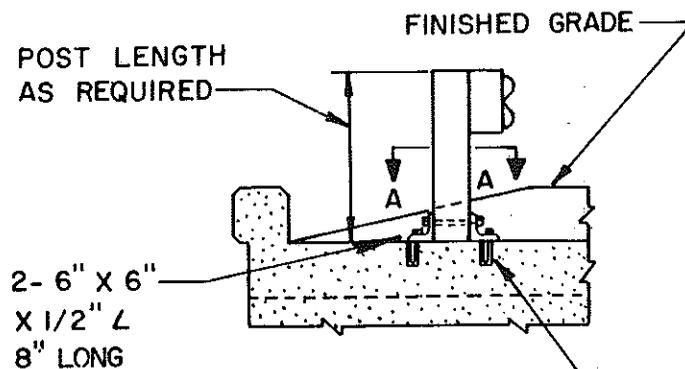
**NOTES**

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



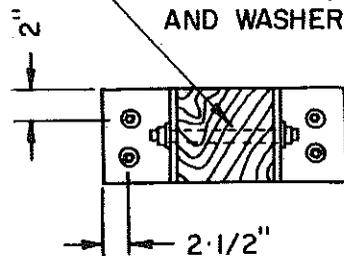
DETAIL NO.5 - BUFFER END SECTION

DETAIL NO.4  
ATTACHMENT OF GUARD RAIL TO STRUCTURES



ELEVATION

1" SQ. OR HEX. HEAD MACH. BOLT, NUT AND WASHERS.



SECTION A-A

4-5/8" BOLT SIZE SELF DRILLING ANCHOR & BOLTS. SEE NOTE 1.

DETAIL NO.1- GUARD RAIL  
POST INSTALLATION ON STRUCTURES

DETAIL NO.  
135-4

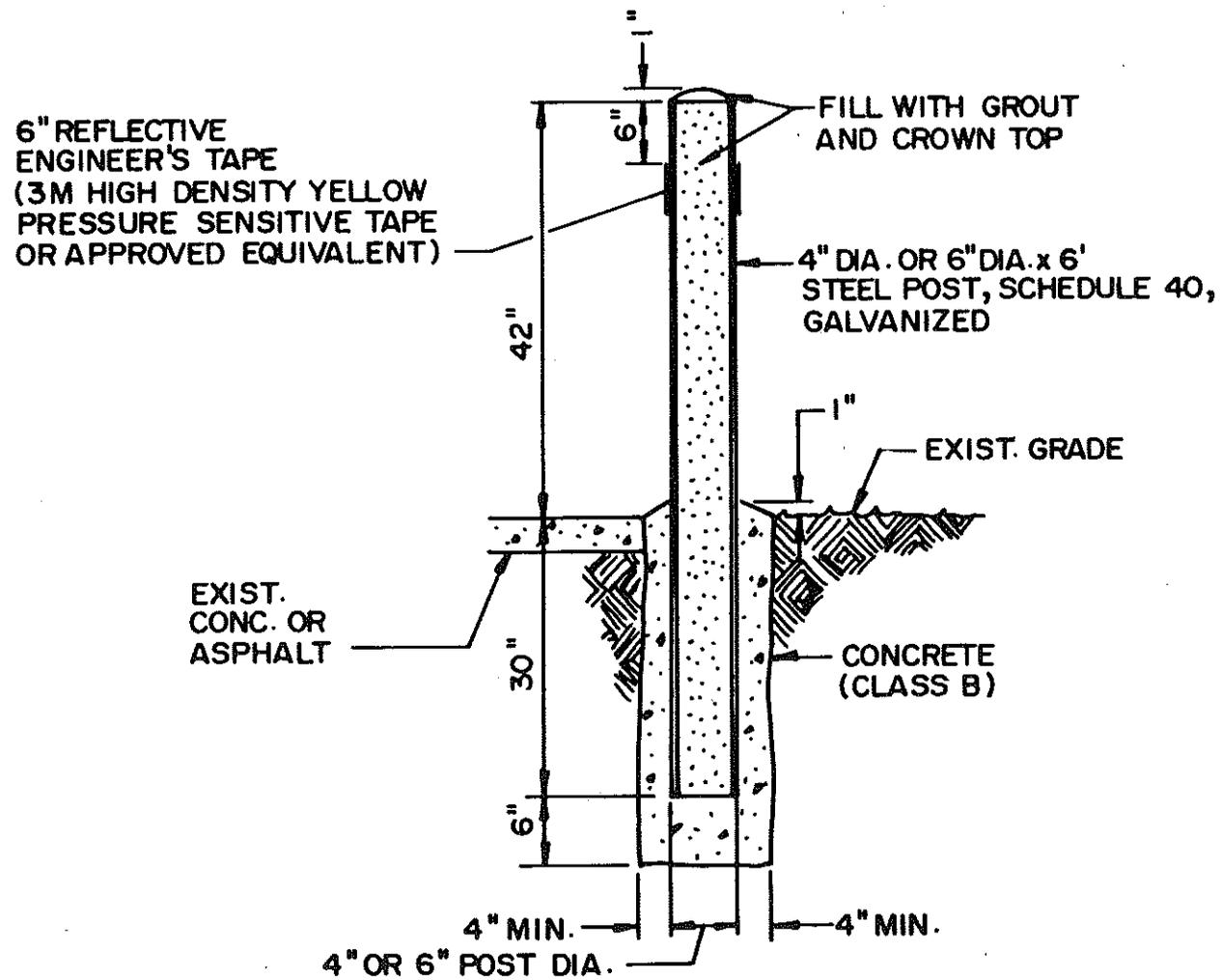


STANDARD DETAIL

STEEL GUARD RAIL

DETAIL NO.  
135-4

THIS PAGE RESERVED FOR FUTURE USE



**SAFETY POST SECTION**  
N.T.S.

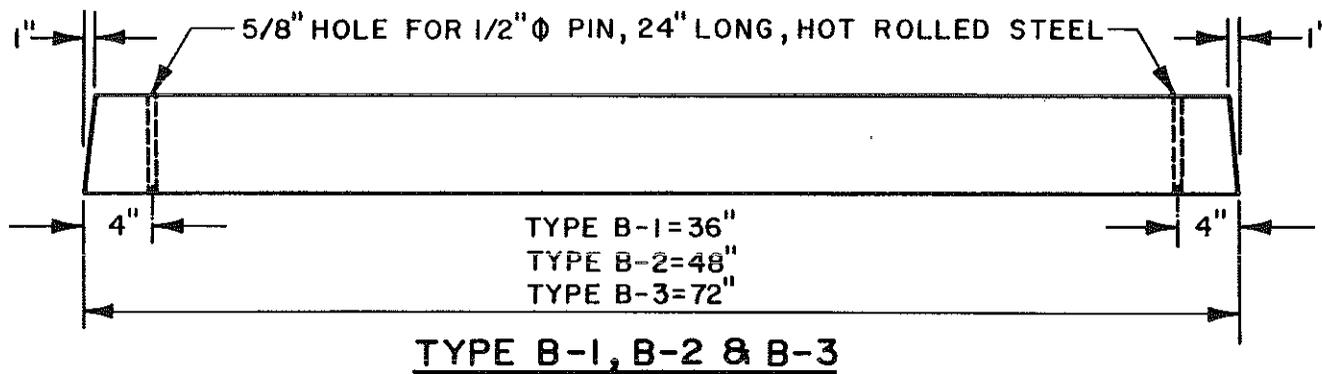
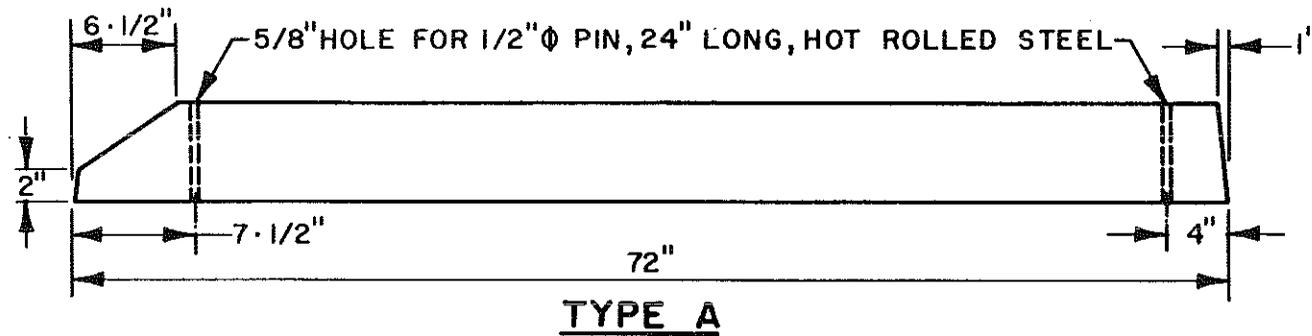
DETAIL NO.  
140



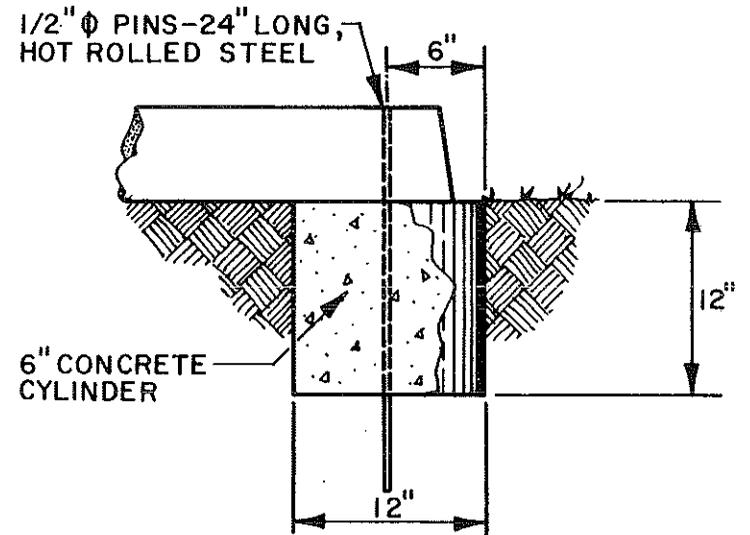
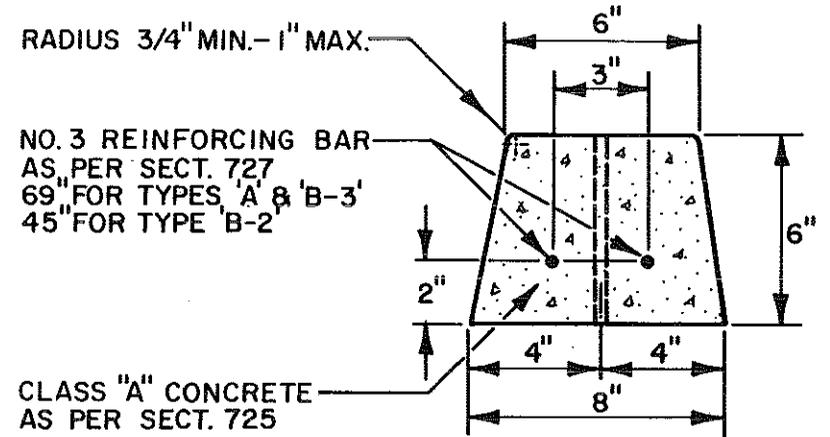
STANDARD DETAIL

SAFETY POST

DETAIL NO.  
140



NOTE: DIMENSIONAL AND REINFORCEMENT CHANGES WILL BE PERMITTED UPON PRIOR WRITTEN APPROVAL OF THE ENGINEER.



DETAIL NO.  
150



STANDARD DETAIL

PRECAST SAFETY CURB

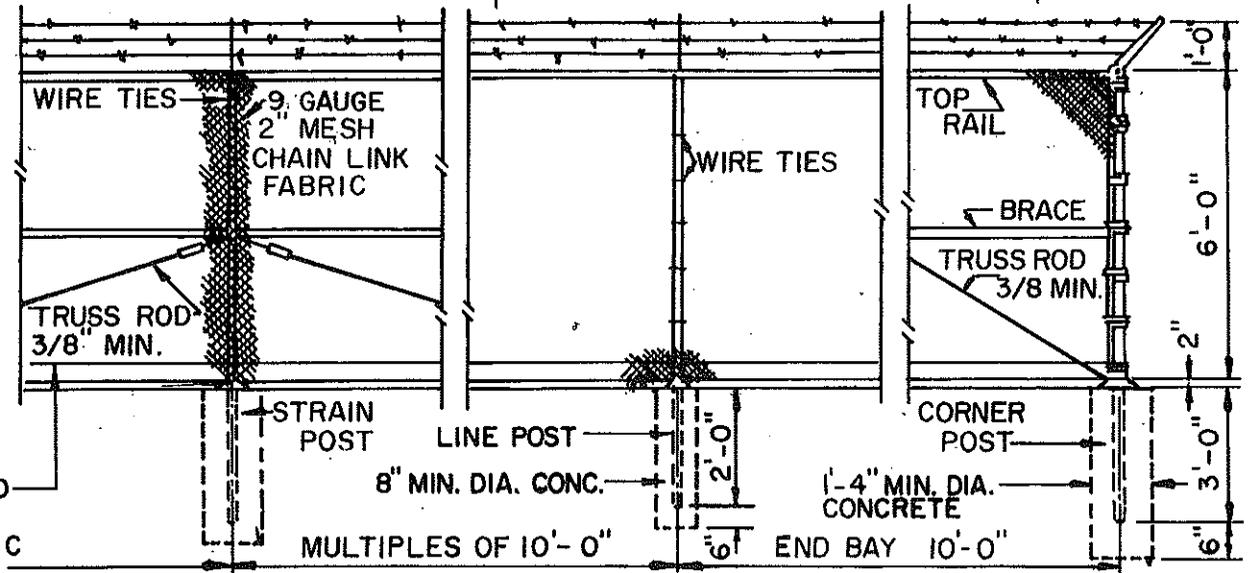
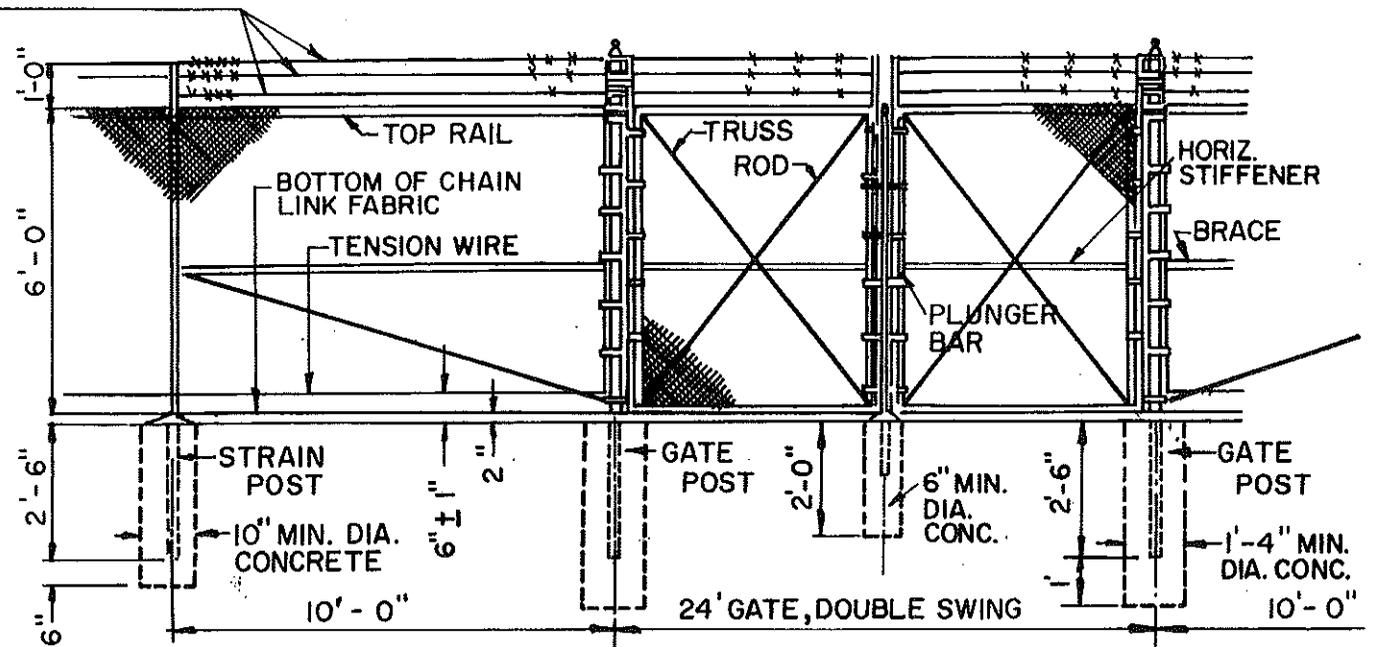
DETAIL NO.  
150

3 STRANDS-4 POINT BARBED WIRE  
UNLESS OTHERWISE SPECIFIED

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:

MEMBER	AISC SIZE	OUTSIDE DIA.
CORNER POST	2 1/2"	2.875"
LINE POST	1 1/2"	1.900"
STRAIN POST	1 1/2"	1.900"
BRACE	1 1/4"	1.666"
STRETCH BAR	3/16" X 3/4" FLAT	
GATE POST	3 1/2"	4.000"
TOP RAIL	1 1/4"	1.666"

7. CONSTRUCTION AND MATERIALS SHALL CONFORM TO SECTIONS 420 AND 772 RESPECTIVELY. SEE TABLE 772 FOR WEIGHTS OF MEMBERS.



NO. 7 COILED SPRING REINFORCED  
WIRE TIE WITH 12 GAUGE WIRE OR  
HOG RING FASTENERS. 1'-6" C TO C

DETAIL NO.  
160

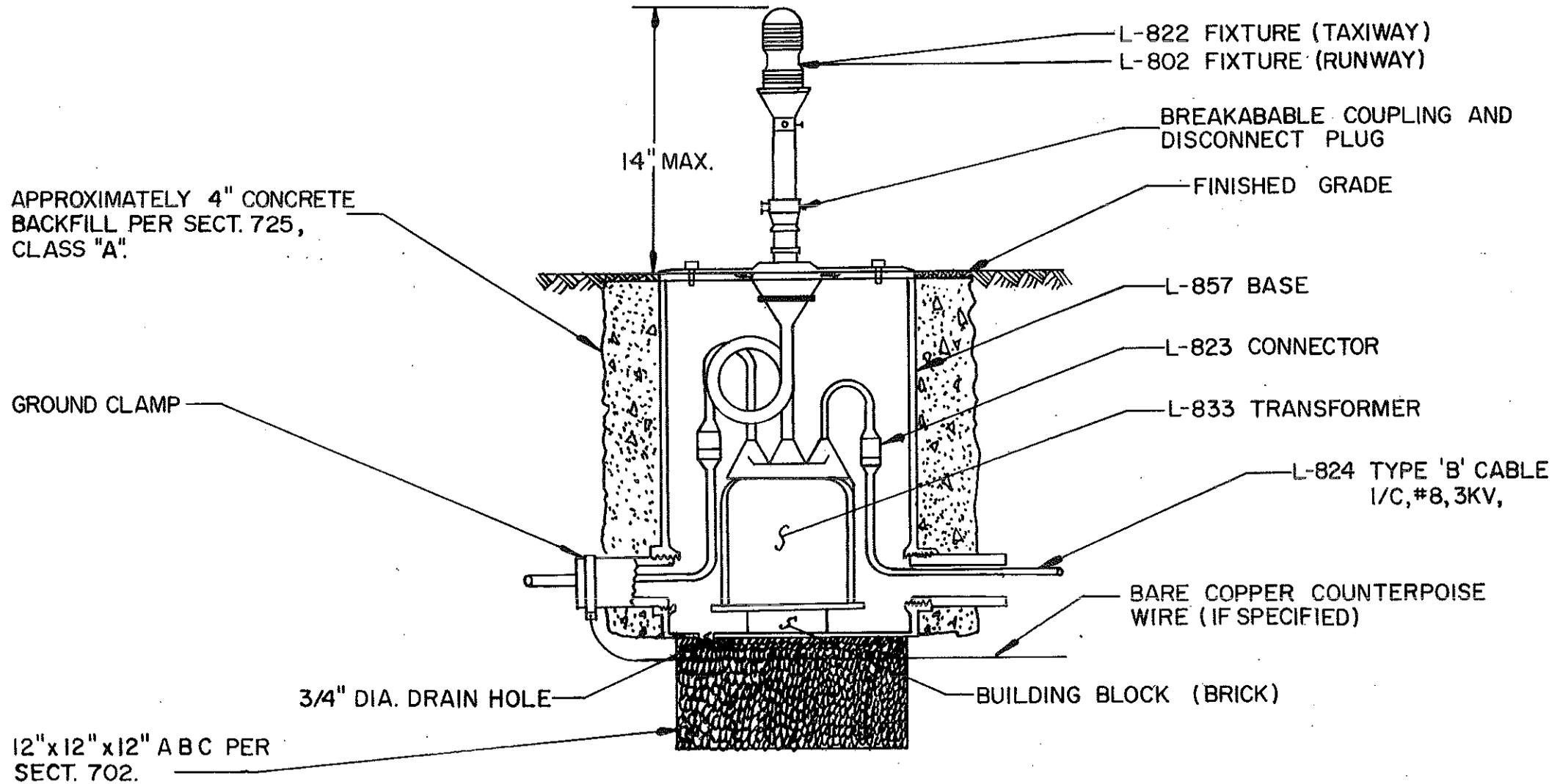


STANDARD DETAIL

6' CHAIN LINK FENCE & GATE

DETAIL NO.  
160

NOTE: L-\_\_\_ NUMBERS DESIGNATES  
FAA SPECIFICATION NO.



DETAIL NO.  
170



STANDARD DETAIL

TYPICAL RUNWAY OR TAXIWAY  
LIGHTING DETAIL

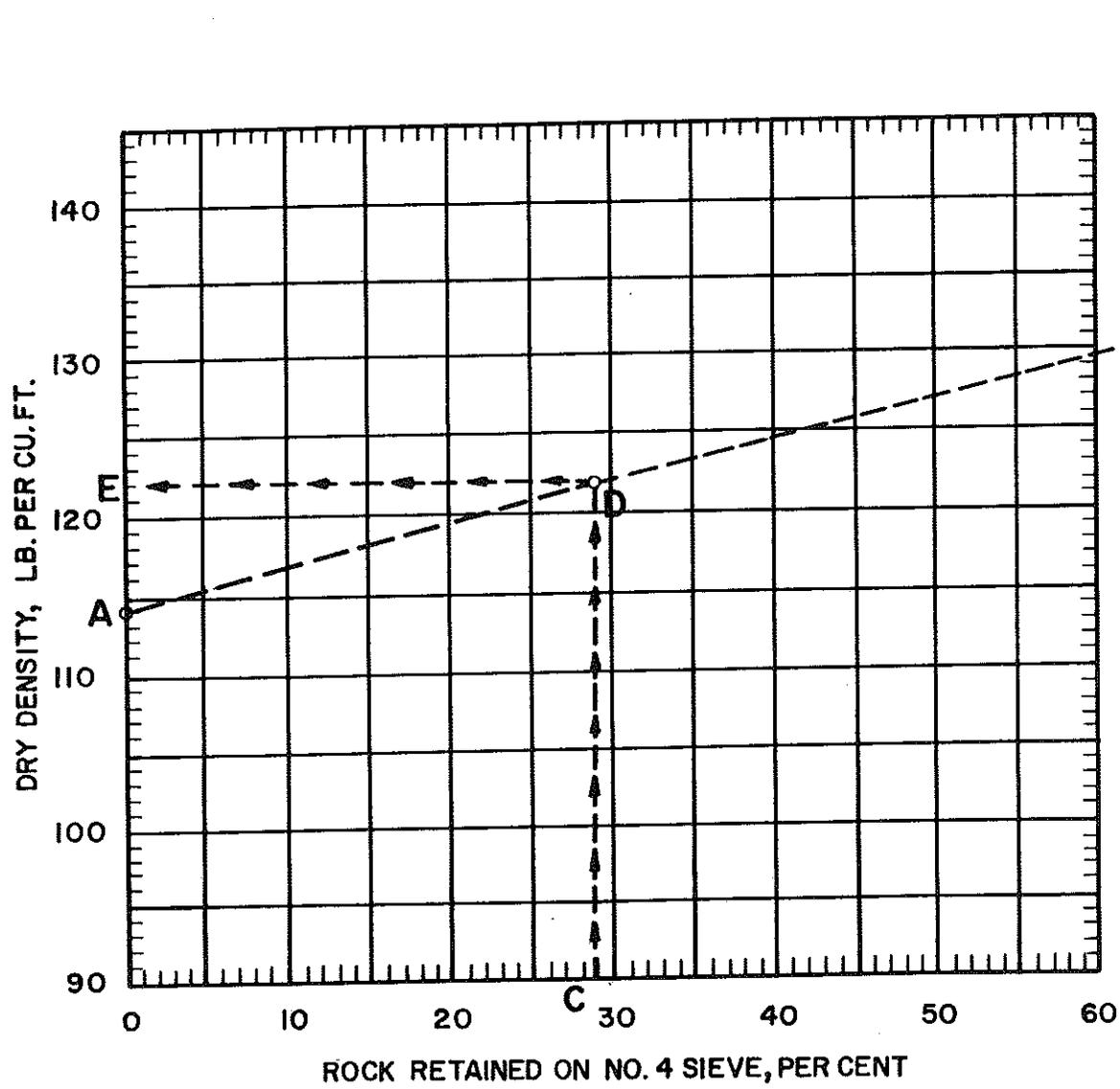
APPROVED PUBLIC WORKS COMMITTEE

CHAIRMAN

DATE

DETAIL NO.

170



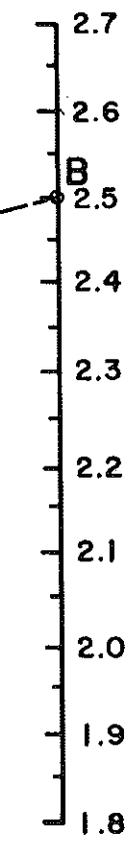
$$D = \frac{(100-R)d + 0.9RS \times 62.4}{100}$$

WHERE:

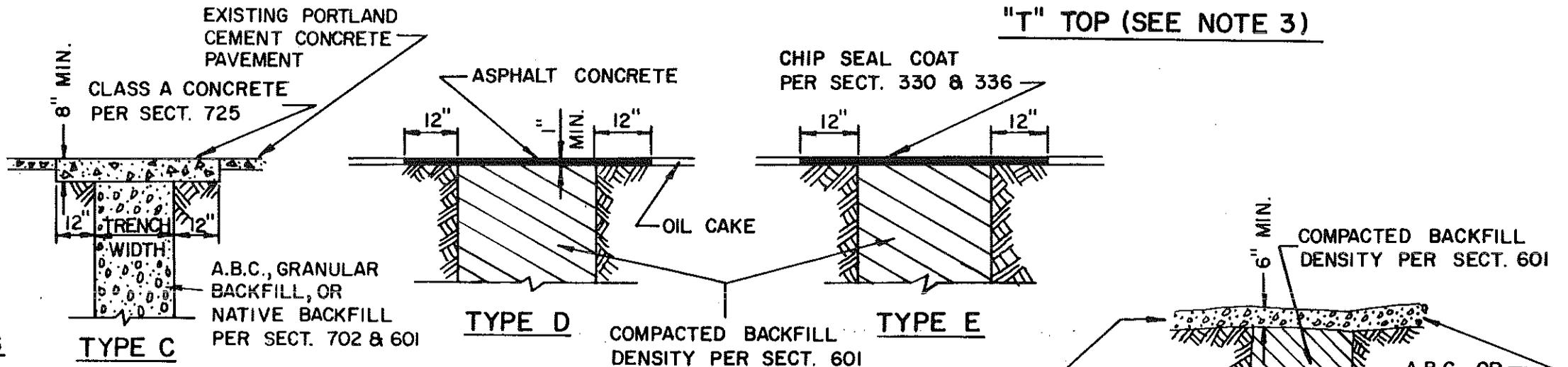
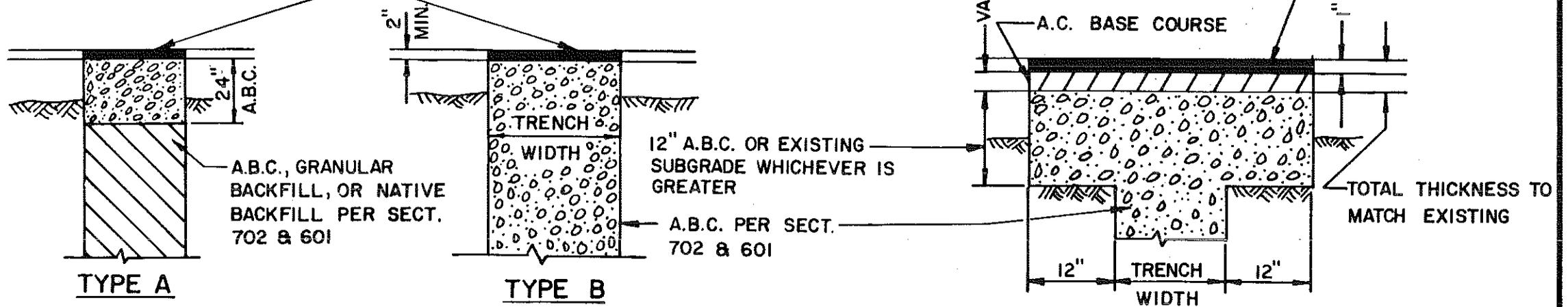
- D = DRY DENSITY OF SAMPLE CONTAINING R PERCENT ROCK, LB. PER CU. FT.
- R = PERCENT ROCK RETAINED ON NO. 4 SIEVE.
- d = DRY DENSITY OF PORTION PASSING NO. 4 SIEVE, LB. PER CU. FT.
- S = BULK SP. GR. OF ROCK.

EXAMPLE:

- KNOWN: DRY DENSITY OF MATERIAL PASSING NO. 4 SIEVE = 114 LB. PER CU. FT. PLOT AT A.
- KNOWN: SPECIFIC GRAVITY OF ROCK = 2.5 PLOT AT B. DRAW LINE AB.
- KNOWN: PERCENT OF ROCK IN TOTAL SAMPLE = 29. PLOT AT C. DRAW LINE CD AND LOCATE D AT INTERSECTION WITH AB. DRAW LINE DE LOCATING POINT E AT 122. 122 = DRY DENSITY IN LB. PER CU. FT. OF TOTAL SAMPLE CONTAINING 29% ROCK.



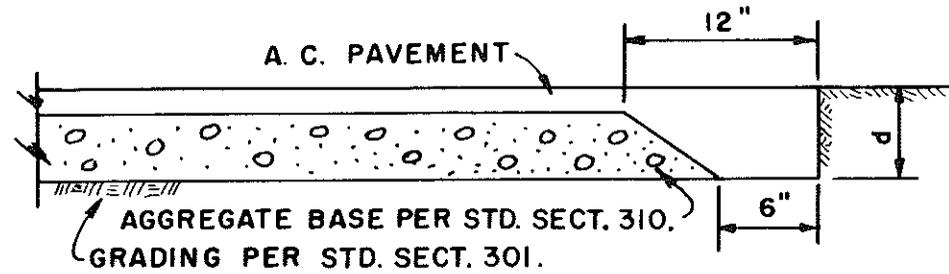
**A.C. PAVEMENT MATCH GRADATION & THICKNESS OF EXISTING PAVEMENT AND COURSES**



**NOTES**

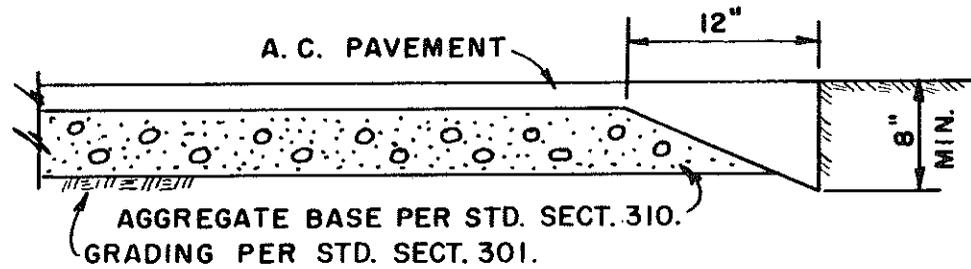
1. BEDDING PER SECTION 601
2. ASPHALT CONCRETE SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECT. 321
3. 12" LIP IS REQUIRED ON THE SIDES OF A TRENCH THAT ARE NOT PARALLEL TO THE CENTER LINE OF THE STREET.
4. TYPES D & E REQUIRE 9" OF A.B.C. AT TOP OF TRENCH WHEN THERE IS AN EXISTING BASE.

DETAIL NO. 200		<b>STANDARD DETAIL</b>	<b>BACKFILL, PAVEMENT &amp; SURFACE REPLACEMENT</b>		DETAIL NO. 200
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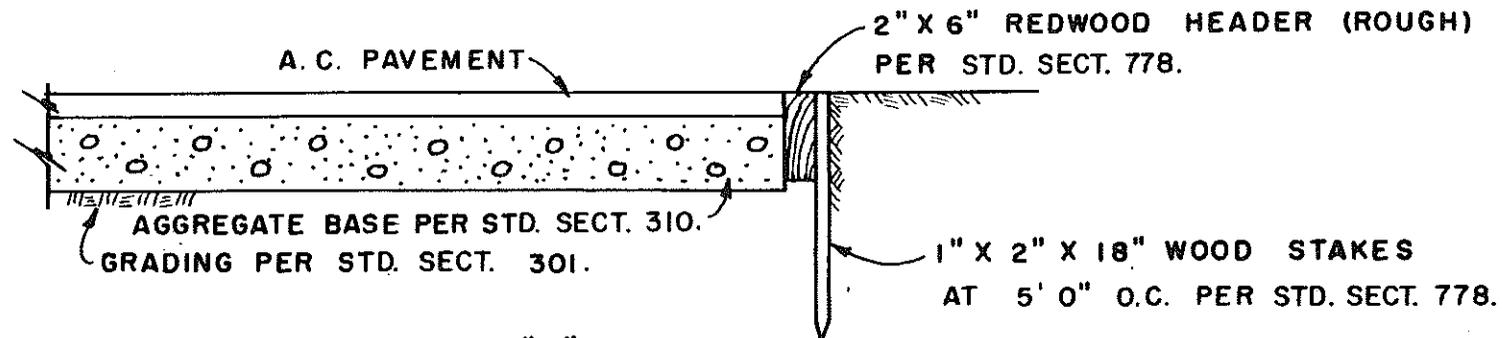


d = DESIGN THICKNESS OF A.C.  
PAVEMENT PLUS AGGREGATE BASE

TYPE "A"



TYPE "B"



TYPE "C"

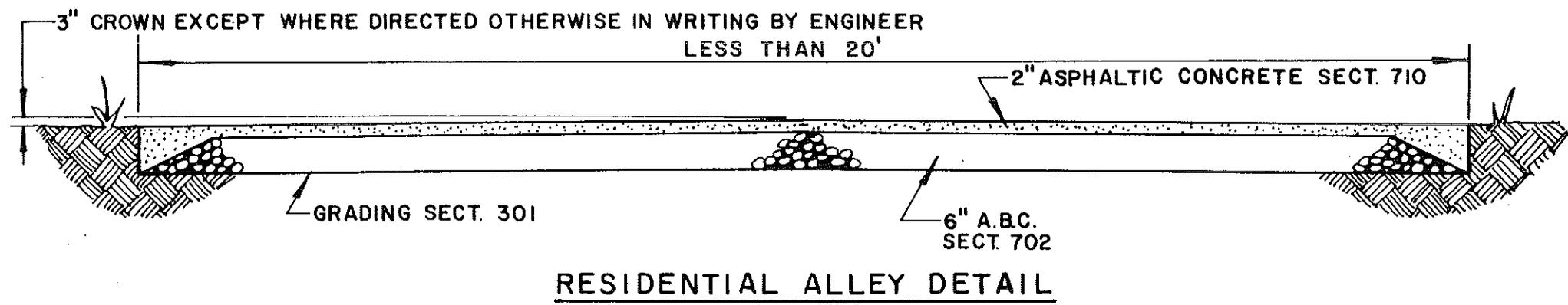
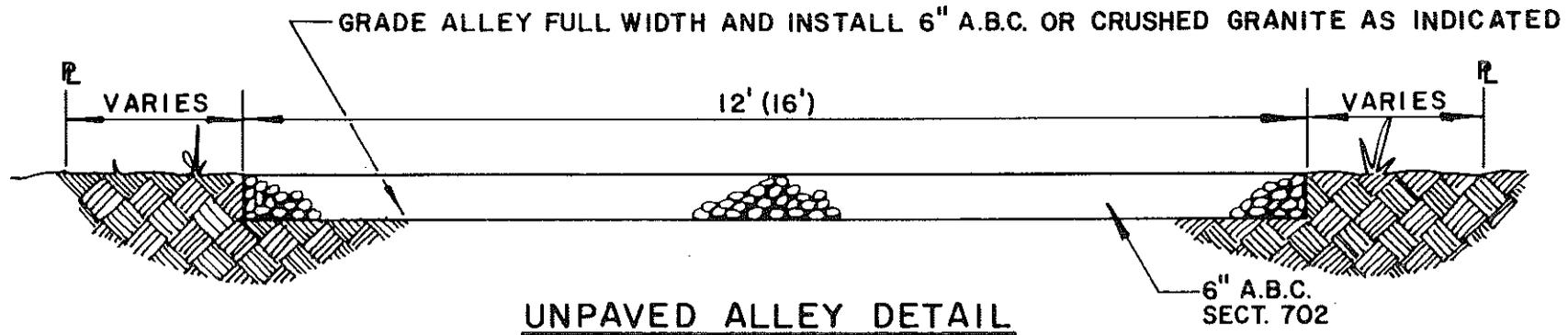
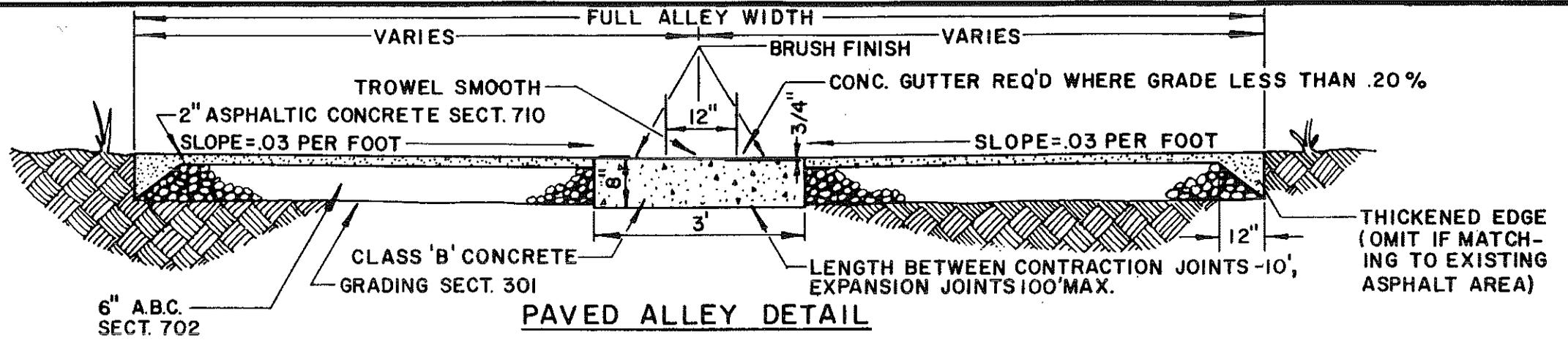
DETAIL NO.  
201



STANDARD DETAIL

PAVEMENT SECTION AT TERMINATION

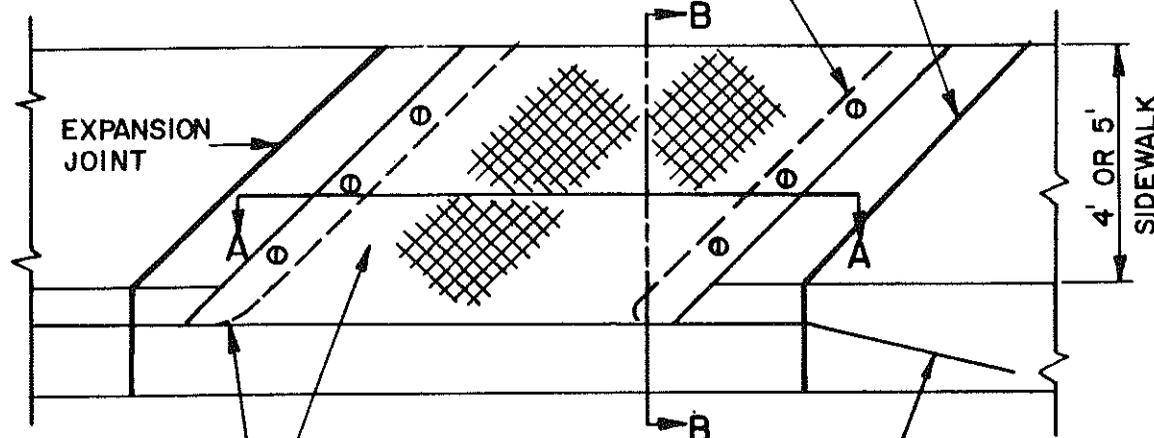
DETAIL NO.  
201



DETAIL NO. 202		STANDARD DETAIL	ALLEY DETAILS (PAVED & UNPAVED)	DETAIL NO. 202
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3/8" FLATHEAD STAINLESS STEEL CAP  
SCREW COUNTERSINK (6 EACH MIN.)

EXPANSION JOINT



EXPANSION JOINT

4' OR 5'  
SIDEWALK

SEE NOTE "1"

SEE NOTE "5"

TRANSITION FROM ROLL CURB TO VERTICAL CURB

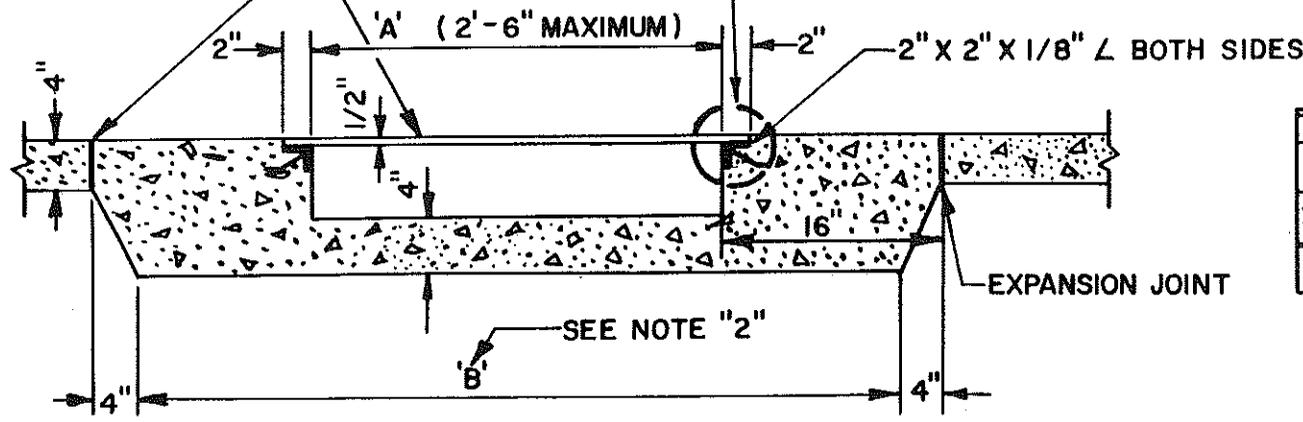
**NOTES**

1. ANGLE EQUALS 45° UNLESS SPECIFIED ON PLAN.
2. DIMENSION 'B' EQUALS A+2'
3. (→) INDICATES DIRECTION OF FLOW
4. PAINT STEEL ACCORDING TO SECT. 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.

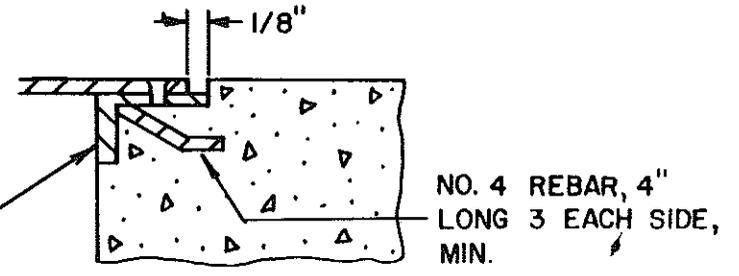
STEEL DIAMOND PLATE A-36

EXPANSION JOINT

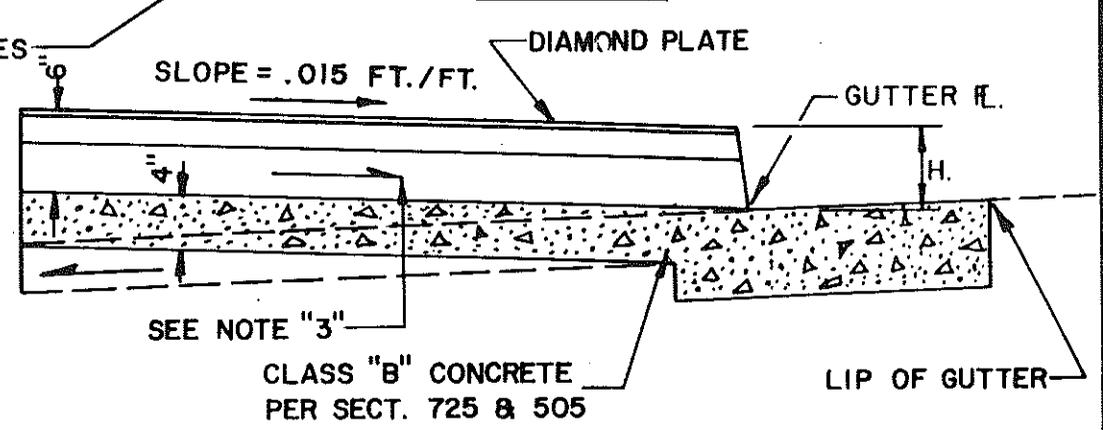
SEE DETAIL "C"



**SECTION 'A-A'**



**DETAIL C**



**SECTION 'B-B'**

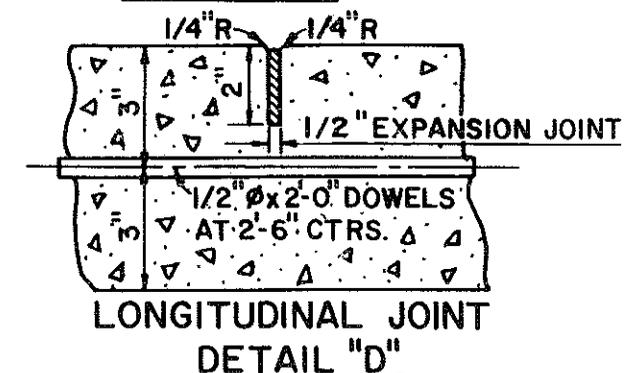
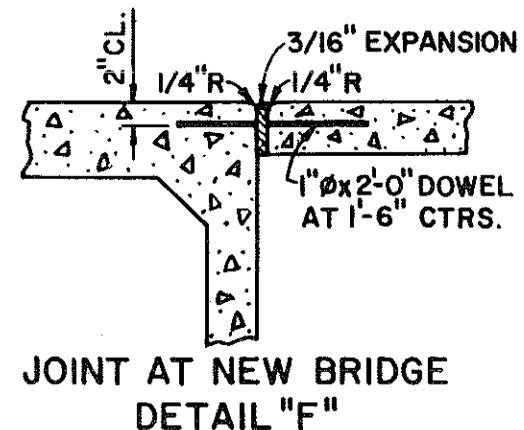
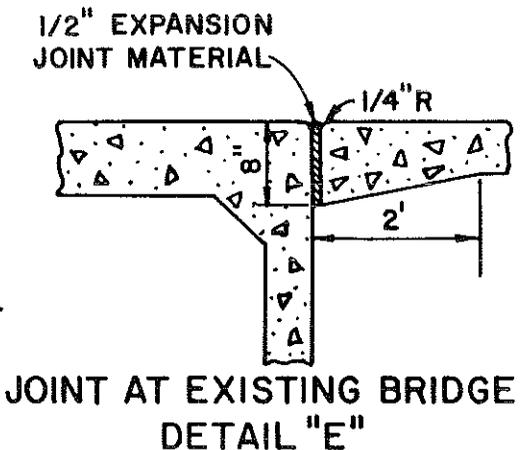
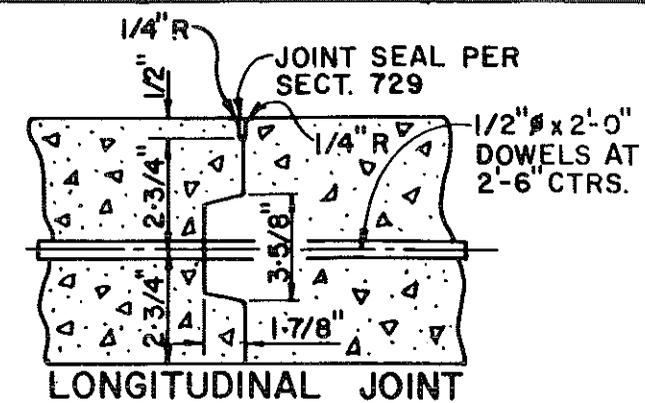
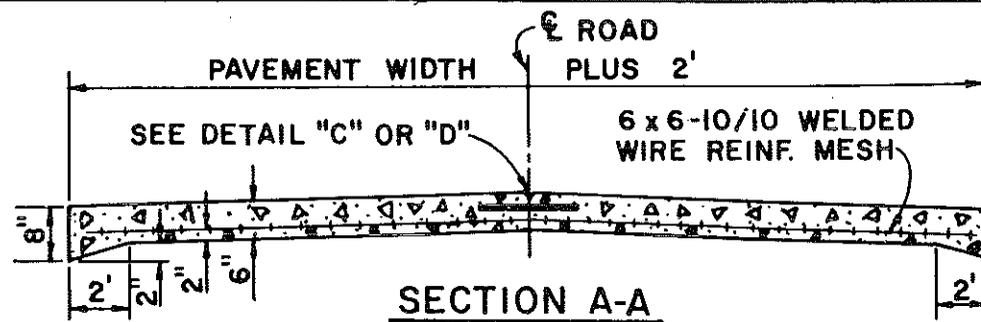
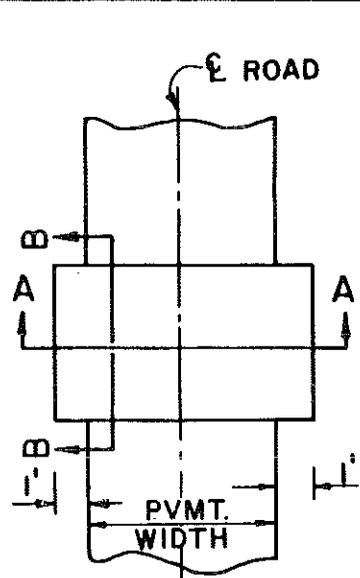
DETAIL NO.  
**203**



**STANDARD DETAIL**

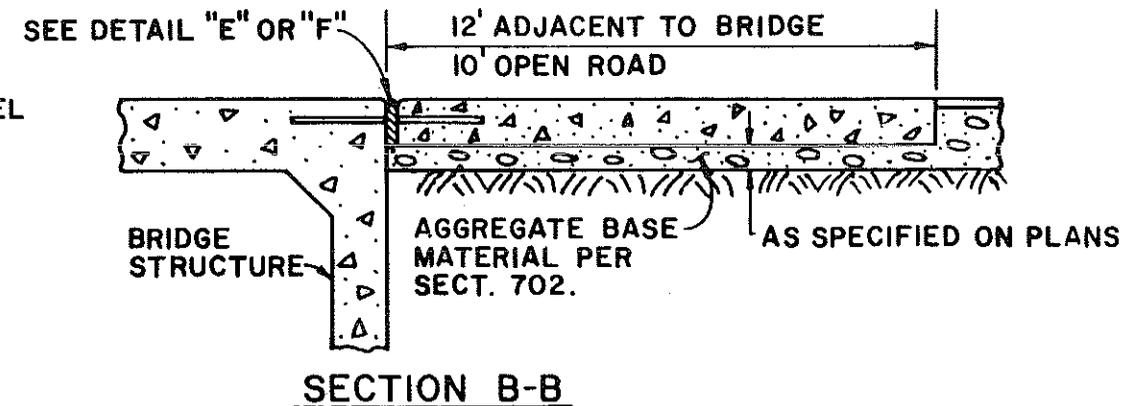
**SCUPPER**

DETAIL NO.  
**203**

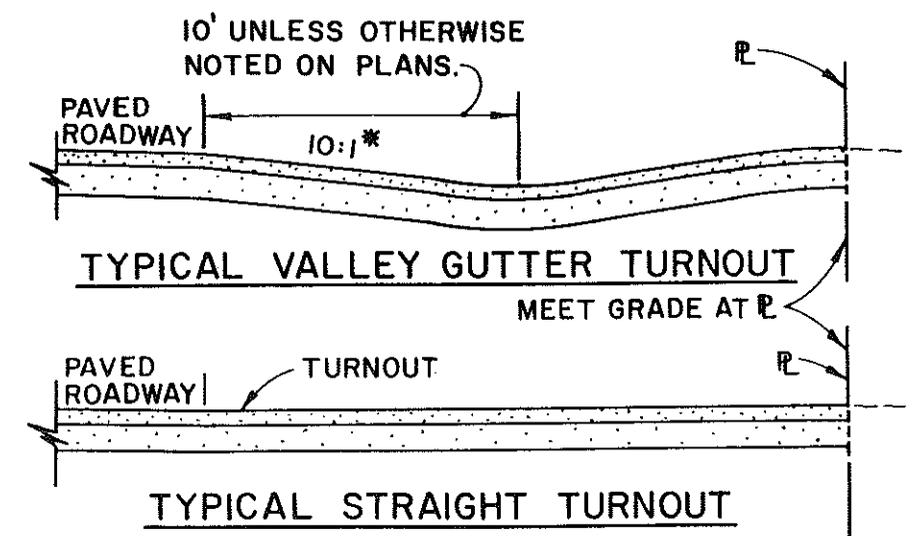
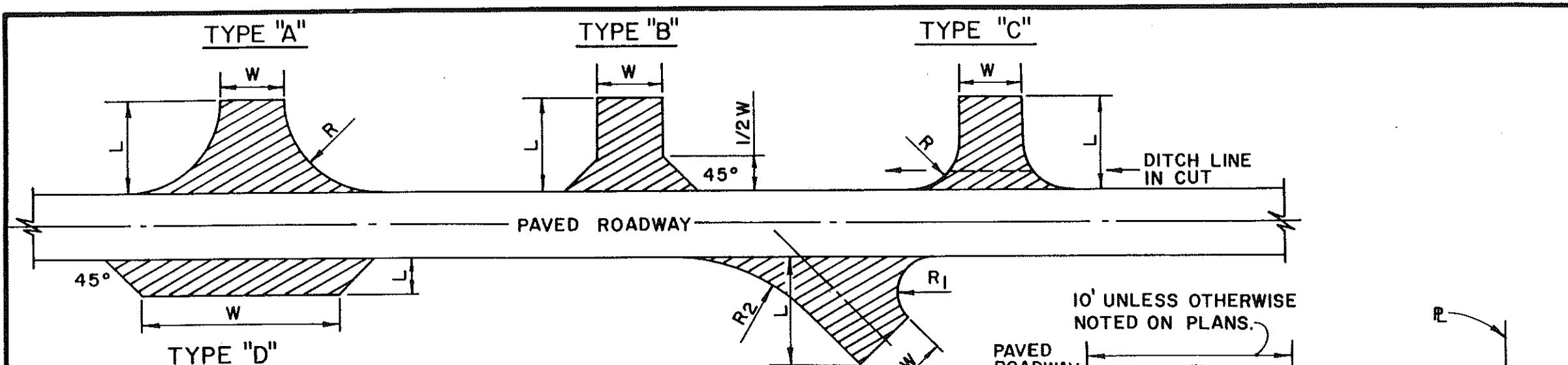


**NOTES:**

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 & PERPENDICULAR TO THE CENTERLINE 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.



DETAIL NO. 204	<b>STANDARD DETAIL</b>	<b>EQUIPMENT CROSSING</b>	DETAIL NO. 204
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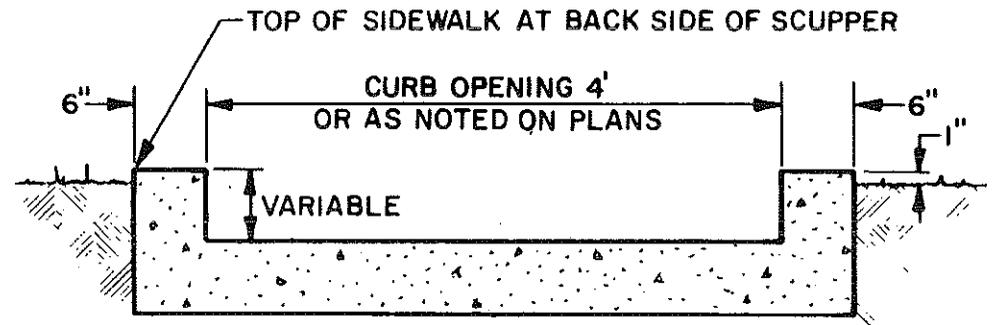
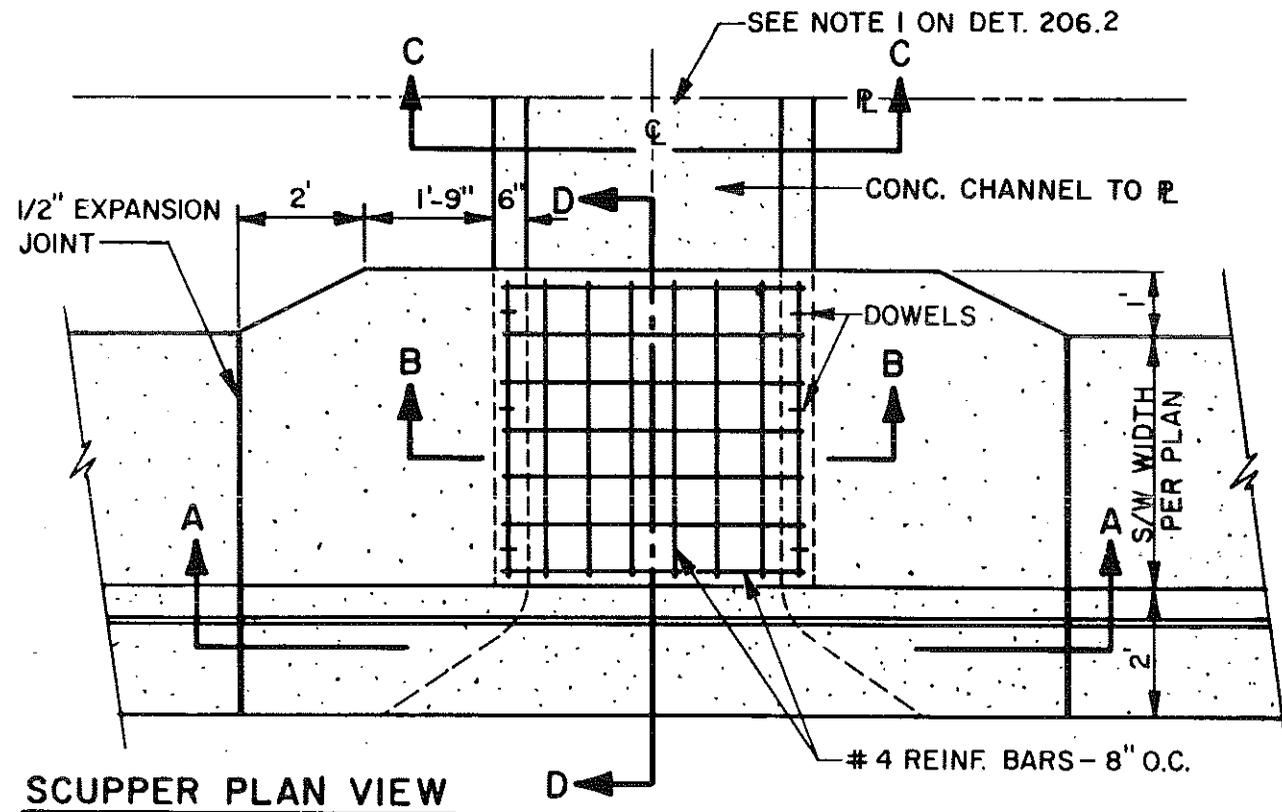
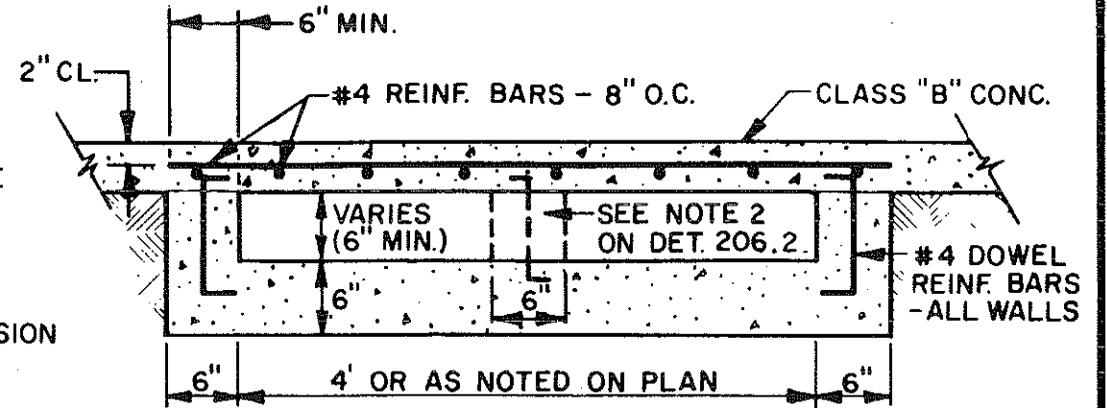
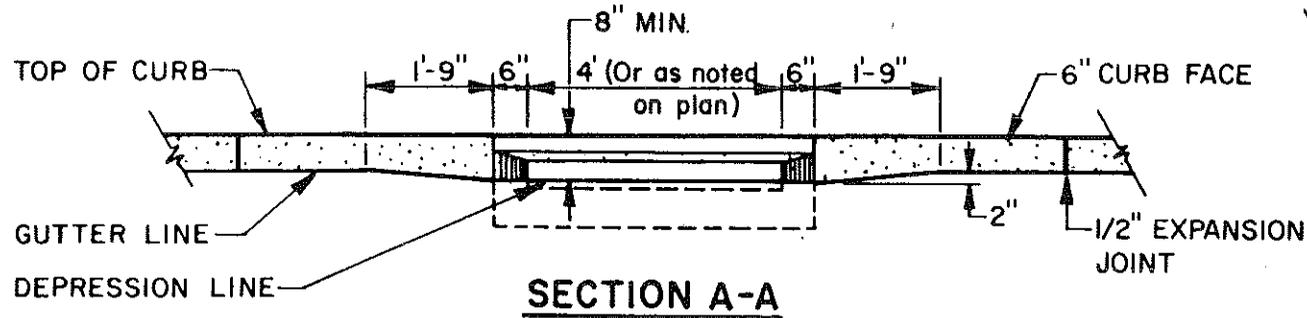


**NOTES:**

1. W-INDICATES WIDTH OF PAVED SURFACE OF TURNOUT.  
L-INDICATES LENGTH OF PAVED SURFACE OF TURNOUT.  
R - RADIUS.
2. SIZE & TYPE OF TURNOUT SHALL BE NOTED ON PLANS AS FOLLOWS:  
90°-NO RADIUS: WxL-SURFACE-TYPE; (12'x30'-A.C.-TYPE "B" TURNOUT).  
90°-WITH A RADIUS: WxLxR-SURFACE-TYPE; (12'x30'x15'-A.C.-TYPE "C" TURNOUT).  
OTHER THAN 90° WITH 2 RADII-TYPE "S": WxLxR<sub>1</sub>xR<sub>2</sub>-SURFACE-TYPE;  
(12'x30'x15'x50'-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

DETAIL NO. <b>205</b>	<b>STANDARD DETAIL</b>	<b>PAVED TURNOUTS</b>	DETAIL NO. <b>205</b>
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DETAIL NO.  
206.1

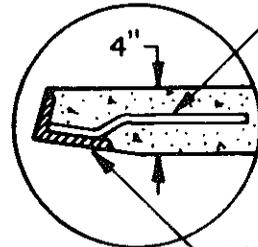


STANDARD DETAIL

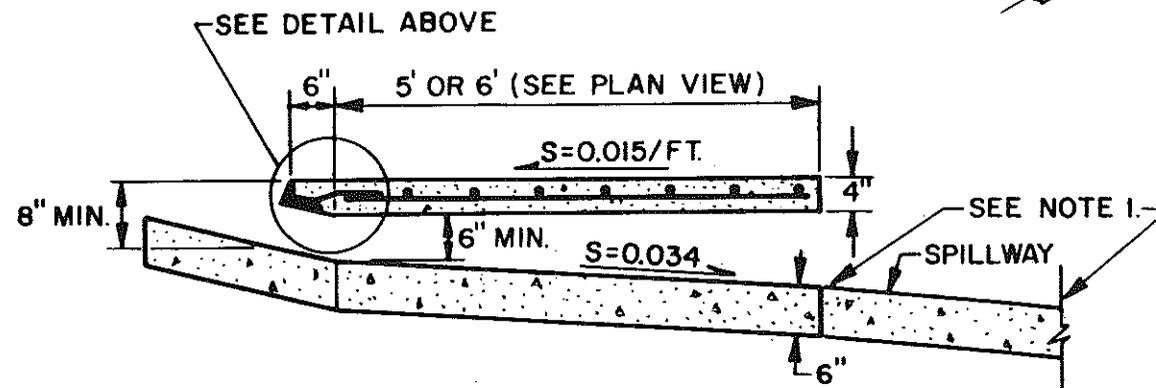
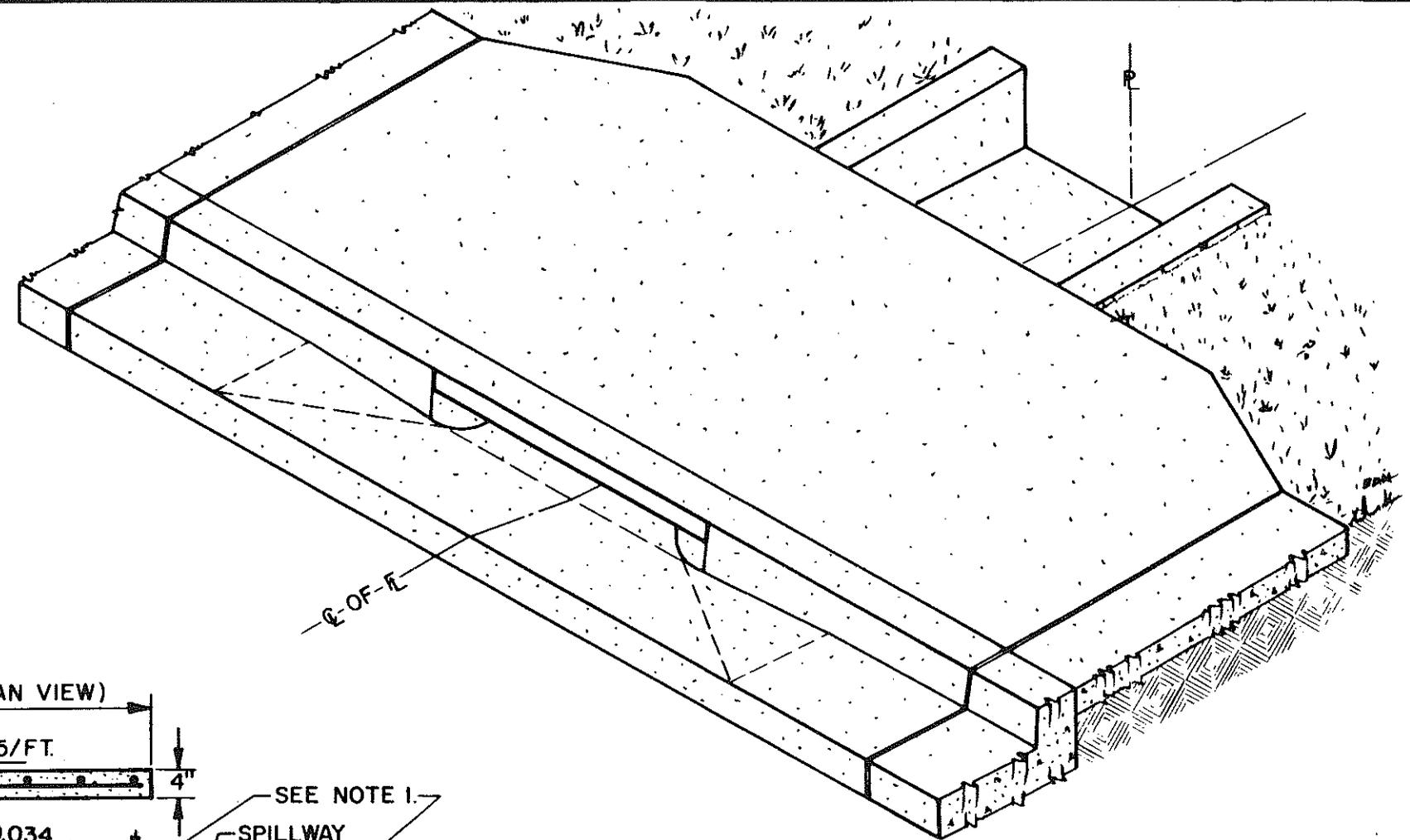
CONCRETE SCUPPER

DETAIL NO.  
206.1

ANCHOR BAR WELDED TO



1/2" x 3" x 4" L



SECTION D-D

NOTES

1. TRANSITION TO SPILLWAY/ CHANNEL AS PER APPROVED PLANS.
2. A CENTER WALL SHALL BE INSTALLED IN SCUPPERS WIDER THAN 4' OR IF MORE THAN 1 SCUPPER IS BUILT IN SERIES.
3. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751.

DETAIL NO.  
206.2

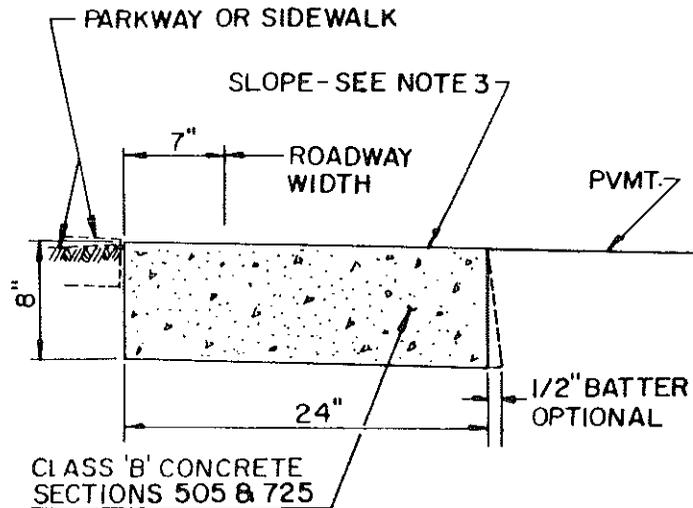


STANDARD DETAIL

CONCRETE SCUPPER

DETAIL NO.  
206.2

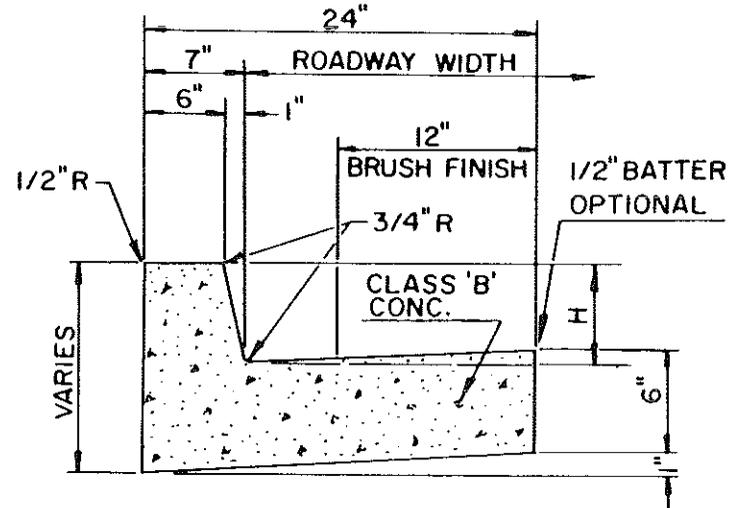
**RIBBON CURB  
(TYPE B)**



**NOTES**

1. CONSTRUCT CURB AND INSTALL 1/2" MASTIC EXPANSION JTS., A.S.T.M. D-1751. SECT. 340.
2. BROOM FINISH ALL SURFACES.
3. RIBBON CURB MAY SLOPE TOWARDS PAVEMENT OR PARKWAY AS INDICATED ON PLANS.
4. CONTRACTION JOINT SPACING 10' MAX.

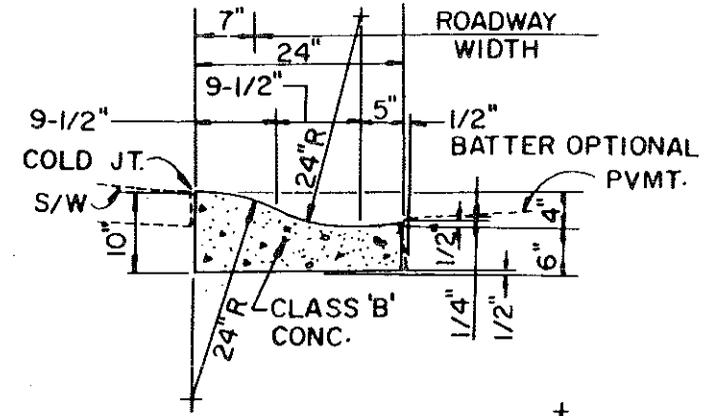
**VERTICAL CURB & GUTTER  
(TYPE A)**



**NOTES**

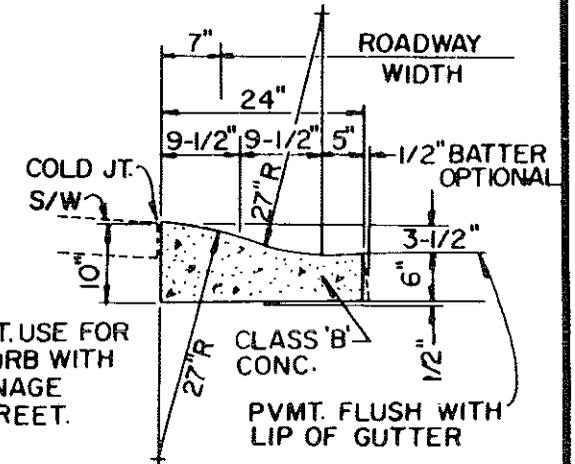
1. ALL EXPOSED SURFACES TO BE TROWEL FINISHED EXCEPT AS SHOWN. SEE SECTION 340.
2. H=6" OR AS SPECIFIED ON PLANS.
3. CONTRACTION JOINT SPACING 10' MAX.
4. EXPANSION JOINTS AS PER STD. SECT. 340

**ROLL TYPE CURB & GUTTER  
(TYPE C)**



**(TYPE D)**

SPECIAL SECT. USE FOR HIGH SIDE CURB WITH SHEET DRAINAGE ACROSS STREET.



**NOTES**

1. ALL WORK AND MATERIALS SHALL CONFORM TO SECT. 340, 505, 725 BROOM FINISH EXPOSED SURFACE.
2. CONTRACTION JOINT SPACING 10' MAX.
3. EXPANSION JOINTS AS PER STD. SECT. 340

DETAIL NO.  
220

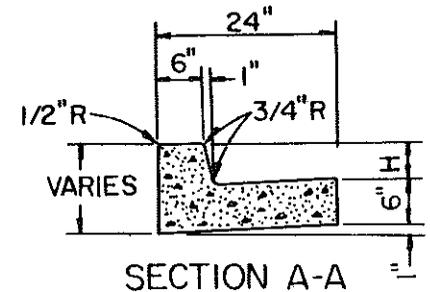
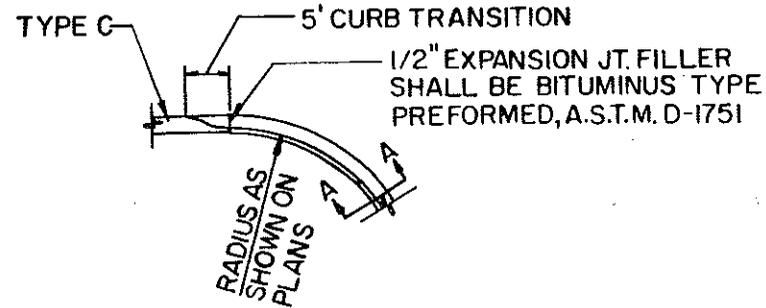


STANDARD DETAIL

CURB AND GUTTER - TYPES A, B, C & D

DETAIL NO.  
220

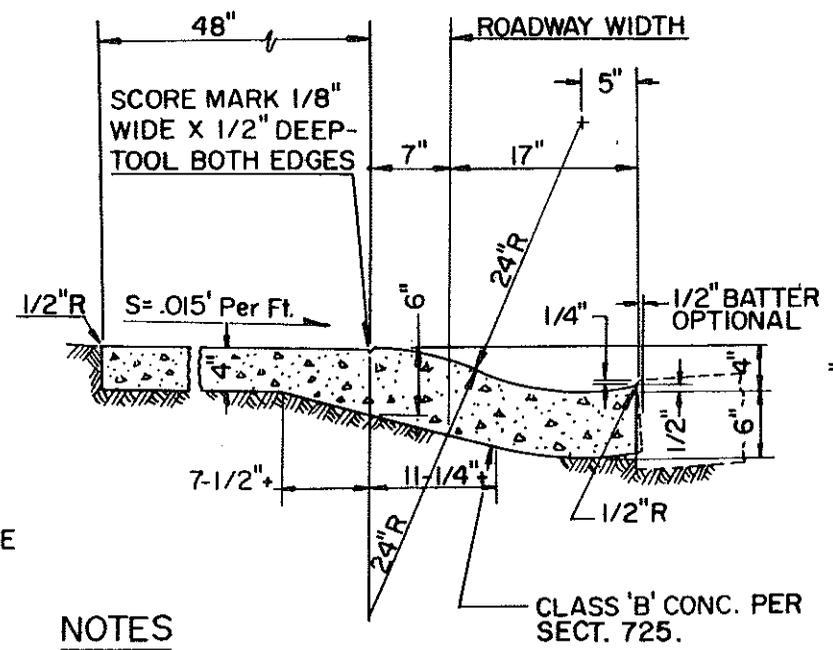
**CURB & GUTTER TRANSITION**



**NOTES**

1. THE CURB TRANSITION WILL BE PAID FOR AS TYPE C. WHEN A PROJECT CONSISTS OF TYPE C. CURB & GUTTER THROUGHOUT, THE ENTIRE RETURN SHALL BE MEASURED AND PAID FOR AS TYPE A.
2. WHERE PROPOSED CONSTRUCTION IS TO BE CONNECTED TO EXISTING C. & G., THE TRANSITION SHALL BE AS INDICATED ON PLANS.

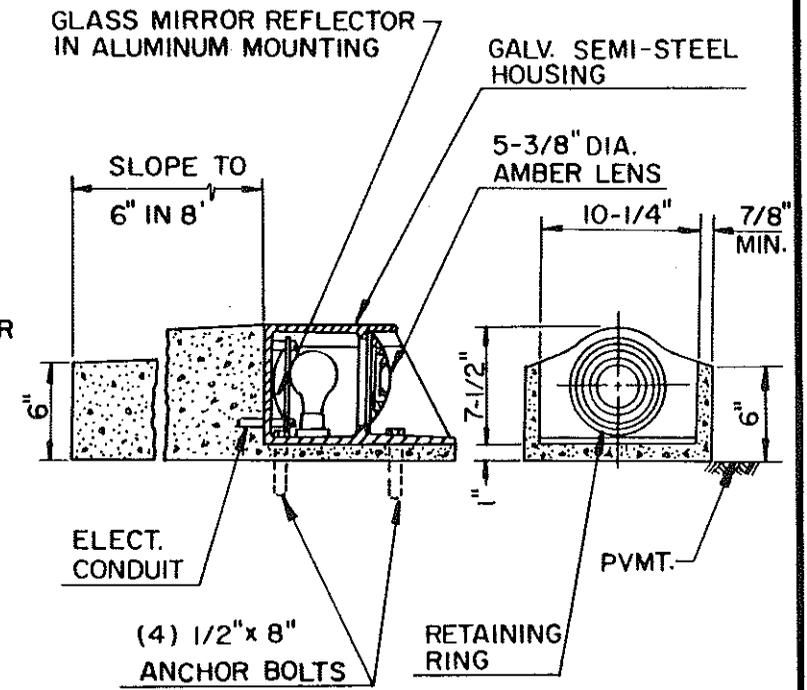
**INTEGRAL ROLL CURB, GUTTER & SIDEWALK**



**NOTES**

1. CONCRETE TO BE MONOLITHIC POUR. EXPOSED SURFACE FINISH AS PER SIDEWALK AND GUTTER DETAIL.
2. CONTRACTION JOINT SPACING 16' MAXIMUM.
3. EXPANSION JOINTS PER SECT. 340.

**CURB WARNING BEACON**



DETAIL NO.  
221



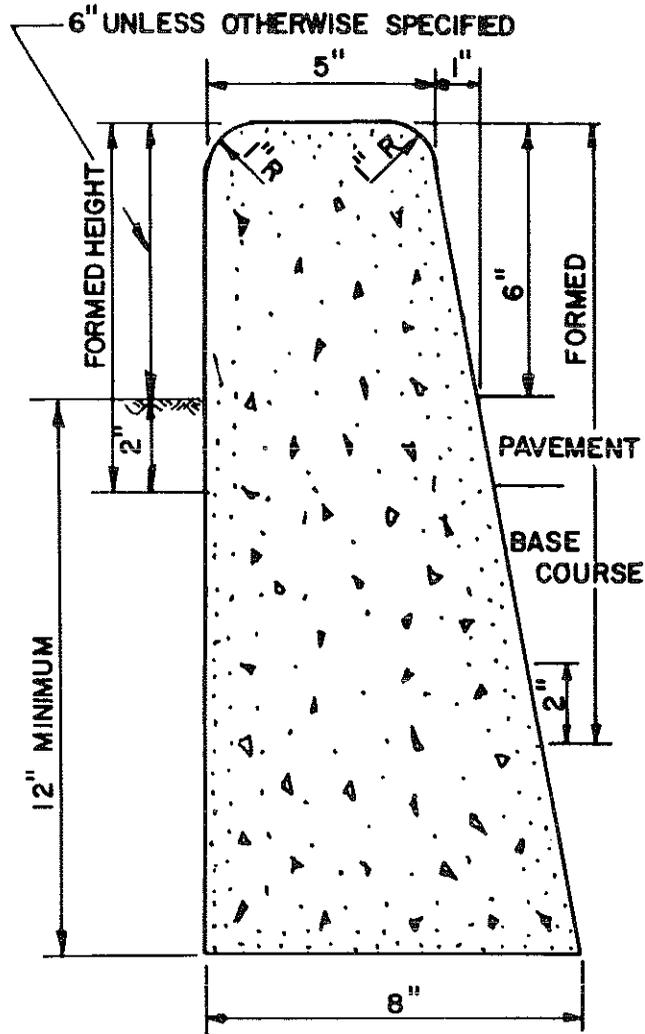
**STANDARD DETAIL**

**CURB AND GUTTER  
(TRANSITION, INTEGRAL & WARNING BEACON)**

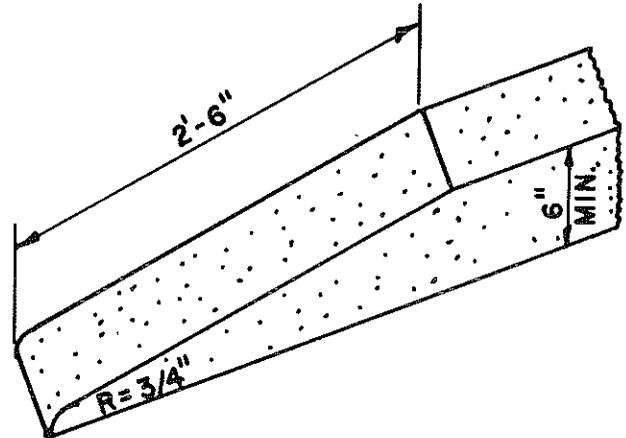
DETAIL NO.  
221

**NOTES**

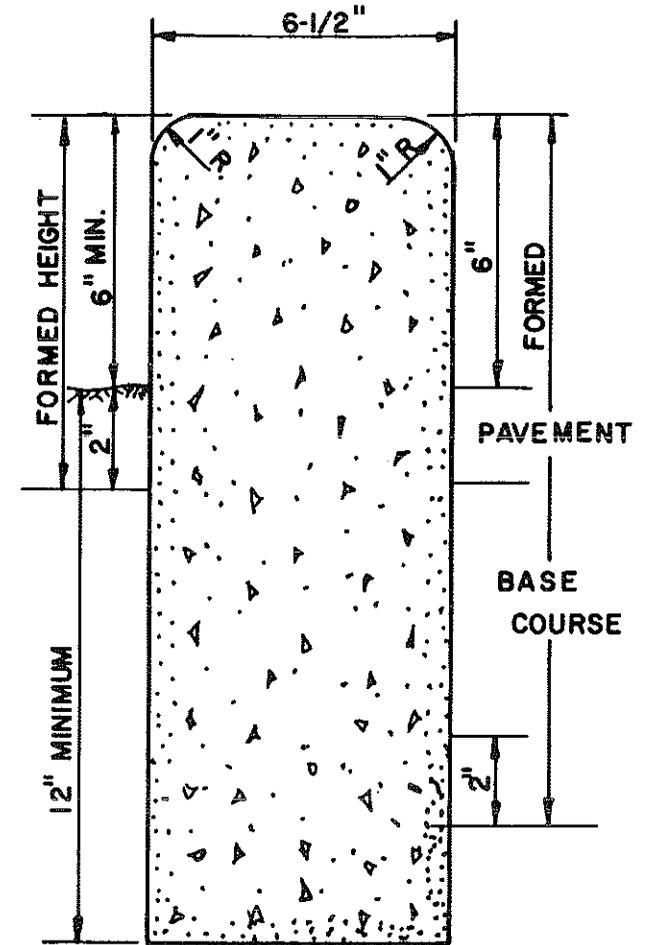
1. ALL VERTICAL SURFACES TO BE FORMED
2. VERTICAL SURFACES DOWN FROM 2" BELOW UNDISTURBED SOIL MAY BE PLACED AGAINST NEAT CUT IF APPROVED BY THE ENGINEER AND CONCRETE WILL NOT EXTEND MORE THAN 1" BEYOND THEORETICAL FACE
3. ALL EXPOSED SURFACES TO BE STRIPPED GREEN AND TROWEL FINISHED
4. CONCRETE CURBS CONFORM TO SECTION 340
5. MAXIMUM SPACING OF CONTRACTION JOINTS IS 10'
6. CONCRETE TO BE CLASS "B" PER SECT. 725.



TYPE "A"

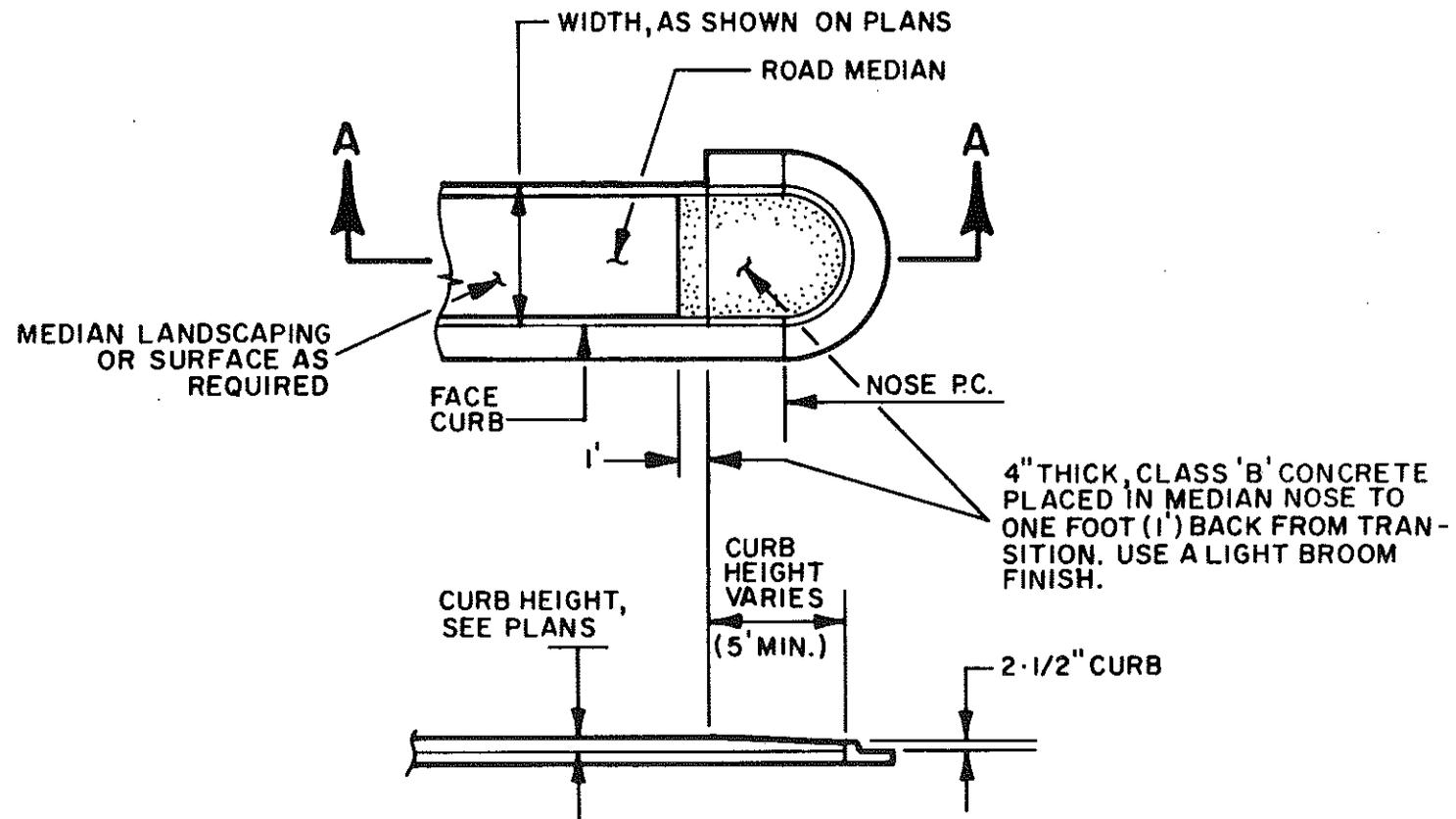


TYPICAL CURB TERMINATION



TYPE "B"

DETAIL NO. 222		STANDARD DETAIL	SINGLE CURB - TYPES A, B & TERMINATION	DETAIL NO. 222
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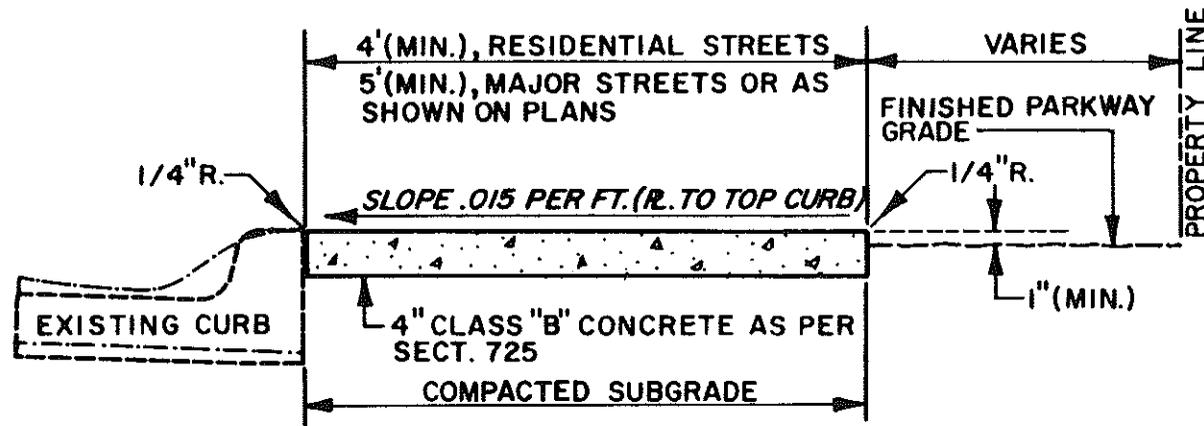


**SECTION A-A**

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

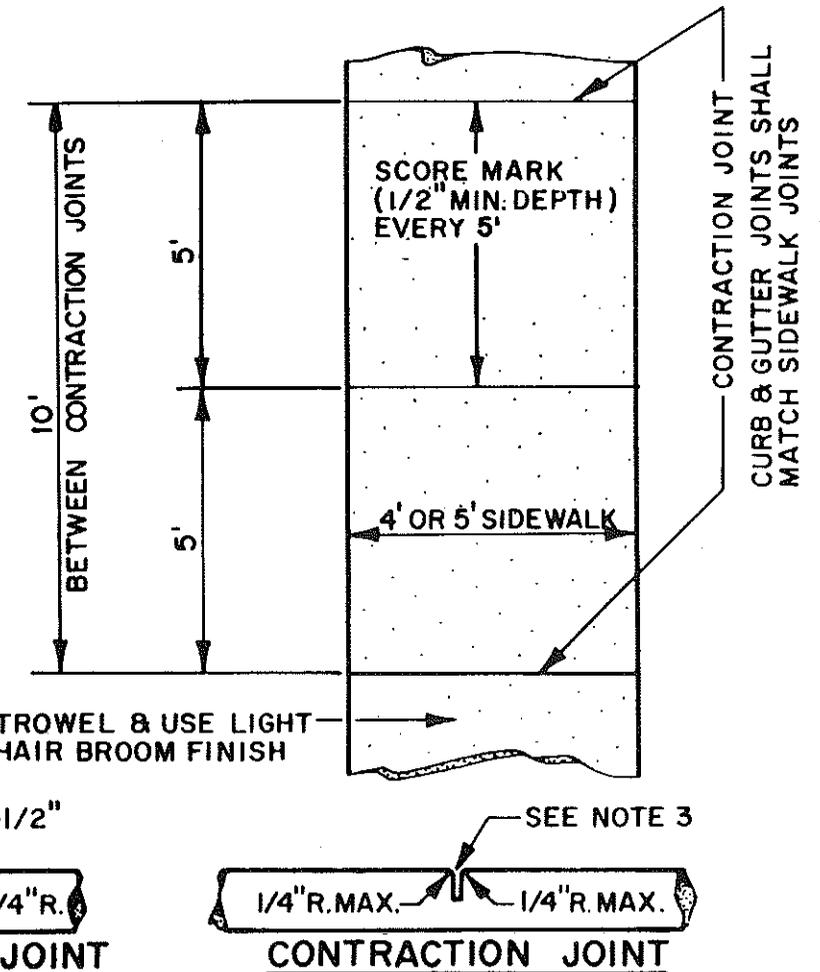
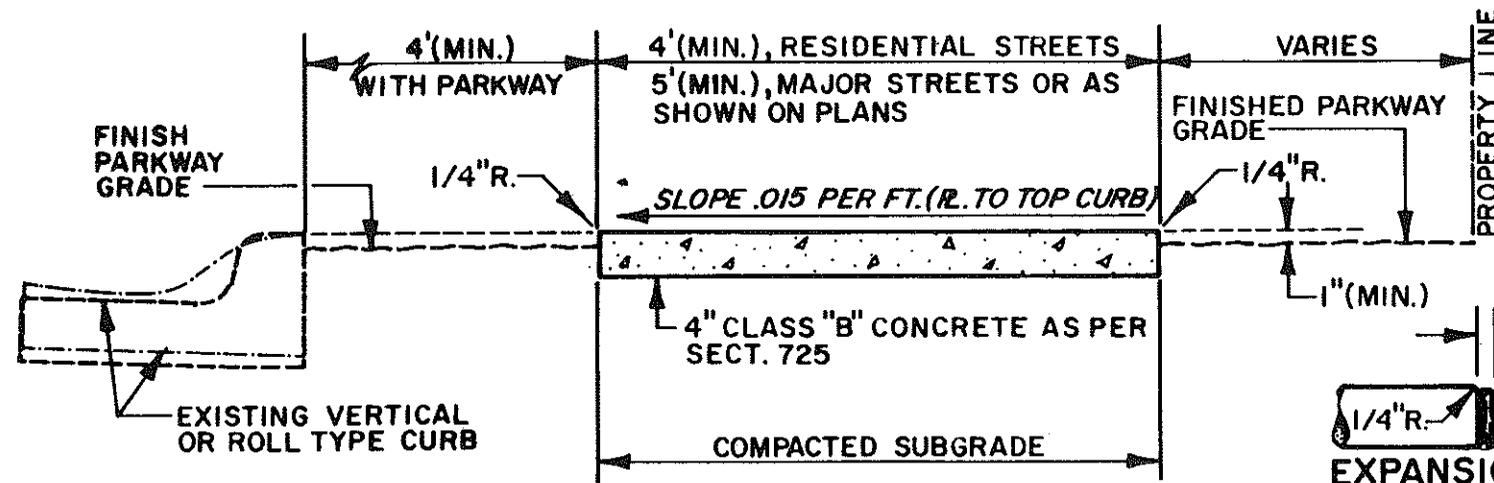
DETAIL NO. <b>223</b>	 <b>STANDARD DETAIL</b>	<b>MEDIAN NOSE TRANSITION</b>		DETAIL NO. <b>223</b>
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**NOTES**

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECT. 340.
2. EXPANSION JOINT FILLER 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 MIN. OF 3/4".
4. EXPANSION JOINT 100 MAX. SPACING PER SECT. 340.



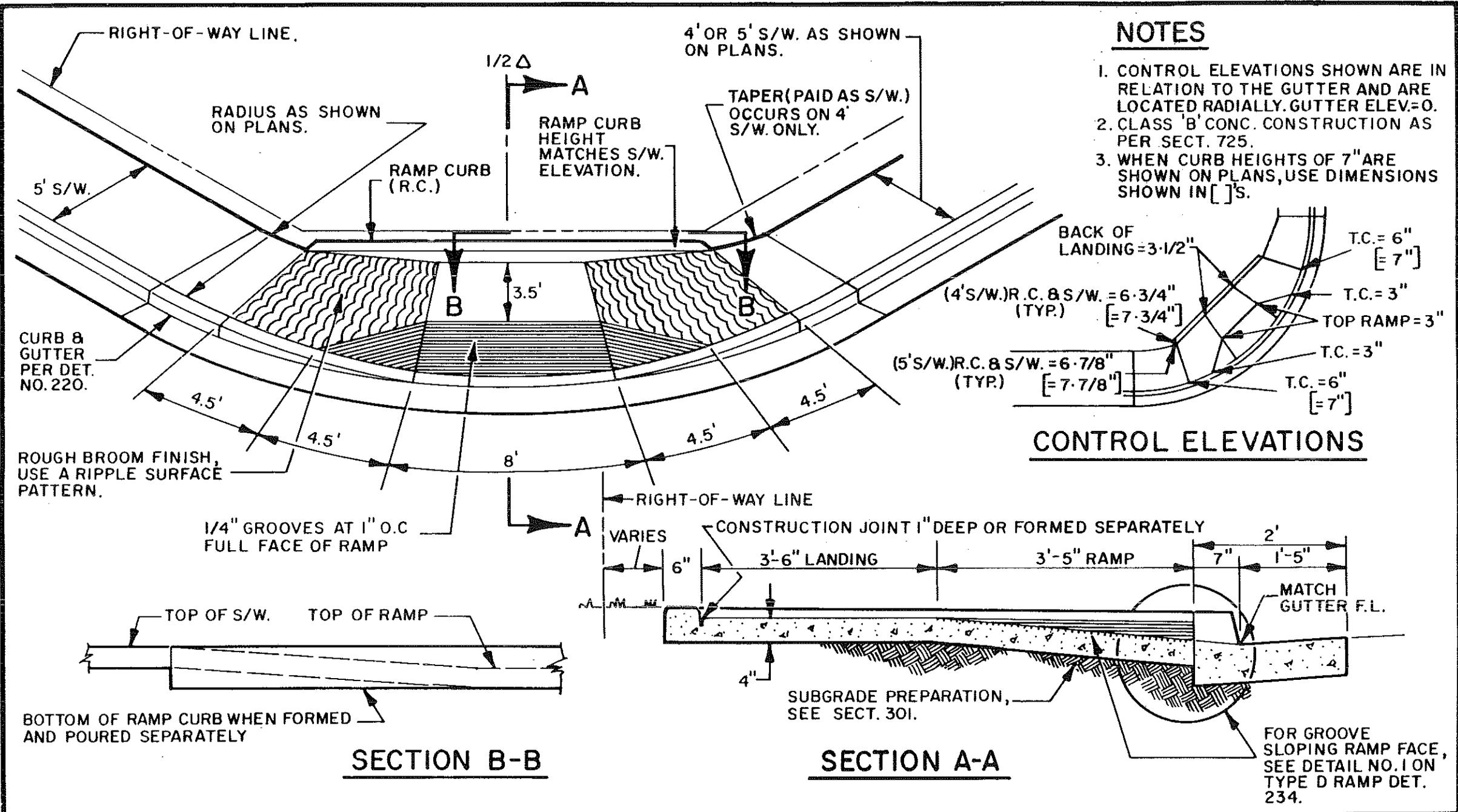
DETAIL NO.  
230



STANDARD DETAIL

SIDEWALKS

DETAIL NO.  
230



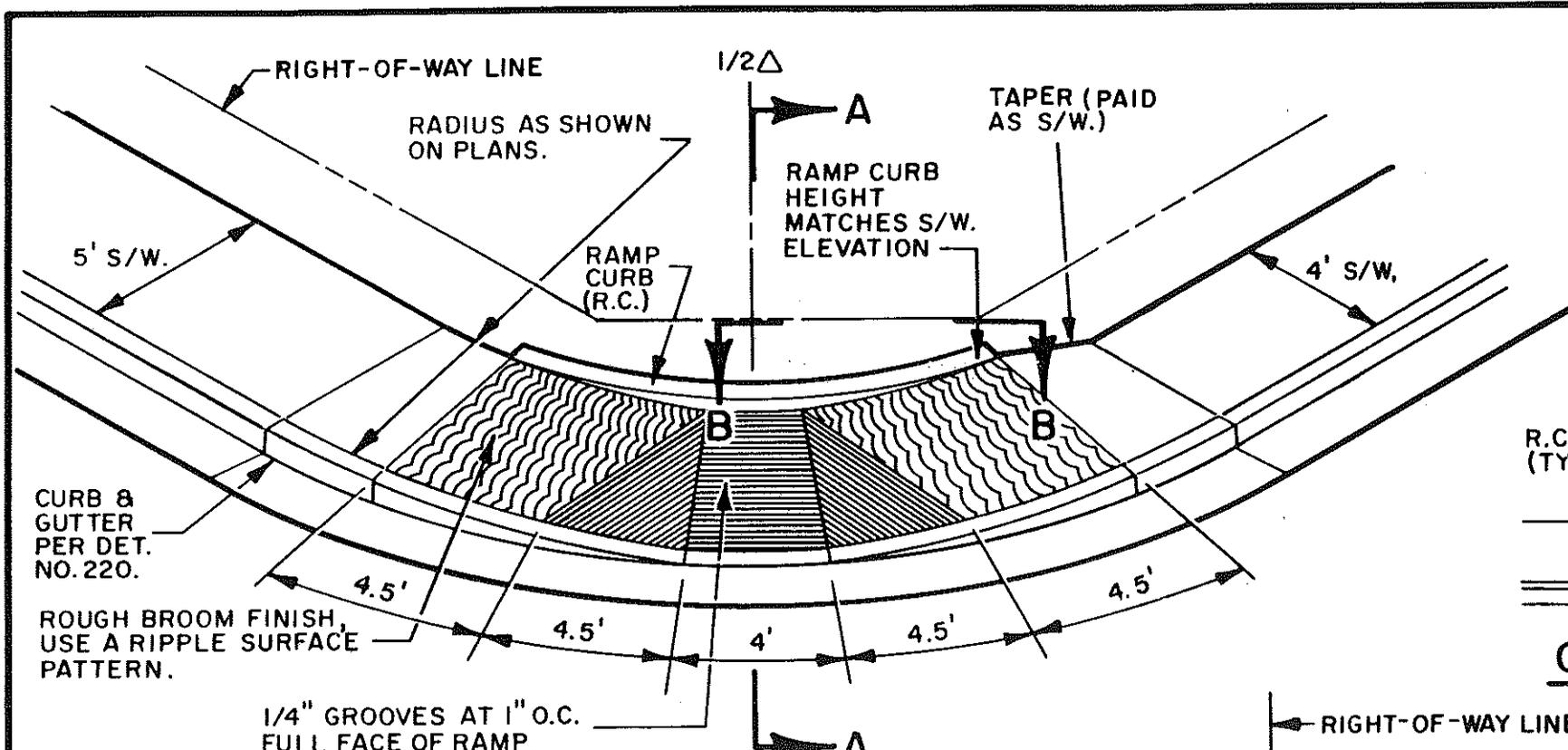
- NOTES**
1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADially. GUTTER ELEV.=0.
  2. CLASS 'B' CONC. CONSTRUCTION AS PER SECT. 725.
  3. WHEN CURB HEIGHTS OF 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]'S.

**CONTROL ELEVATIONS**

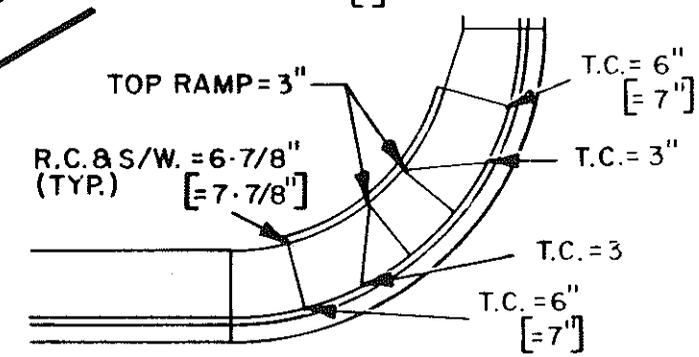
**SECTION B-B**

**SECTION A-A**

DETAIL NO. <b>231</b>	 <b>STANDARD DETAIL</b>	<b>SIDEWALK RAMPS- TYPE A</b>	DETAIL NO. <b>231</b>
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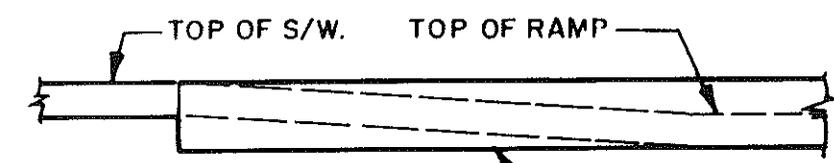


- ### NOTES
- CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIALLY. GUTTER ELEV.= 0.
  - CLASS 'B' CONC. CONSTRUCTION AS PER SECT. 725.
  - WHEN CURB HEIGHTS OF 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]'S.



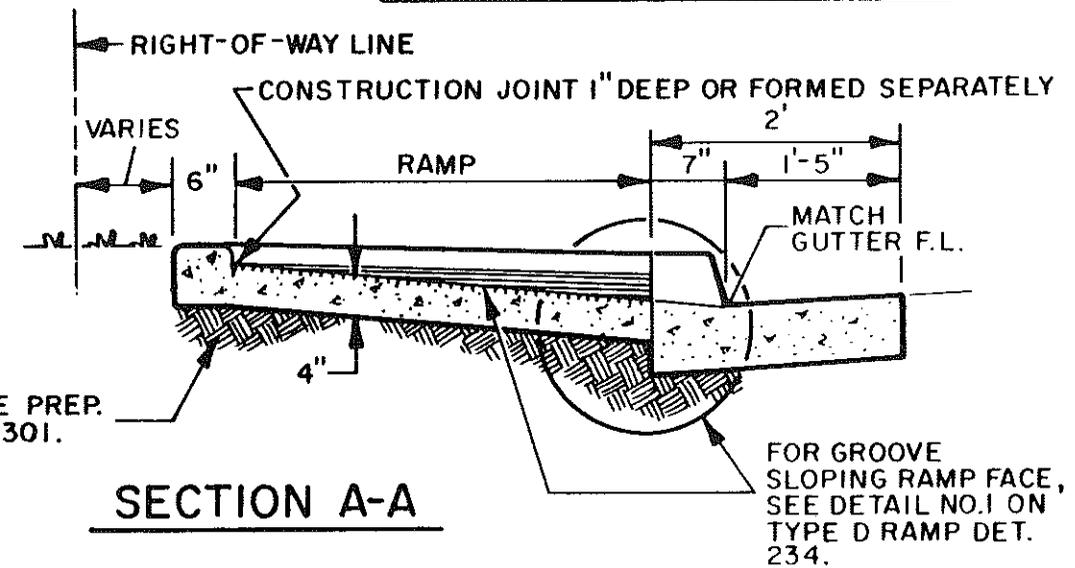
### CONTROL ELEVATIONS

CURB & GUTTER PER DET. NO. 220.  
 ROUGH BROOM FINISH, USE A RIPPLE SURFACE PATTERN.



BOTTOM OF RAMP CURB WHEN FORMED AND POURED SEPARATELY

### SECTION B-B

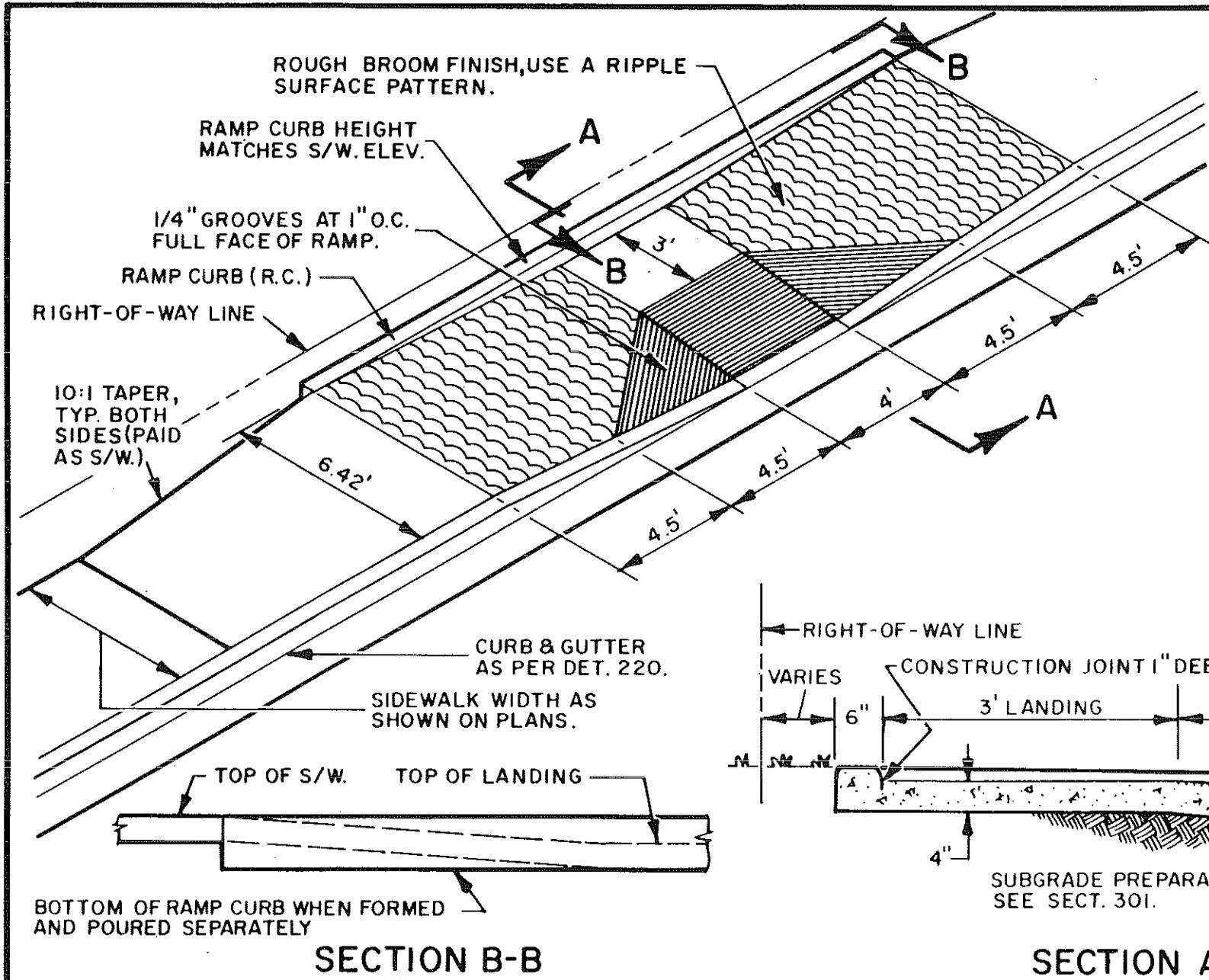


SUBGRADE PREP. SEE SECT. 301.

### SECTION A-A

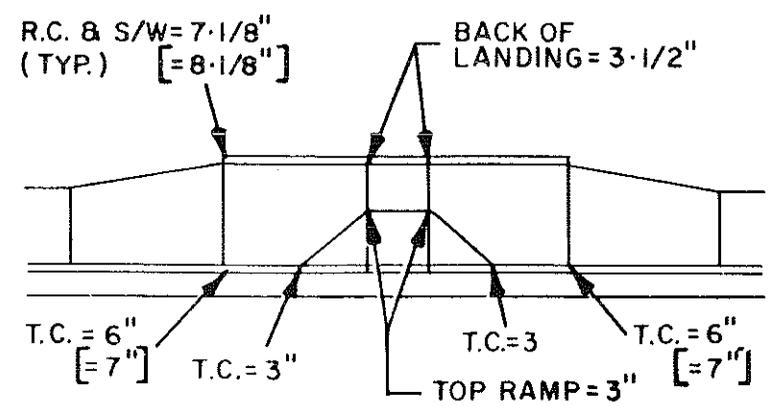
FOR GROOVE SLOPING RAMP FACE, SEE DETAIL NO. 1 ON TYPE D RAMP DET. 234.

DETAIL NO. <b>232</b>	 <b>STANDARD DETAIL</b>	<b>SIDEWALK RAMPS - TYPE B</b>	DETAIL NO. <b>232</b>
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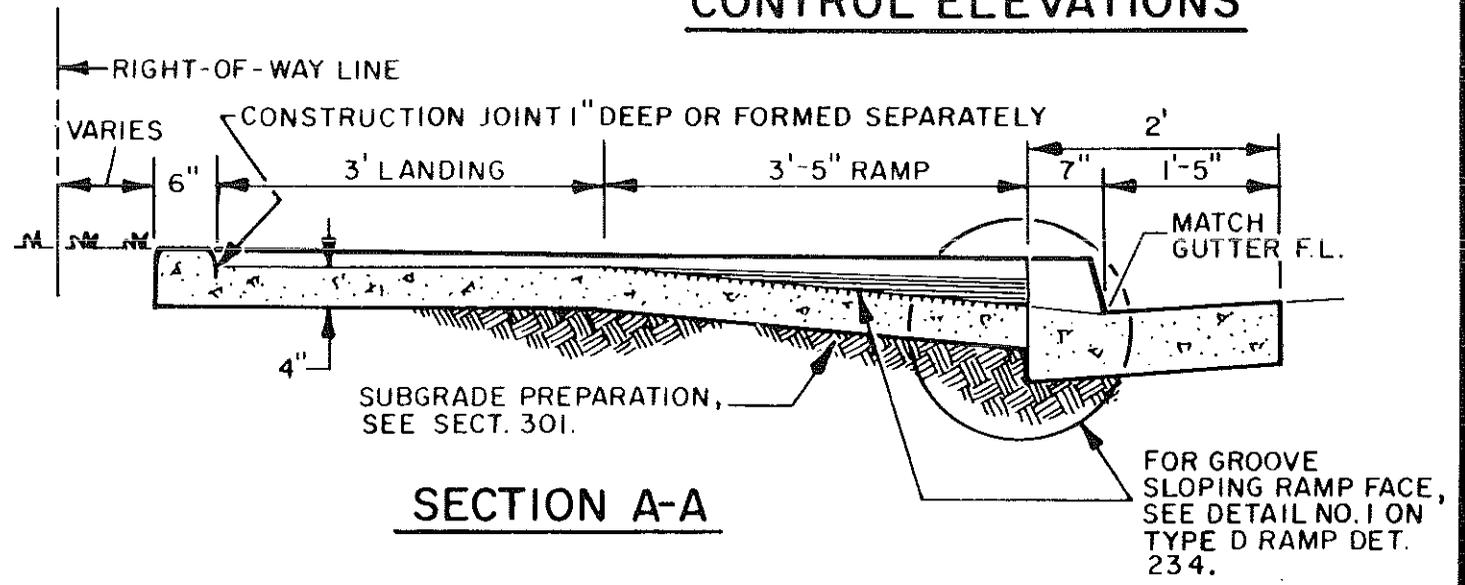


**NOTES**

1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER. GUTTER ELEVATION = 0.
2. CLASS 'B' CONC. CONSTRUCTION AS PER SECT. 725.
3. WHEN CURB HEIGHTS OF 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN [ ]'S.

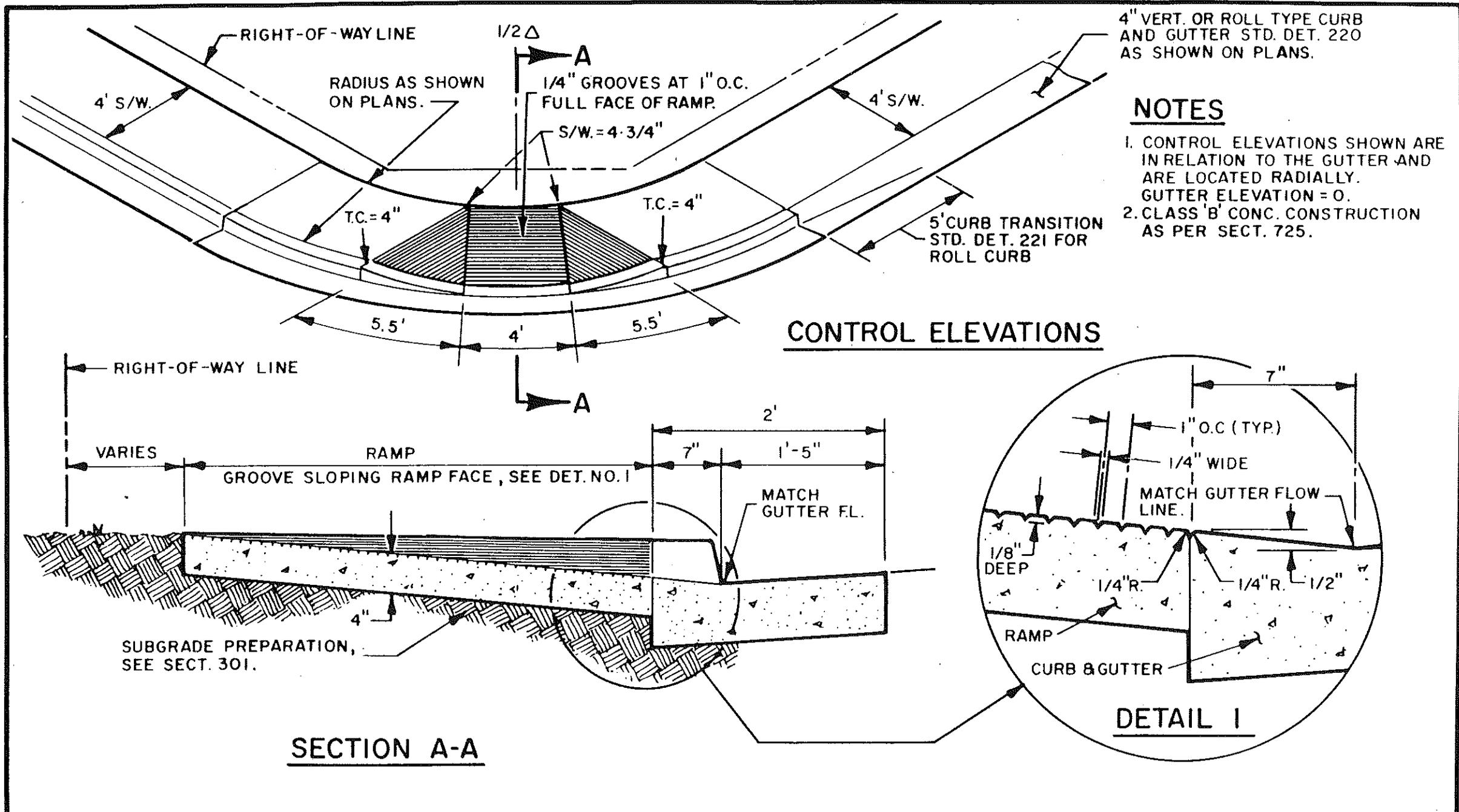


**CONTROL ELEVATIONS**

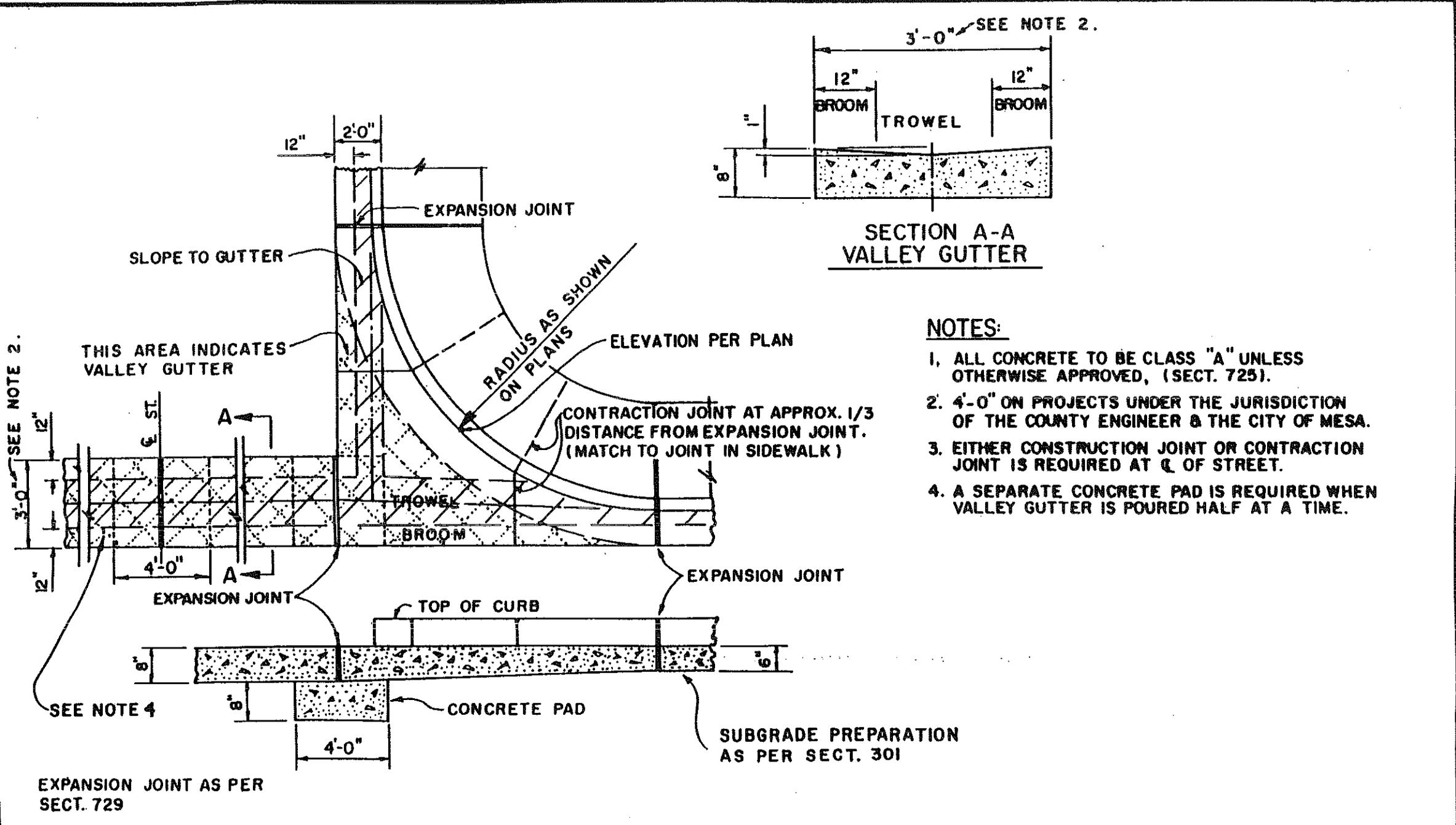


**SECTION A-A**

DETAIL NO. <b>233</b>	<b>STANDARD DETAIL</b>	<b>SIDEWALK RAMPS- TYPE C</b>	DETAIL NO. <b>233</b>
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DETAIL NO. <b>234</b>	 <b>STANDARD DETAIL</b>	<b>SIDEWALK RAMPS - TYPE D</b>		DETAIL NO. <b>234</b>
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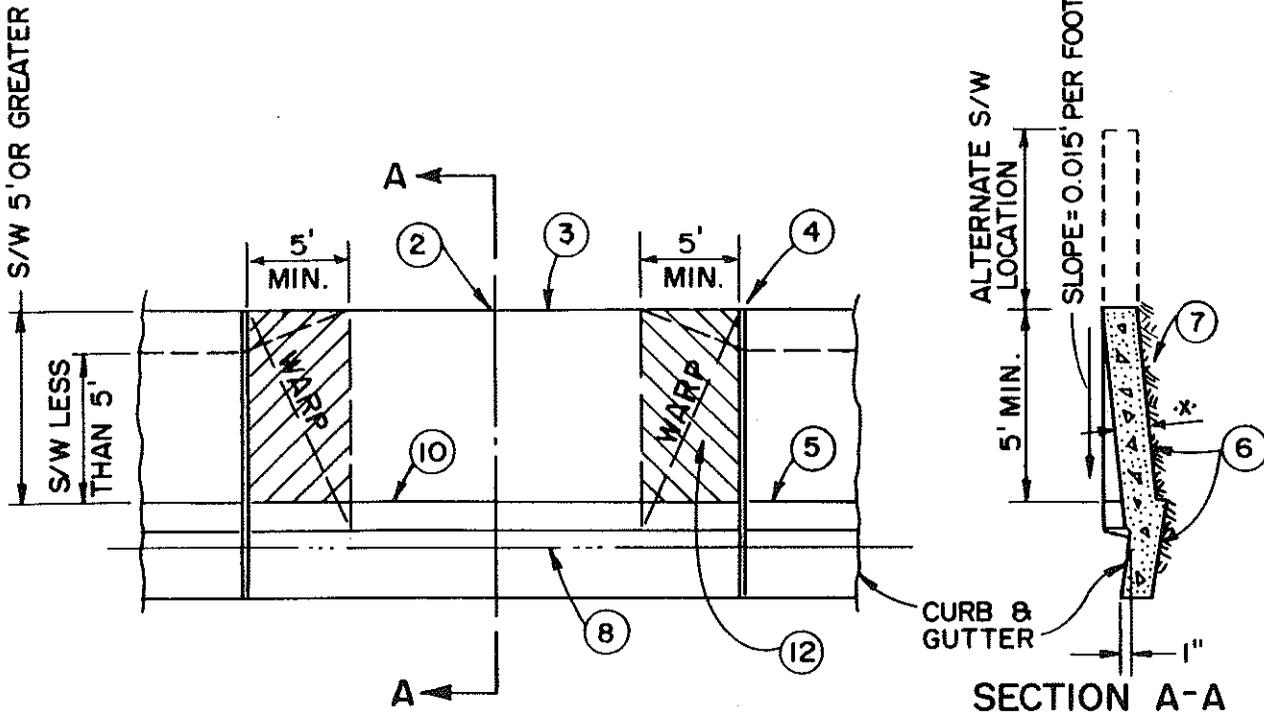
**NOTES:**

1. ALL CONCRETE TO BE CLASS "A" UNLESS OTHERWISE APPROVED, (SECT. 725).
2. 4'-0" ON PROJECTS UNDER THE JURISDICTION OF THE COUNTY ENGINEER & THE CITY OF MESA.
3. EITHER CONSTRUCTION JOINT OR CONTRACTION JOINT IS REQUIRED AT C OF STREET.
4. A SEPARATE CONCRETE PAD IS REQUIRED WHEN VALLEY GUTTER IS POURED HALF AT A TIME.

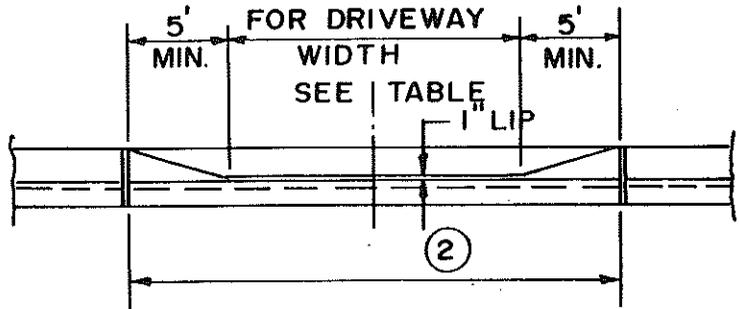
DETAIL NO. <b>240</b>	<b>STANDARD DETAIL</b>	<b>VALLEY GUTTER</b>	DETAIL NO. <b>240</b>
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**NOTES**

1. DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE BID FOR THE TYPE OF CURB USED AT THAT LOCATION.
2. WHEN WIDTH EXCEEDS 22' PROVIDE A CONTRACTION JOINT ON D/W CENTERLINE.
3. BACK OF D/W OR FACE OF FUTURE S/W.
4. MASTIC EXPANSION JOINT THROUGH CURB & GUTTER. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER A.S.T.M. D-1751.
5. BACK OF CURB - CONSTRUCTION JOINT OR SCORE MARK.
6. CLASS 'B' CONCRETE, SECT. 725.
7. SUBGRADE PREPARATION, SECT. 301.
8. FLOW LINE OF GUTTER.
9. DEPRESSED CURB.
10. SECTION A-A & ELEVATION, D/W VERTICAL CURB & GUTTER OR ROLL TYPE CURB & GUTTER.
11. ROLL TYPE CURB & GUTTER NOT PERMITTED IN THE CITY OF MESA.



12. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF DRIVEWAY. SEE DETAIL NO. 1 ON TYPE D RAMP DETAIL NO. 234.



COMMERCIAL & INDUSTRIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	*DEPTH
COMMERCIAL	+ 16'	40'	B	6"
INDUSTRIAL	+ 16'	40'	B	6"
+ 24' MIN. FOR TWO WAY TRAFFIC				
RESIDENTIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	*DEPTH
MAJOR STREET	16'	30'	B	5"
COLLECTOR STREET	* 12'	30'	B	5"
LOCAL STREET	12'	30'	B	5"
* 16' DESIRABLE				

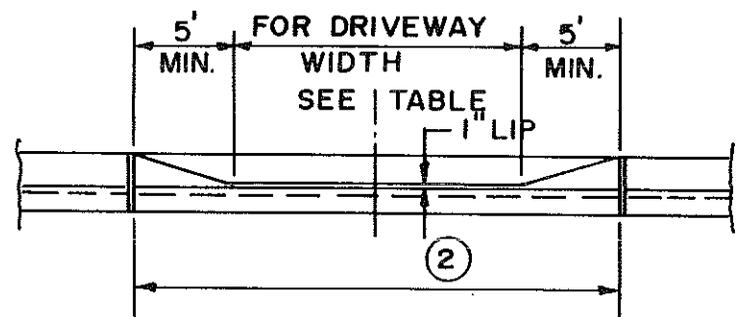
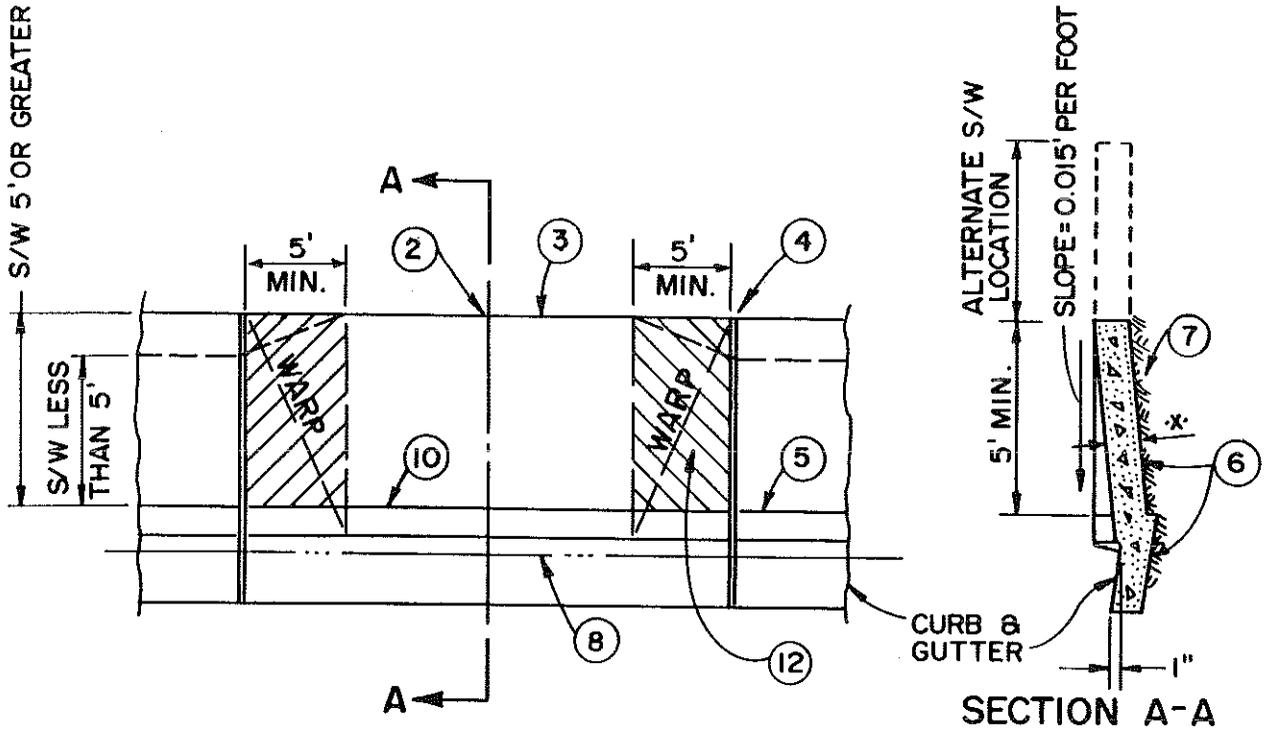
DETAIL NO. 250  STANDARD DETAIL

**DRIVEWAY ENTRANCES**

DETAIL NO. 250

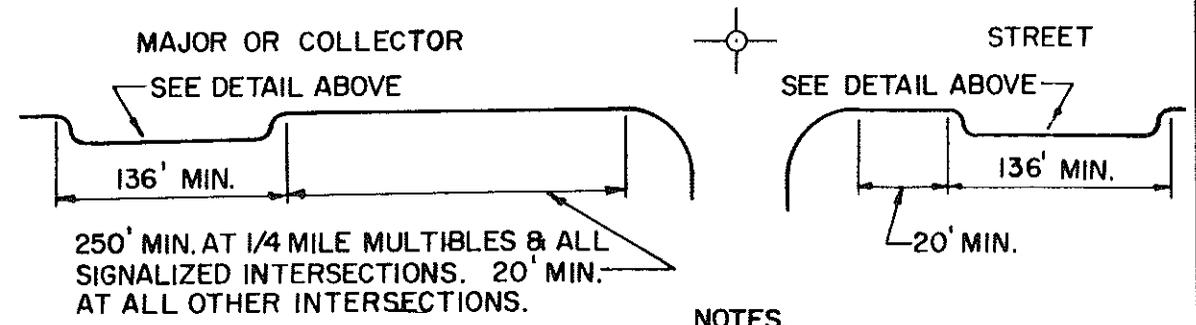
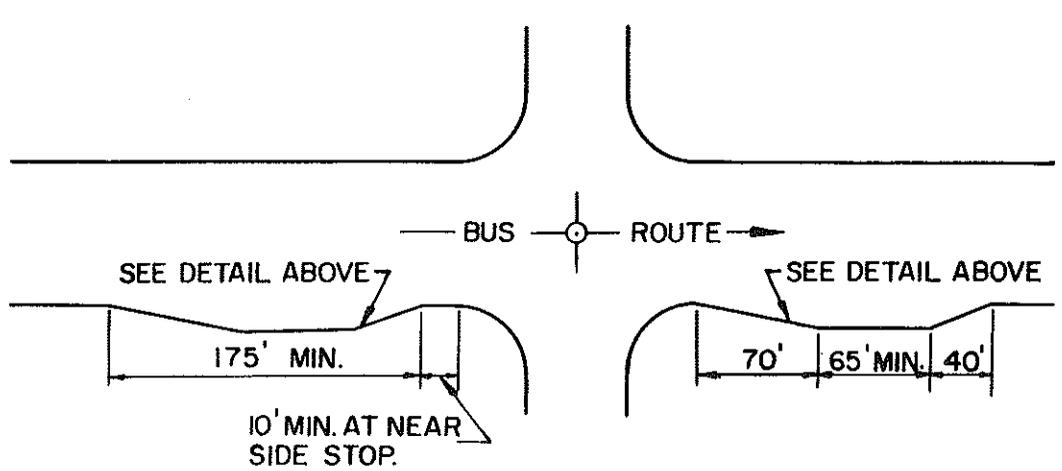
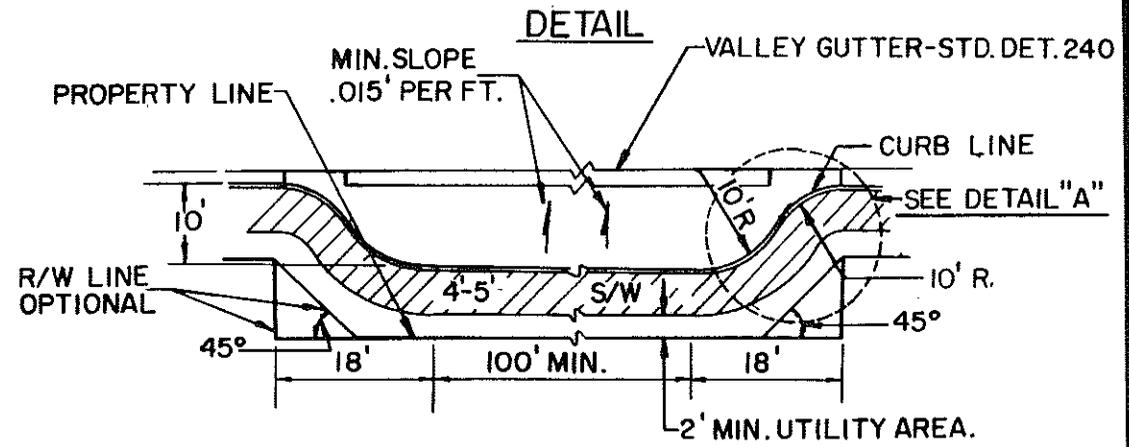
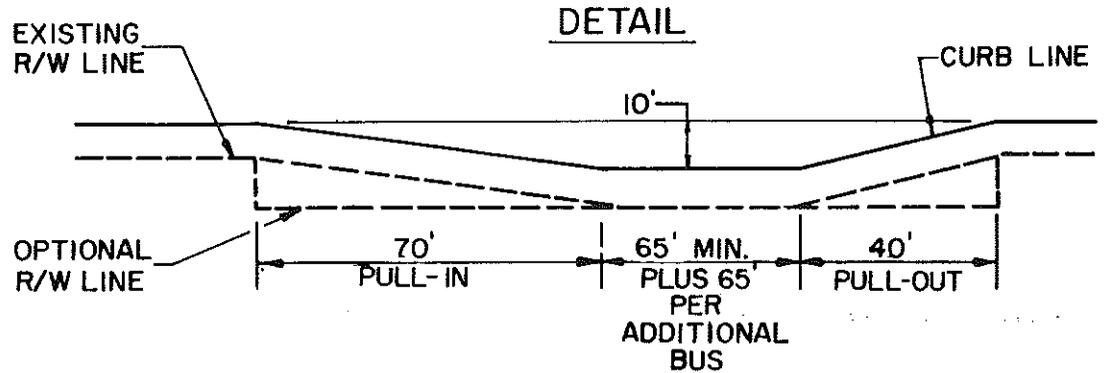
**NOTES**

1. DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE BID FOR THE TYPE OF CURB USED AT THAT LOCATION.
2. WHEN WIDTH EXCEEDS 22' PROVIDE A CONTRACTION JOINT ON D/W CENTERLINE.
3. BACK OF D/W OR FACE OF FUTURE S/W.
4. MASTIC EXPANSION JOINT THROUGH CURB & GUTTER. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER A.S.T.M. D-1751.
5. BACK OF CURB - CONSTRUCTION JOINT OR SCORE MARK.
6. CLASS 'B' CONCRETE, SECT. 725.
7. SUBGRADE PREPARATION, SECT. 301.
8. FLOW LINE OF GUTTER.
9. DEPRESSED CURB.
10. SECTION A-A & ELEVATION, D/W VERTICAL CURB & GUTTER OR ROLL TYPE CURB & GUTTER.
11. ROLL TYPE CURB & GUTTER NOT PERMITTED IN THE CITY OF MESA.



12. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF DRIVEWAY. SEE DETAIL NO. 1 ON TYPE D RAMP DETAIL NO. 234.

COMMERCIAL & INDUSTRIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	*DEPTH
COMMERCIAL	+ 16'	40'	B	6"
INDUSTRIAL	+ 16'	40'	B	6"
+ 24' MIN. FOR TWO WAY TRAFFIC				
RESIDENTIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	*DEPTH
MAJOR STREET	16'	30'	B	5"
COLLECTOR STREET	* 12'	30'	B	5"
LOCAL STREET	12'	30'	B	5"
* 16' DESIRABLE				



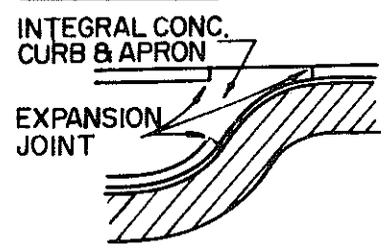
NEAR SIDE

FAR SIDE

NOTES

1. SUFFICIENT RIGHT-OF-WAY MUST BE AVAILABLE TO CONSTRUCT BUS BAY.
2. RADII, SIDEWALK, CURB & GUTTER, PAVING SLOPE AND CONCRETE APRON SHALL BE CONSTRUCTED AS FOR PARKING BAYS.

DETAIL "A"



NOTES.

1. SUFFICIENT RIGHT-OF-WAY MUST BE AVAILABLE TO CONSTRUCT PARKING BAY.
2. PARKING BAYS WILL NOT BE ALLOWED WHERE THEY CONFLICT WITH BUS STOPS.

BUS BAY

PARKING BAY

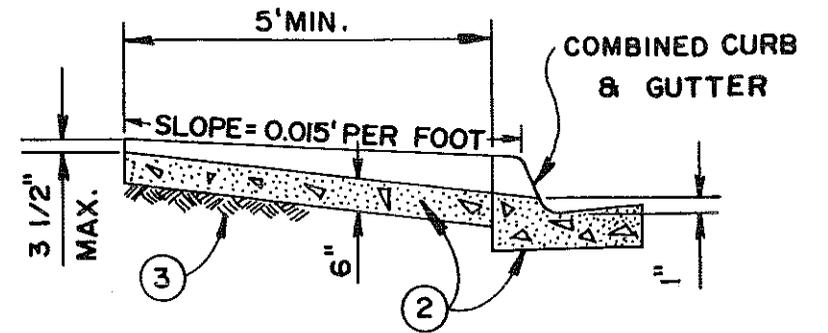
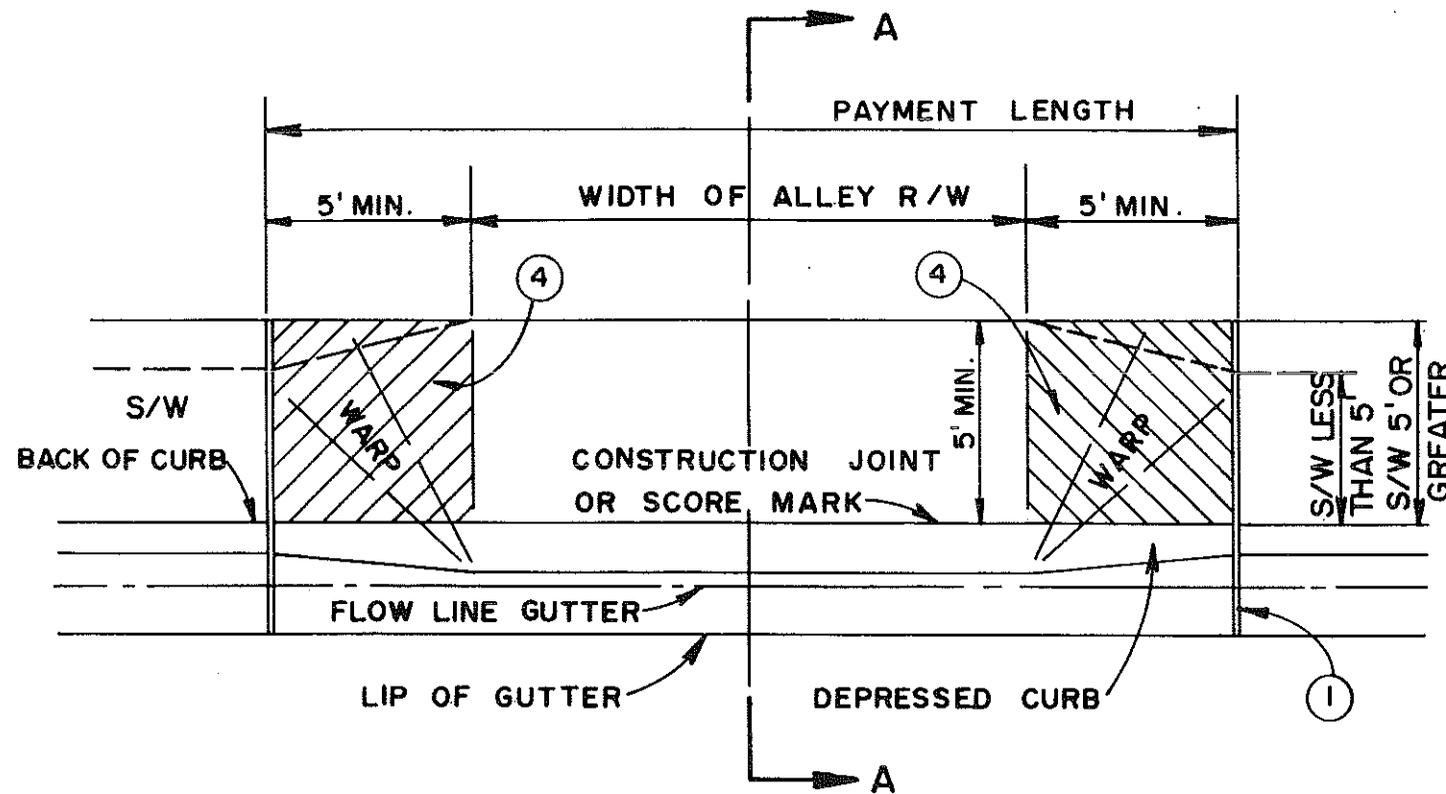
DETAIL NO.  
252



**STANDARD DETAIL**

**PARKING BAYS**

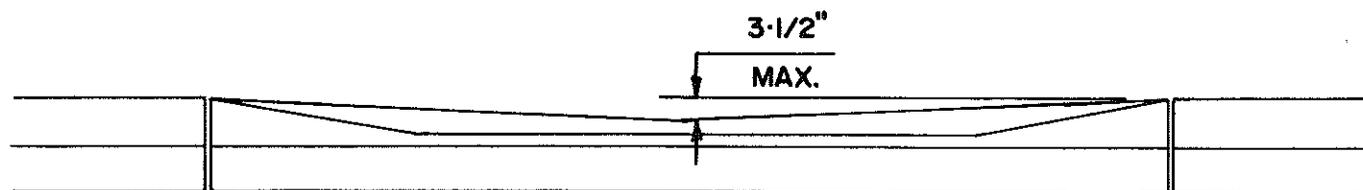
DETAIL NO.  
252



SECTION A-A

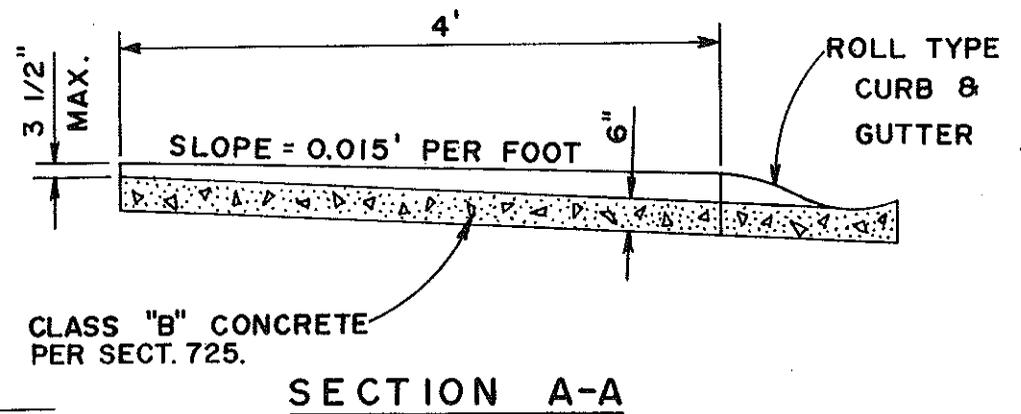
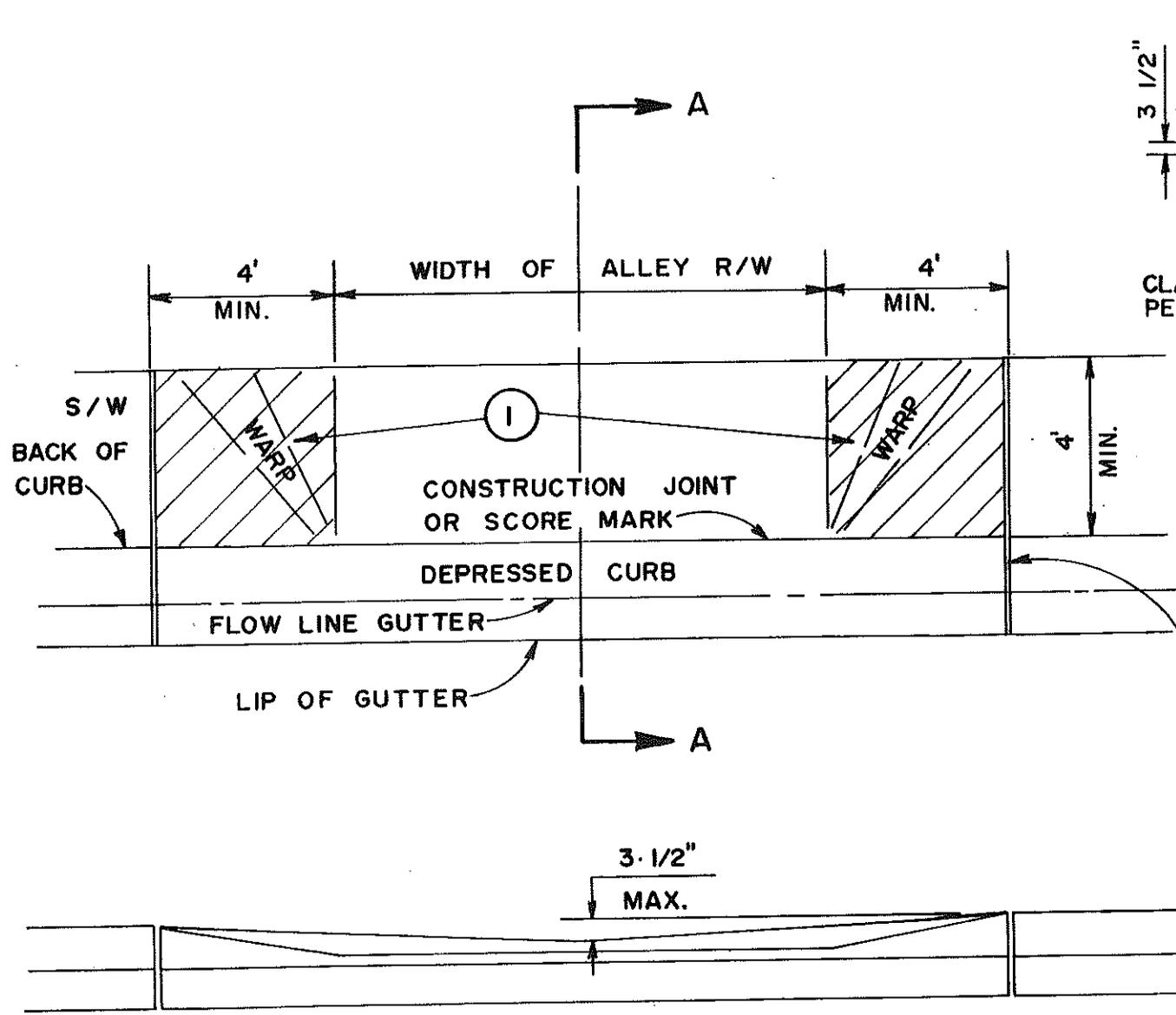
NOTES

1. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, ASTM D-1751. BETWEEN S/W & ALLEY ENTRANCE & THROUGH CURB & GUTTER.
2. CLASS "B" CONCRETE PER SECTION 725.
3. SUBGRADE PREPARATION, SECTION 301.
4. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE D RAMP DETAIL NO. 234.



ELEVATION

DETAIL NO. 260	 <b>STANDARD DETAIL</b>	<b>ALLEY ENTRANCE (WITH COMBINED CURB &amp; GUTTER)</b>	DETAIL NO. 260
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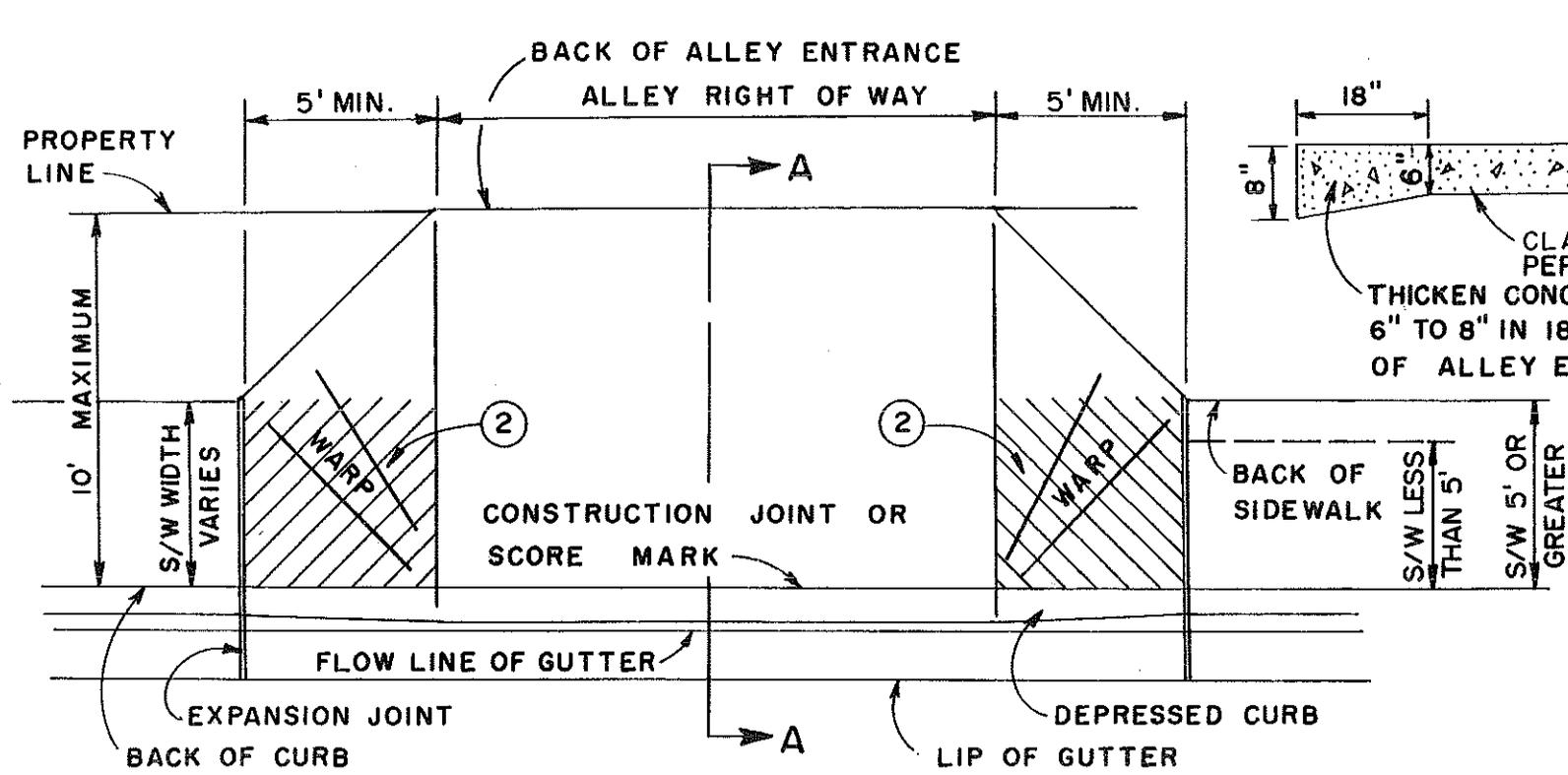
EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, ASTM D-1751.

**NOTES**

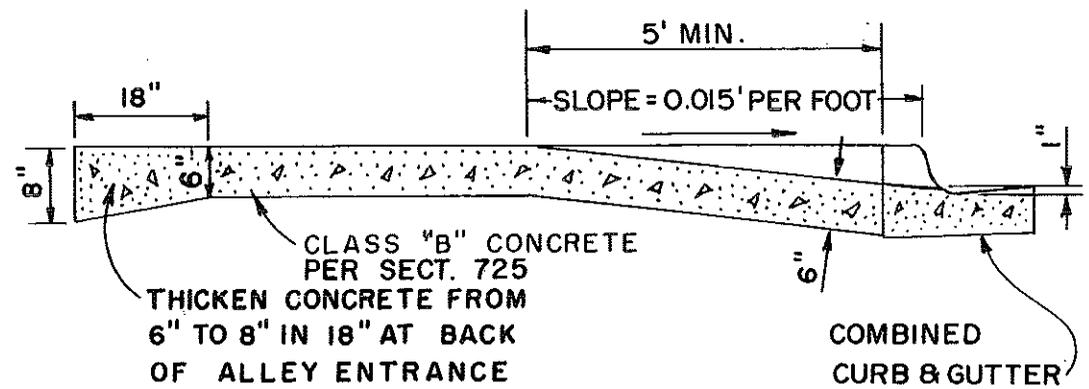
- ① 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 4' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE D RAMP DETAIL 234.

**ELEVATION**

DETAIL NO. <b>261</b>	<b>STANDARD DETAIL</b>	<b>ALLEY ENTRANCE (WITH ROLL TYPE CURB &amp; GUTTER)</b>	DETAIL NO. <b>261</b>
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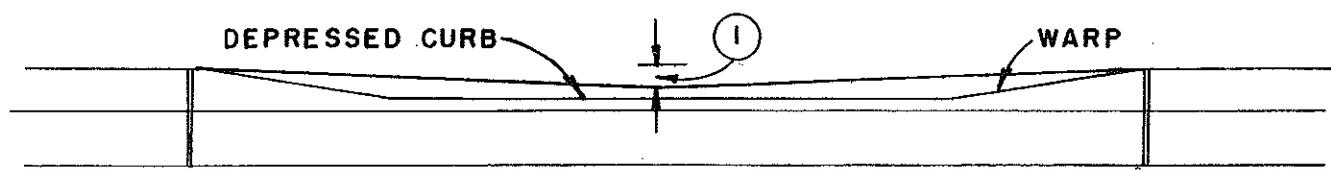
**PLAN**



**SECTION A-A**

**NOTE**

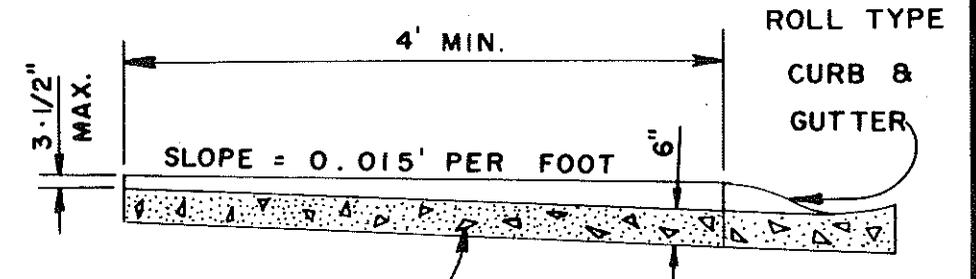
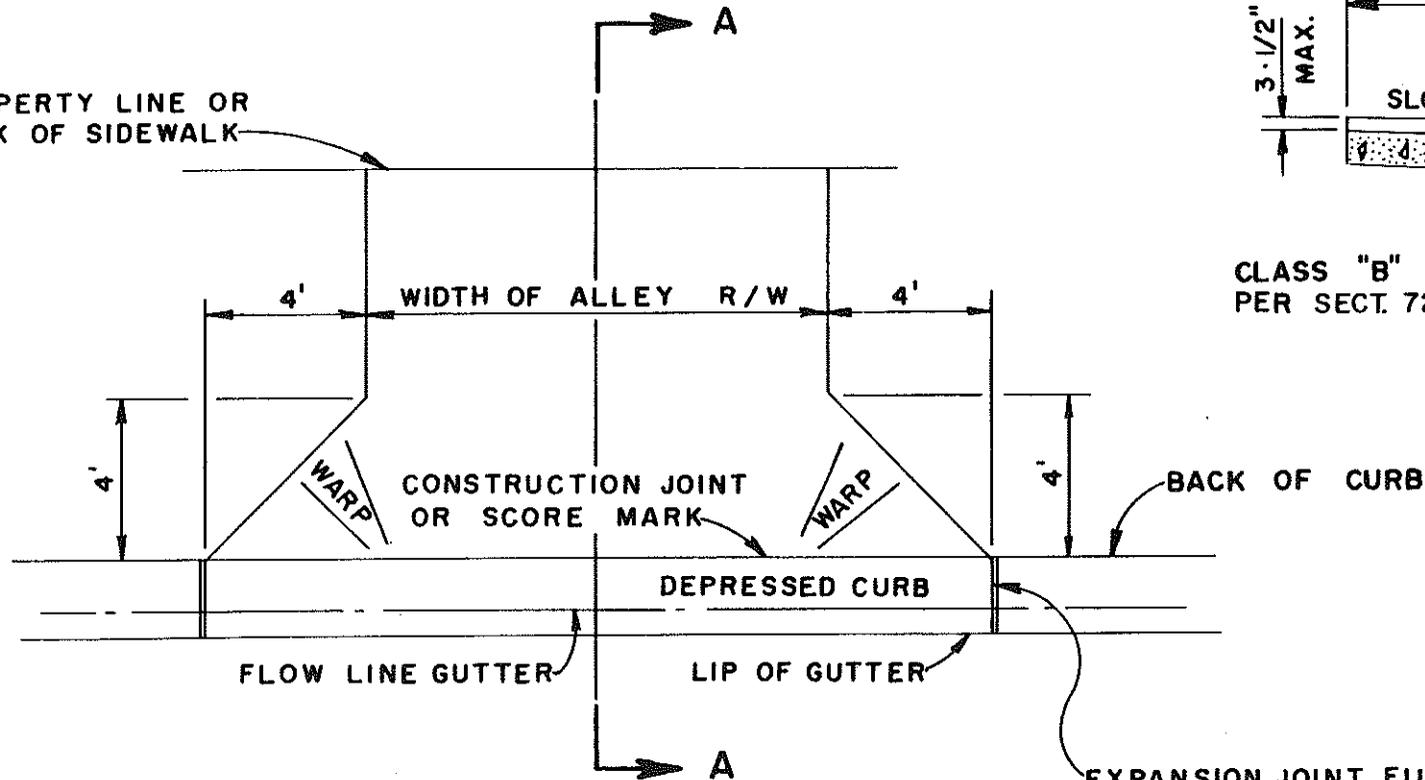
1. IF ALLEY ENTRANCE IS USED FOR DRAINAGE, THE CENTER BACK OF ALLEY ENTRANCE MAY BE DEPRESSED 2" FOR 4" CURB OR 3" FOR 6" CURB.
2. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE D RAMP DETAIL NO. 234.



**ELEVATION**

DETAIL NO. 262	<b>STANDARD DETAIL</b>	<b>WING TYPE ALLEY ENTRANCE (WITH COMBINED CURB &amp; GUTTER)</b>	DETAIL NO. 262
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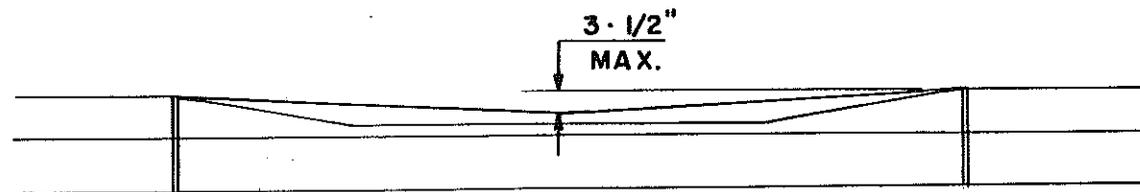
PROPERTY LINE OR  
BACK OF SIDEWALK



CLASS "B" CONCRETE  
PER SECT. 725.

SECTION A-A

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



ELEVATION

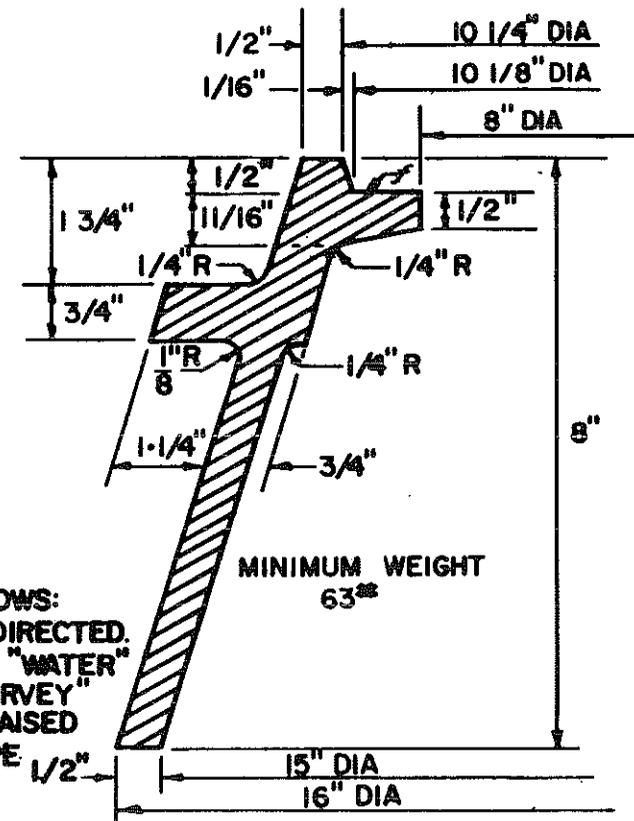
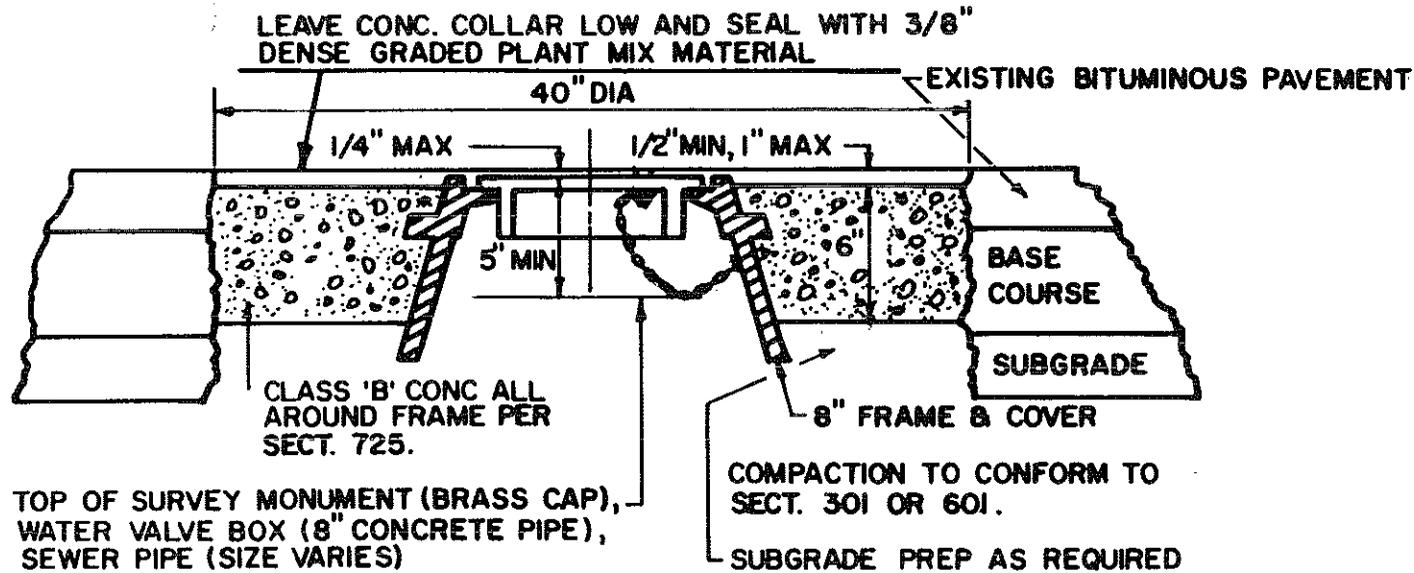
DETAIL NO.  
263



STANDARD DETAIL

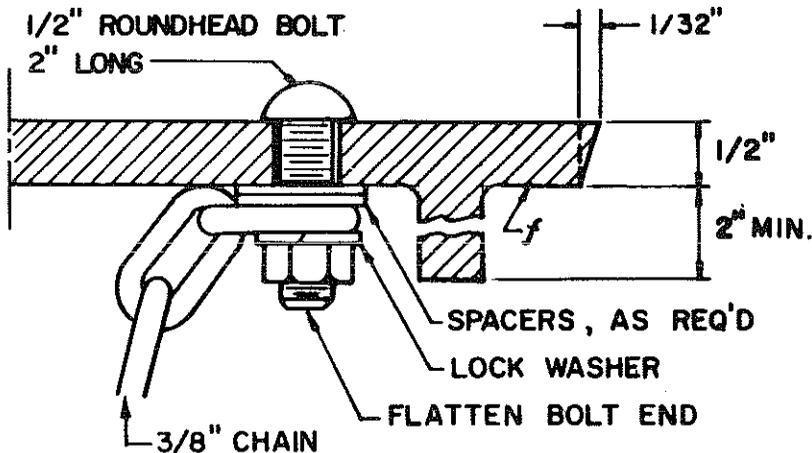
WING TYPE ALLEY ENTRANCE  
(WITH ROLL TYPE CURB & GUTTER)

DETAIL NO.  
263



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

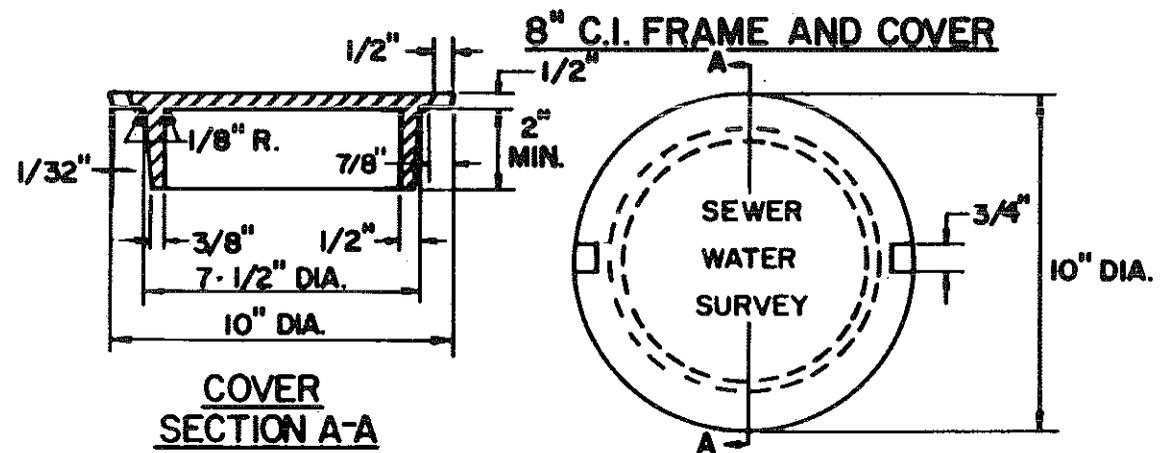
LETTERS ON COVER TO BE AS FOLLOWS:  
 "SEWER", "WATER", OR "SURVEY" AS DIRECTED.  
 TOTAL WIDTH OF WORD "SEWER" OR "WATER" 3-3/4".  
 TOTAL WIDTH OF WORD "SURVEY" 4-1/2".  
 LETTER SIZE 5/8" X 3/4", RAISED 1/16" ABOVE LEVEL OF COVER, TYPE 1/2".  
 OF LETTERS TO BE SUBMITTED FOR APPROVAL.



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

**CHAIN ATTACHMENT**  
(AS REQUIRED)

DETAIL TYPICAL FOR BOTH FRAME AND COVER



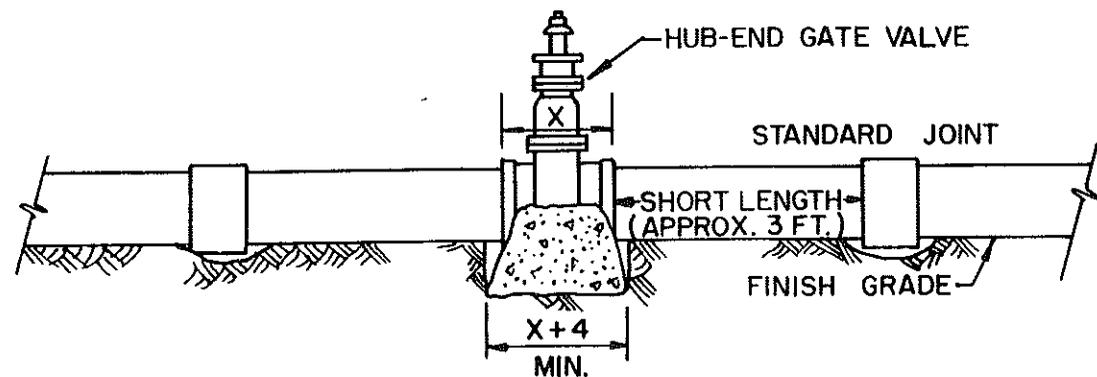
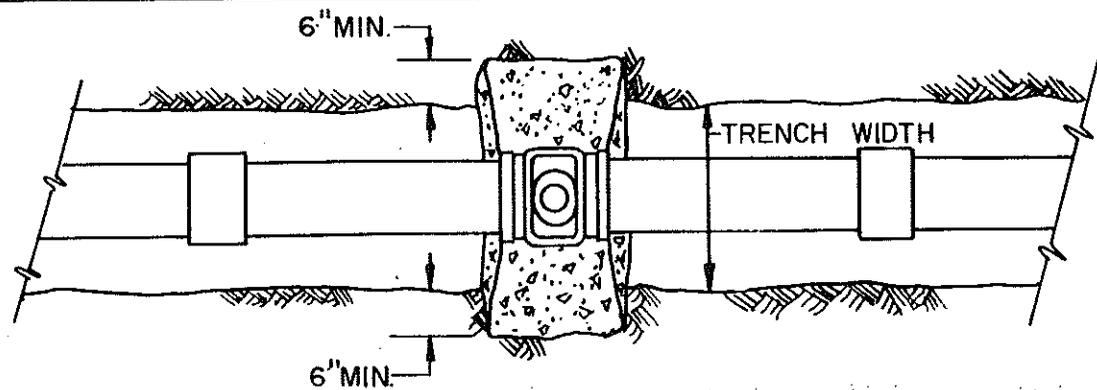
DETAIL NO.  
270



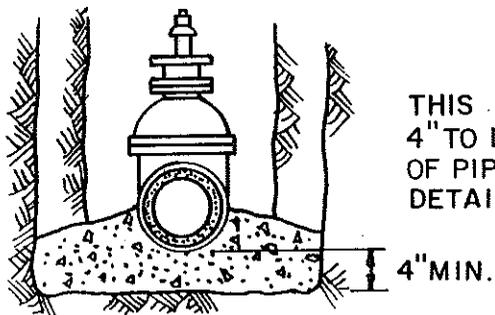
STANDARD DETAIL

FRAME AND COVER AND GRADE ADJUSTMENT

DETAIL NO.  
270



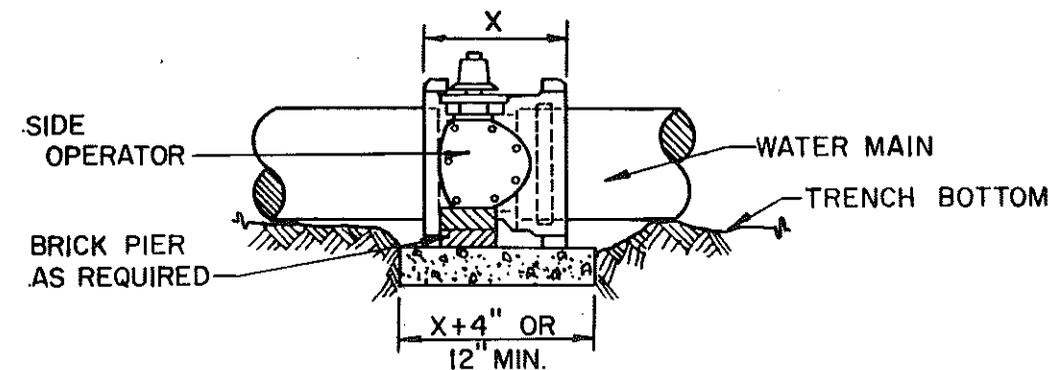
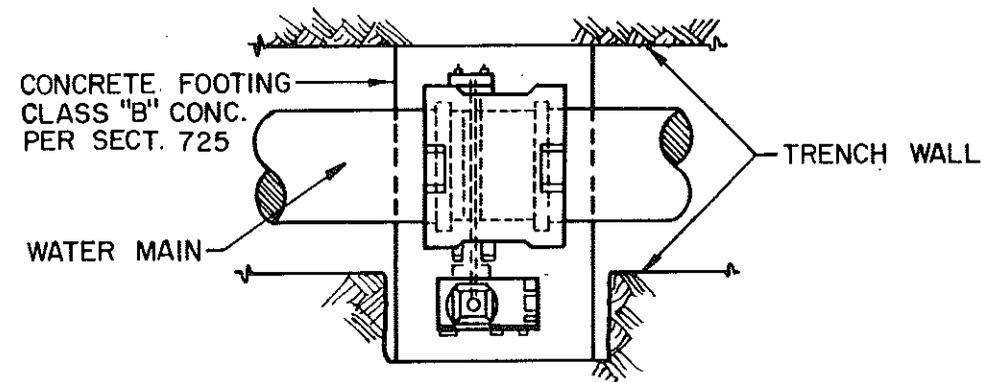
CLASS C CONCRETE AS PER SECTION 725  
FORM AS REQUIRED TO KEEP CLEAR OF JOINTS.



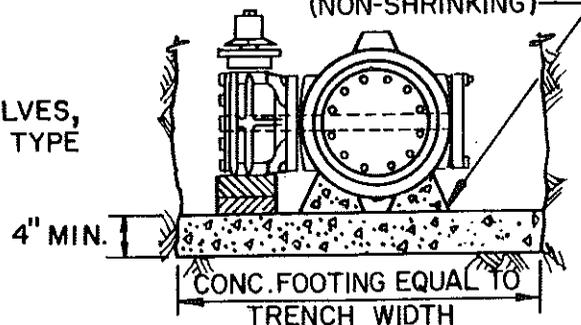
WATER GATE VALVE

NOTE

THIS DETAIL COVERS WATER GATE VALVES, 4" TO 16" INCLUSIVE, REGARDLESS OF TYPE OF PIPE USED. LARGER LINES TO BE DETAILED ON PLANS.



CEMENT GROUTING UNDER VALVE  
(NON-SHRINKING)



BUTTERFLY VALVE

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 STD. DETAILS 270 AND 391.

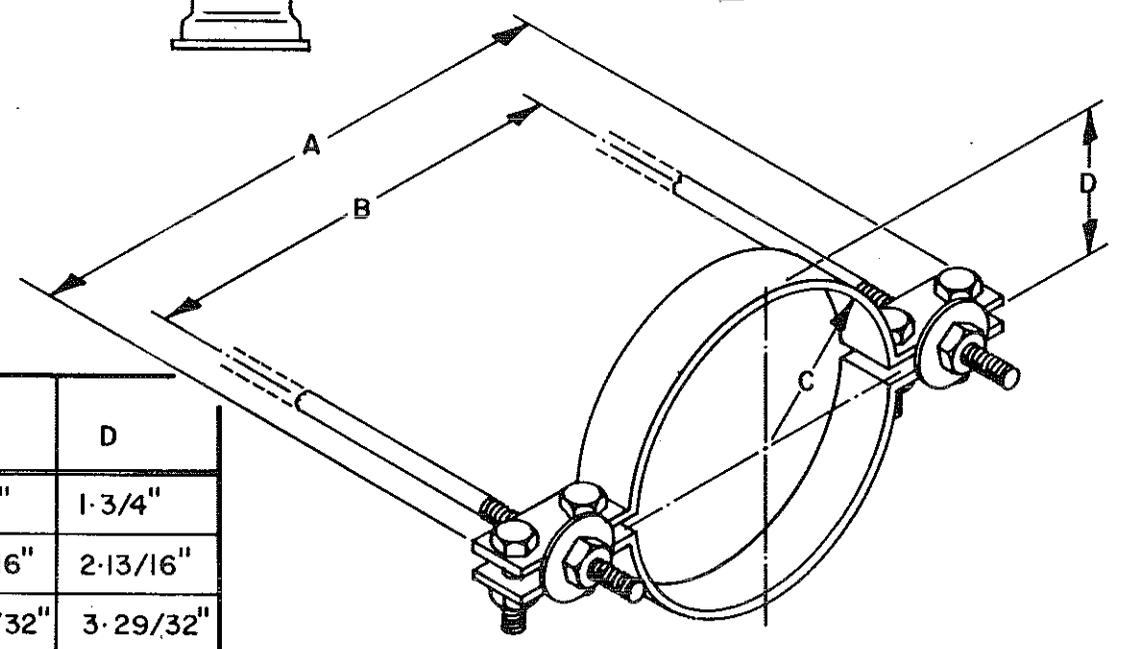
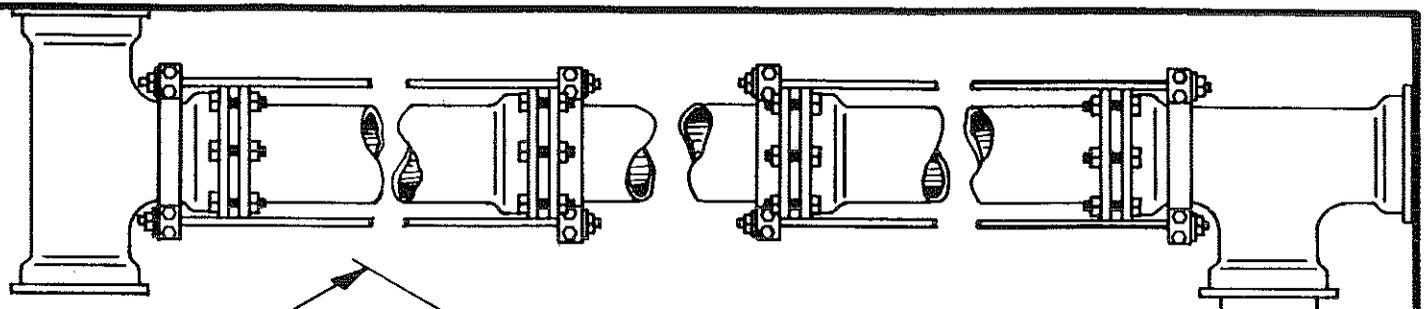
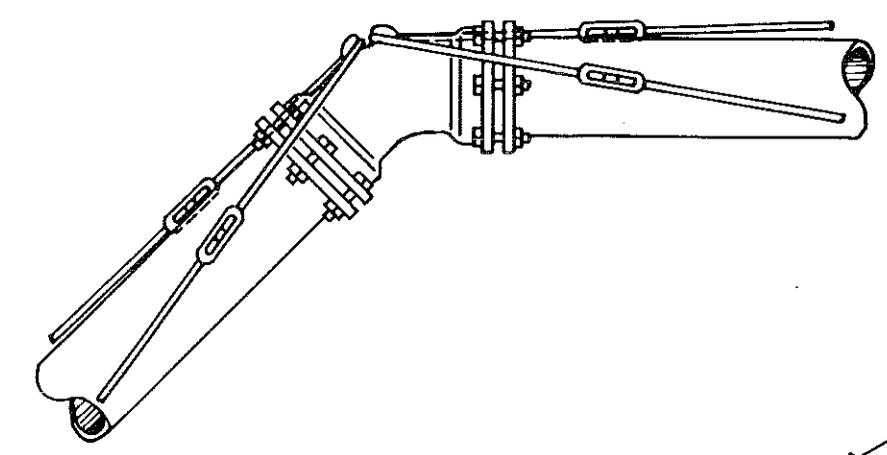
DETAIL NO.  
301



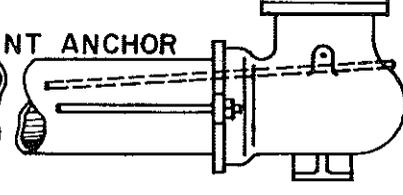
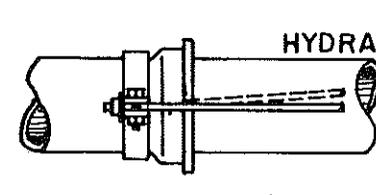
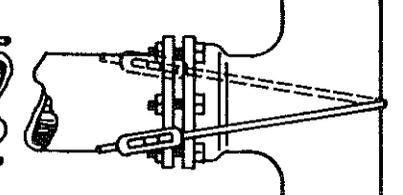
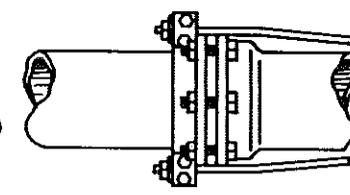
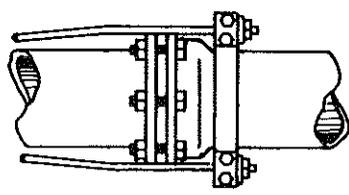
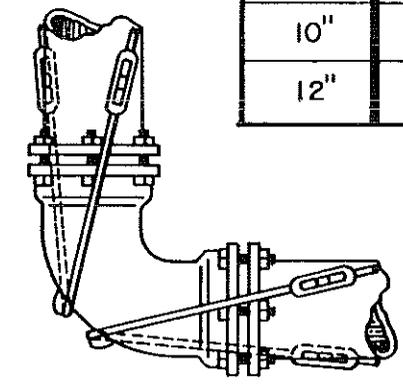
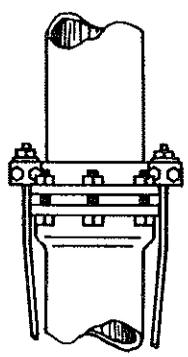
STANDARD DETAIL

BLOCKING FOR  
WATER GATE AND BUTTERFLY VALVES

DETAIL NO.  
301



PIPE SIZE	A	B	C	D
4"	12-1/2"	10-1/8"	2-1/2"	1-3/4"
6"	14-1/2"	12-1/8"	3-9/16"	2-13/16"
8"	16-3/4"	14-3/8"	4-21/32"	3-29/32"
10"	19-1/16"	16-11/16"	5-3/4"	5"
12"	22-5/16"	19-3/16"	6-3/4"	5-7/8"



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.

HYDRANT ANCHOR

SHEET 1 OF 2

DETAIL NO.  
302-1



STANDARD DETAIL

JOINT RESTRAINT WITH TIE RODS

DETAIL NO.  
302-1

THIS DETAIL IS FOR USE ONLY ON UNDERGROUND INSTALLATIONS WHERE THE USE OF CONCRETE THRUST BLOCKING PER STD. DET. 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" IN DIA., HOLES SHALL BE 1/8 INCH LARGER THAN THE RODS.

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

1. ALL TIE RODS, ROD COUPLINGS, TURNBUCKLES, BOLTS AND NUTS FOR THESE JOINTS SHALL BE OF CARBON STEEL EQUIVALENT TO A.S.T.M. A-307, GRADE B, WITH CADMIUM PLATING IN ACCORDANCE WITH A.S.T.M. A-165, EXCEPT THAT THE MIN. THICKNESS OF THE PLATING SHALL BE .0002 OF AN INCH. CADMIUM PLATED BOLTS SHALL HAVE CLASS 2A THREADS AND THE NUTS, ROD COUPLINGS AND TURNBUCKLES SHALL HAVE 2B THREADS.

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

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

4. IN CERTAIN ASSEMBLIES OF RODS AND CLAMPS SHOWN, RODS RUN FROM A LUG ON THE FITTING (OR A CLAMP BEHIND THE HUB OF A BELL) TO A CLAMP AGAINST A FACE OF A BELL. NOTE THAT THIS ARRANGEMENT ANCHORS ONLY ONE JOINT. THE STABILITY OF THE JOINT WHERE THE CLAMP IS AGAINST THE FACE OF THE BELL DEPENDS ON HAVING SOIL ABOVE A RELATIVELY LONG PIECE OF PIPE ON BOTH SIDES OF THE JOINT. CONSEQUENTLY, IF THE DISTANCE BETWEEN THE FIRST AND SECOND JOINTS IS LESS THAN 12 FEET, THE SECOND JOINT SHOWN SHALL BE ANCHORED BY A CLAMP BEHIND THE HUB OF THE BELL AND RODS TO A CLAMP AT THE FACE OF THE NEXT BELL.

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

SHEET 2 OF 2

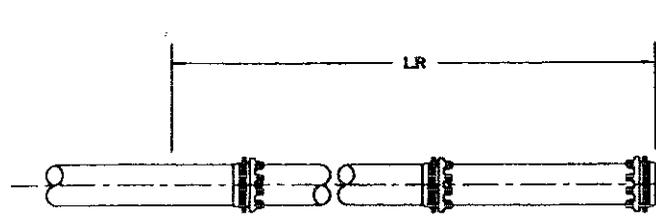
DETAIL NO.  
302-2



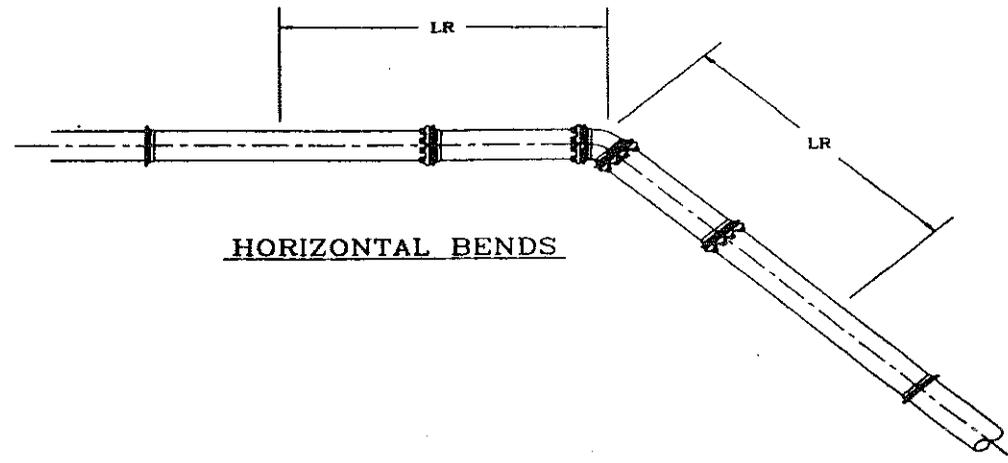
STANDARD DETAIL

JOINT RESTRAINT WITH TIE RODS

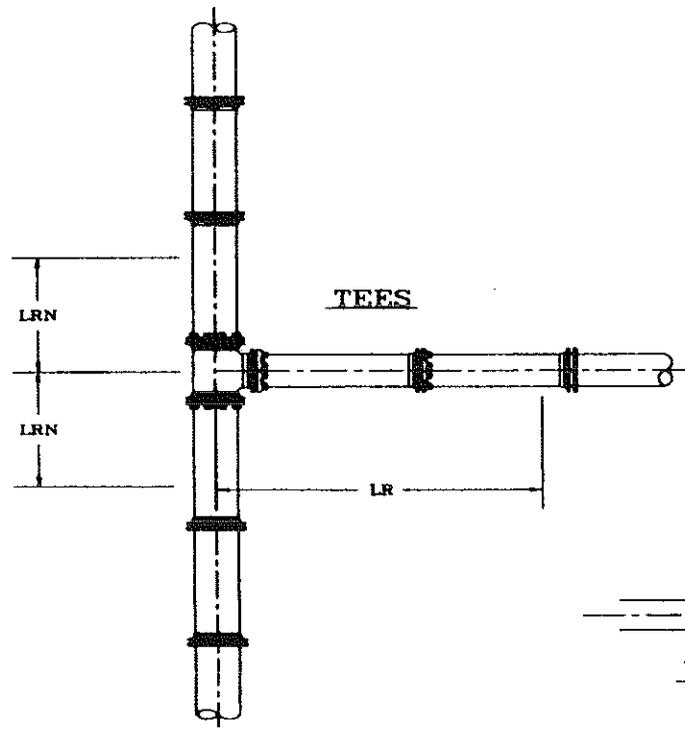
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302-2



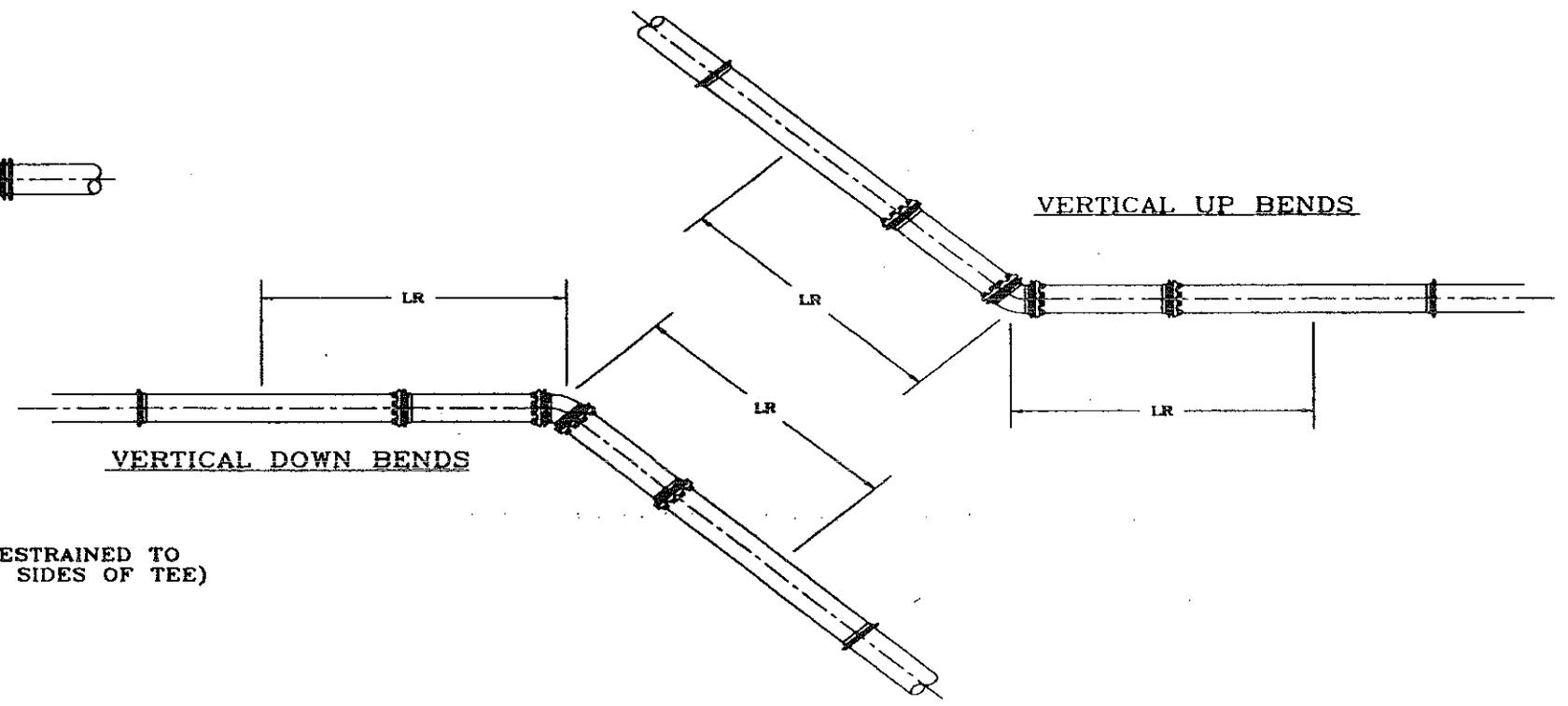
DEAD ENDS



HORIZONTAL BENDS



TEES



VERTICAL UP BENDS

VERTICAL DOWN BENDS

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

DETAIL NO.  
**303-1**



**STANDARD DETAIL**

**JOINT RESTRAINT FOR DUCTILE IRON AND  
POLYETHYLENE WRAPPED DUCTILE IRON PIPE**

DETAIL NO.  
**303-1**

REVISED 1996

RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE												
NOMINAL PIPE SIZE	HORIZONTAL BENDS			TEES		VERTICAL OFFSETS						DEAD ENDS
						90° BEND FITTINGS		45° BEND FITTINGS		22½° BEND FITTINGS		
	90°	45°	22½°	LRN=0'	LRN=10'	DOWN BEND	UP BEND	DOWN BEND	UP BEND	DOWN BEND	UP BEND	
4	18	7	4	30	8	31	18	13	7	6	3	31
6	25	10	5	43	20	44	25	18	10	9	5	44
8	32	13	6	56	34	58	32	24	13	11	6	58
10	38	16	8	68	45	69	38	29	16	14	8	69
12	45	19	9	80	57	81	45	34	19	16	9	81
14	51	21	10	91	68	92	51	38	21	18	10	92
16	57	24	11	103	79	104	57	43	24	21	11	104
18	62	26	12	113	90	115	62	48	26	23	12	115
20	68	28	14	125	100	126	68	52	28	25	14	126
24	79	33	16	145	121	147	79	61	33	29	16	147

RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE WITH POLYETHYLENE WRAP												
NOMINAL PIPE SIZE	HORIZONTAL BENDS			TEES		VERTICAL OFFSETS						DEAD ENDS
						90° BEND FITTINGS		45° BEND FITTINGS		22½° BEND FITTINGS		
	90°	45°	22½°	LRN=0'	LRN=10'	DOWN BEND	UP BEND	DOWN BEND	UP BEND	DOWN BEND	UP BEND	
4	26	11	5	69	18	72	26	30	11	14	5	72
6	36	15	7	99	47	102	36	42	15	20	7	102
8	47	19	9	130	78	133	47	55	19	26	9	133
10	58	23	11	157	103	159	56	66	23	32	11	159
12	65	27	13	185	131	187	65	77	27	37	13	187
14	74	31	15	211	156	214	74	89	31	42	15	214
16	82	34	16	238	183	241	82	100	34	48	16	241
18	90	37	18	263	207	266	90	110	38	53	18	266
20	98	41	20	289	233	292	98	121	41	58	20	292
24	113	47	22	337	280	340	113	141	47	68	22	340

**NOTE:**

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 187.5 PSI.
3. THE MINIMUM DEPTH OF BURY SHALL BE THREE FEET TO TOP OF PIPE.
4. RESTRAINED LENGTHS MAY BE REDUCED WHEN SUPPORTED BY ENGINEERING CALCULATIONS.

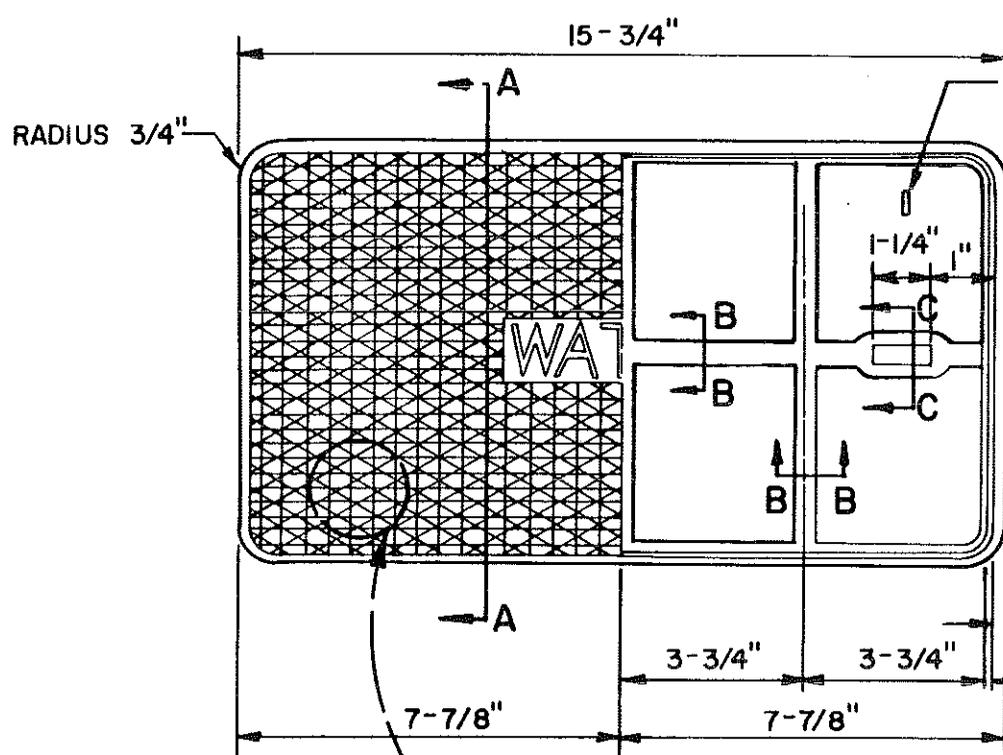
DETAIL NO.  
**303-2**



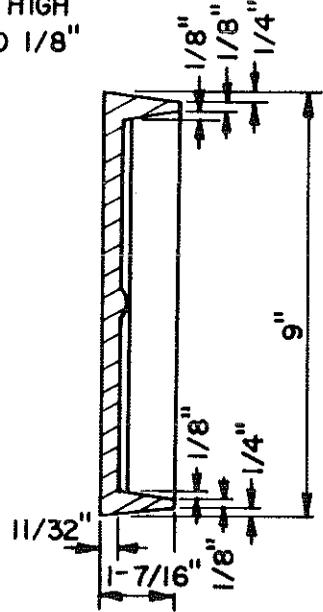
**STANDARD DETAIL**

JOINT RESTRAINT FOR DUCTILE IRON AND  
POLYETHYLENE WRAPPED DUCTILE IRON WATER LINES

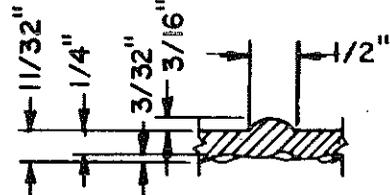
DETAIL NO.  
**303-2**



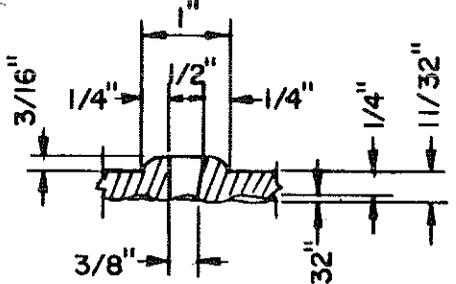
NUMBER 1  
1-1/4" HIGH  
RAISED 1/8"



SECTION A-A

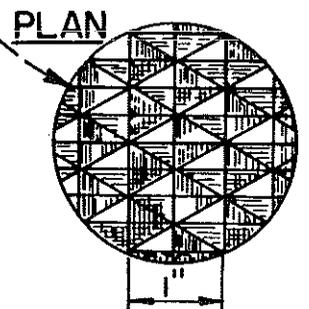


SECTION B-B

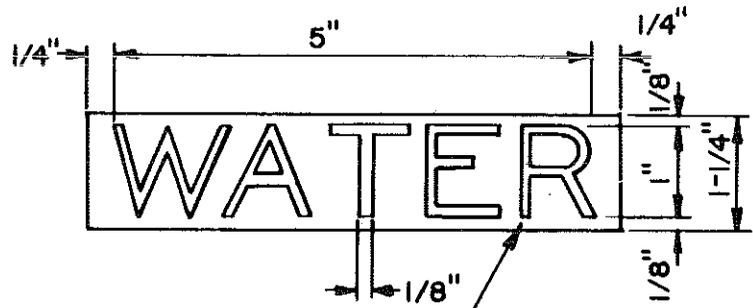


SECTION C-C

TOP BOTTOM



TOP OF COVER



LETTERS RAISED 1/8"

FOR CASTING SPECIFICATIONS  
SEE SECT. 787

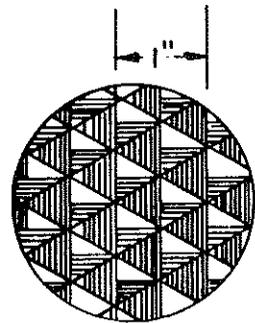
DETAIL NO.  
310



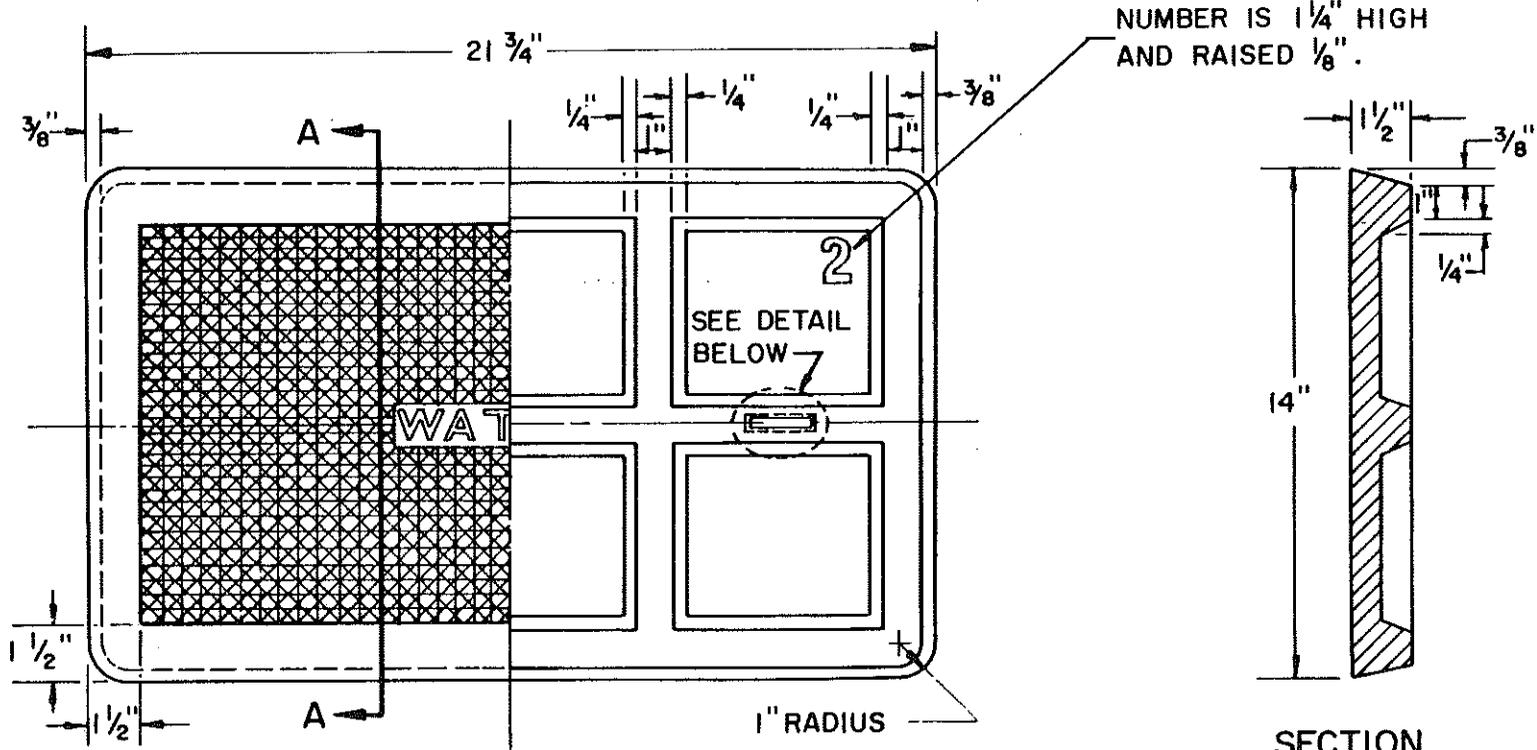
STANDARD DETAIL

CAST IRON WATER METER BOX COVER NO. 1

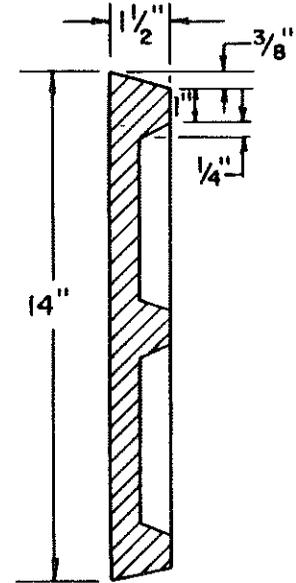
DETAIL NO.  
310



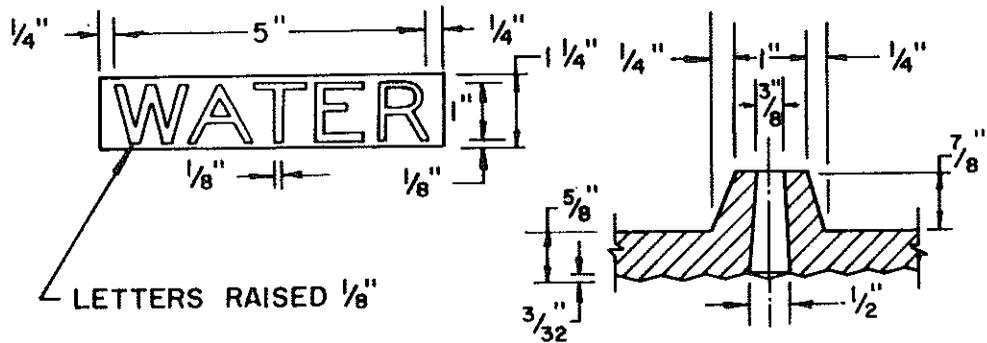
TOP OF COVER



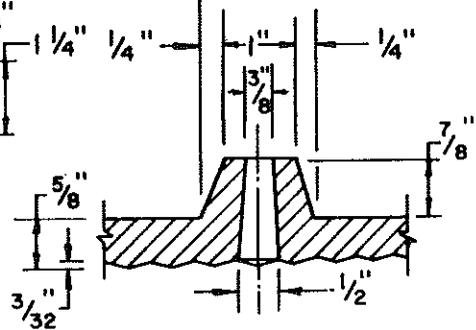
NUMBER IS 1/4" HIGH AND RAISED 1/8".



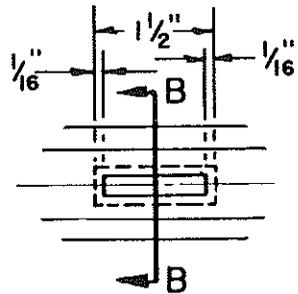
SECTION A-A



LETTERS RAISED 1/8"



SECTION B-B



DETAIL

NOTE

FOR CASTING SPECIFICATIONS SEE SECT. 787.

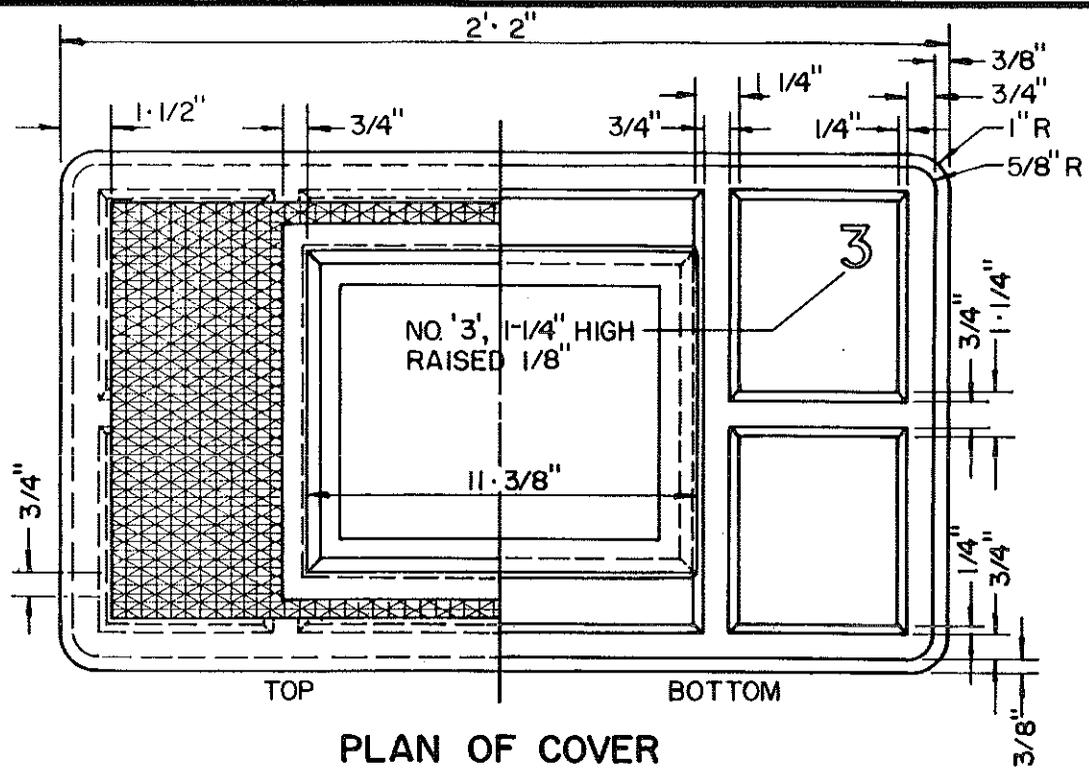
DETAIL NO.  
311



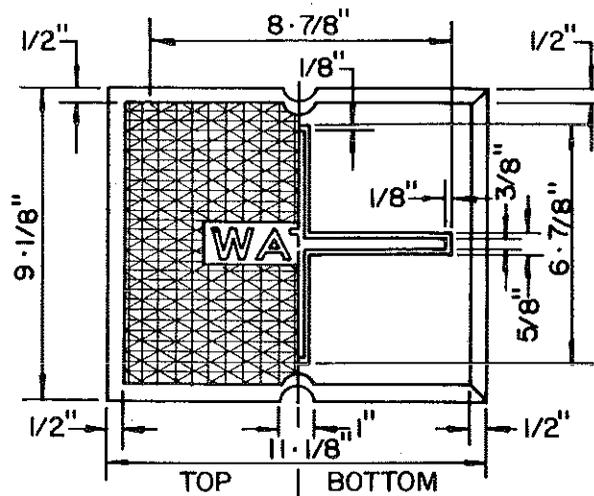
STANDARD DETAIL

CAST IRON WATER METER BOX COVER NO. 2

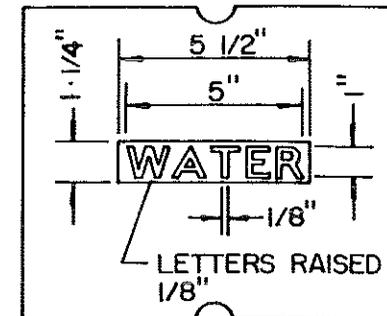
DETAIL NO.  
311



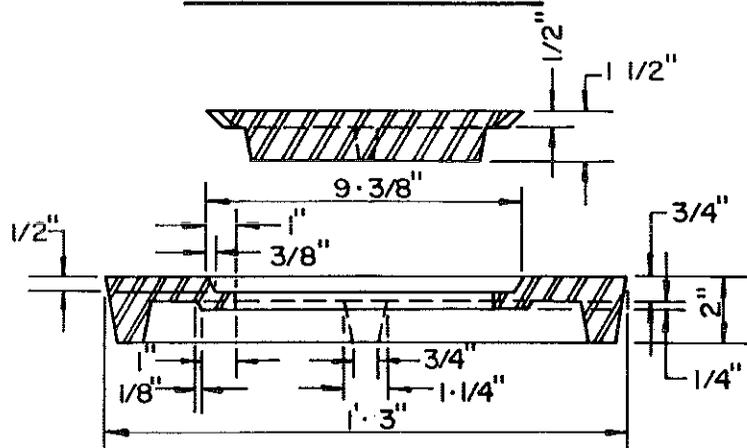
PLAN OF COVER



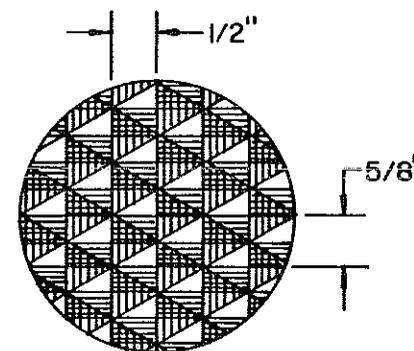
INSPECTION PLATE



LETTERING DETAIL



SECTION 'A'-A'



DETAIL  
TOP OF COVER & PLATE

NOTES

1. INSPECTION PLATE IS SAME AS USED WITH METER BOX COVER NO. 4.
2. FOR CASTING SPECIFICATIONS, SEE SECTION 787.

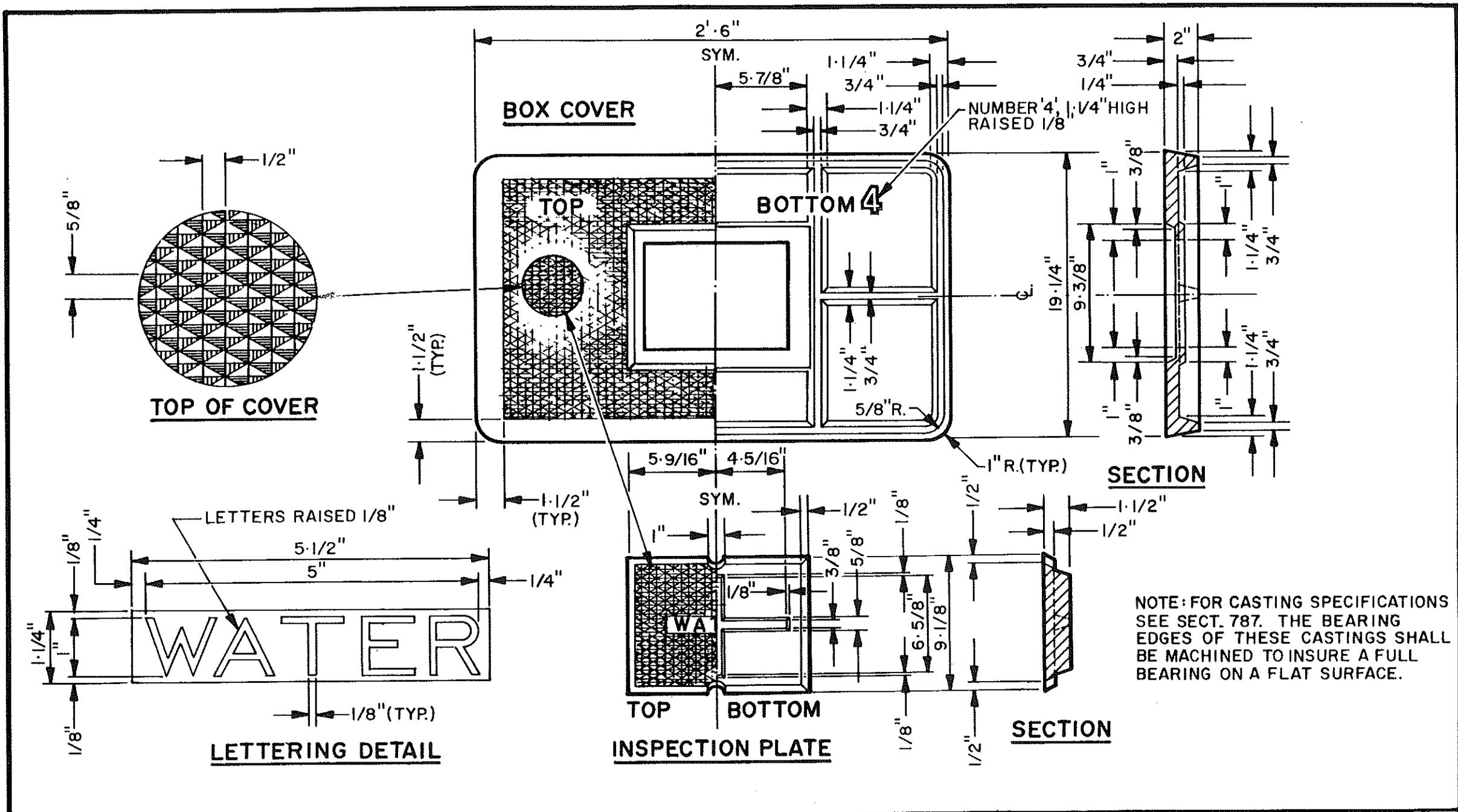
DETAIL NO.  
312



STANDARD DETAIL

CAST IRON WATER METER BOX COVER  
NUMBER 3

DETAIL NO.  
312



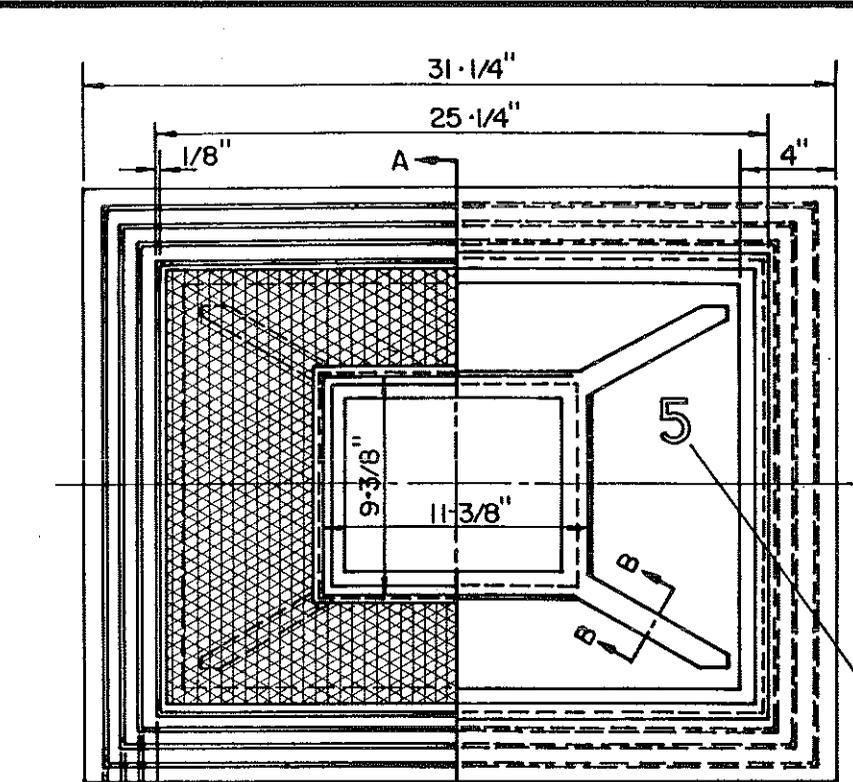
DETAIL NO.  
313

 STANDARD DETAIL

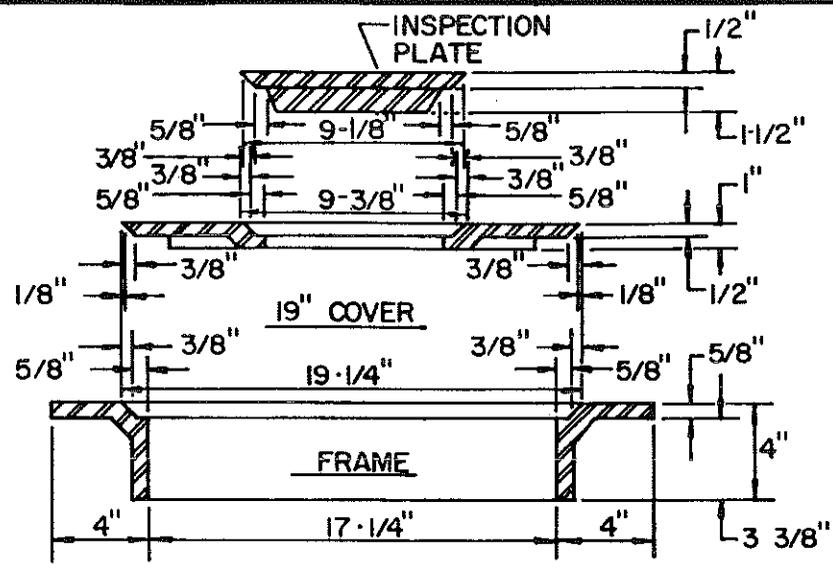
CAST IRON WATER METER BOX COVER NO. 4

ASME

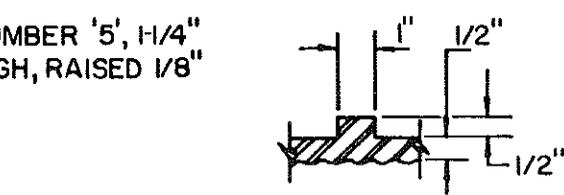
DETAIL NO.  
313



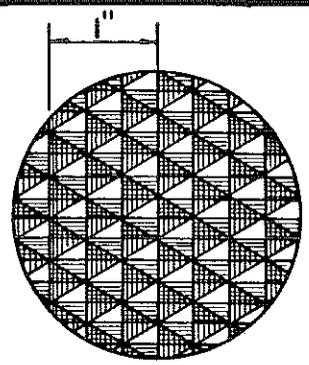
**PLAN VIEW**



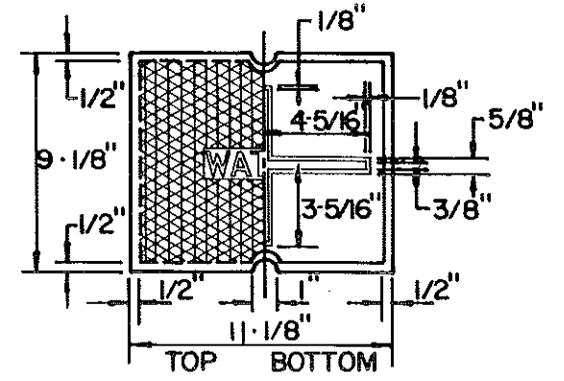
**SECTION A-A**



**SECTION B-B**



**DETAIL - TOP OF COVER**



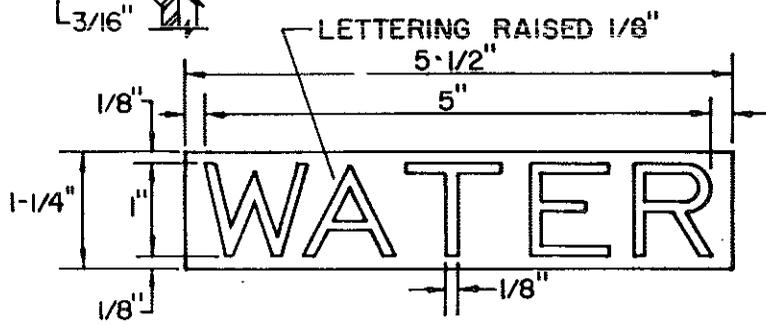
**INSPECTION PLATE**



NUMBER '5', 1 1/4" HIGH, RAISED 1/8"

**NOTES**

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



**LETTERING DETAIL**

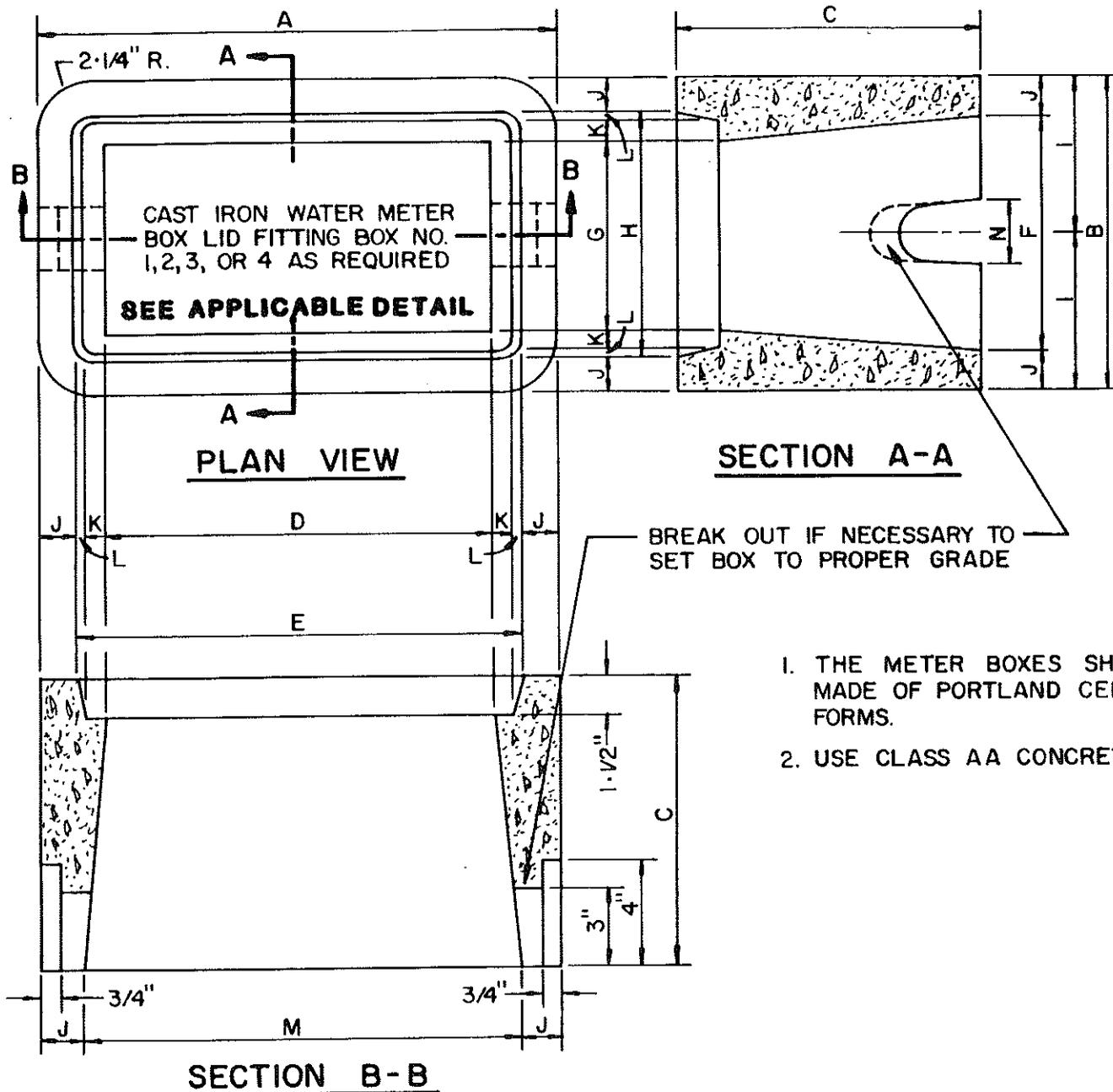
DETAIL NO.  
314



**STANDARD DETAIL**

**CAST IRON WATER METER BOX COVER  
NUMBER 5**

DETAIL NO.  
314



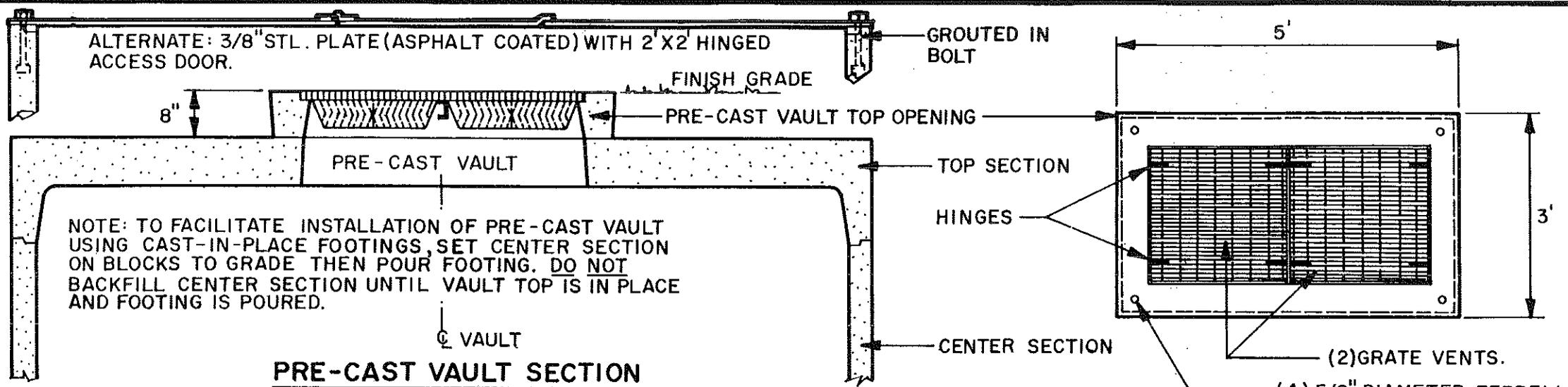
METER BOX DIMENSIONS				
DIM.	BOX NUMBER			
	1	2	3	4
A	19"	24-1/2"	29-1/2"	33-1/2"
B	12"	16-3/4"	18-1/2"	22-3/4"
C	11"	12"	13"	12"
D	14"	19"	23-3/4"	27-3/4"
E	16"	22"	26-1/2"	30-1/2"
F	9"	13-1/4"	15"	19-3/4"
G	7"	11-1/4"	12-3/4"	17"
H	9"	14-1/4"	15-1/2"	19-3/4"
I	6"	8-3/8"	9-1/4"	11-3/8"
J	1-1/2"	1-3/4"	1-3/4"	1-1/2"
K	3/4"	1-1/8"	1"	1"
L	1/4"	3/8"	3/8"	3/8"
M	16"	21"	25-1/2"	30-1/2"
N	2-1/2"	3-1/2"	4"	4"
	5/8" OR 3/4" METER	1" METER	1-1/2" METER	2" METER

**NOTES**

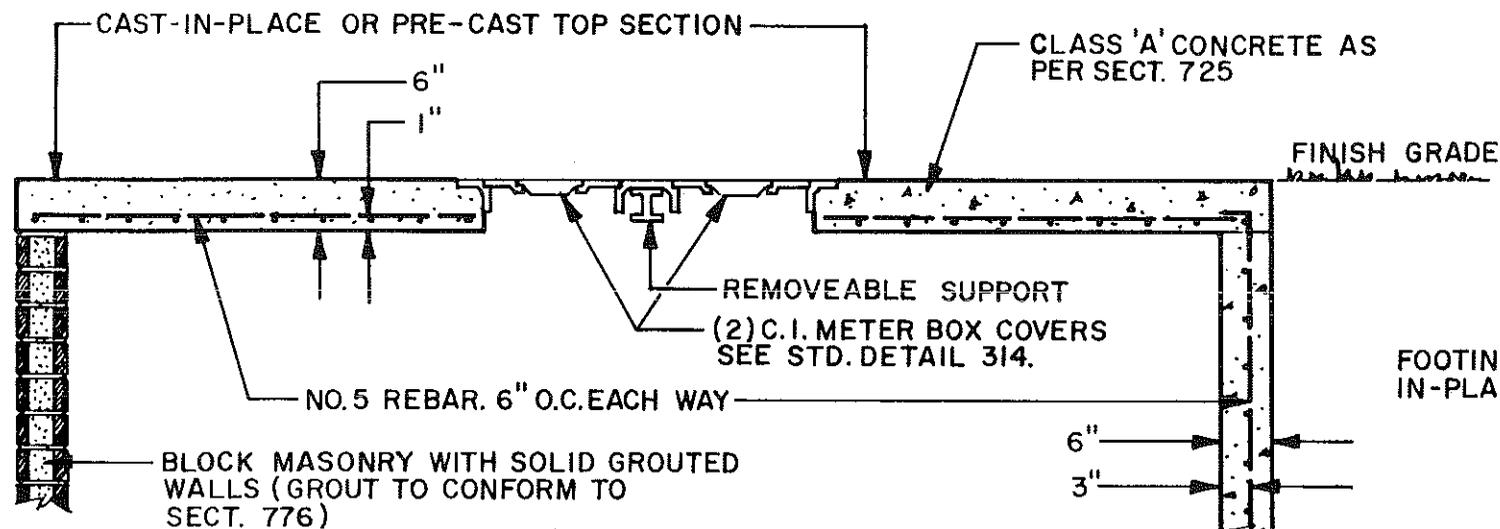
1. THE METER BOXES SHALL CONFORM TO THE DIMENSIONS AS SHOWN AND SHALL BE MADE OF PORTLAND CEMENT CONCRETE POURED AND TAMPED (OR VIBRATED) IN TRUE FORMS.
2. USE CLASS AA CONCRETE PER SECTION 725.

BREAK OUT IF NECESSARY TO SET BOX TO PROPER GRADE

DETAIL NO. <b>320</b>	<b>STANDARD DETAIL</b>	<b>CONCRETE WATER METER BOXES</b>	DETAIL NO. <b>320</b>
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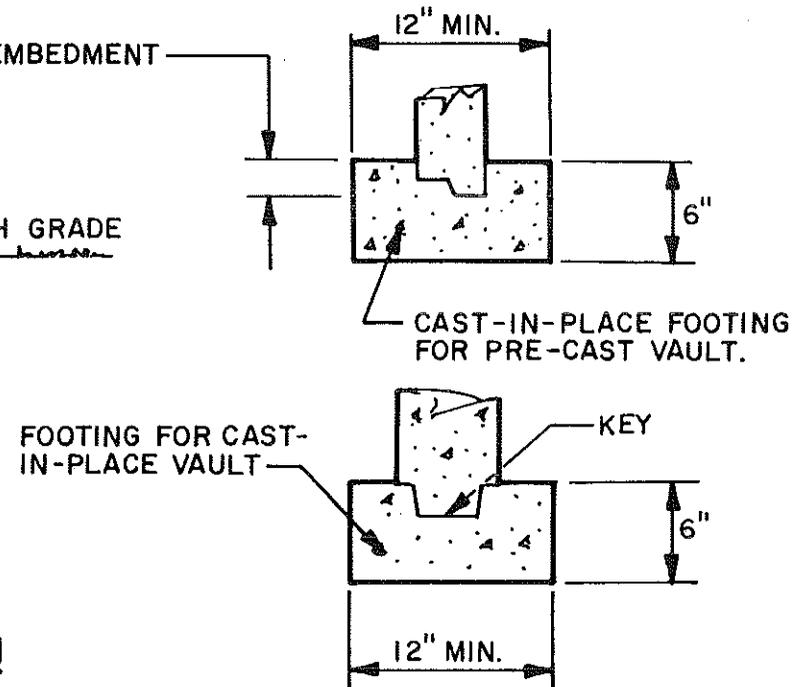


NOTE: PRE-CAST REINFORCED VAULT SECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND DETAILS AS APPROVED BY ENGINEER.



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

2" MIN. EMBEDMENT



DETAIL NO.

321

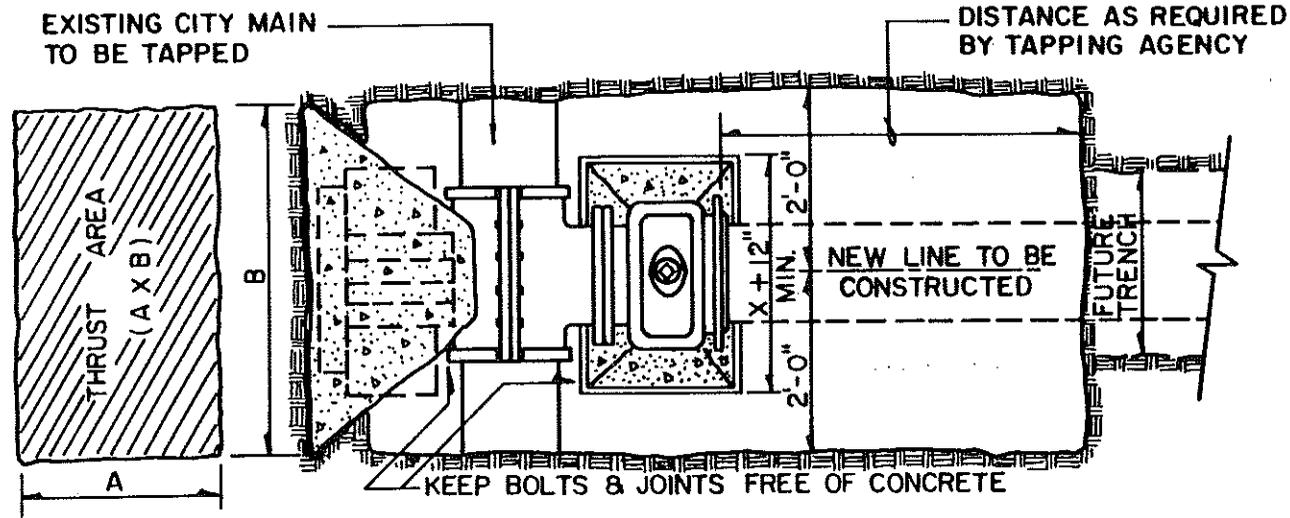


STANDARD DETAIL

STANDARD WATER METER VAULT

DETAIL NO.

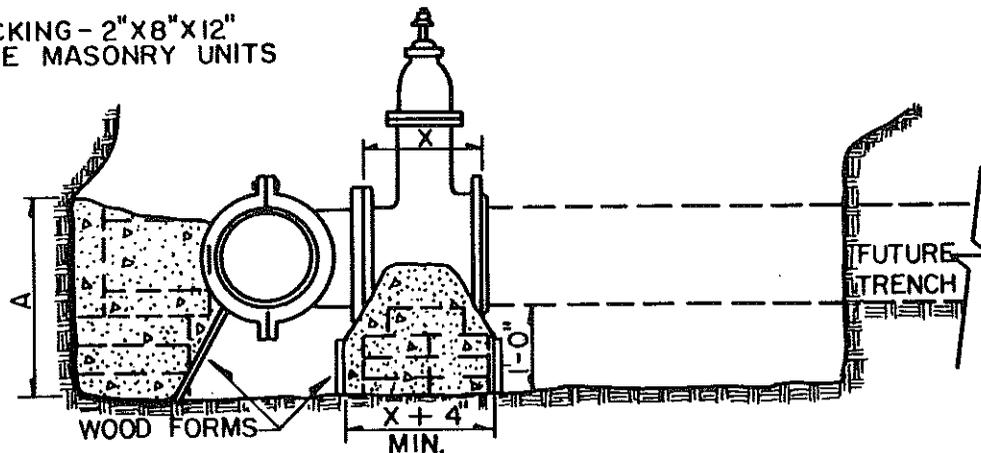
321



**PLAN**

CONCRETE: CLASS "B" PER SECT. 725  
 NORMALLY, CURE 24 HRS. BEFORE  
 BACKFILLING.

OPTIONAL BLOCKING - 2" X 8" X 12"  
 SOLID CONCRETE MASONRY UNITS  
 AS INDICATED.



**ELEVATION**

**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. TAPS SHALL BE MADE BY CITY CREWS AT PREVAILING RATES OR BY APPROVED CONTRACTORS WHEN ALLOWED BY CITY.
6. THIS DETAIL COVERS TAPPING SLEEVES 4" THROUGH 16" IN SIZE ON DUCTILE IRON, CAST IRON AND ASBESTOS CEMENT PIPE. ANY OTHER SIZE OR TYPE OF PIPE WILL REQUIRE A SEPERATE SUBMITTAL AND APPROVAL BY THE ENGINEER.

SIZE OF PIPE BEING CONNECTED	MINIMUM THRUST AREA REQUIRED EQUALS (AXB)
4" & LESS	3 SQUARE FEET
6"	4 " "
8"	6 " "
10"	9 " "
12"	13 " "
16"	23 " "

DETAIL NO.  
**340**



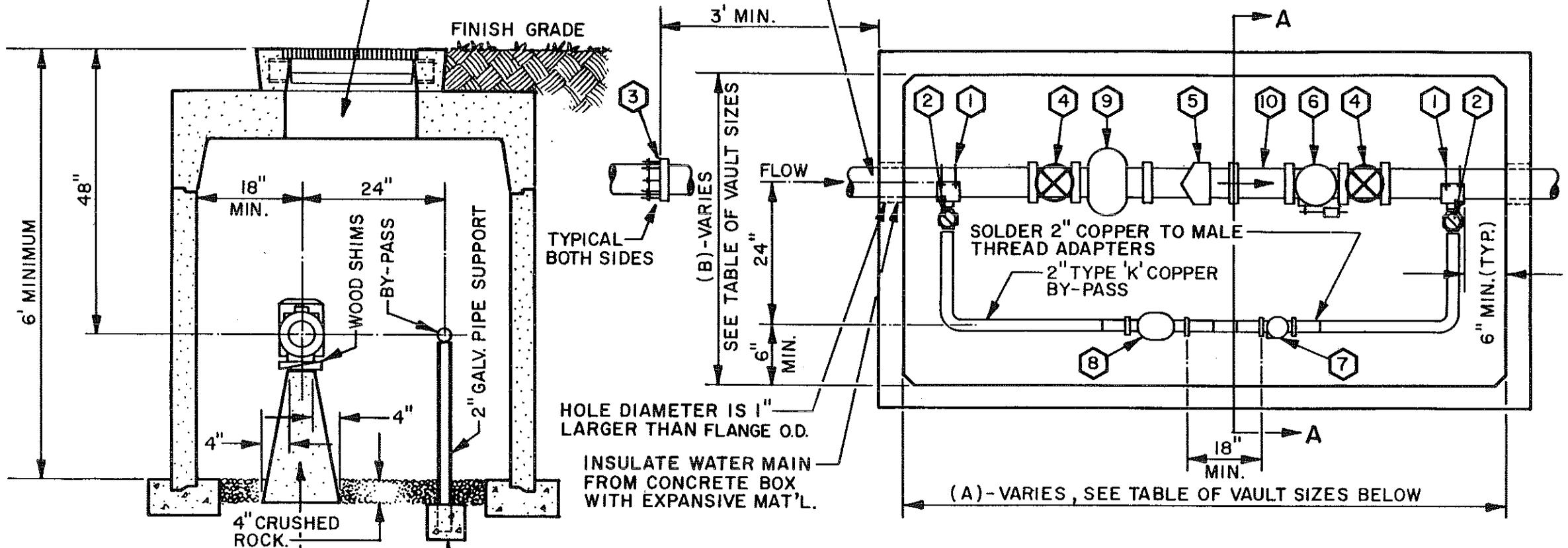
**STANDARD DETAIL**

**INSTALLING TAPPING SLEEVES AND VALVES**

DETAIL NO.  
**340**

FOR VAULT CONSTRUCTION  
SEE STD. DETAIL 321.

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



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

INSULATE WATER MAIN  
FROM CONCRETE BOX  
WITH EXPANSIVE MAT'L.

CONCRETE SUPPORT UNDER  
NO. 4 5 11 12

**SECTION A-A**

6" X 6" X 6" CONCRETE BASE

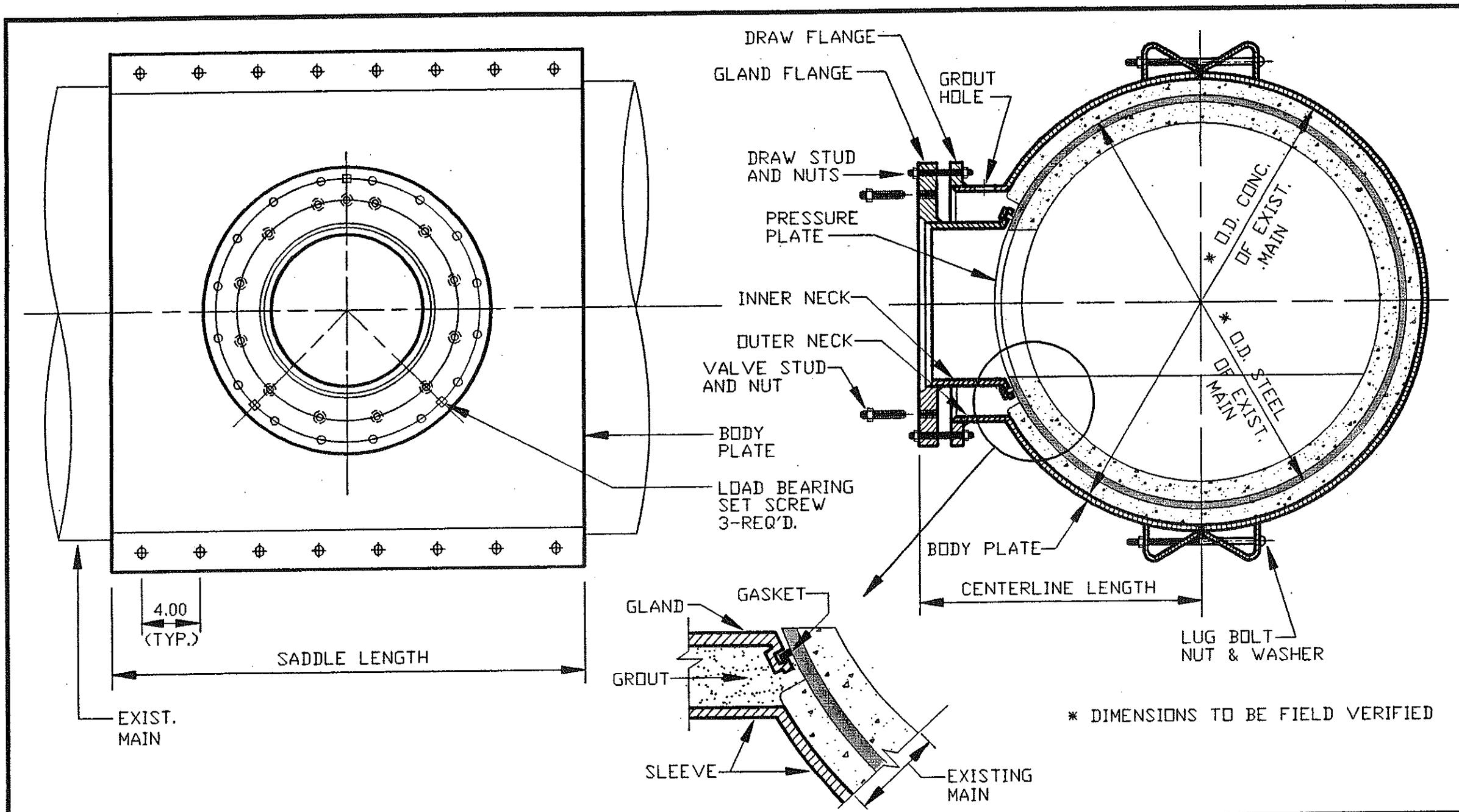
**VAULT DIMENSION TABLE**

A. C. P. SIZE	3"	4"	6"
(A)	8'-4"	10'-6"	12'
(B)	4'-4"	5'	5'

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

**SHEET 1 OF 2**

DETAIL NO. <b>345-1</b>	<b>STANDARD DETAIL</b>	<b>3", 4", 6" WATER METER</b>	APPROVED PUBLIC WORKS COMMITTEE _____ CHAIRMAN	DETAIL NO. <b>345-1</b> _____ DATE
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DETAIL NO.  
342

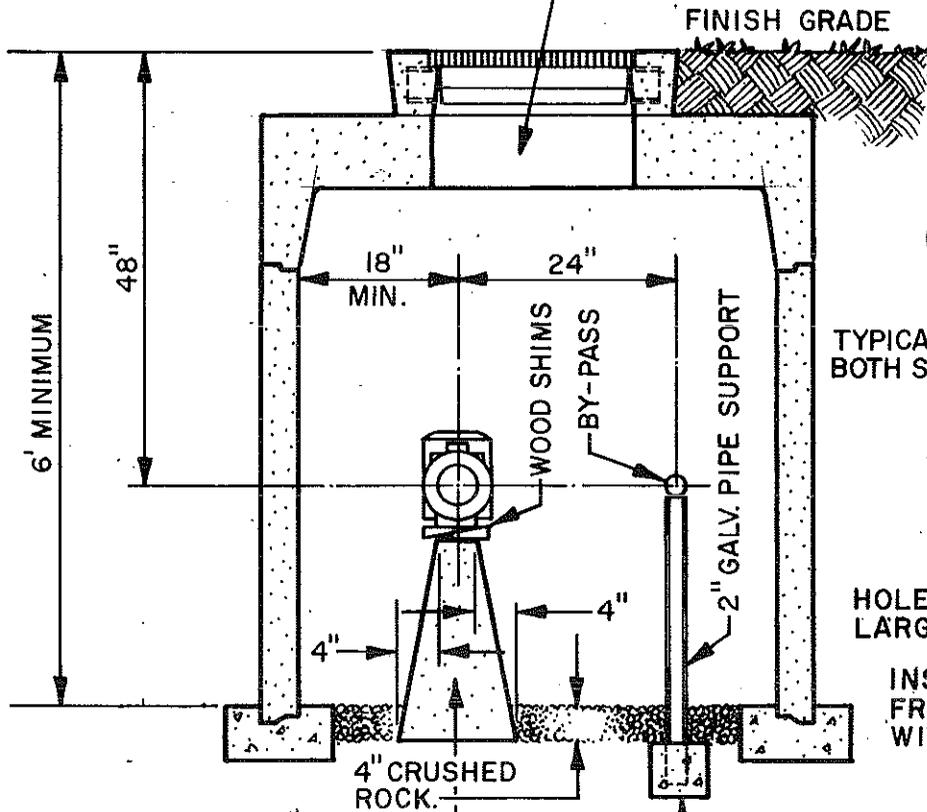


STANDARD DETAIL

CONCRETE PRESSURE PIPE TAPPING SLEEVE

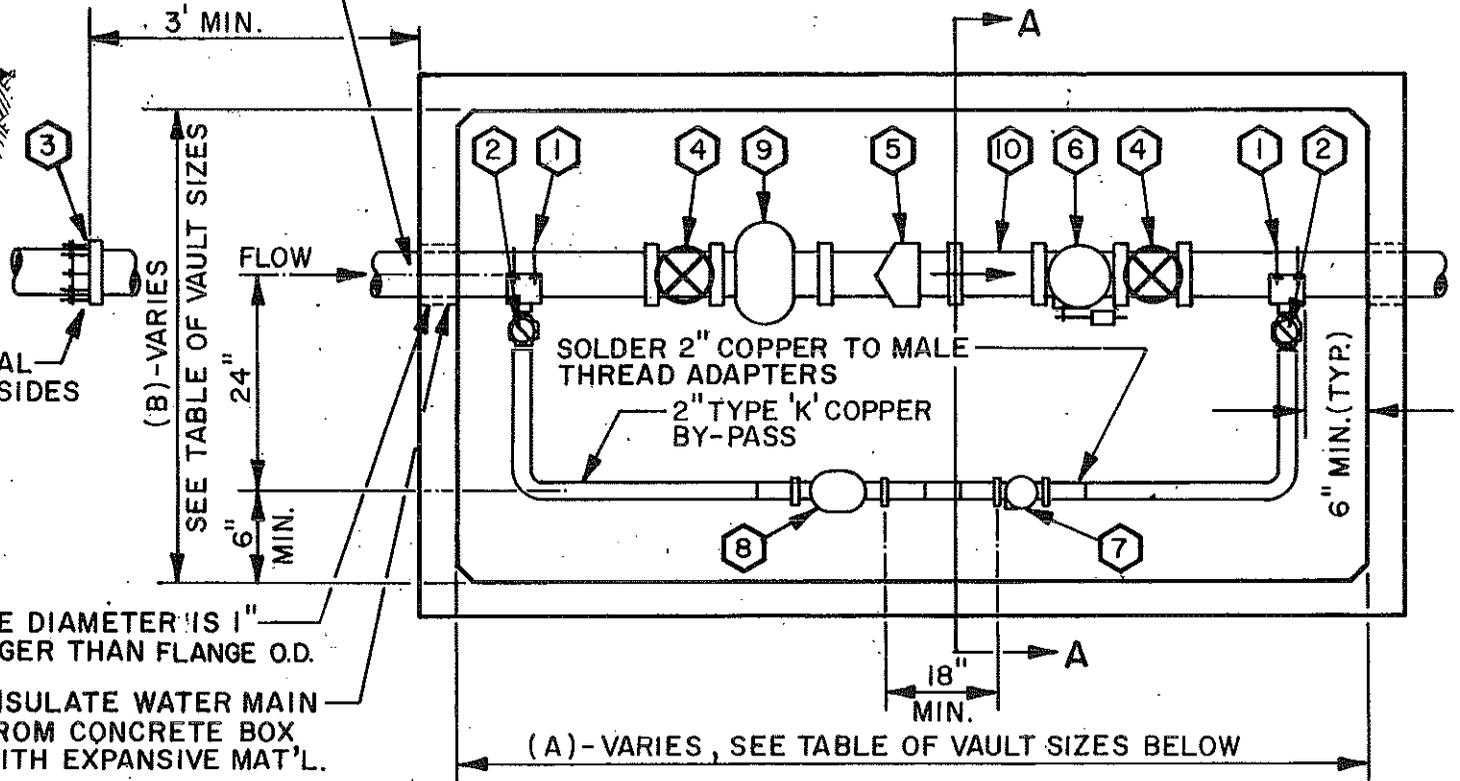
DETAIL NO.  
342

FOR VAULT CONSTRUCTION  
SEE STD. DETAIL 321.



CONCRETE SUPPORT UNDER  
NO. 4 5 11 12  
**SECTION A-A**  
6" X 6" X 6" CONCRETE BASE

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



HOLE DIAMETER IS 1"  
LARGER THAN FLANGE O.D.  
INSULATE WATER MAIN  
FROM CONCRETE BOX  
WITH EXPANSIVE MAT'L.

(A) - VARIES, SEE TABLE OF VAULT SIZES BELOW

VAULT DIMENSION TABLE				
A. C. P.	SIZE	3"	4"	6"
(A)		8'-4"	10'-6"	12'
(B)		4'-4"	5'	5'

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

**SHEET 1 OF 2**

DETAIL NO.  
**345-1**



**STANDARD DETAIL**

**3", 4", 6" WATER METER**

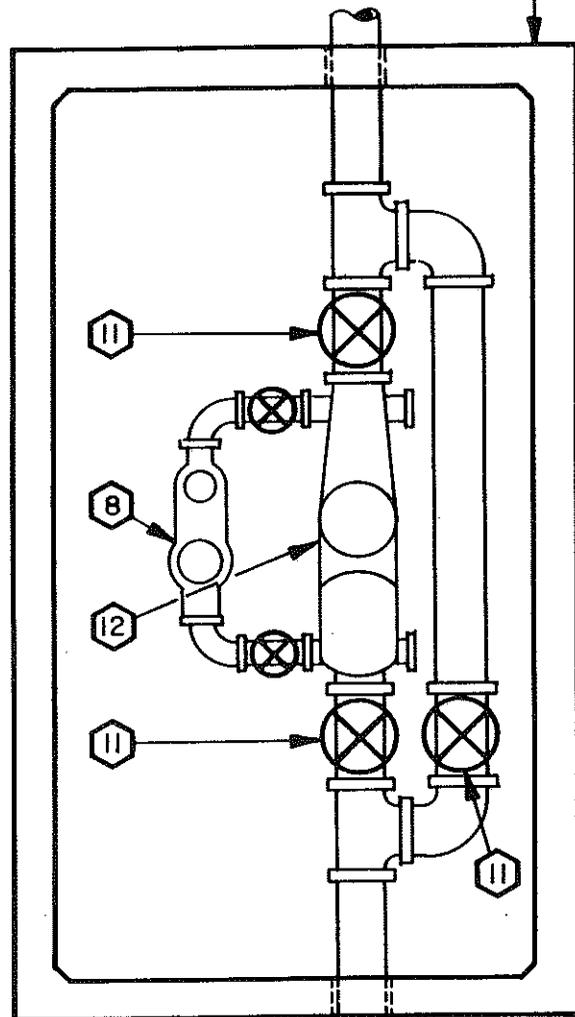
APPROVED PUBLIC WORKS COMMITTEE

CHAIRMAN

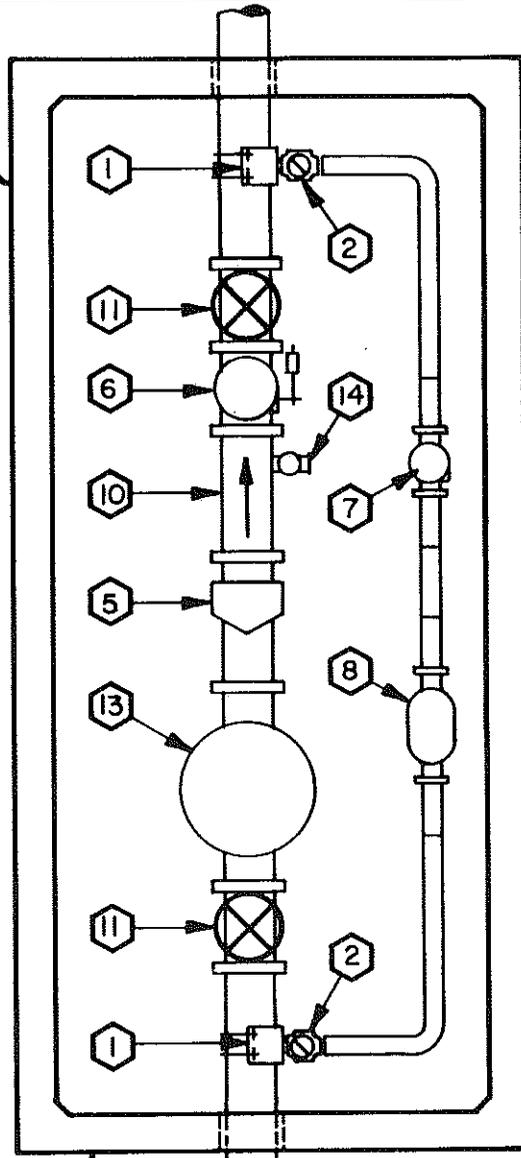
DATE

DETAIL NO.  
**345-1**

FOR VAULT CONSTRUCTION  
SEE STD. DETAIL 321



3' MIN.



3' MIN.



TYPICAL BOTH  
SIDES

### LEGEND

- ① DOUBLE STRAP ALL BRONZE SERVICE SADDLES.
- ② CORP. STOP, 2" (BALL TYPE).
- ③ ADAPTER, FLANGED TO MECH. JOINT FOR A.C.P.
- ④ GATE VALVE, FLANGED, WITH HAND WHEEL, OPEN LEFT.
- ⑤ TURBOMETER: ROCKWELL SERIES 'W' OR HERSEY SERIES 'M.H.R.' OR NEPTUNE TRIDENT TURBINE
- ⑥ FLANGED SWING CHECK VALVE WITH EXTERNAL LEVER AND WEIGHT
- ⑦ 2" BRONZE CHECK VALVE.
- ⑧ 2" TURBOMETER: ROCKWELL 'W-160' OR HERSEY 'M.H.R.' OR NEPTUNE TRIDENT TURBINE
- ⑨ STRAINER (3", 4", 6") AVAILABLE FROM METER MANUFACTURER, INSTALL ONLY WHEN 'TURBO' IS USED.
- ⑩ FLANGED SPOOL (3 PIPE DIAMETERS IN LENGTH).
- ⑪ O.S. & Y. GATE VALVE, FLANGED WITH HAND WHEEL OPEN LEFT, AND RISING STEM.
- ⑫ TURBOMETER U.L. APPROVED: ROCKWELL W-5000 DR. OR W-2000 DR. OR HERSEY FM.-CT. OR NEPTUNE TURBINE -FS-UL
- ⑬ 6" OR 10" STRAINER U.L. APPROVED.
- ⑭ 2" THREADED OUTLET AND GATE VALVE.

### NOTES

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

SHEET 2 OF 2

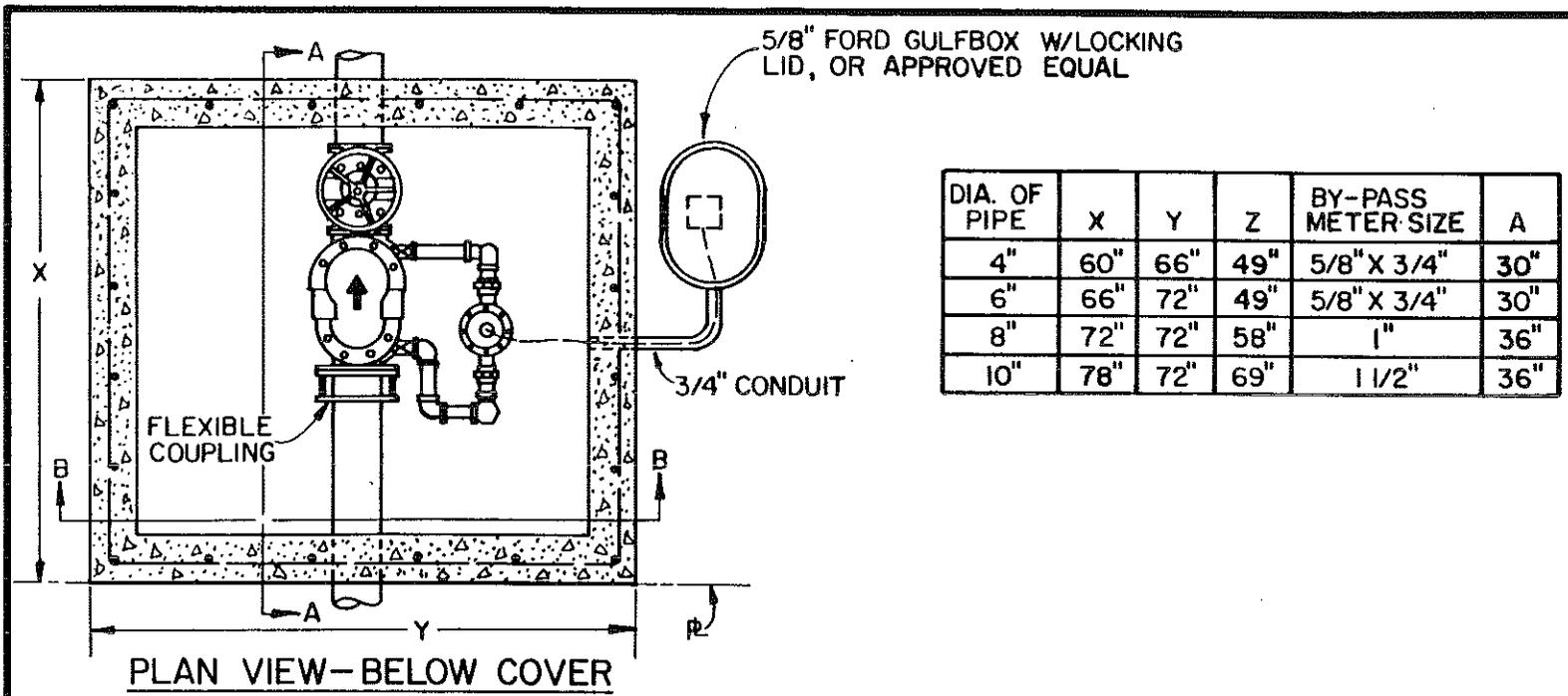
DETAIL NO.  
345-2



STANDARD DETAIL

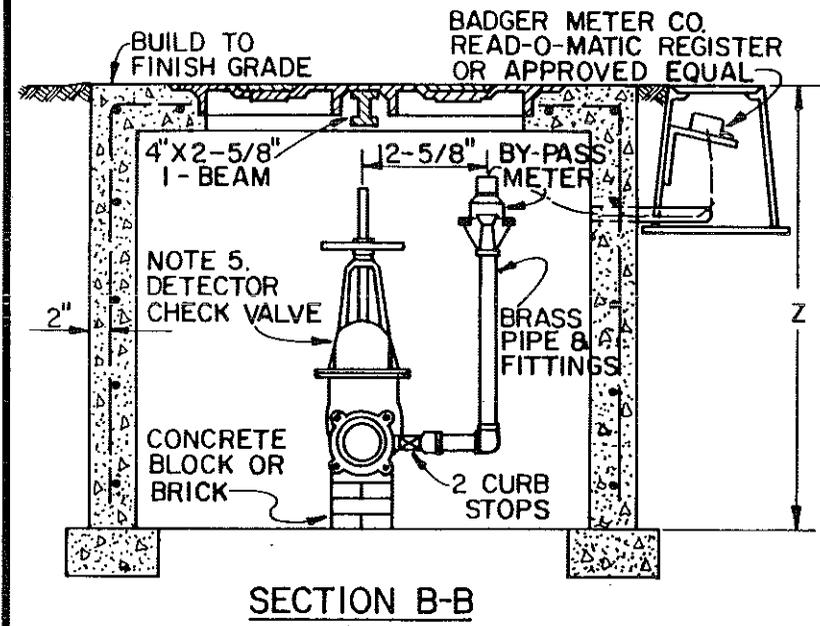
4", 6" WATER METER  
WITH ON-SITE FIRE HYDRANTS

DETAIL NO.  
345-2

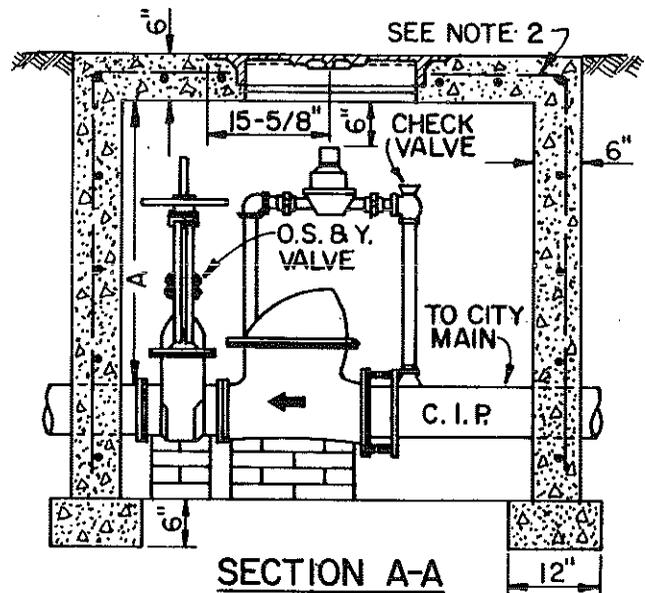


**NOTES:**

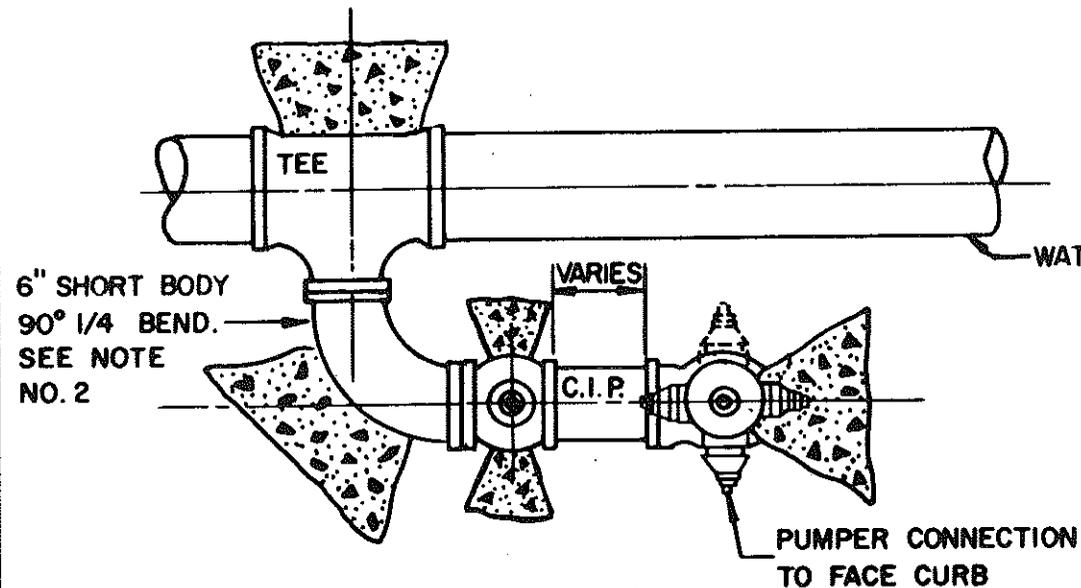
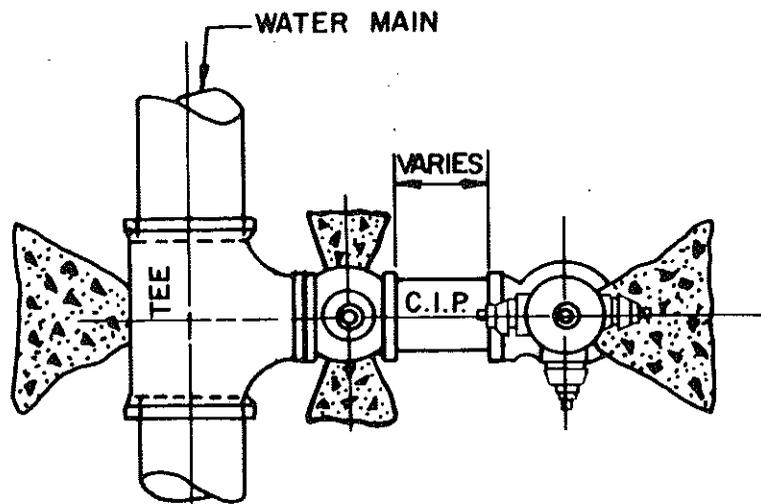
1. FIRELINE FROM CITY MAIN TO PROPERTY LINE SHALL BE CONSTRUCTED OF CAST IRON PIPE.
2. REINFORCING TO BE 1/2"  $\phi$  ROD ON 6" CENTERS EACH WAY ON TOP AND 12" CENTERS EACH WAY ON THE SIDES.
3. COVERS TO CONSIST OF TWO METER BOX COVERS STD. DET. 314.
4. BY-PASS METER TO BE ACCORDING TO GOVERNING AGENCY.
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 & FENCES SHALL NOT OBSTRUCT ACCESS.
7. CITY CONTROL VALVE TO BE REQUIRED AT MAIN.
8. PARTS OF PIPE TO BE EMBEDDED IN CONCRETE SHALL BE WRAPPED WITH 30# 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.



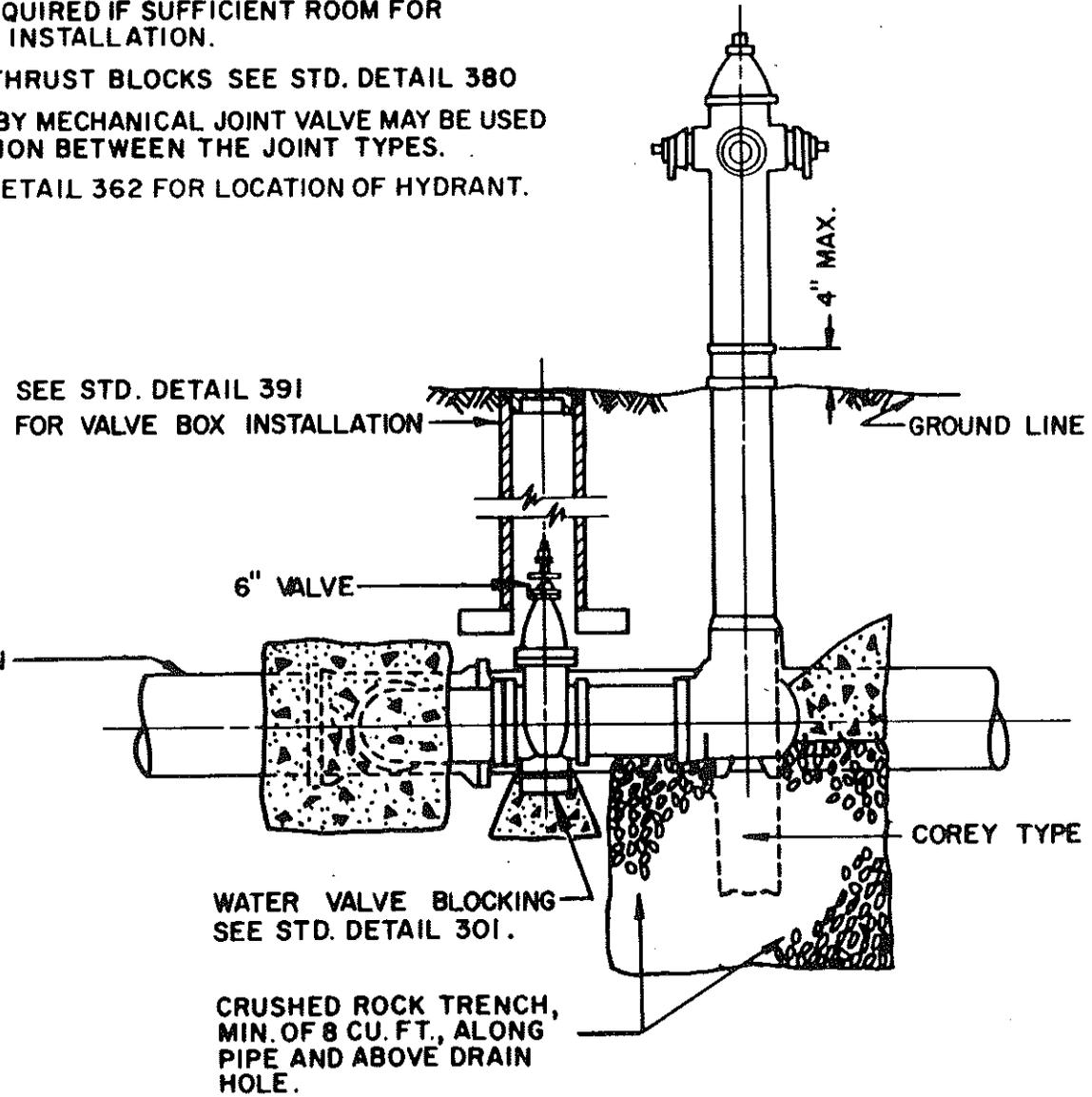
SECTION B-B



SECTION A-A



- NOTES:**
1. JOINTS BETWEEN THE VALVE AND THE MAIN SHALL BE FLANGED TYPE. JOINTS BETWEEN THE VALVE AND HYDRANT SHALL BE FLANGED OR MECHANICAL TYPE.
  2. 90° BEND NOT REQUIRED IF SUFFICIENT ROOM FOR PERPENDICULAR INSTALLATION.
  3. FOR CONCRETE THRUST BLOCKS SEE STD. DETAIL 380
  4. A FLANGE JOINT BY MECHANICAL JOINT VALVE MAY BE USED AS THE TRANSITION BETWEEN THE JOINT TYPES.
  5. SEE STANDARD DETAIL 362 FOR LOCATION OF HYDRANT.



DETAIL NO.  
**360**

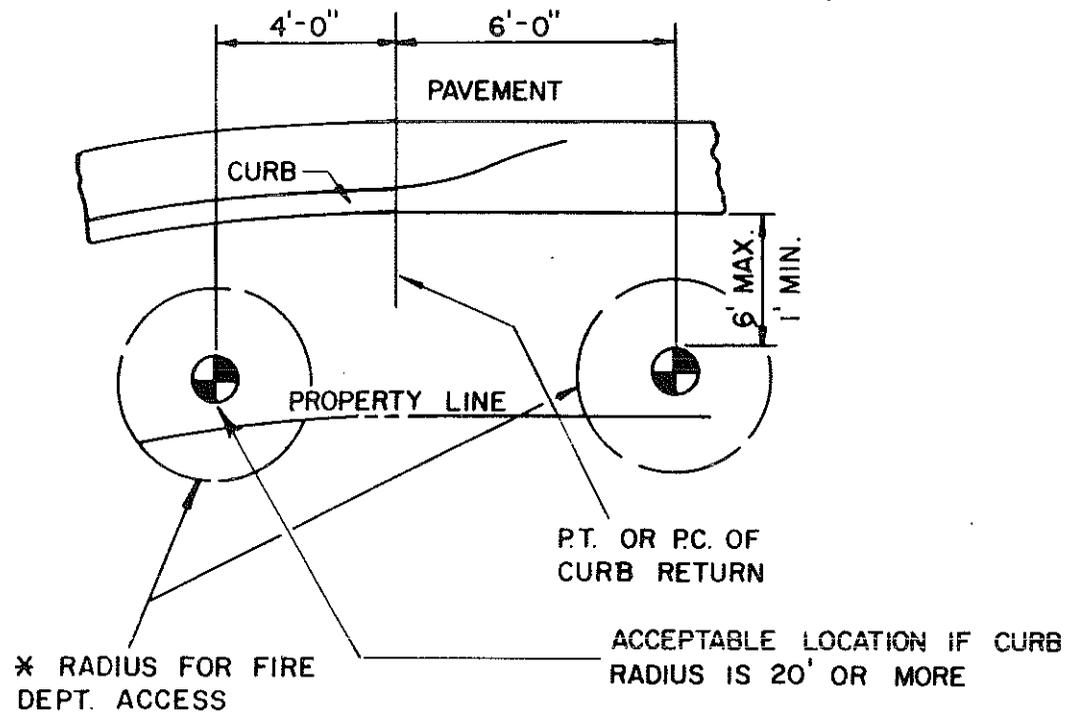
 **STANDARD DETAIL**

**FIRE HYDRANT INSTALLATION**

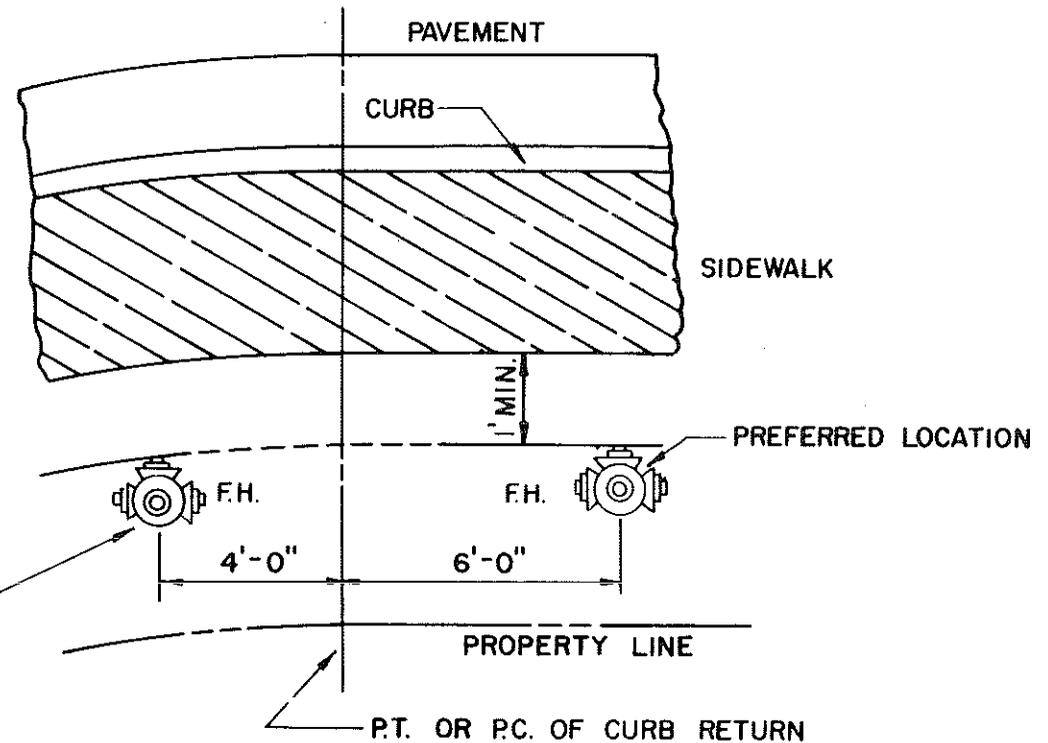
DETAIL NO.  
**360**

**NOTES**

1. OBSTRUCTIONS SUCH AS UTILITY POLES, STREET SIGNS, IRRIGATION BOXES, FENCES, ETC., MUST NOT BE PLACED BETWEEN CURB AND HYDRANT.
2. \* RADIUS VARIES BY MUNICIPALITY.
3. DIMENSIONS SHOWN ON CONSTRUCTION DRAWINGS SUPERSEDE LOCATIONS SHOWN HERE.
4. ON LOCATIONS IN MIDBLOCK, THE FIRE HYDRANT WILL BE ALIGNED WITH A PROPERTY LINE.



PARKWAY AREA OR NO SIDEWALK



AREA WITH SIDEWALK

DETAIL NO.

362

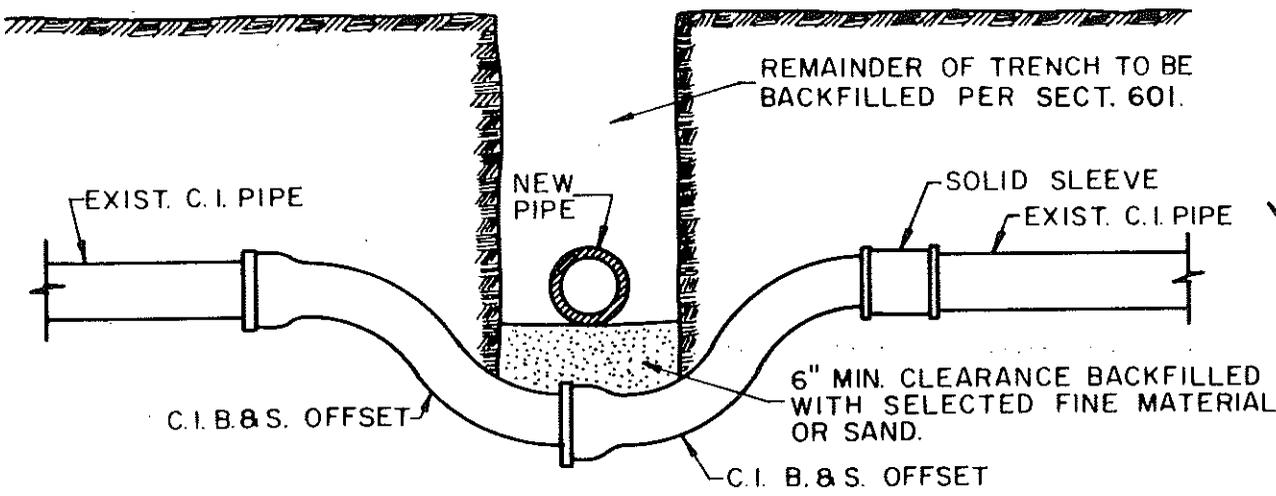


STANDARD DETAIL

LOCATIONS FOR NEW FIRE HYDRANTS

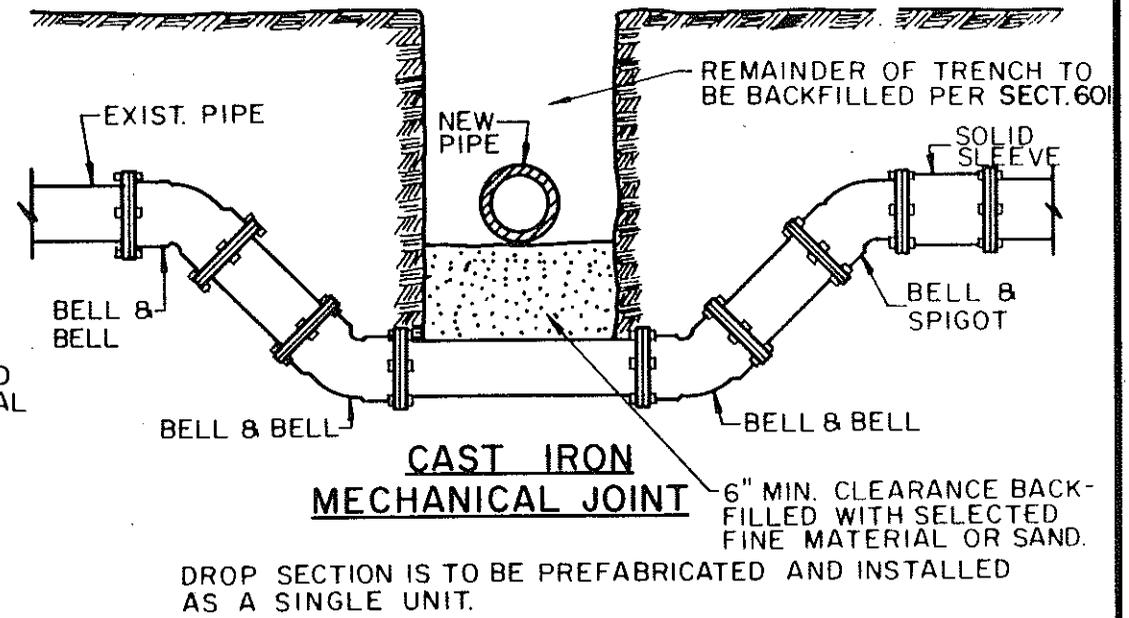
DETAIL NO.

362



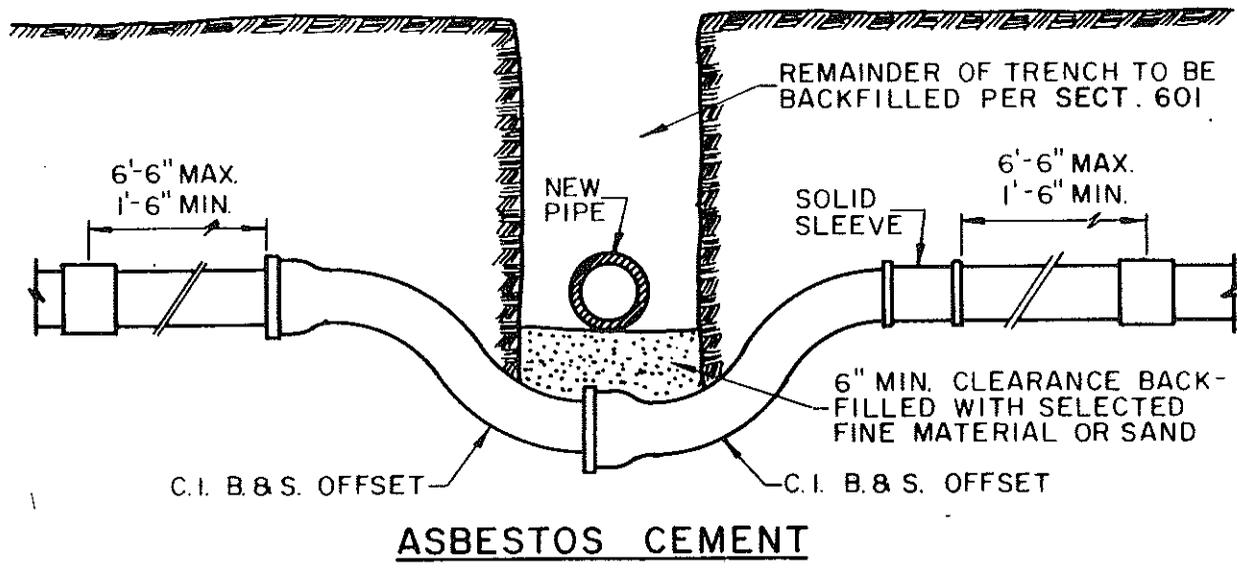
45° CAST IRON BENDS MAY BE USED IN PLACE OF CAST IRON OFFSETS, AS SHOWN

**CAST IRON**



**CAST IRON MECHANICAL JOINT**

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



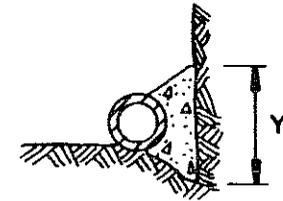
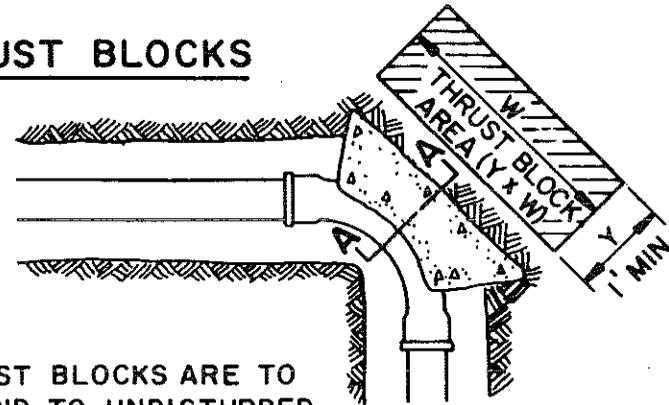
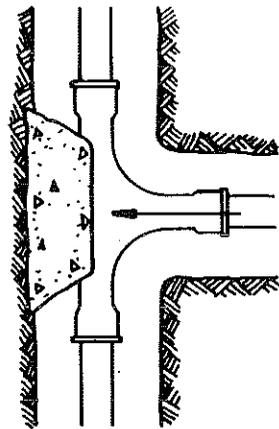
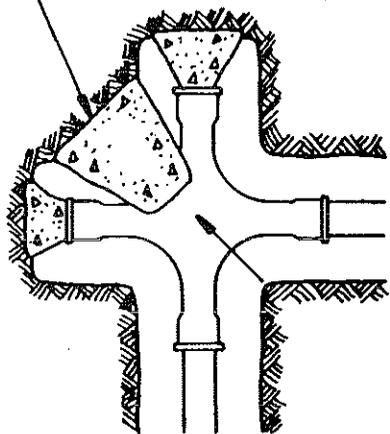
**ASBESTOS CEMENT**

- NOTES:**
1. THIS DETAIL COVERS MOVING OF WATER MAINS, 2" TO 12" ONLY.
  2. THRUST BLOCKING AS PER STD. 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.

DETAIL NO. <b>370</b>	 <b>STANDARD DETAIL</b>	<b>VERTICAL REALIGNMENT OF WATER MAINS</b>	DETAIL NO. <b>370</b>
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## TYPICAL LOCATIONS OF THRUST BLOCKS

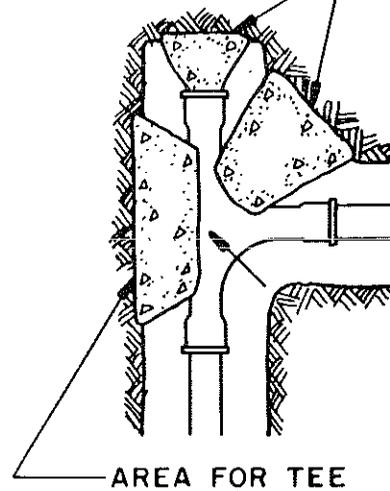
AREA REQUIRED FOR 90° BEND



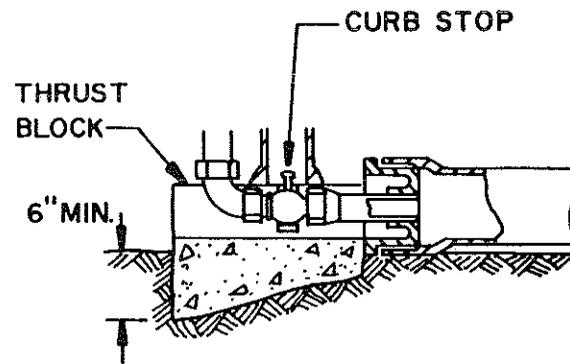
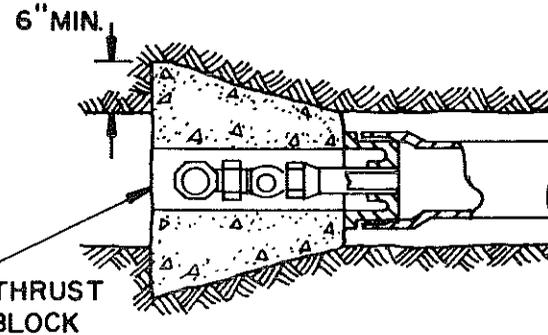
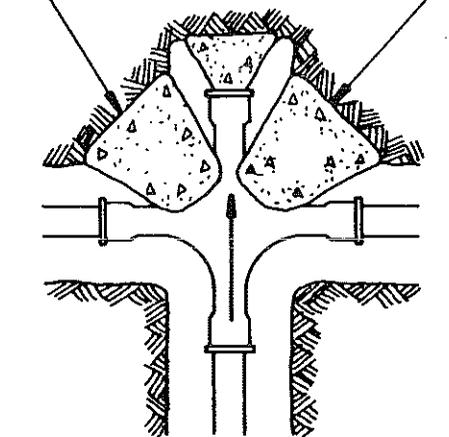
SECTION A-A

NOTE: THRUST BLOCKS ARE TO EXTEND TO UNDISTURBED GROUND. CONCRETE TO BE CLASS C, SECT. 725.

1/2 AREA REQUIRED FOR 90° BEND



TOTAL AREA EQUALS AREA REQUIRED FOR TEE



### MINIMUM THRUST BLOCK AREA REQUIRED (Y x W)

PIPE SIZE	WATER PIPE	
	TEE, DEAD END, 90° BEND	45° & 22 1/2° BENDS
4" & LESS	3 SQ. FEET	3 SQ. FEET
6"	4 " "	3 " "
8"	6 " "	3 " "
10"	9 " "	5 " "
12"	13 " "	7 " "
16"	23 " "	12 " "

**NOTES:**

1. TABLE IS BASED ON 3000 #/ SQ. FT. SOIL. IF CONDITIONS ARE FOUND TO INDICATE SOIL BEARING IS LESS, THE AREAS SHALL BE INCREASED ACCORDINGLY.
2. AREAS FOR PIPE LARGER THAN 18" SHALL BE CALCULATED FOR EACH PROJECT.
3. FORM ALL NON-BEARING VERTICAL SURFACES.

DETAIL NO.  
380



STANDARD DETAIL

THRUST BLOCKS FOR WATER LINES

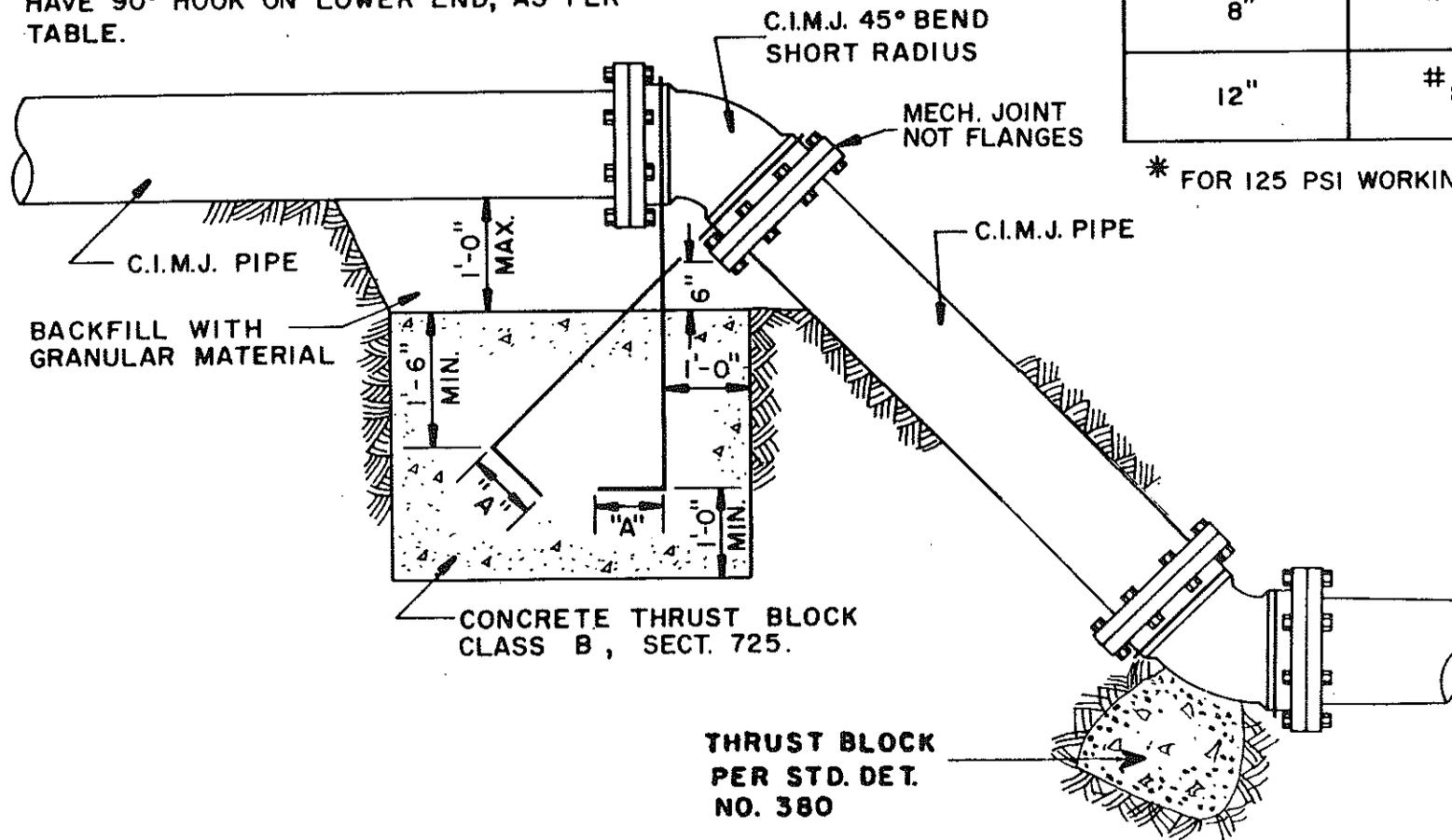
DETAIL NO.  
380

**NOTE**

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.

PIPE SIZE	MIN. BAR SIZE	"A"-DIMENSION (HOOK)	MIN. * BLOCK DIM.
6"	# 6	6"	3' x 3' x 3'
8"	# 6	9"	4' x 4' x 2.5'
12"	# 8	9"	4' x 5' x 5'

\* FOR 125 PSI WORKING PRESSURE



**NOTES**

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.

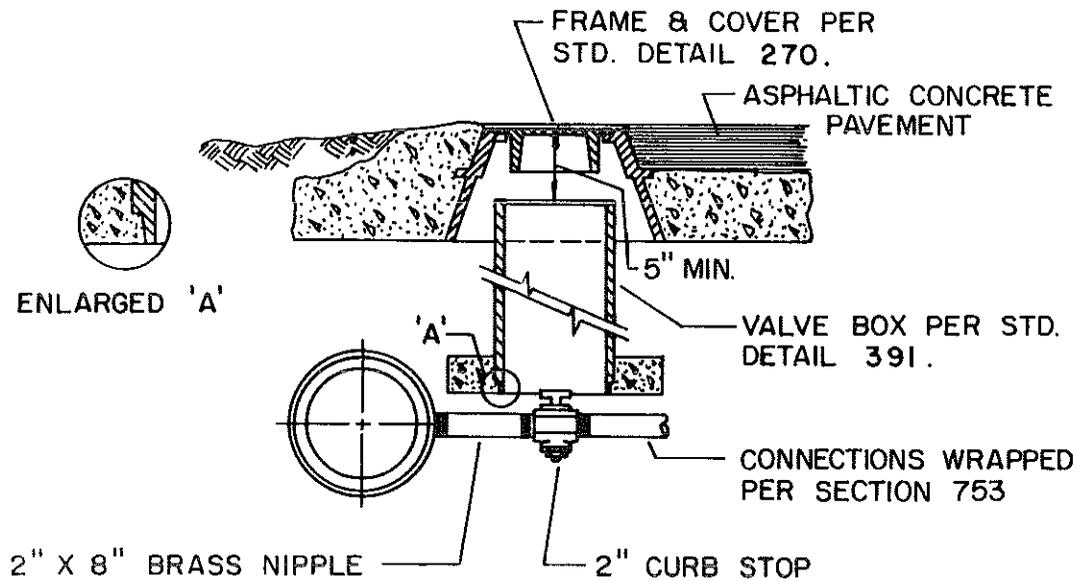
DETAIL NO.  
381



STANDARD DETAIL

ANCHOR BLOCKS FOR VERTICAL BENDS

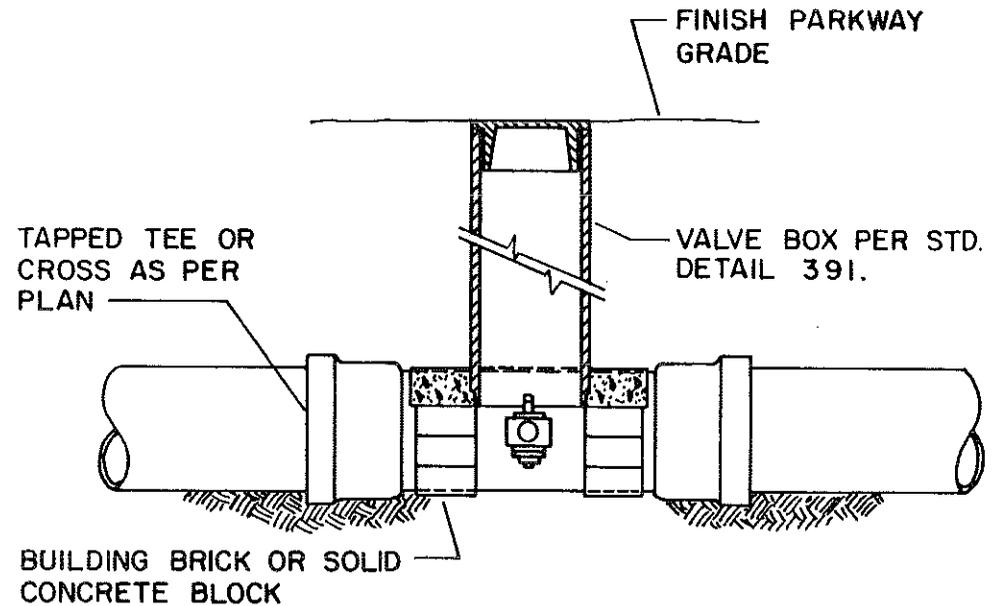
DETAIL NO.  
381



**TYPE 'A'**

**NOTES**

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



**TYPE 'B'**

**NOTE**

1. VALVE BOX TO BE SUPPORTED ON BRICKS TO PREVENT VERTICAL LOADS FROM BEING TRANSMITTED TO THE SMALL PIPE.

DETAIL NO.  
**389**



**STANDARD DETAIL**

**CURB STOP WITH VALVE BOX & COVER**

DETAIL NO.  
**389**

CAST IRON WATER METER BOX  
COVER PER STD. DETAIL 311.

GROUND LEVEL

CONC. WATER METER  
BOX NO. 2 PER STD.  
DETAIL 320.

2" CORP STOP

2" P.E. OR COPPER PIPE

2" BRASS COUPLING

2" BRASS ELL

WATER MAIN

2" TAPPED CAP (CAST IRON)

TYPE 'A'

VALVE BOX LOCATION MAY VARY IF  
APPROVED BY THE CITY ENGINEER

CAST IRON WATER METER BOX  
COVER PER STD. DETAIL 311.

GROUND LEVEL

CONC. WATER METER  
BOX NO. 2 PER STD.  
DETAIL 320.

6" GRAVEL BED

2" ADAPTER  
BRASS OR COPPER

2" COPPER PIPE

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

2" BRONZE CURB STOP

TAPPED PLUG OR CAP

BRONZE OR BRASS  
FITTINGS

WATER LINE

CONC. THRUST BLOCK PER STD. DET. 380.

TYPE 'B'

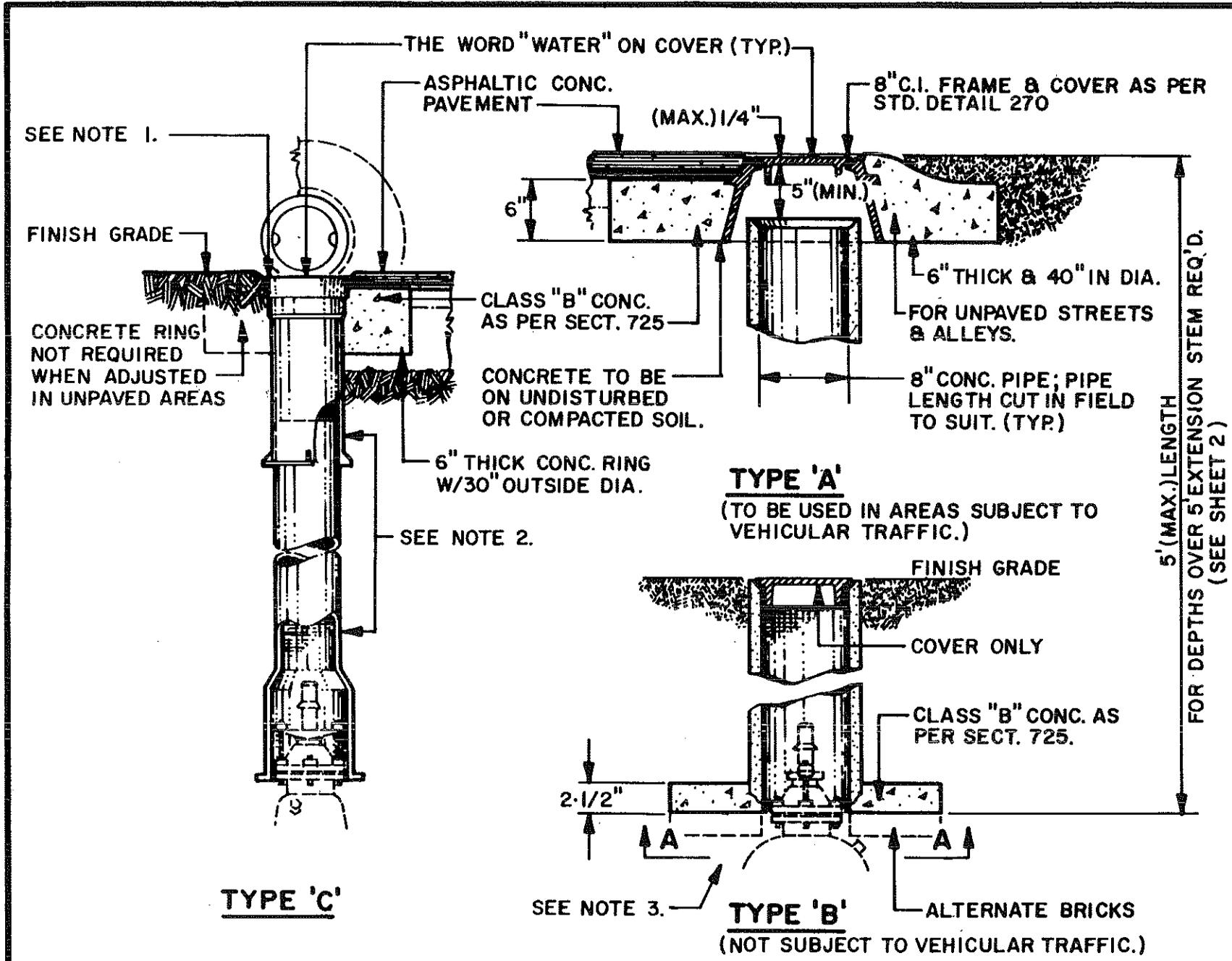
DETAIL NO.  
390



STANDARD DETAIL

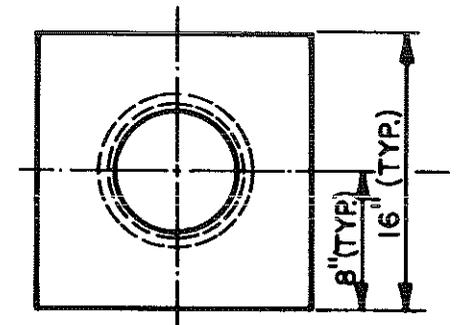
CURB STOP WITH FLUSHING PIPE

DETAIL NO.  
390



**NOTES**

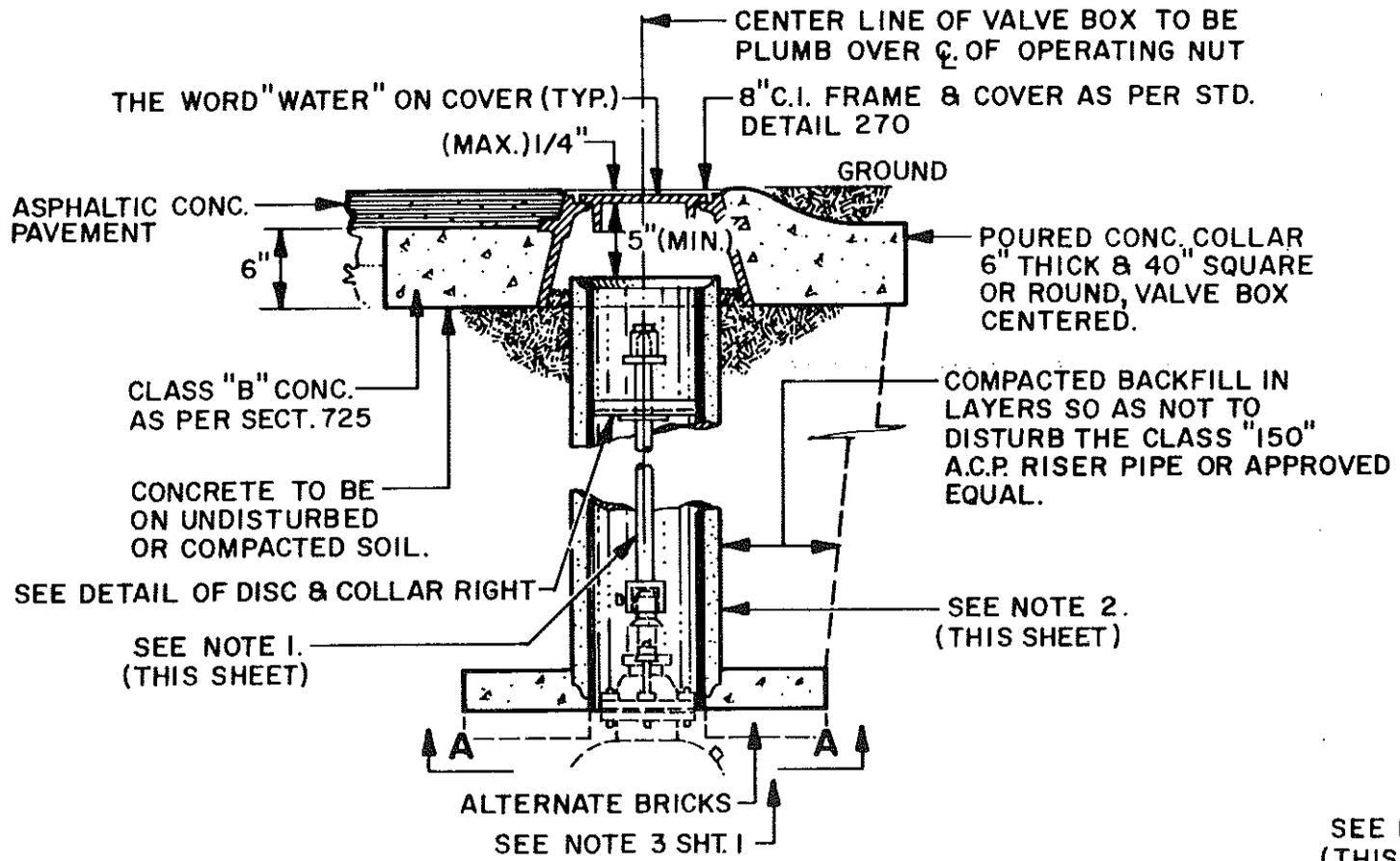
1. VALVE BOX SHALL BE ADJUSTED TO THE FINISHED GRADE PRIOR TO PLACING OF THE ASPHALTIC CONCRETE SURFACE.
2. USE PARKSON TYLER, APCO, OR EQUAL DEEP SKIRTED LID (4" OR MORE) TYPE, SLIDING ADJUSTABLE CAST IRON VALVE BOX. C.I. MIN. T.S. 30,000 P.S.I.
3. GROUND BELOW CONCRETE PAD OR 3 BRICKS TO BE COMPACTED 95% OF MAX. DENSITY.



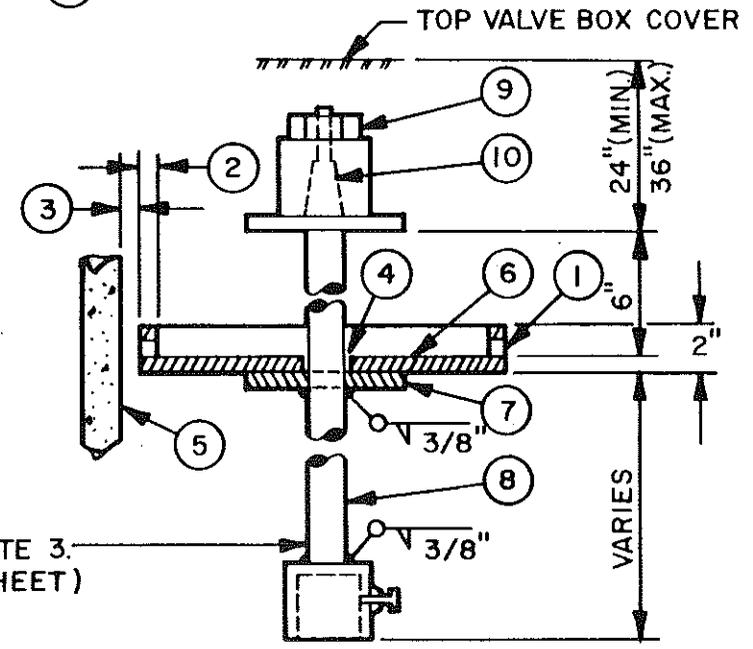
**VIEW A-A**

DETAIL NO. 391-1	 <b>STANDARD DETAIL</b>	<b>VALVE BOX INSTALLATION AND GRADE ADJUSTMENT</b>		DETAIL NO. 391-1
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REVISED 1991



- ① — (2) 1/2" DIA. HOLES OPPOSITE SIDES
- ② — 3/16"
- ③ — 1/4" ALL SIDES
- ④ — 1/16" MIN. CLEARANCE
- ⑤ — A.C.P. RISER WALL
- ⑥ — 3/16" STL. PLATE
- ⑦ — 3/8" X 3" DIA. PLATE



SEE NOTE 3. (THIS SHEET)

- ⑧ — MIN. ROD SIZE 1-1/4" DIA. STL. DESIG. A-15
- ⑨ — 2" SQUARE OPER. NUT TO BE HELD DOWN WITH NUT ON THREADED SHAFT AS STD. VALVE STEM NUT ATTACHMENT.
- ⑩ — THIS PART OF STEM SQUARE WITH 4 SIDES TAPERED.

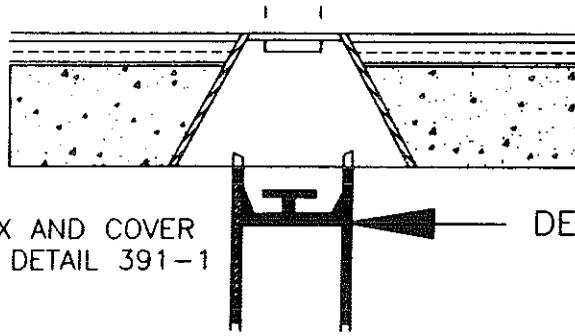
**NOTES**

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.

DETAIL NO. 391-2	<b>STANDARD DETAIL</b>	<b>VALVE BOX INSTALLATION</b>	DETAIL NO. 391-2
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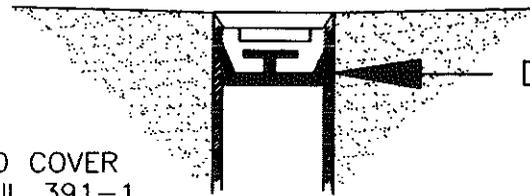
## NOTES

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 SLIPPAGE, A MINIMUM VERTICAL FORCE OF 50 POUNDS, AT A LOADING RATE OF 1.0 IN./MINUTE.
2. THE CAP SHALL BE MANUFACTURED OF CORROSIVE RESISTANT MATERIALS.
3. DEBRIS CAP SHALL BE INSTALLED AS CLOSE UNDER THE CAST IRON COVER WITHOUT INTERFERING WITH COVER OPERATION.
4. THE CAP SHALL BE CAPABLE OF SECURELY HOLDING A STANDARD LOCATING COIL, "SCOTCH MARK" 4 DISK MARKER BY 3M OR EQUAL.
5. THE CAP SHALL BE CONSTRUCTED TO ALLOW THE DEVICE TO BE SECURED BY A LOCK. THE LOCK (PAD, BARREL, ETC.) SHALL BE SUPPLIED BY THE AGENCY.
6. THE HANDLE AND/OR BODY OF THE CAP SHALL BE INTEGRALLY COLORED IF REQUIRED BY THE AGENCY. IF REQUIRED THE COLOR SHALL CONFORM TO THE ONE CALL LOCATING SERVICE (BLUE STAKE) COLORS (ARS 40-360.21)
7. THE CAP SHALL BE INSTALLED IN ALL VALVE HOUSINGS AS REQUIRED BY THE CONTRACT DOCUMENTS OR BY THE AGENCY'S POLICIES.
8. THE DEBRIS CAP SHALL BE MANUFACTURED BY SW SERVICES, INC., PHOENIX, ARIZONA OR EQUAL.



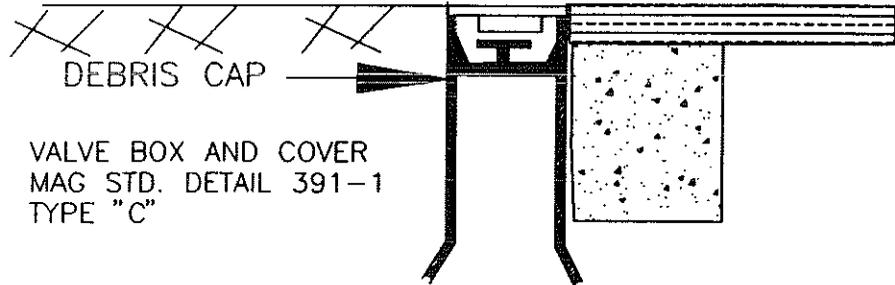
VALVE BOX AND COVER  
MAG STD. DETAIL 391-1  
TYPE "A"      DEBRIS CAP

TYPE "A"



VALVE BOX AND COVER  
MAG STD. DETAIL 391-1  
TYPE "B"      DEBRIS CAP

TYPE "B"

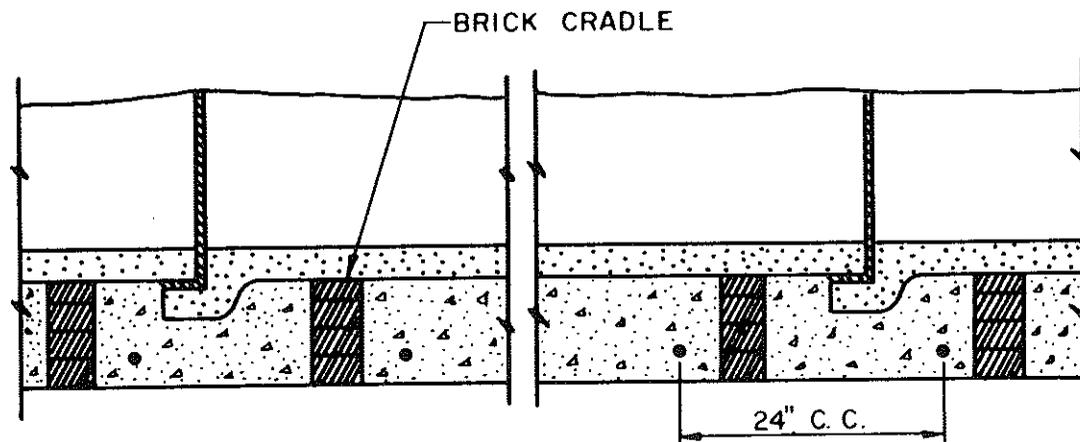
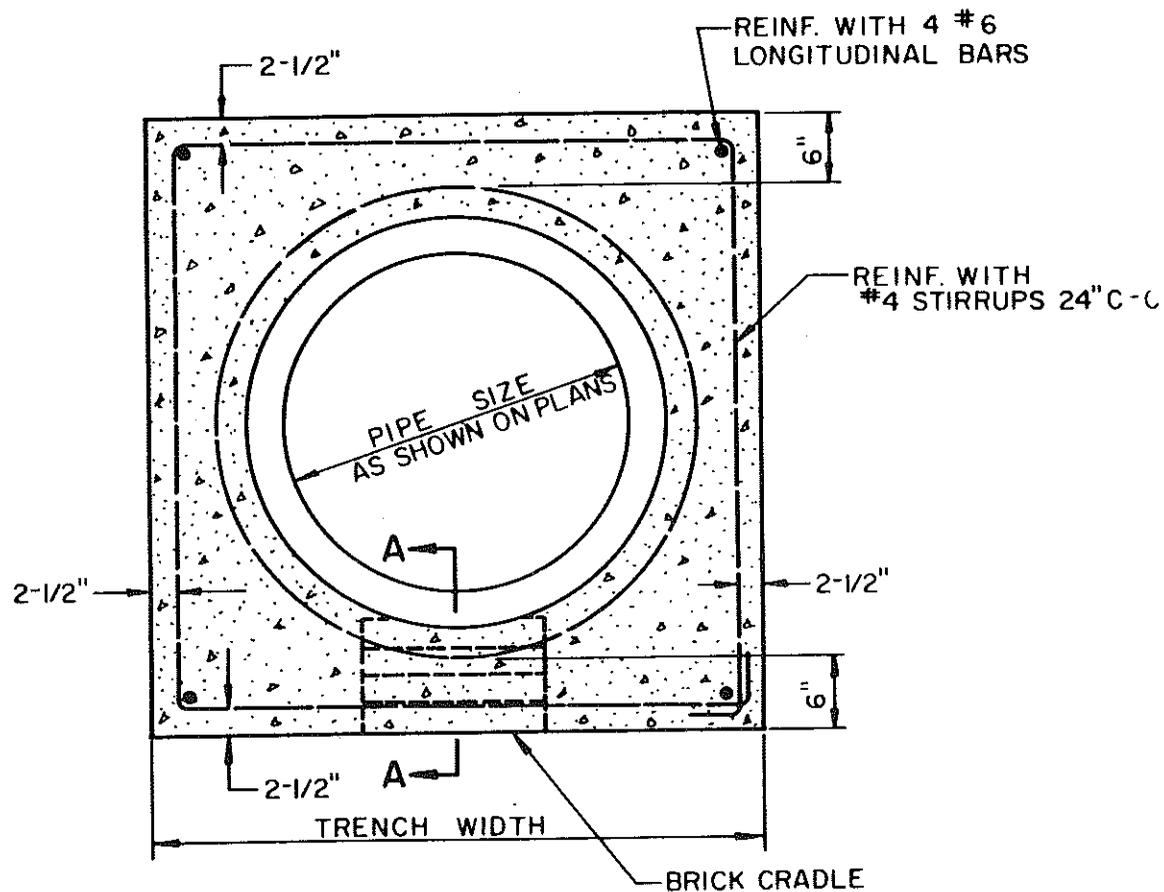


VALVE BOX AND COVER  
MAG STD. DETAIL 391-1  
TYPE "C"      DEBRIS CAP

TYPE "C"

REVISED 04-12-95

DETAIL NO. <b>392</b>		STANDARD DETAIL	DEBRIS CAP INSTALLATION		DETAIL NO. <b>392</b>
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SECTION A-A

NOTES

1. LAY PIPE TO LINE AND GRADE ON BRICK CRADLE.
2. PLACE CLASS "C" CONC. PER SECT. 725 & 505, IN SUCH A MANNER AS NOT TO FLOAT THE PIPE.

DETAIL NO.  
402

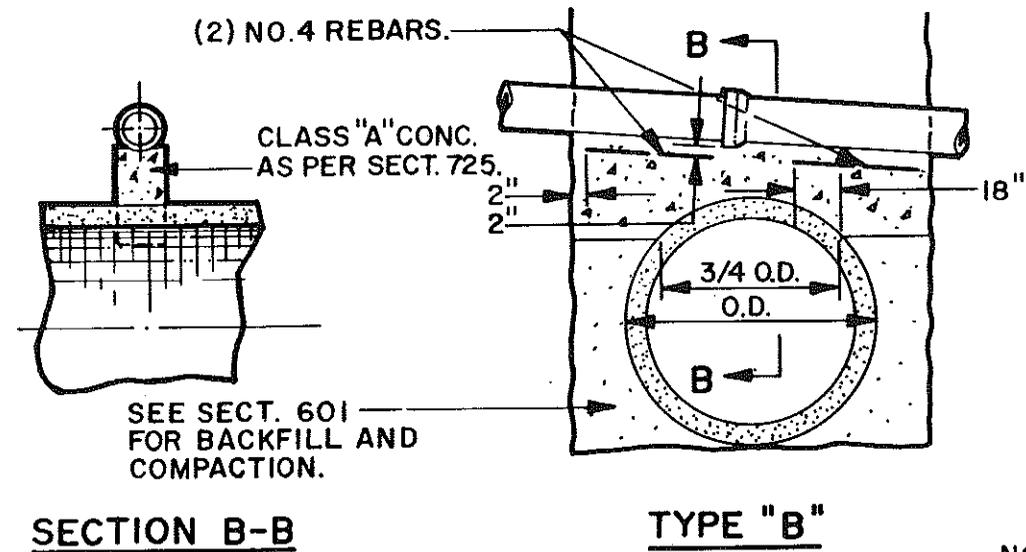
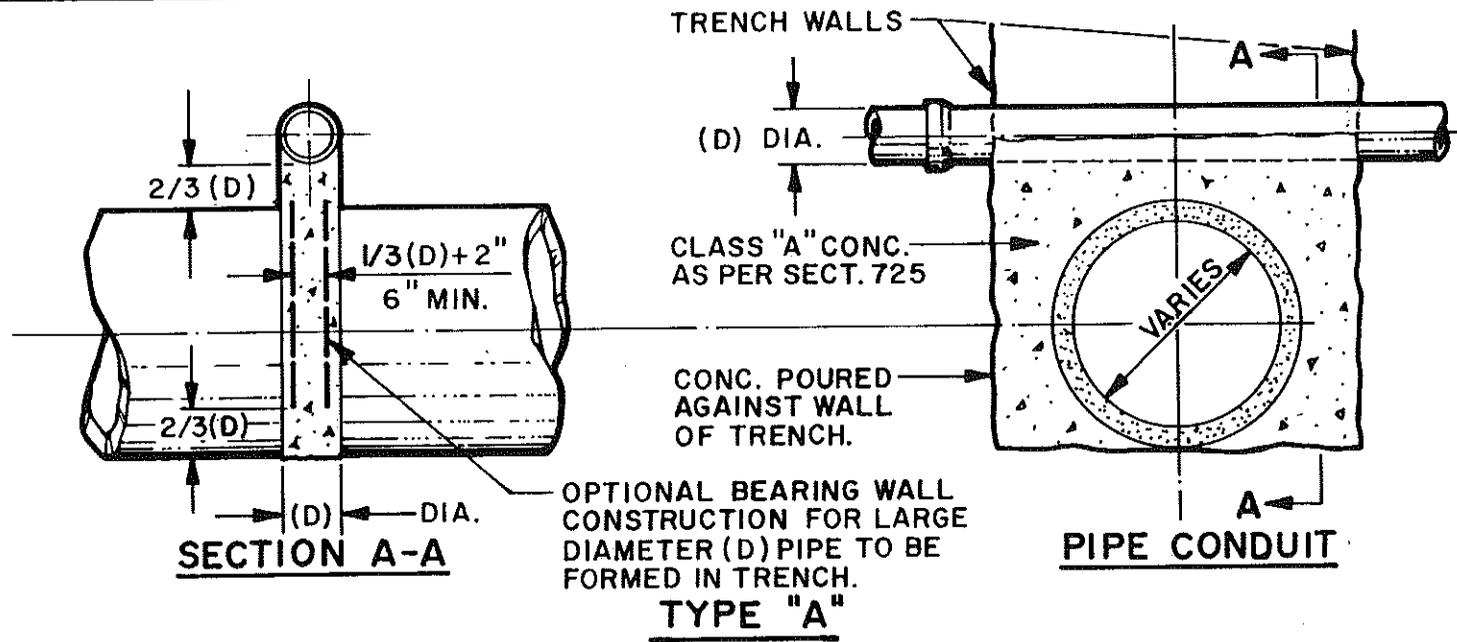


STANDARD DETAIL

ENCASED PIPE FOR CANAL CROSSINGS

DETAIL NO.  
402





**NOTES**

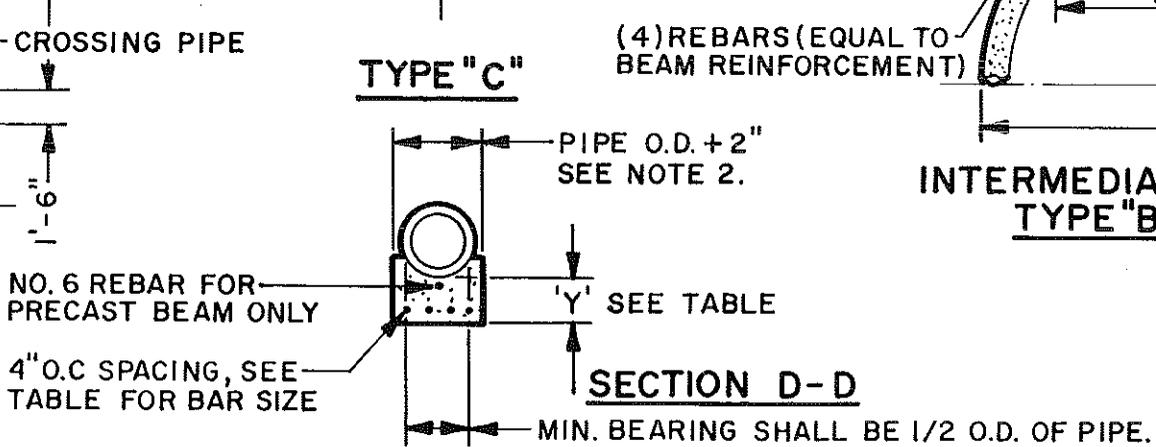
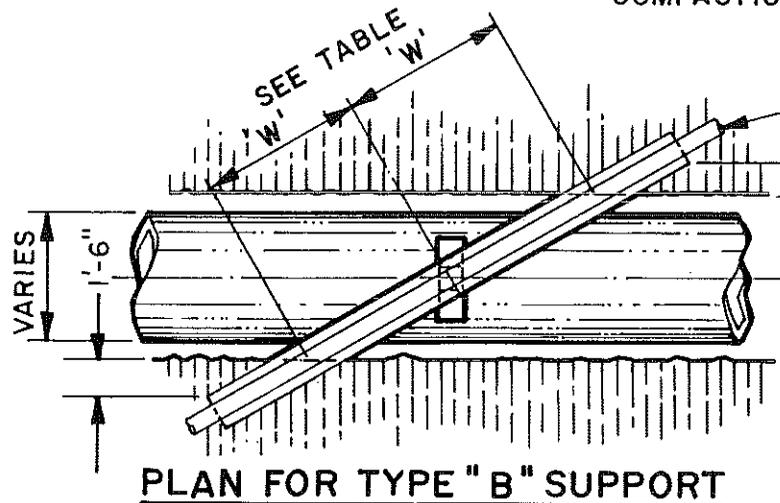
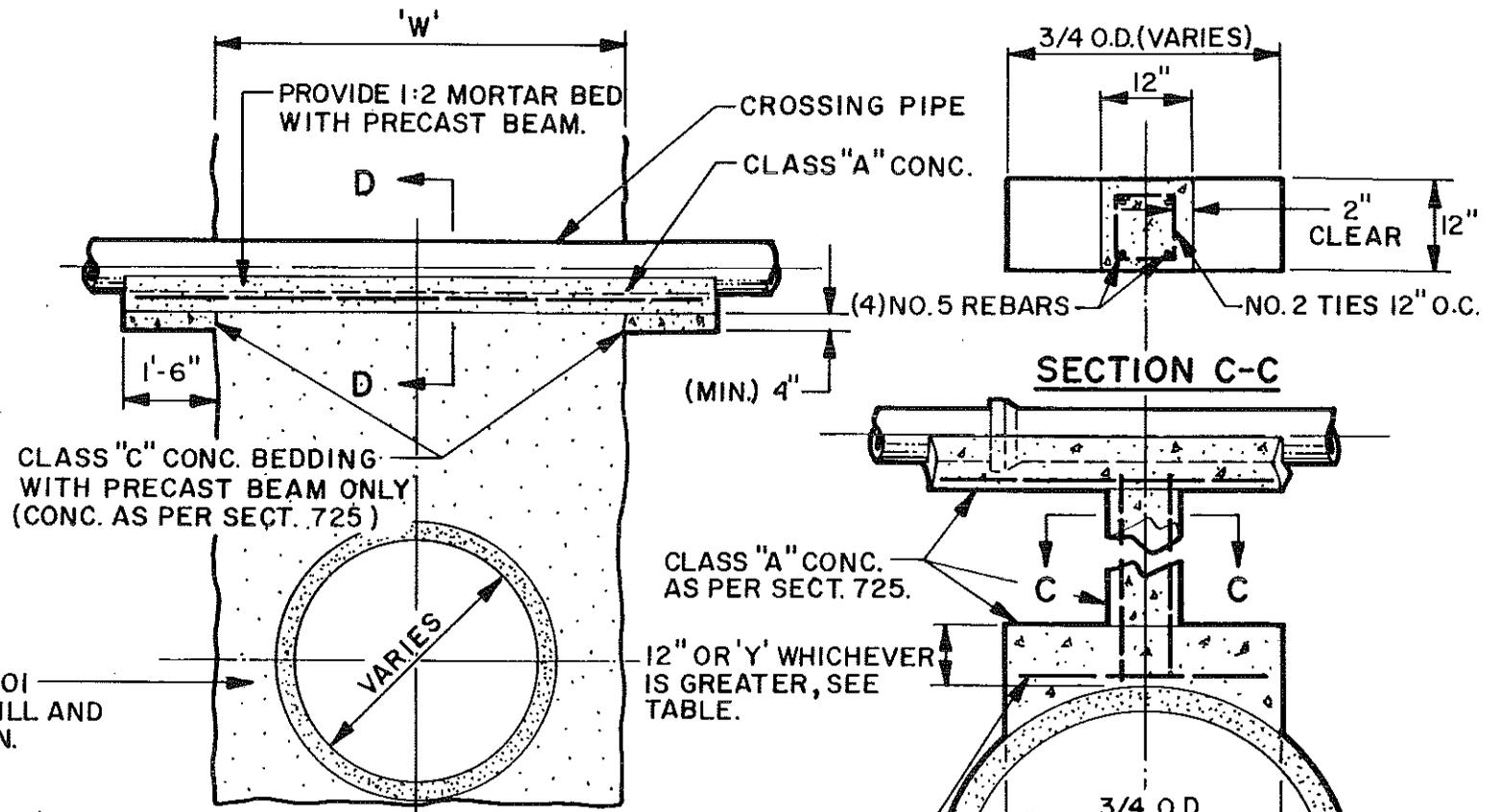
1. TYPE "A" PIPE SUPPORT MAY BE USED FOR ANY TYPE CROSSING CONDITION.
2. TYPE "C" PIPE SUPPORT MAY BE USED FOR CROSSING PIPES WITH A BELL DIAMETER OF 18" OR LESS IF SUFFICIENT CLEARANCE OVER STORM SEWER IS AVAILABLE AND TOTAL SPAN IS LESS THAN 34'.
3. INTERMEDIATE PIPE SUPPORT SHALL BE USED IN CONJUNCTION WITH TYPE "C" PIPE SUPPORT IF TOTAL SPAN EXCEEDS MAX. 'W' IN TABLE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL SUPPORTS BOTH PERMANENT AND TEMPORARY. TEMPORARY SUPPORTS SHALL NOT BE A SEPARATE PAY ITEM.
5. PERMANENT PIPE SUPPORTS MAY BE DECREASED FROM PLAN QUANTITIES, OR EXTENDED TO INCLUDE SOME LISTED BELOW AS TEMPORARY SUPPORTS IF CONDITIONS WARRANT THESE CHANGES AT THE TIME OF CONSTRUCTION. DECISION SHALL BE MADE BY THE ENGINEER.
6. WHEN TYPE "A" PIPE SUPPORT IS USED AND WHENEVER SO DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL PIERCE THE WALL WITH SUITABLE OPENINGS TO PREVENT UNEQUAL PRESSURE RESULTING FROM FLOODING OF THE BACKFILL. THE VOLUME OF THE PIERCED OPENING SHALL NOT EXCEED 1/2 THE VOLUME OF THE SUPPORTING WALL.
7. USE TYPE "B" PIPE SUPPORT INSTEAD OF TYPE "C" WHEN CLEARANCE IS LESS THAN 'Y' IN TABLE, BETWEEN PIPES.

**SCHEDULE OF REQUIRED SUPPORTS**

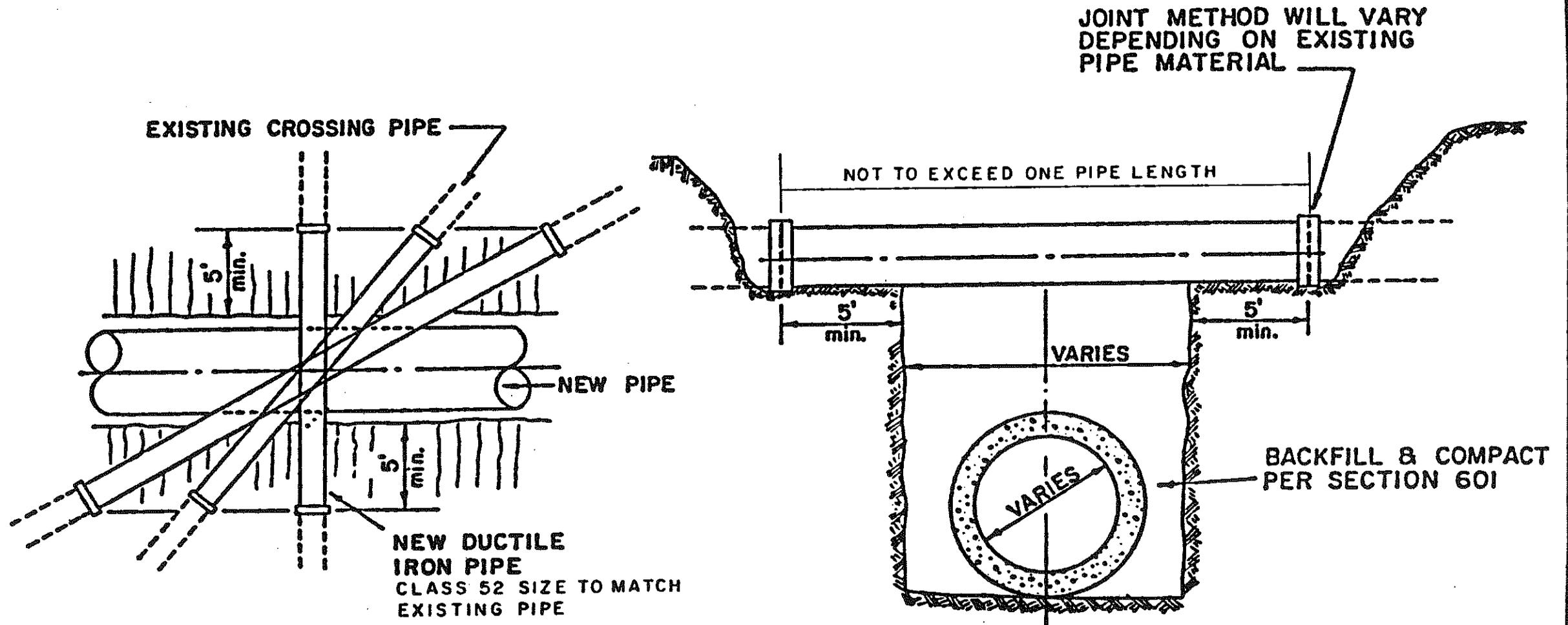
PERMANENT	TEMPORARY
SEWER LINES	CAST IRON PIPE CONC. IRRIG. PIPE BURIED TELCO. GAS PIPES
	CONC. STORM DRAIN CONC. BOX CULVERT TRAFFIC CONTROL CONDUIT WATER & SEWER LINES

NOTE: OTHER UTILITIES AS NOTED ON THE PLANS OR AS REQUIRED BY THE ENGINEER AT TIME OF CONSTRUCTION.

TABLE				
'W'	DEPTH OF COVER ON SUPPORTS			
	0' TO 8'		8' TO 16'	
	BAR NO.	Y	BAR NO.	Y
TO 6'	5	8"	6	11"
7'	5	9"	6	12"
8'	5	10"	6	13"
9'	6	11"	6	14"
10'	6	12"	7	15"
11'	6	13"	7	16"
12'	6	14"	7	17"
13'	7	15"	7	19"
14'	7	16"	8	20"
15'	7	17"	8	21"
16'	7	18"		
17'	8	19"		



INTERMEDIATE SUPPORT FOR TYPE "B" CROSSINGS



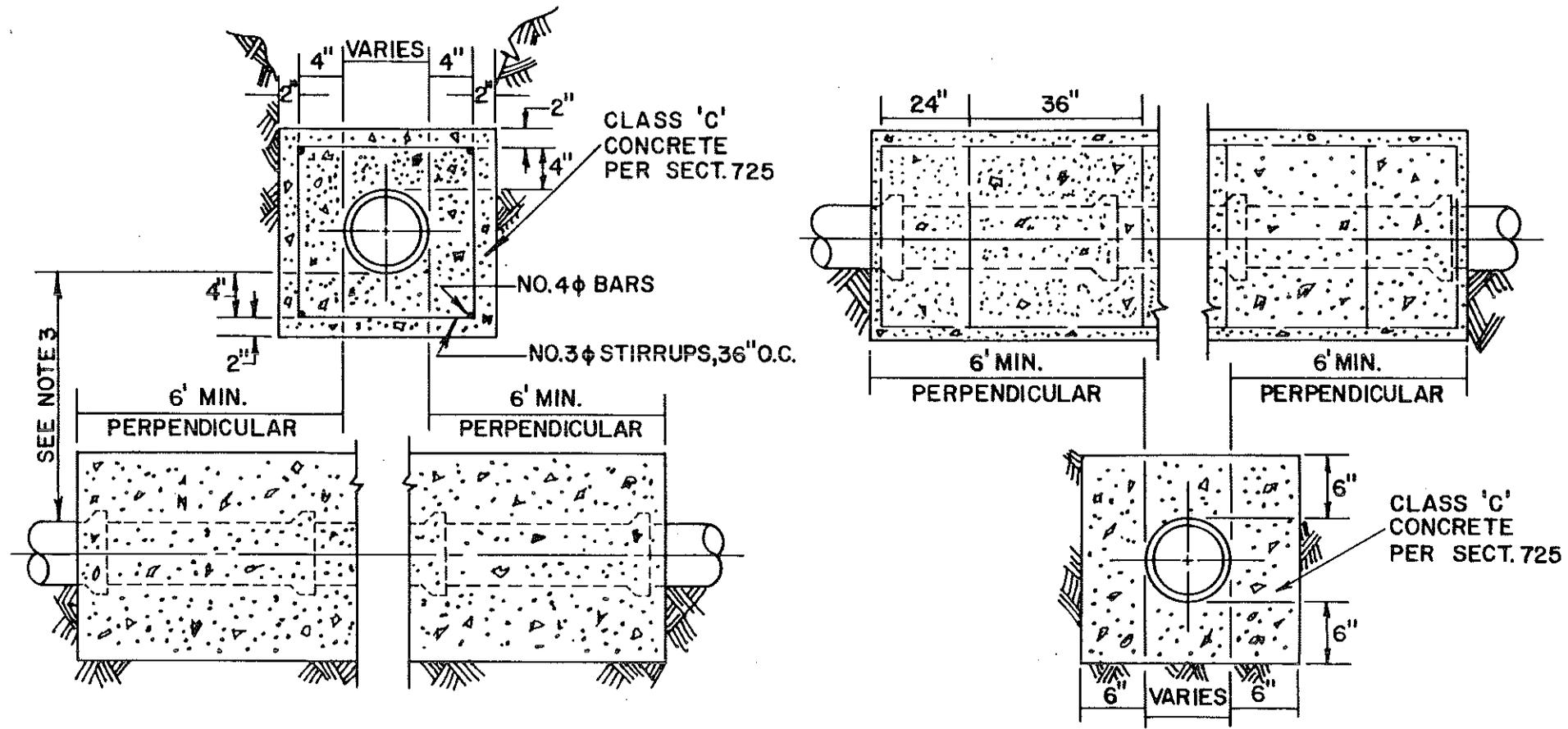
DETAIL NO.  
403-3



STANDARD DETAIL

ALTERNATE TO PIPE SUPPORT

DETAIL NO.  
403-3



**NOTES:**

1. THE ENCASEMENT SHALL EXTEND AT LEAST 6' ON EACH SIDE OF BOTH PIPES AND MUST INCLUDE THE NEAREST JOINT.
2. PROTECTION IS REQUIRED WHEN THE DISTANCE FROM THE BOTTOM OF THE WATER TO THE TOP OF THE SEWER IS 24" OR LESS. WHEN THE SEWER IS A 4" OR 6" HOUSE CONNECTION, NO PROTECTION IS REQUIRED IF THE DISTANCE IS MORE THAN 12". MECHANICAL JOINT OR RESTRAINED JOINT DUCTILE IRON PIPE MAY BE USED AS AN ALTERNATIVE.
3. ENCASEMENT IS REQUIRED IN ALL CASES WHERE A SANITARY SEWER CROSSES ABOVE THE WATER LINE AND THERE SHALL BE AT LEAST 24" OF CLEARANCE BETWEEN THE BOTTOM OF THE SEWER AND THE TOP OF THE WATER.

DETAIL NO.  
404

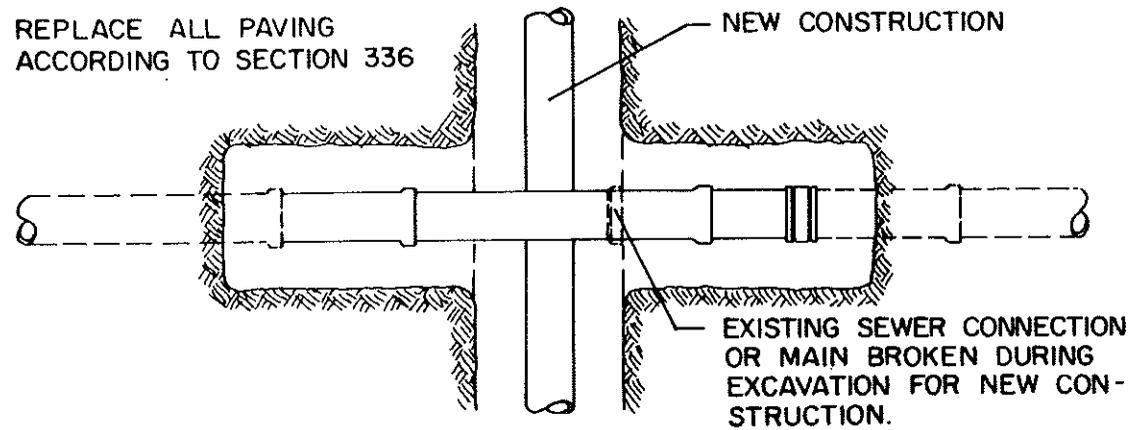


STANDARD DETAIL

WATER AND SANITARY SEWER CROSSING

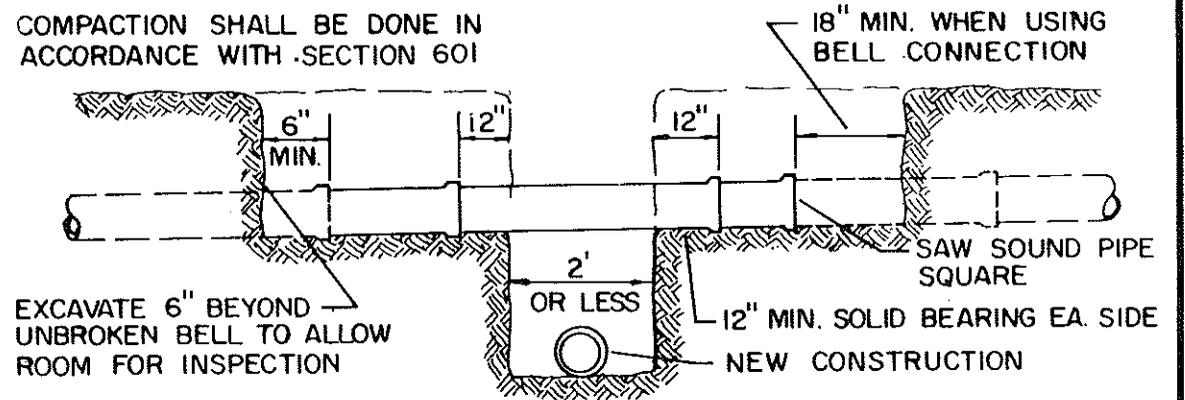
DETAIL NO.  
404

REPLACE ALL PAVING  
ACCORDING TO SECTION 336



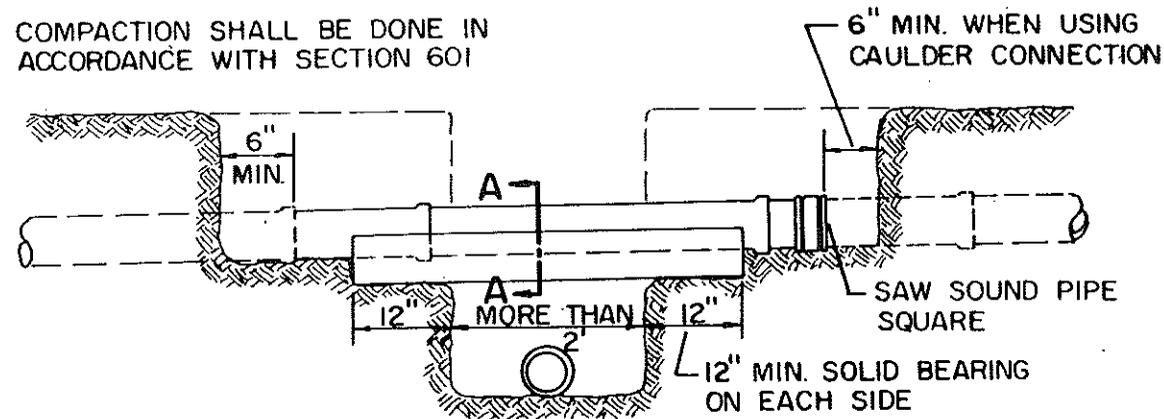
PLAN VIEW OF REPLACEMENT

COMPACTION SHALL BE DONE IN  
ACCORDANCE WITH SECTION 601



REPLACEMENT WHEN NEW TRENCH  
2' WIDE OR LESS

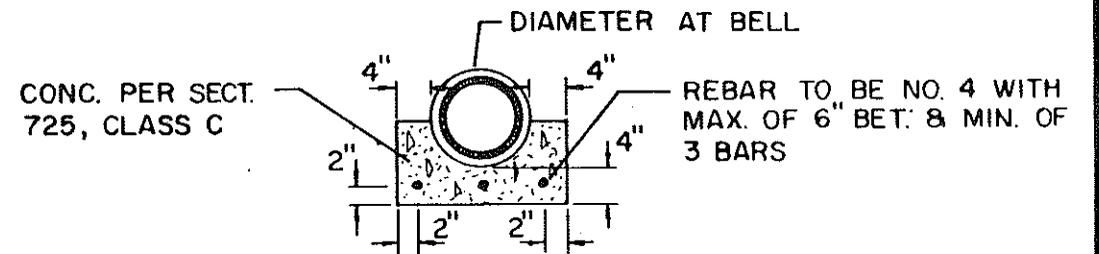
COMPACTION SHALL BE DONE IN  
ACCORDANCE WITH SECTION 601



REPLACEMENT WHEN NEW TRENCH  
MORE THAN 2' WIDE

NOTE

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



SECTION 'A'-A'

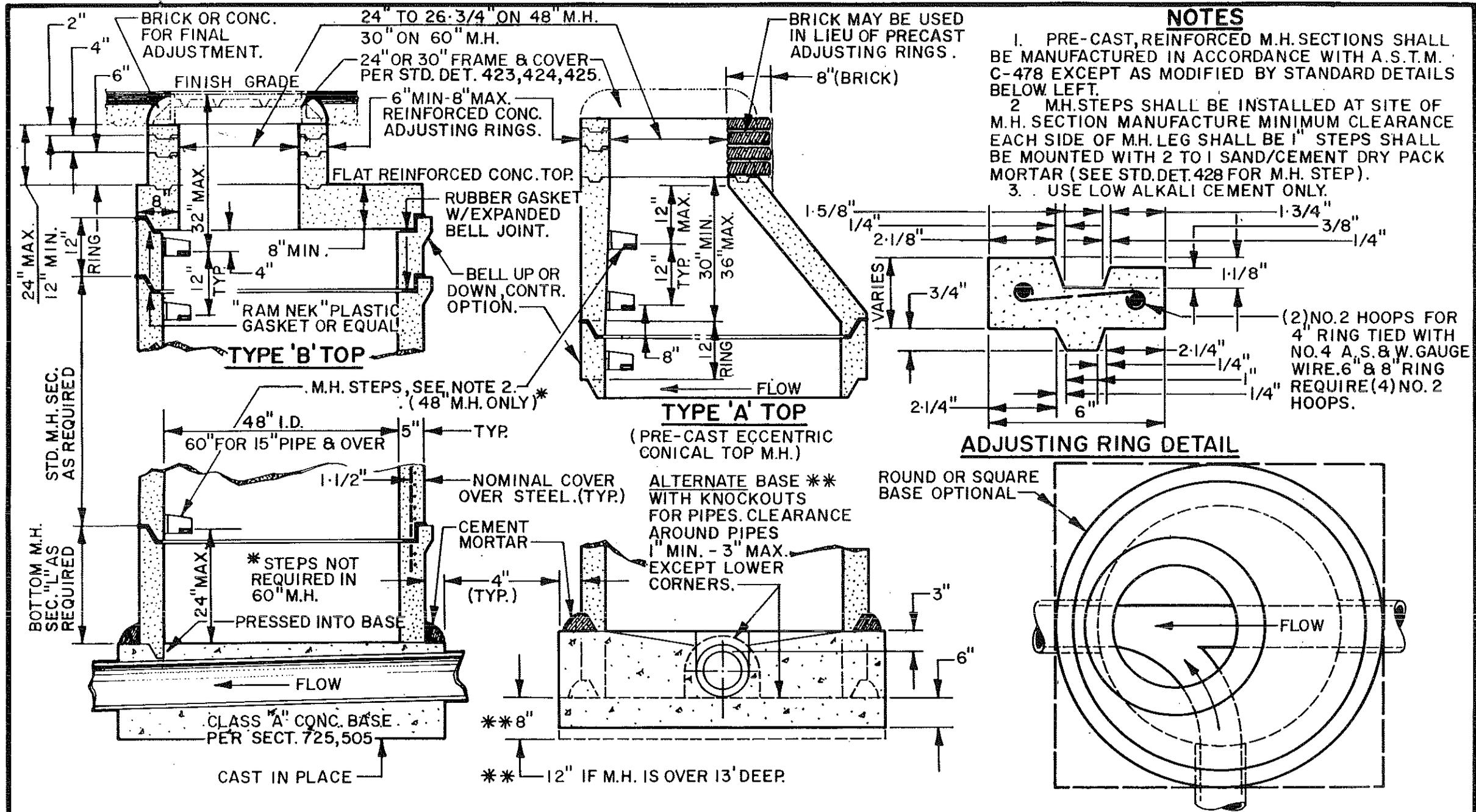
DETAIL NO.  
405



STANDARD DETAIL

BROKEN SEWER LINE REPLACEMENT

DETAIL NO.  
405



**NOTES**

1. PRE-CAST, REINFORCED M.H. SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH A.S.T.M. C-478 EXCEPT AS MODIFIED BY STANDARD DETAILS BELOW LEFT.
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 STD. DET. 428 FOR M.H. STEP).
3. USE LOW ALKALI CEMENT ONLY.

DETAIL NO.  
**420**



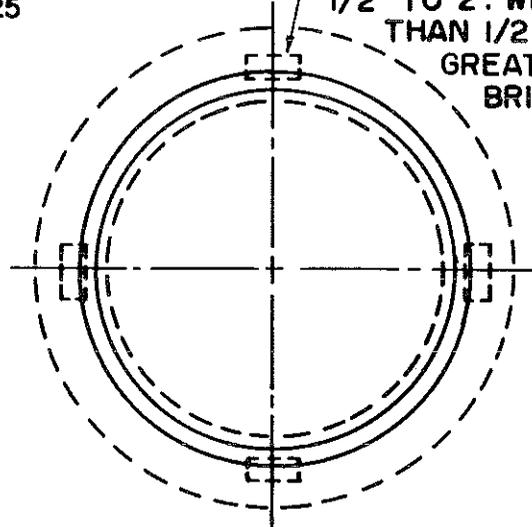
**STANDARD DETAIL**

**PRE-CAST CONCRETE SEWER MANHOLE**

DETAIL NO.  
**420**

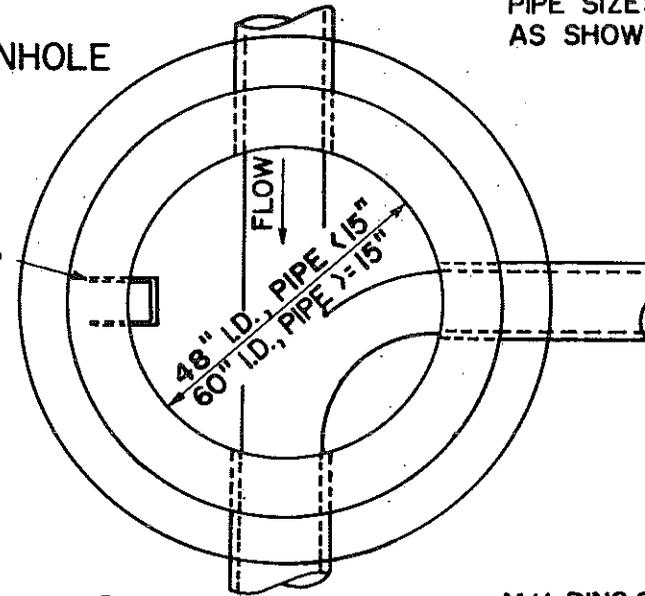


M.H. FRAME AND COVER PER SECT. 625



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 2", USE BRICK.

SEWER MANHOLE

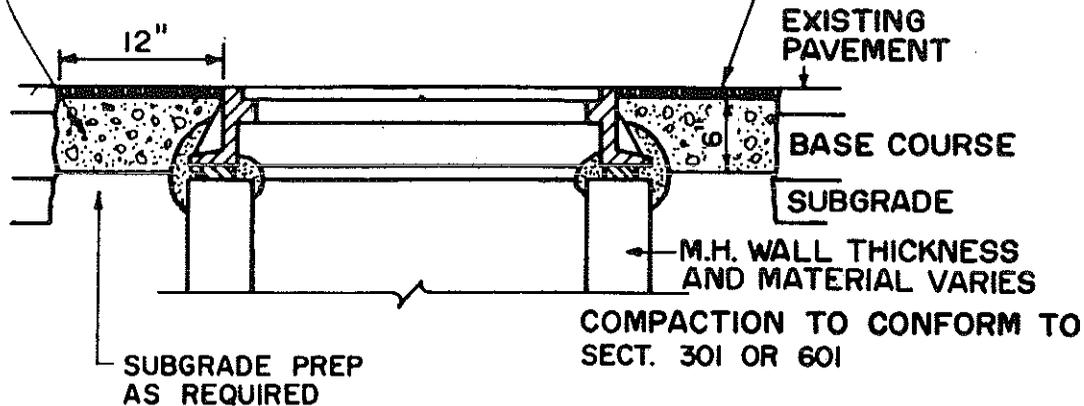


PIPE SIZES AND ELEVATIONS AS SHOWN ON PLANS

M.H. STEP IN 48" M.H. ONLY

CLASS B CONCRETE AS PER SECT. 725,505

LEAVE CONC. COLLAR LOW AND SEAL WITH 3/8" FINE DENSE GRADED PLANT MIX MATERIAL, MIN THICKNESS 1/2", MAX 1".



EXISTING PAVEMENT

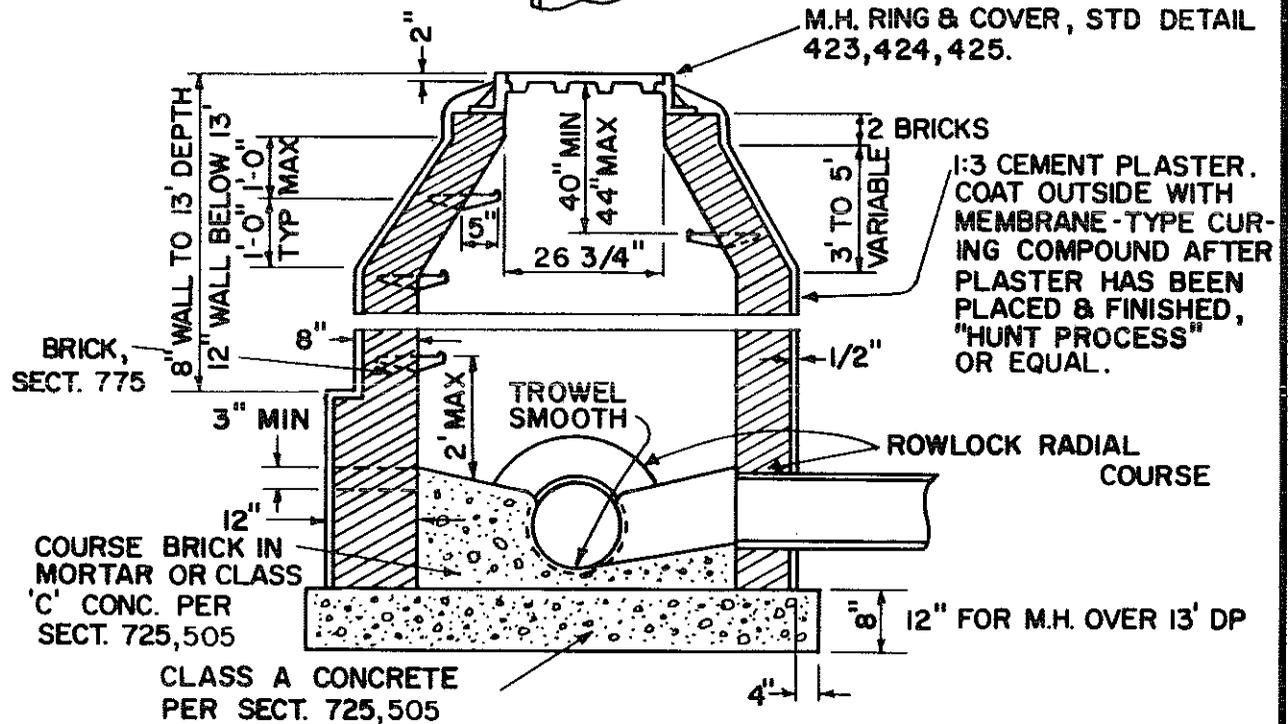
BASE COURSE

SUBGRADE

M.H. WALL THICKNESS AND MATERIAL VARIES

COMPACTION TO CONFORM TO SECT. 301 OR 601

SUBGRADE PREP AS REQUIRED



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

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

BRICK, SECT. 775

TROWEL SMOOTH

ROWLOCK RADIAL COURSE

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

CLASS A CONCRETE PER SECT. 725,505

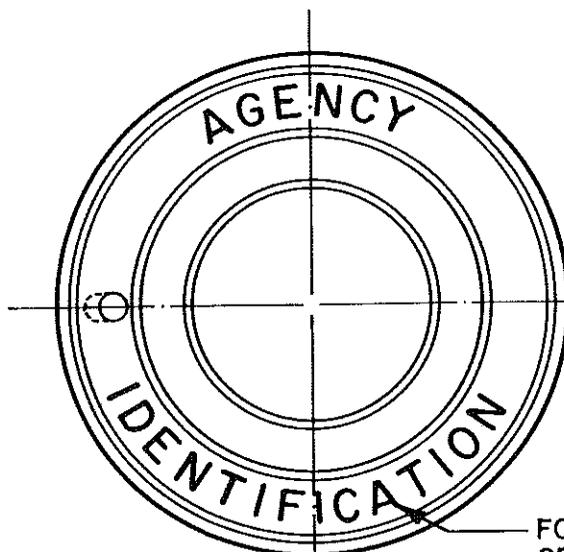
DETAIL NO. 422



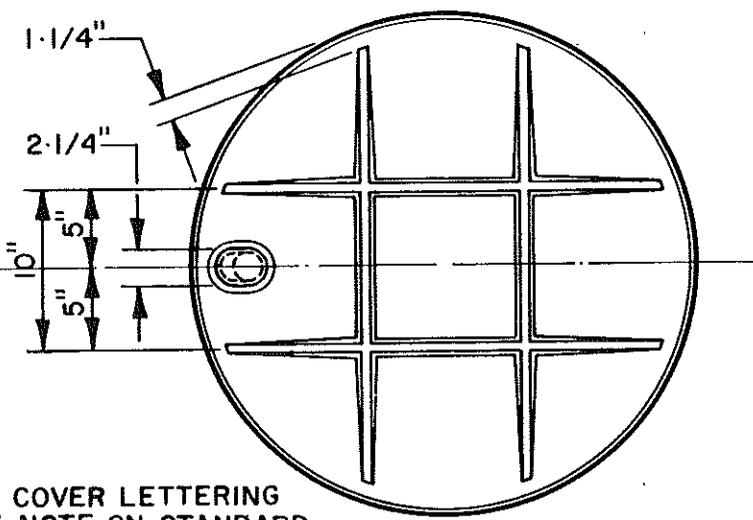
STANDARD DETAIL

SEWER MANHOLE AND COVER FRAME ADJ

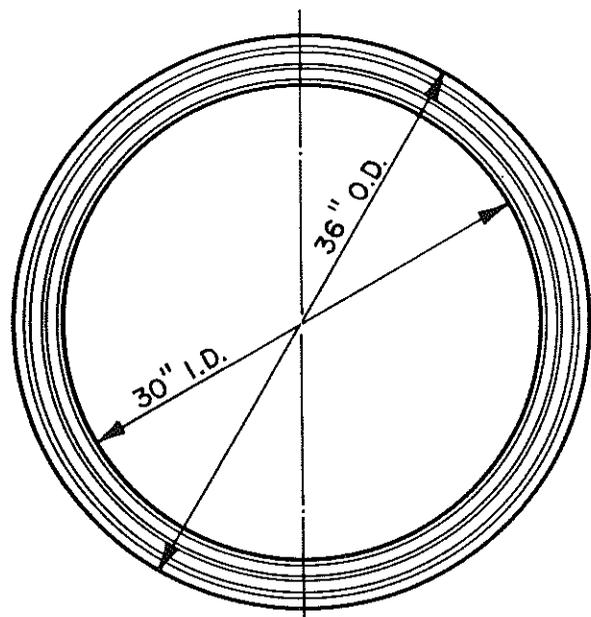
DETAIL NO. 422



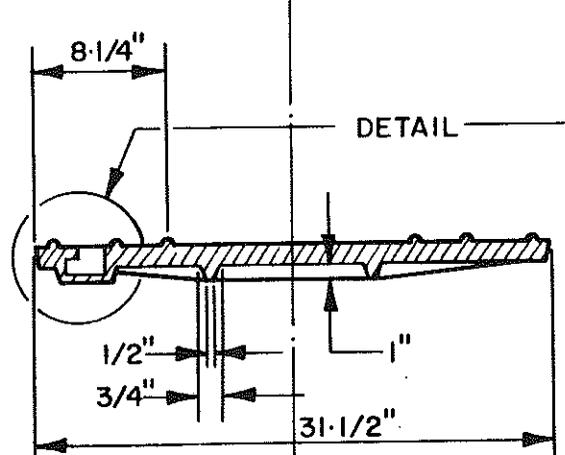
**FACE OF COVER**  
CAST IRON



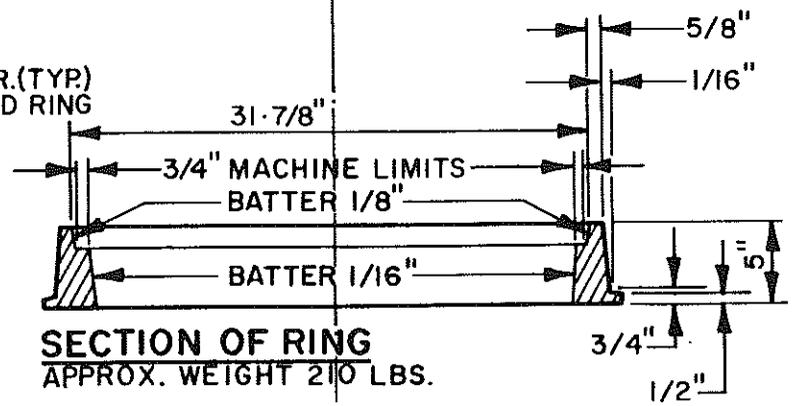
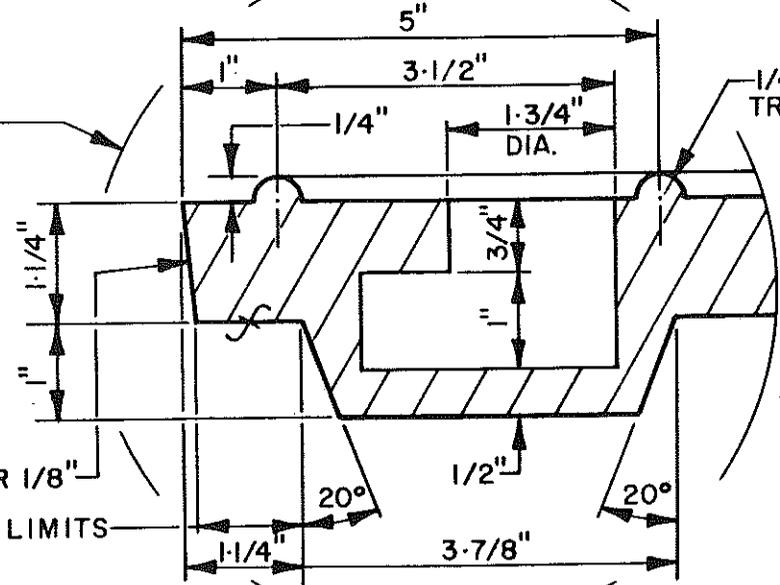
**BACK OF COVER**



**CAST IRON MANHOLE RING**



**SECTION OF COVER**  
APPROX. WEIGHT 276 LBS.



**SECTION OF RING**  
APPROX. WEIGHT 210 LBS.

**NOTES**

1. WEIGHT OF CASTING SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED.
2. CASTINGS SHALL CONFORM TO SECT. 787

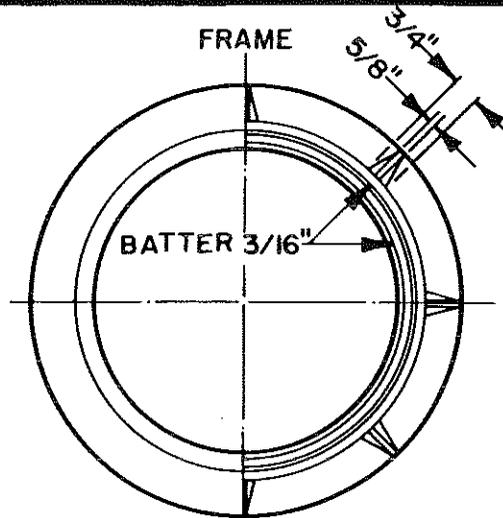
DETAIL NO.  
423



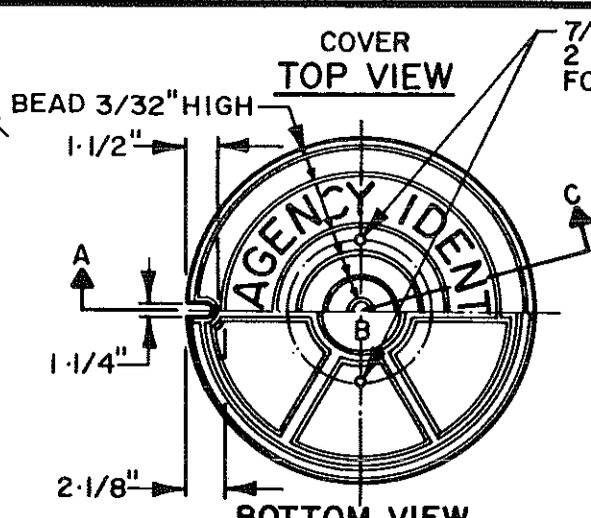
**STANDARD DETAIL**

**WATER TIGHT 30" MANHOLE FRAME & COVER**

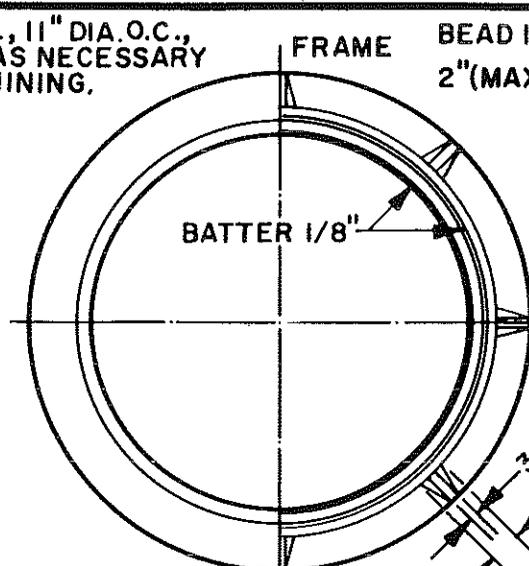
DETAIL NO.  
423



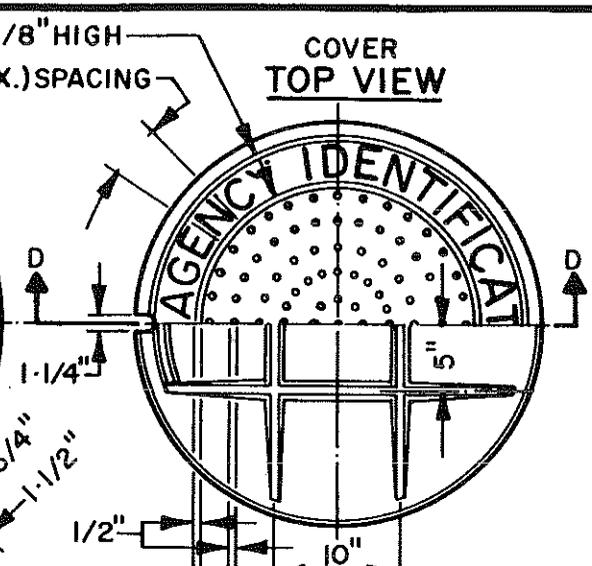
**BOTTOM VIEW** | **TOP VIEW**  
 WT. (CL. 30) - 205 LBS.  
 WT. (CL. 35) - 170 LBS.



**TOP VIEW**  
**BOTTOM VIEW**  
 WT. (CL. 30) - 200 LBS.  
 WT. (CL. 35) - 180 LBS.

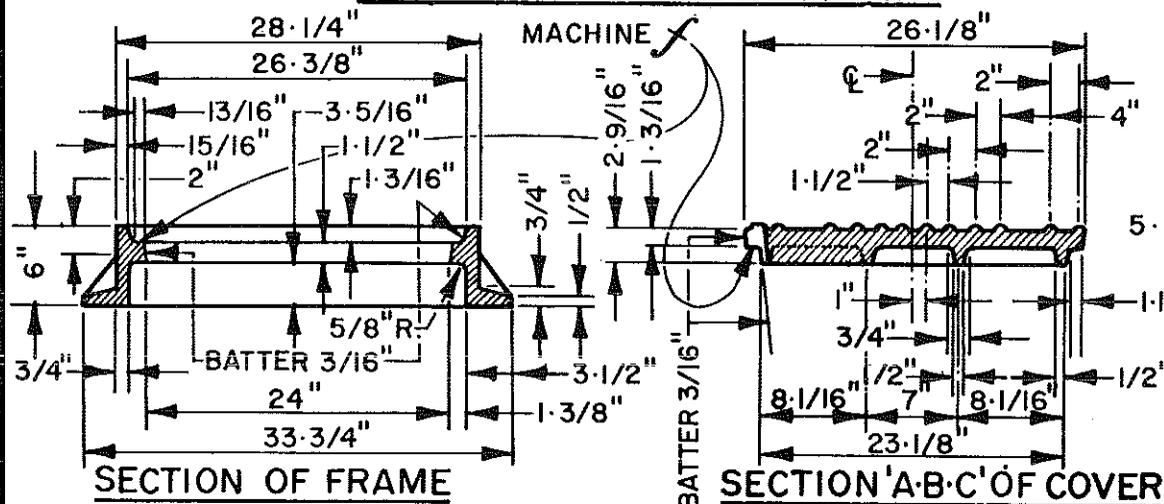


**BOTTOM VIEW** | **TOP VIEW**  
 WT. (CL. 30) - 224 LBS.  
 WT. (CL. 35) - 219 LBS.



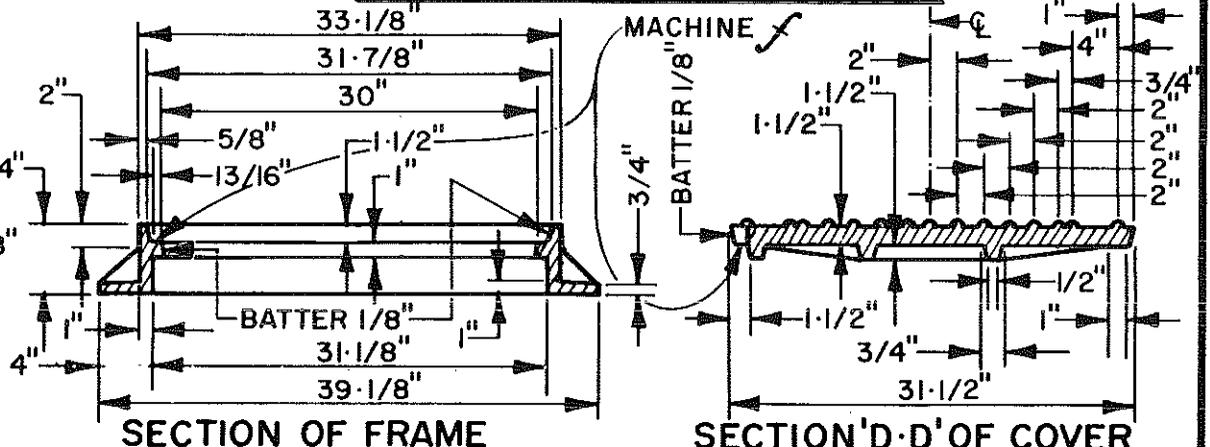
**TOP VIEW**  
**BOTTOM VIEW**  
 WT. (CL. 30) - 324 LBS.  
 WT. (CL. 35) - 207 LBS.

**24" MANHOLE FRAME & COVER**



**SECTION OF FRAME** | **SECTION 'A-B-C' OF COVER**

**30" MANHOLE FRAME & COVER**



**SECTION OF FRAME** | **SECTION 'D-D' OF COVER**

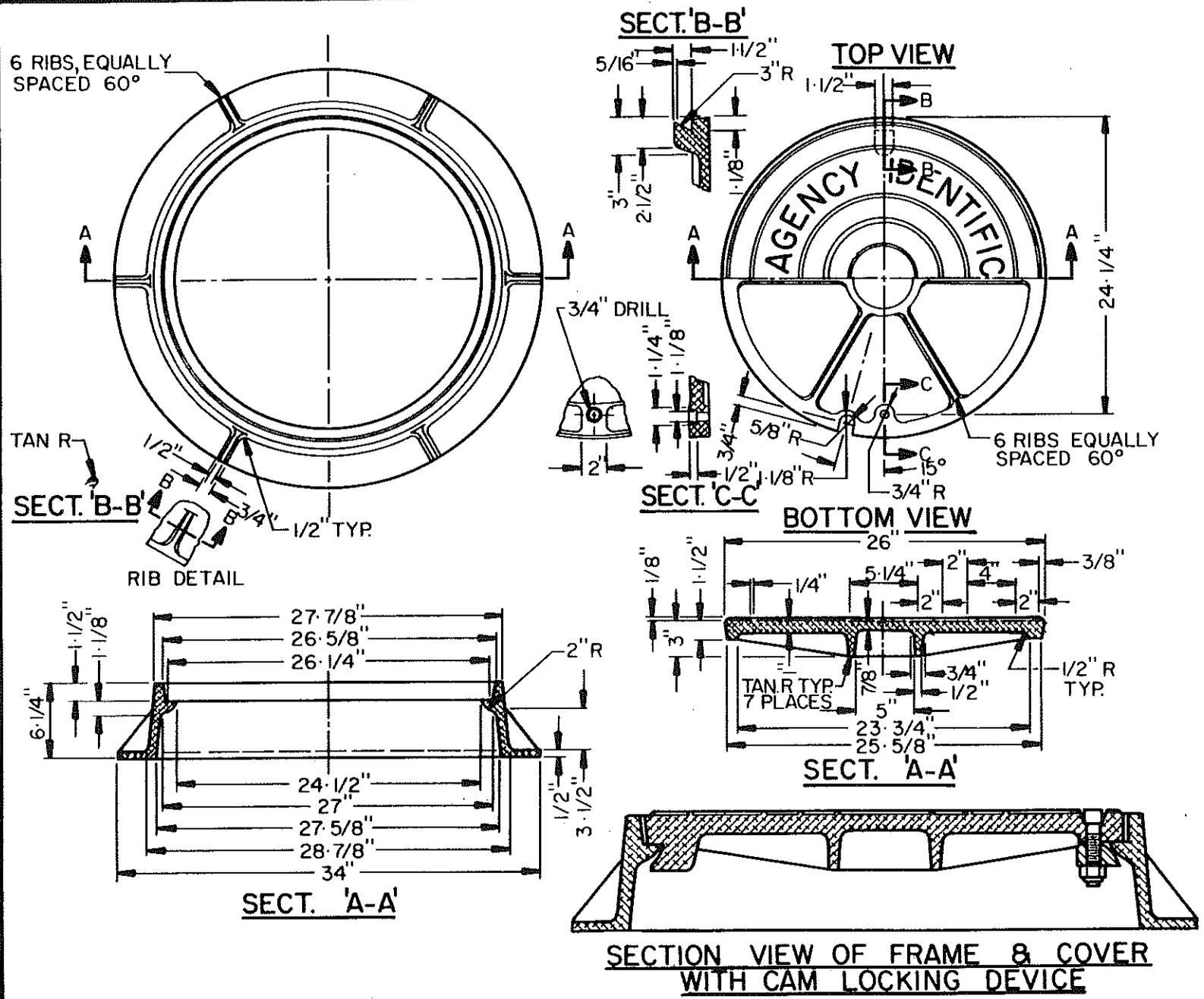
**NOTE** LETTERING ON MANHOLE COVER TO CONTAIN NAME OF AGENCY AND UTILITY FOR WHICH MANHOLE IS NEEDED, (I.E. "PHOENIX SANITARY SEWER"), OR AS DIRECTED. THE TOTAL WIDTH OF INDIVIDUAL LETTERS TO BE SUCH THAT LETTERS AND WORDS ARE EQUALLY SPACED AND BALANCED TO FORM A COMPLETE CIRCLE WITH SPACERS BEFORE AND AFTER THE WORD IDENTIFYING THE AGENCY INVOLVED. LETTERS TO BE 2" IN HEIGHT AND RAISED 1/8" ABOVE LEVEL OF COVER. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO SECTION 787.

DETAIL NO. 424	 <b>STANDARD DETAIL</b>	<b>24" &amp; 30" MANHOLE FRAME &amp; COVER</b>	DETAIL NO. 424
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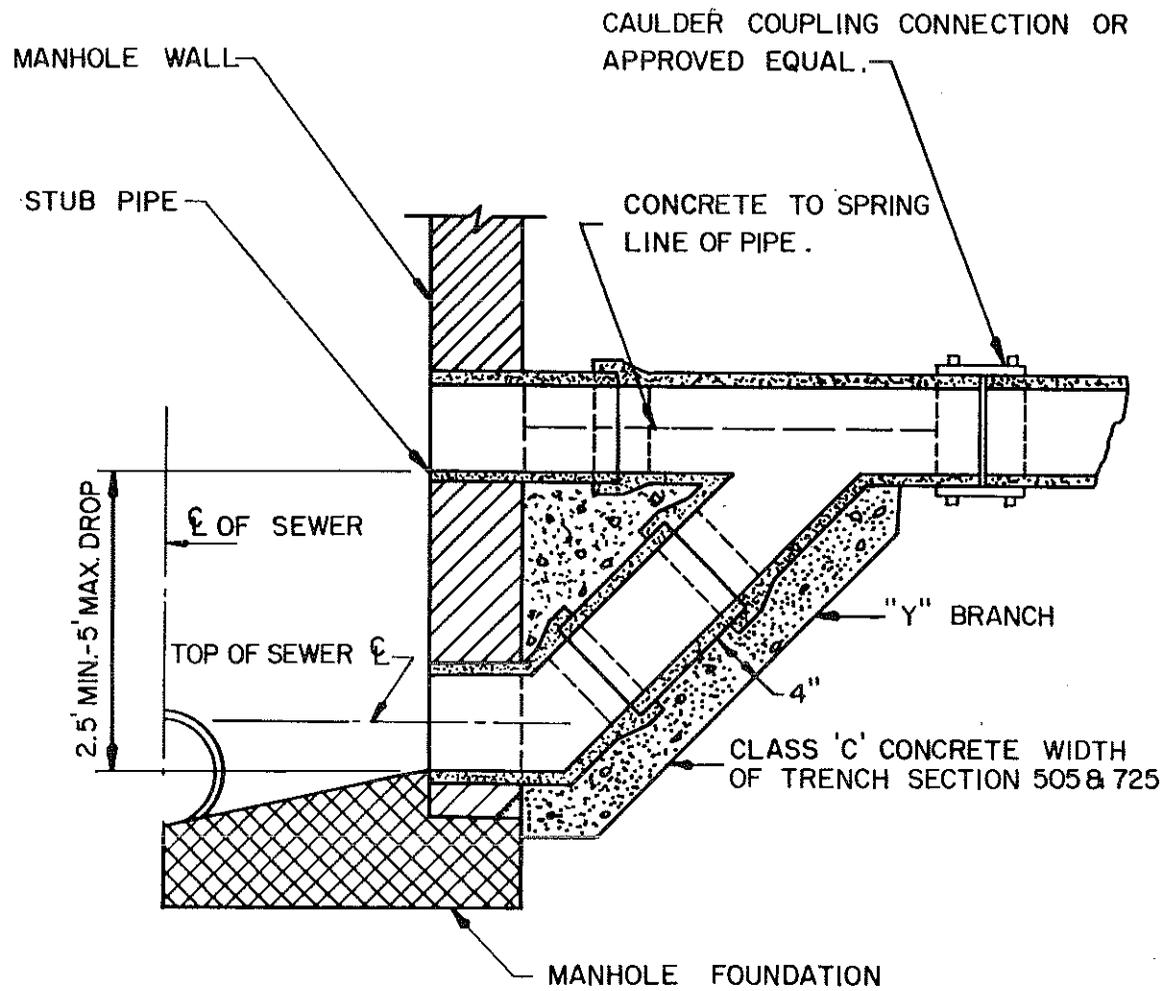
MATERIAL SHALL CONFORM TO ASTM STANDARDS  
 B 179-65 ALLOY SN122A  
 B 179-65 ALLOY CN42A  
 B 108-65 ALLOY SC103A  
 (ALL 3 ACCEPTABLE)

LETTERING ON MANHOLE COVER TO CONTAIN NAME OF AGENCY AND UTILITY FOR WHICH MANHOLE IS NEEDED, (I. E. "PHOENIX SANITARY SEWER"), OR AS DIRECTED. THE TOTAL WIDTH OF INDIVIDUAL LETTERS TO BE SUCH THAT LETTERS AND WORDS ARE EQUALLY SPACED AND BALANCED TO FORM A COMPLETE CIRCLE WITH SPACERS BEFORE AND AFTER THE WORD IDENTIFYING THE AGENCY INVOLVED. LETTERS TO BE 2" IN HEIGHT AND RAISED 1/8" ABOVE LEVEL OF COVER. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED, CASTINGS SHALL CONFORM TO SECTION 787

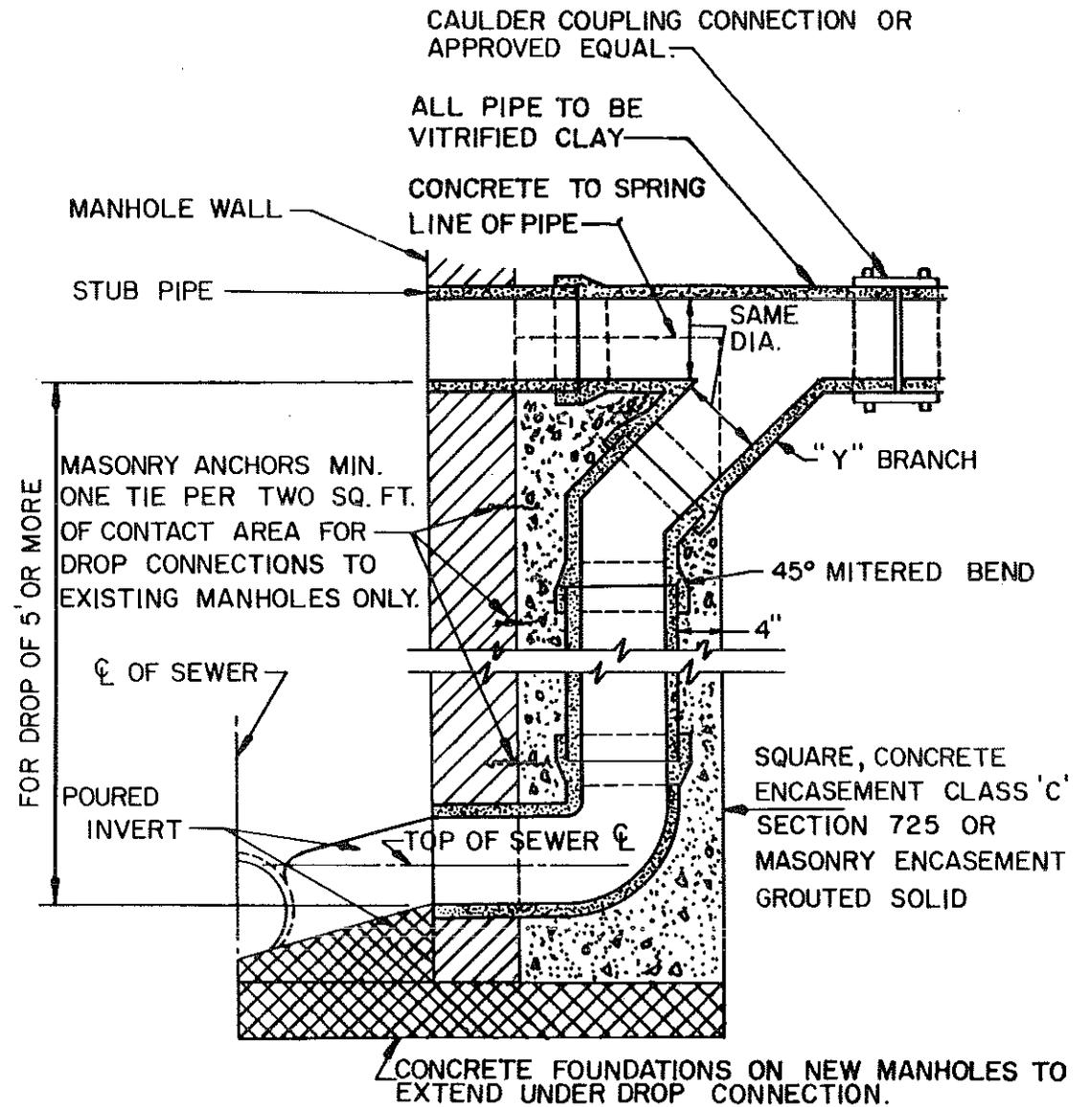
SHALL CONFORM TO SECT. 625.3.1-(FRAME & COVER)



DETAIL NO. <b>425</b>	 <b>STANDARD DETAIL</b>	<b>24" ALUMINUM MANHOLE FRAME &amp; COVER</b>		DETAIL NO. <b>425</b>
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**TYPE A**  
2.5' TO 5' DROP



**TYPE B**  
5' OR MORE

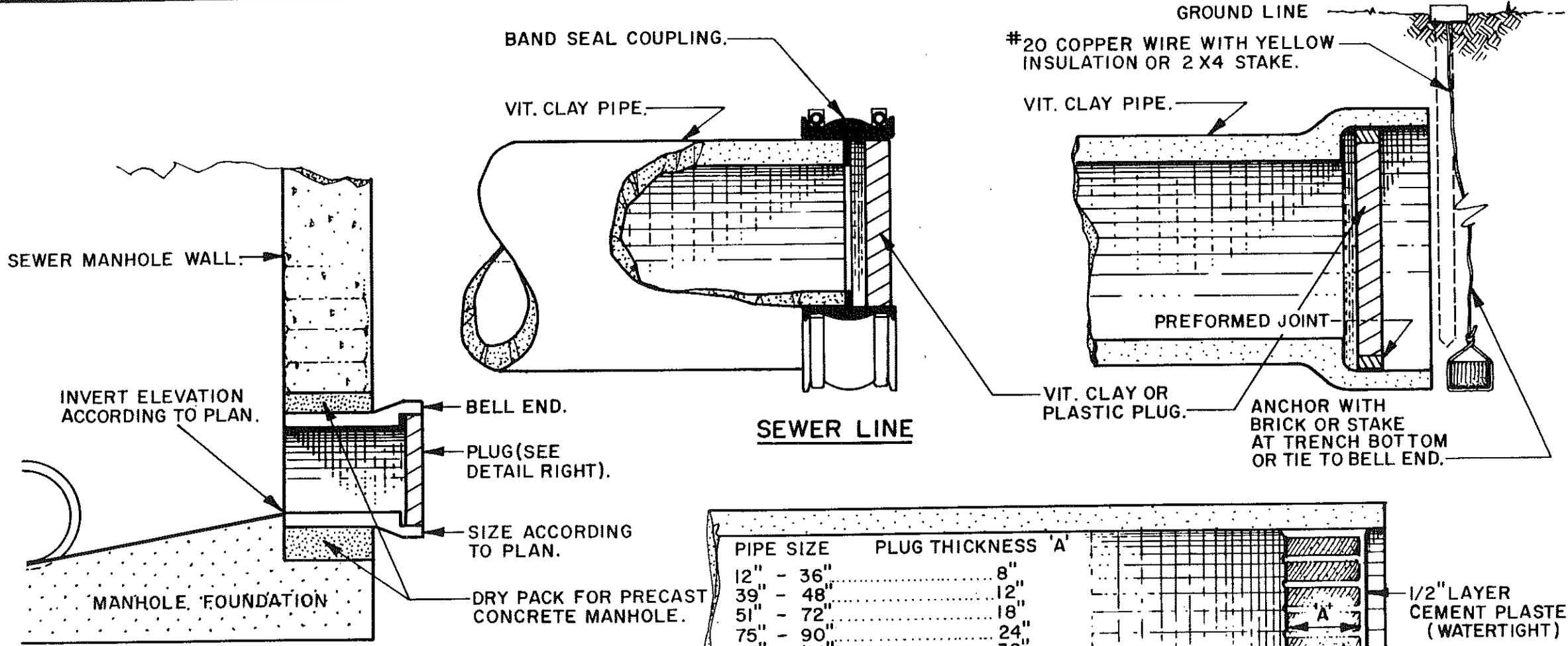
DETAIL NO.  
426



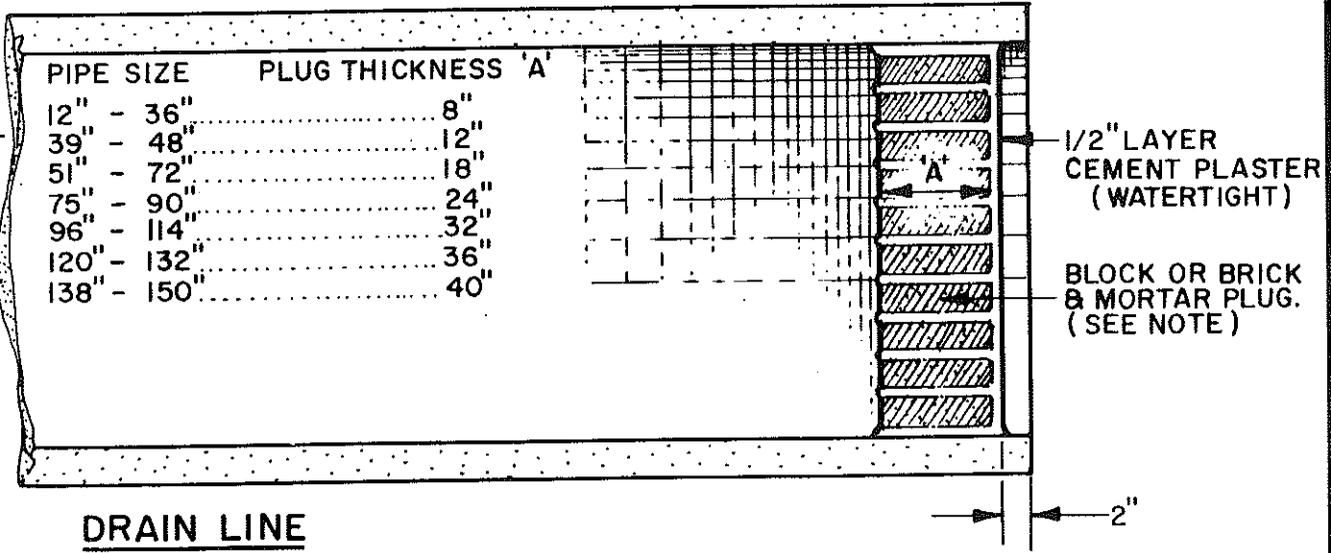
**STANDARD DETAIL**

**DROP SEWER CONNECTIONS**

DETAIL NO.  
426



**TYPICAL STUB OUT**



**NOTES**

- NOTE: COMPACT SOIL AT END OF PIPE TO 95% OF MAXIMUM DENSITY.
- IF DEPTH OF COVER IS LESS THAN 5' OR GREATER THAN 10 INCREASE PLUG THICKNESS A MIN. OF 4"

DETAIL NO.  
427



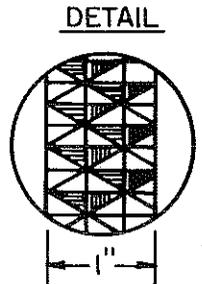
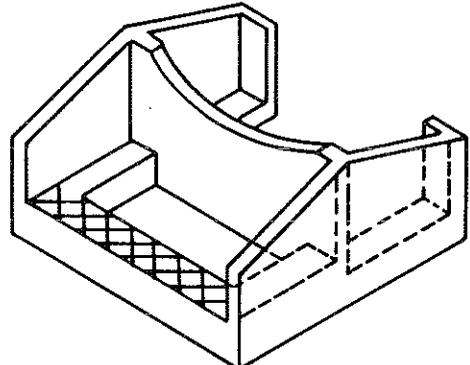
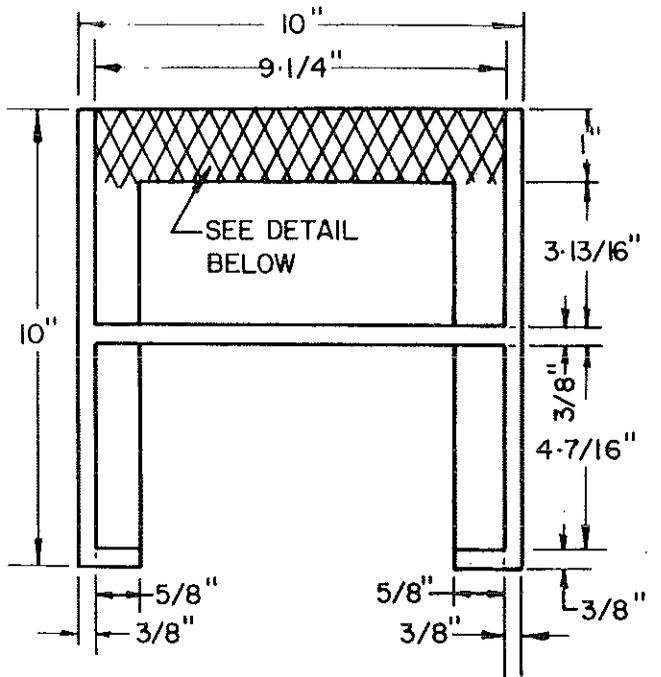
**STANDARD DETAIL**

**STUB OUT AND PLUGS**

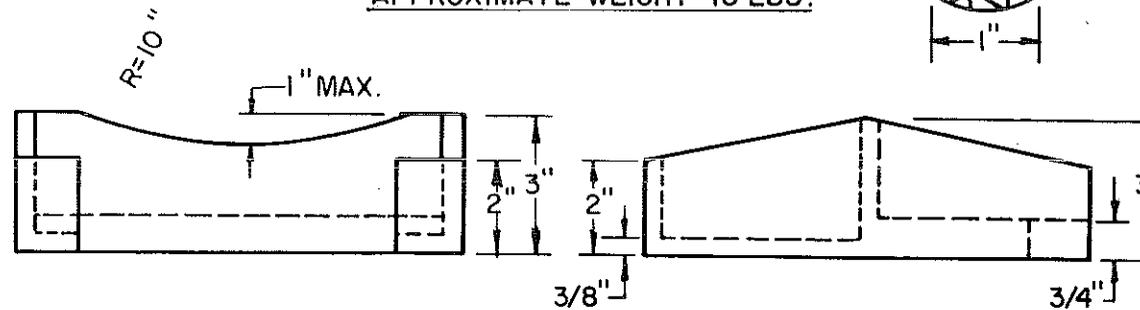
DETAIL NO.  
427

**CAST IRON MANHOLE STEP**

**POLYPROPYLENE MANHOLE STEP**

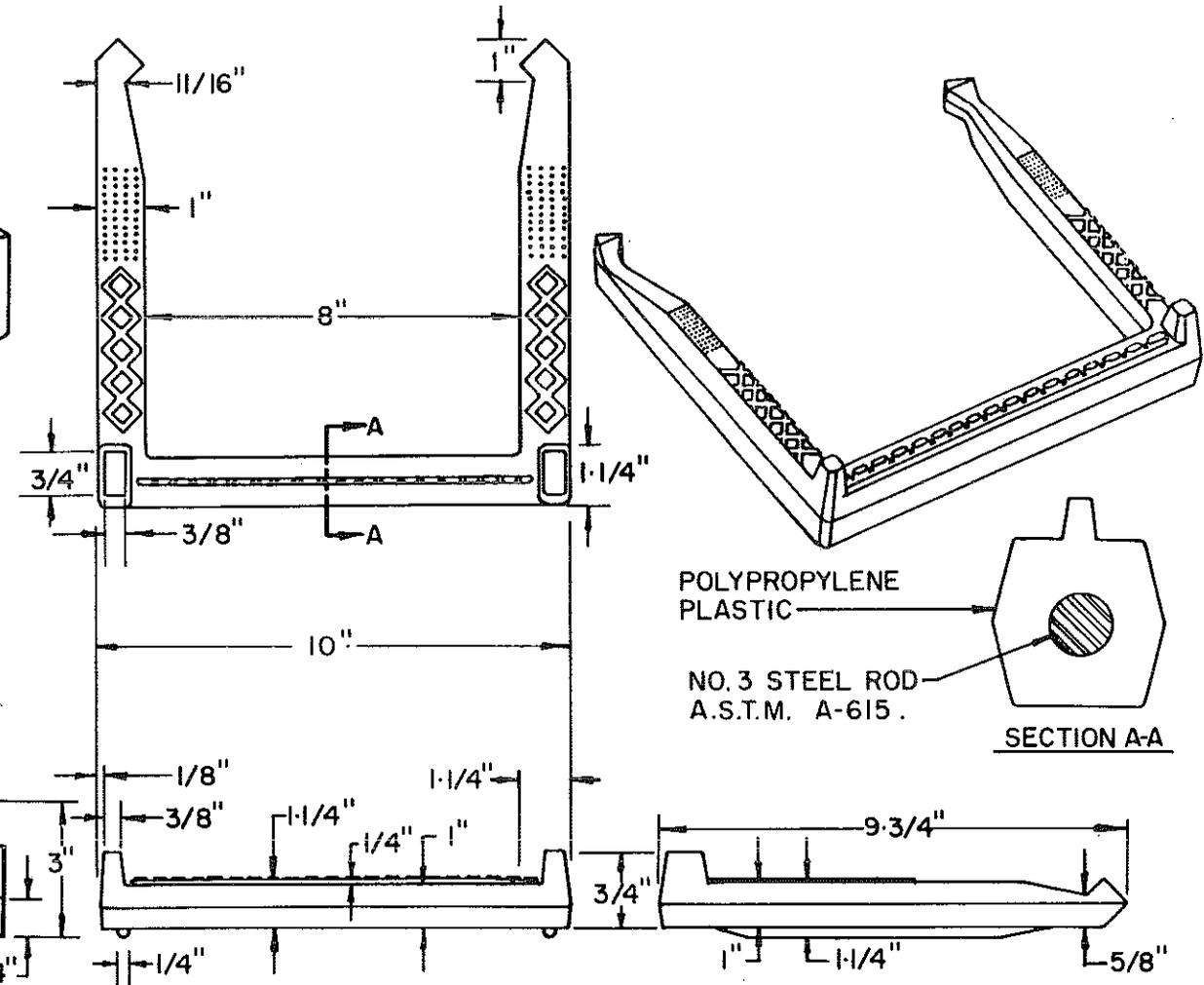


APPROXIMATE WEIGHT 10 LBS.



**NOTES:**

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



POLYPROPYLENE PLASTIC

NO. 3 STEEL ROD  
A.S.T.M. A-615.

SECTION A-A

**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.

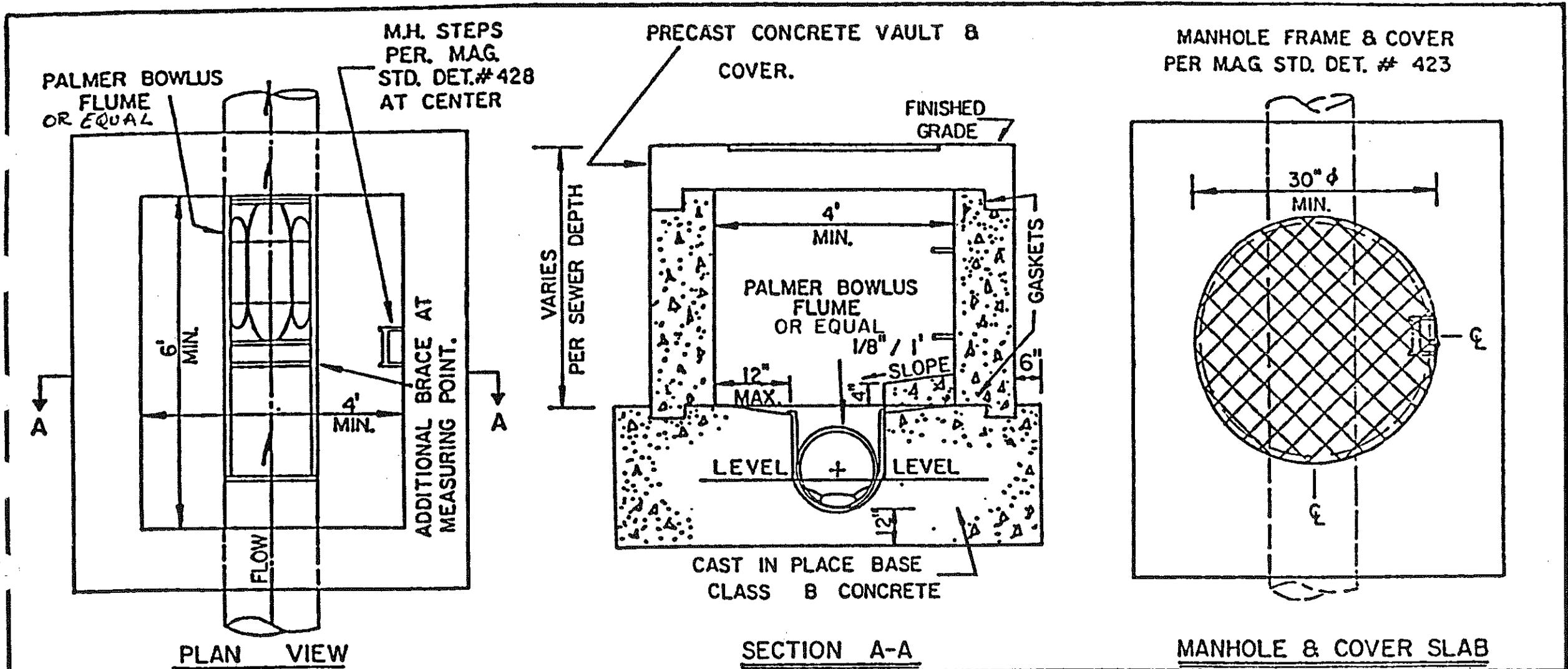
DETAIL NO.  
428



STANDARD DETAIL

MANHOLE STEPS

DETAIL NO.  
428

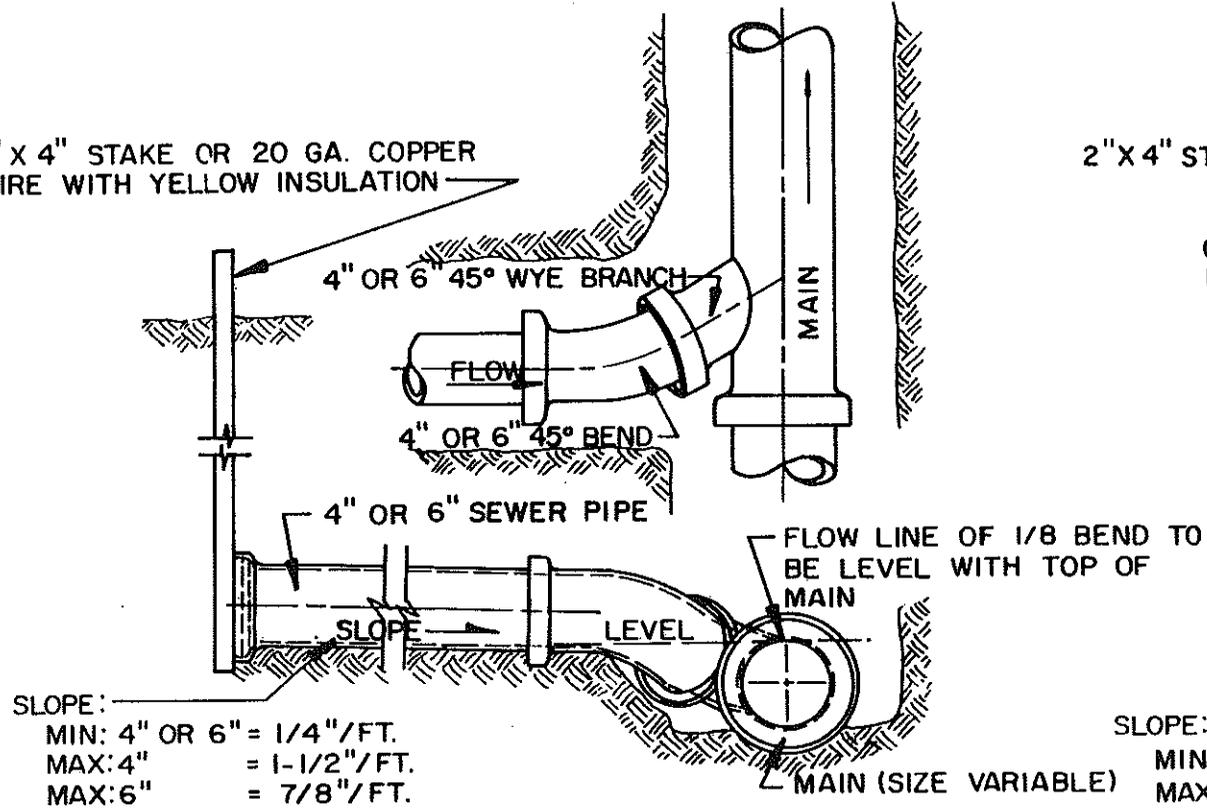


- NOTES:**
1. THIS CONTROL VAULT WITH MANHOLE AND COVER SHALL BE USED ON 6" AND 8" DIAMETER SEWER WITH FLOWS IN THE RANGE OF 40 TO 340 G.P.M.
  2. VAULT TO BE CONSTRUCTED ON STRAIGHT RUN OF BUILDING SEWER, ACCESSIBLE AND SAFELY LOCATED ON THE OWNERS PROPERTY ADJACENT TO A PUBLIC RIGHT-OF-WAY.
  3. THE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

DETAIL NO. <b>429</b>	 <b>STANDARD DETAIL</b>	<b>INDUSTRIAL WASTE CONTROL          VAULT WITH MANHOLE</b>		DETAIL NO. <b>429</b>
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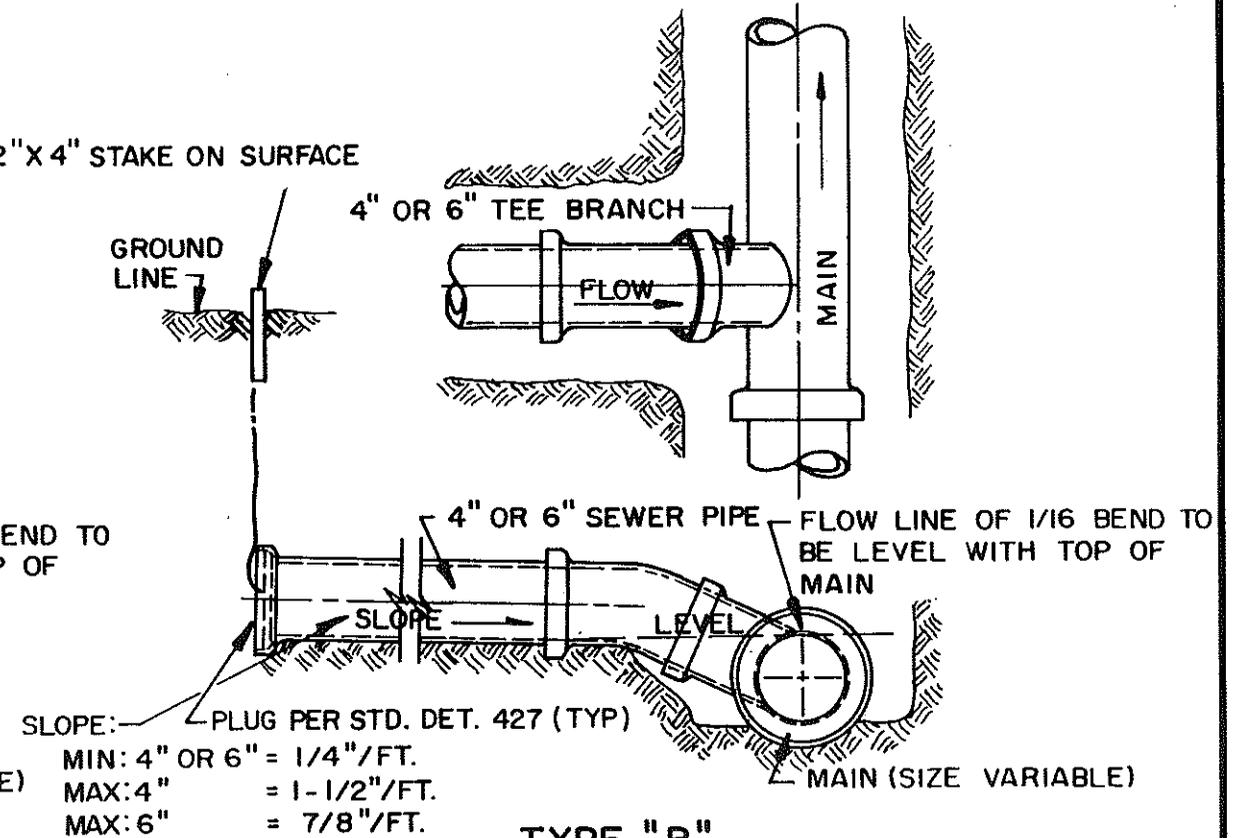
1  
2  
3  
4  
5  
6  
7  
8

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



**TYPE "A"**

2" x 4" STAKE ON SURFACE



**TYPE "B"**

**NOTES**

1. CONSTRUCTION DETAIL APPLIES WHERE CONTRACTOR BUILDS HOUSE CONNECTION. TAP EXTENDS TO PROPERTY LINE IN ALLEYS OR STREETS OR TO ESMT. LINE.
2. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.
3. DETAILS SHOWN MUST BE MET FOR MINIMUM CONDITION OF LESS THAN 5'-0".
4. CONSTRUCT TAP AT MIN. SLOPE IF COVER WILL BE LESS THAN 5 FEET AT PROPERTY LINE.

5. IF DEPTH REQUIRES, MIN. SLOPE CAN BE REDUCED TO 1/8" PER FOOT PROVIDED STUB IS STAKED TO GRADE.
6. FOR DEEPER LATERAL OR TRUNK SEWER CONDITION, THE WYE AND 1/8 BEND OR THE TEE AND 1/16 BEND WILL BE ROTATED TOWARD THE VERTICAL POSITION AS REQUIRED TO OBTAIN 5'-0" COVER OVER TAP AT PROPERTY LINE OR EASEMENT LINE.
7. END OF TAP TO BE SEALED AND MARKED AS NOTED.

DETAIL NO.  
440



**STANDARD DETAIL**

**SEWER BUILDING CONNECTION**

DETAIL NO.  
440

THE WORD 'SEWER' ON COVER

UNPAVED STREETS & ALLEYS

8" C.I. FRAME & COVER STD. DET. 270.

PAVED STREETS & ALLEYS

**NOTE**

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

CLASS 'B' CONC. PER SECTION 725, 6" THICK, 40" DIAMETER

COMPACTED BACKFILL OR UNDISTURBED EARTH

SIZE OF PIPE AS SHOWN ON PLANS

STANDARD 45° BEND

STANDARD 45° BEND

VIT. CLAY PIPE PER SECTION 743

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

STATION & LENGTH SHOWN ON PLANS TO THIS POINT

FLOW LINE ELEVATION SHOWN ON PLANS TO THIS POINT

8" V.C.P.

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

ONE FULL LENGTH OF PIPE

8" X 8" WYE

6" X 8" OR 4" X 8" VITRIFIED CLAY INCREASER

**CLEANOUT INSTALLATION**

**SEWER TAP AT CLEANOUT**

DETAIL NO. 441



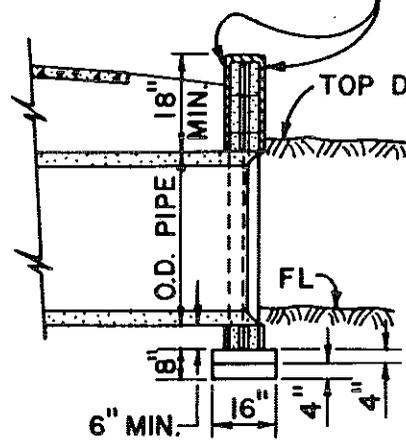
STANDARD DETAIL

SEWER CLEANOUT

DETAIL NO. 441



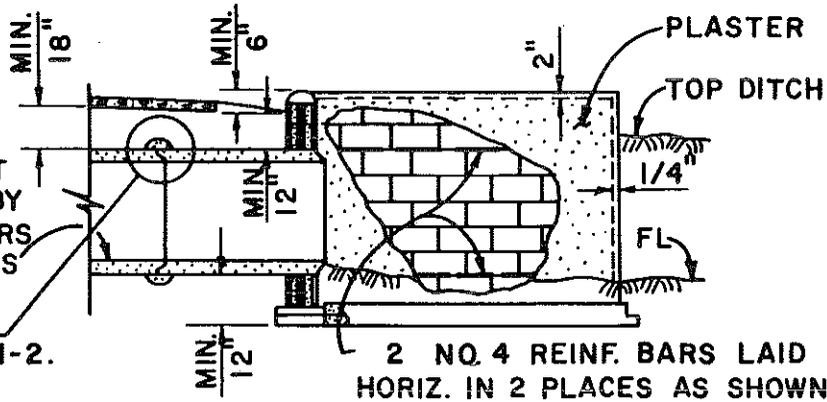
1/4" CONC. PLASTERED WALL



INVERT GRADE SET BY ENGINEER OR BY S.R.V.W.U.A. ENGINEERS IN THEIR LATERALS

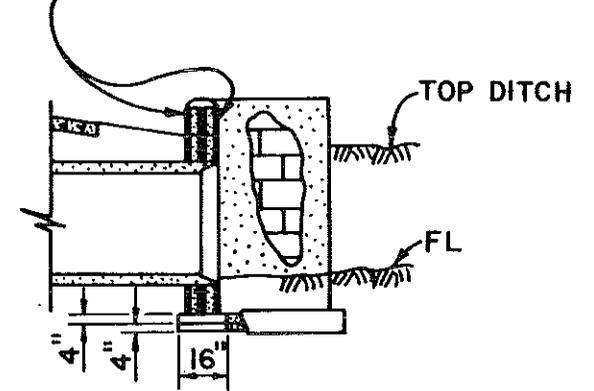
SEE DETAIL "A" STD. DETAIL 501-2.

2" CONC. PLASTER CAP

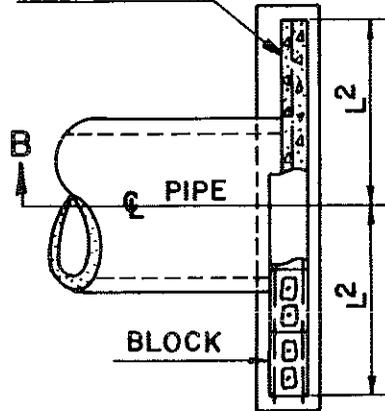


SECTION B-B

1/4" CONC. PLASTERED WALLS



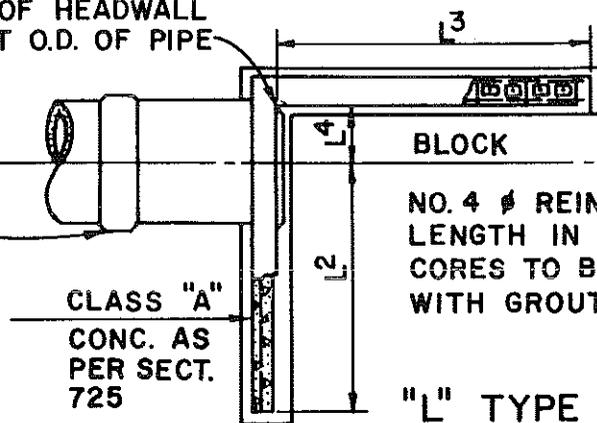
CLASS "A" CONC. AS PER SECT. 725



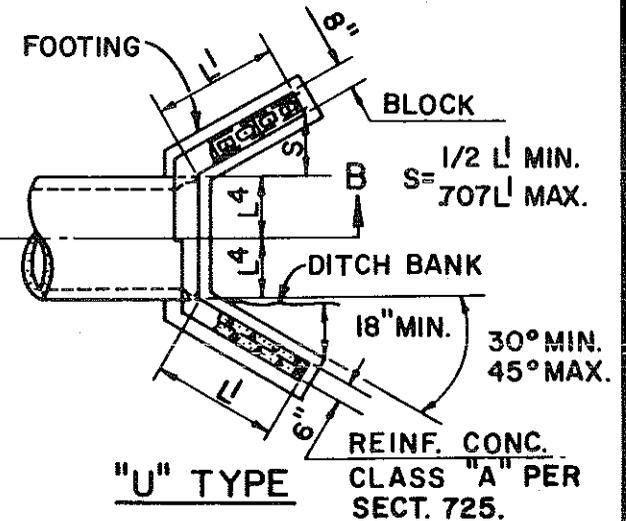
STRAIGHT TYPE

ANGLE OF HEADWALL TO MEET O.D. OF PIPE

SPRAY BANDS WITH CURING COMP.



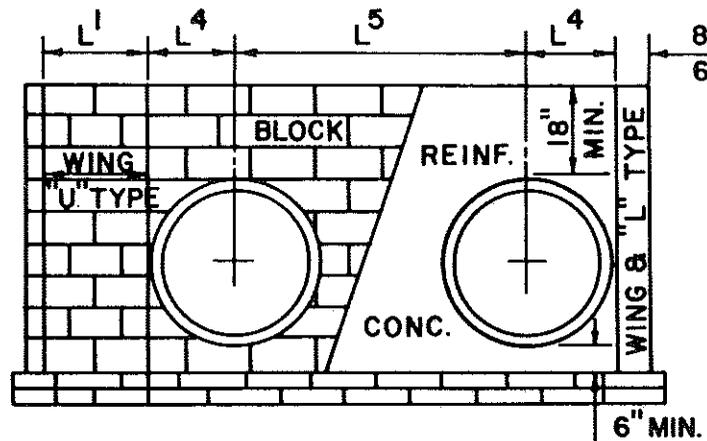
"L" TYPE



"U" TYPE

PLAN

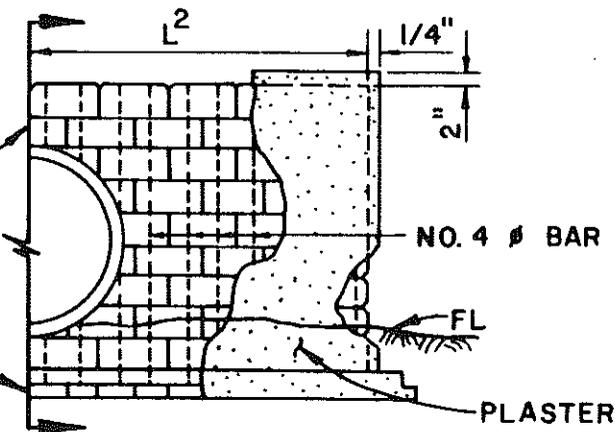




**DOUBLE PIPE HEADWALL**

8" BLOCK OR  
6" REINF. CONC.

WALL BLOCKS TO  
BE 8"x8"x16"  
FOOTING BLOCKS TO  
BE 8"x4"x16". FILL  
ALL CORES WITH  
GROUT MIX 1:3.

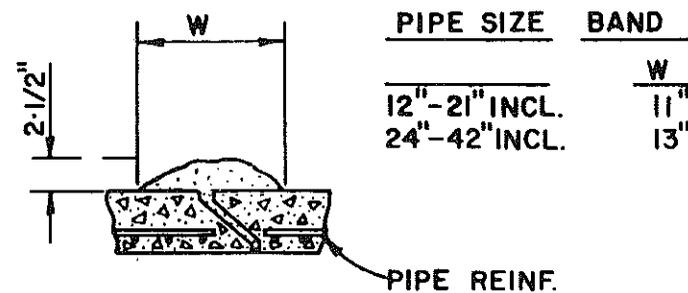


**ELEVATION**

CONC. BLOCK HDWLS. JOINED  
WITH CEMT. MORTAR & CONC.  
PLASTERED BOTH SIDES OF  
WALL FULL HGT. & SHALL BE  
CURED PER SECT. 726.

HEADWALL DIMENSIONS					
PIPE DIA.	L <sup>1</sup>	L <sup>2</sup>	L <sup>3</sup>	L <sup>4</sup>	L <sup>5</sup>
12"	1'-4"	2'-0"	3'-8"	0'-10"	2'-10"
15"	2'-0"	2'-8"	4'-0"	1'-0"	3'-0"
18"	2'-0"	3'-8"	4'-8"	1'-2"	3'-4"
21"	2'-8"	4'-0"	5'-4"	1'-3"	3'-8"
24"	2'-8"	4'-0"	5'-4"	1'-6"	3'-11"
30"	2'-8"	5'-4"	6'-8"	1'-10"	4'-7"
36"	3'-4"	6'-8"	8'-0"	1'-10"	5'-2"
42"	4'-0"	8'-0"	9'-4"	2'-2"	5'-9"

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



**DETAIL "A"**

SHEET 2 OF 2

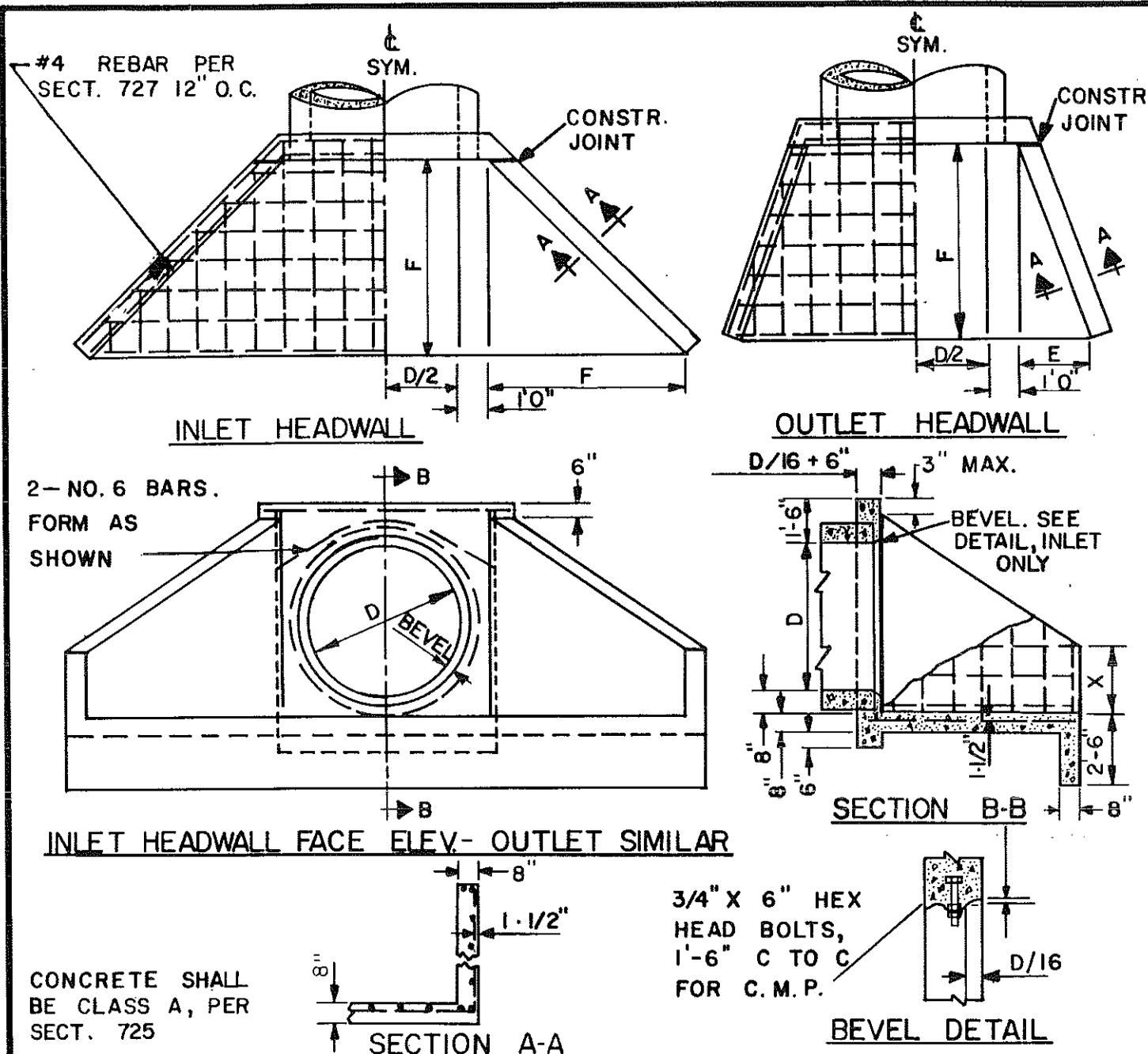
DETAIL NO.  
501-2



STANDARD DETAIL

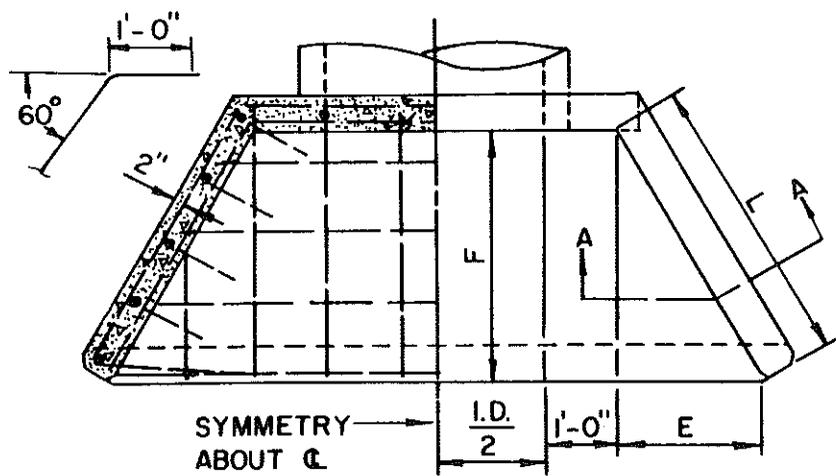
HEADWALL

DETAIL NO.  
501-2

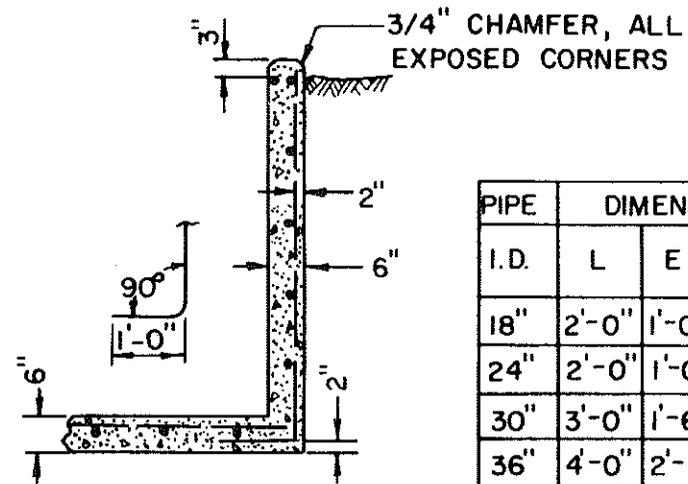


1/2 : 1 EMBANKMENT SLOPE							
D	TYPE	DIMENSIONS			CONC. (C.Y.)		REINF. STEEL (LBS.)
		F	E	X	C.M.P.	R.C.P.	
42"	1(INLET)	5'-2"	5'-2"	1'-9"	4.55	4.45	275
	2(OUTLET)	5'-2"	1'-11"	1'-9"	3.53	3.45	213
48"	3(INLET)	5'-8"	5'-8"	1'-11"	5.32	5.20	321
	4(OUTLET)	5'-8"	2'-1"	1'-11"	4.12	4.03	249
54"	5(INLET)	6'-2"	6'-2"	2'-1"	6.14	6.01	370
	6(OUTLET)	6'-2"	2'-3"	2'-1"	4.75	4.65	287
60"	7(INLET)	6'-8"	6'-8"	2'-3"	7.03	6.88	424
	8(OUTLET)	6'-8"	2'-5"	2'-3"	5.43	5.31	328
66"	9(INLET)	7'-2"	7'-2"	2'-5"	7.98	7.81	481
	10(OUTLET)	7'-2"	2'-7"	2'-5"	6.16	6.02	372
72"	11(INLET)	7'-8"	7'-8"	2'-7"	8.99	8.80	542
	12(OUTLET)	7'-8"	2'-9"	2'-7"	6.94	6.78	419
78"	13(INLET)	8'-2"	8'-2"	2'-9"	10.07	9.85	608
	14(OUTLET)	8'-2"	3'-0"	2'-9"	7.78	7.61	461
84"	15(INLET)	8'-8"	8'-8"	2'-11"	11.20	10.96	676
	16(OUTLET)	8'-8"	3'-2"	2'-11"	8.66	8.47	522
4 : 1 EMBANKMENT SLOPE							
42"	17(INLET)	8'-8"	8'-8"	3'-0"	7.88	7.70	475
	18(OUTLET)	8'-8"	3'-2"	3'-0"	5.59	5.46	337
48"	19(INLET)	8'-8"	8'-8"	3'-6"	8.47	8.28	511
	20(OUTLET)	8'-8"	3'-2"	3'-6"	6.10	5.97	368
54"	21(INLET)	8'-8"	8'-8"	4'-0"	9.07	8.87	548
	22(OUTLET)	8'-8"	3'-2"	4'-0"	6.63	6.48	400
60"	23(INLET)	9'-4"	9'-4"	4'-4"	10.39	10.16	627
	24(OUTLET)	9'-4"	3'-5"	4'-4"	7.60	7.43	458
66"	25(INLET)	9'-8"	9'-8"	4'-9"	11.42	11.17	689
	26(OUTLET)	9'-8"	3'-6"	4'-9"	8.39	8.20	506
72"	27(INLET)	9'-8"	9'-8"	5'-3"	12.11	11.84	731
	28(OUTLET)	9'-8"	3'-6"	5'-3"	8.99	8.80	542
78"	29(INLET)	10'-0"	10'-0"	5'-8"	13.22	12.93	798
	30(OUTLET)	10'-0"	3'-8"	5'-8"	9.88	9.66	596
84"	31(INLET)	10'-8"	10'-8"	6'-0"	14.81	14.48	893
	32(OUTLET)	10'-8"	3'-11"	6'-0"	11.00	10.76	664

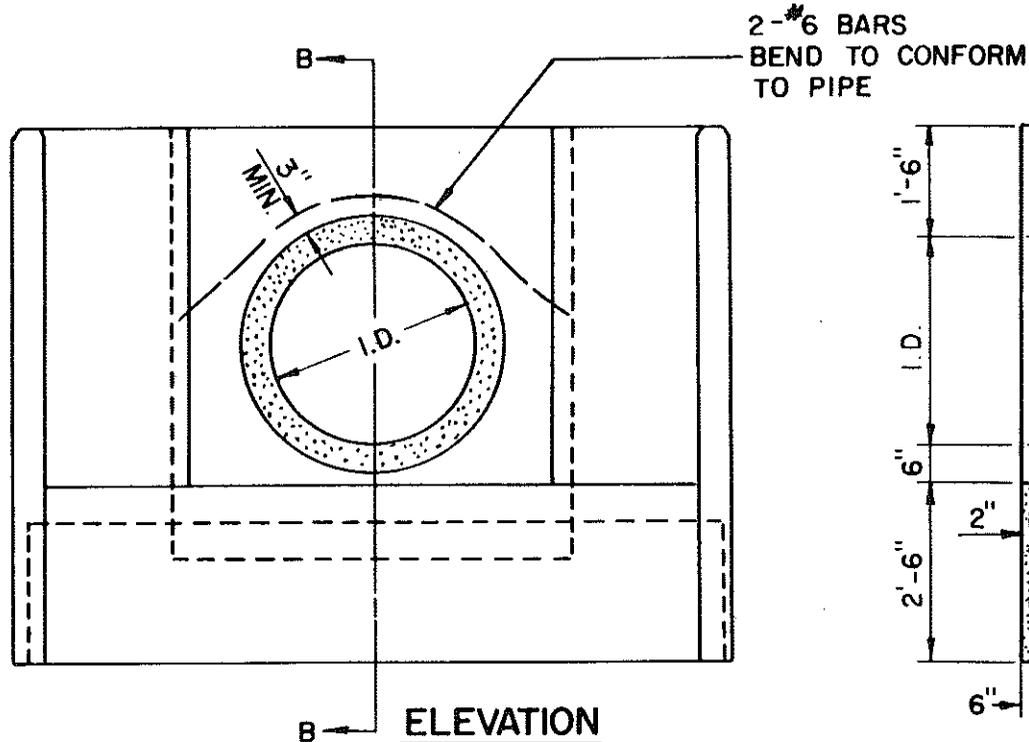
DETAIL NO. 501-3	STANDARD DETAIL	HEADWALL 42" TO 84" PIPE	DETAIL NO. 501-3
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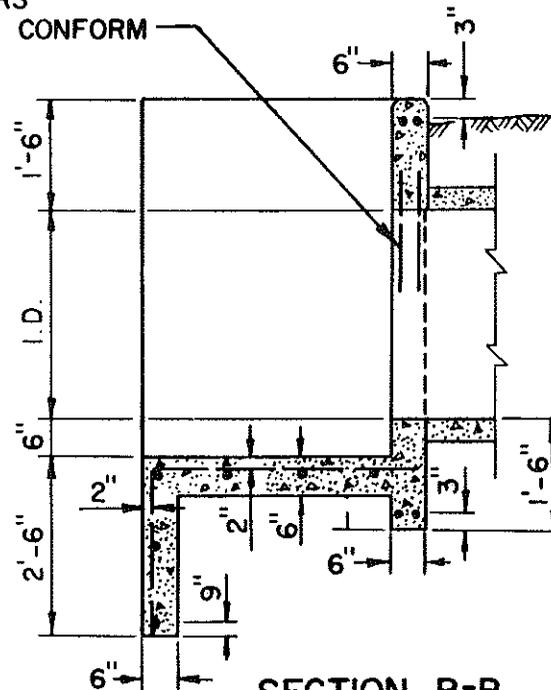
PLAN



SECTION A-A



ELEVATION



SECTION B-B

PIPE I.D.	DIMENSIONS			QUANTITIES		
	L	E	F (APPRX)	C.Y. CONC. C.M.P.	C.Y. CONC. R.C.P.	REINF. STL. LBS.
18"	2'-0"	1'-0"	1'-9"	0.97	0.96	65
24"	2'-0"	1'-0"	1'-9"	1.11	1.07	78
30"	3'-0"	1'-6"	2'-7"	1.50	1.44	108
36"	4'-0"	2'-0"	3'-6"	2.08	2.01	150
42"	5'-0"	2'-6"	4'-4"	2.71	2.63	205
48"	6'-0"	3'-0"	5'-2"	3.39	3.30	270
54"	7'-0"	3'-6"	6'-1"	4.14	4.02	335
60"	8'-0"	4'-0"	6'-11"	4.96	4.80	410

**NOTES**

1. ALL CONCRETE SHALL BE CLASS A. PER SECT. 725
2. ALL REINFORCING BARS SHALL BE #4 EXCEPT #6 BARS OVER PIPE. BAR SPACING APPROXIMATELY 1'-0" C TO C UNLESS OTHERWISE NOTED.
3. 30° WING WALL FLARE SHOWN; 45° NORMALLY DESIRABLE.

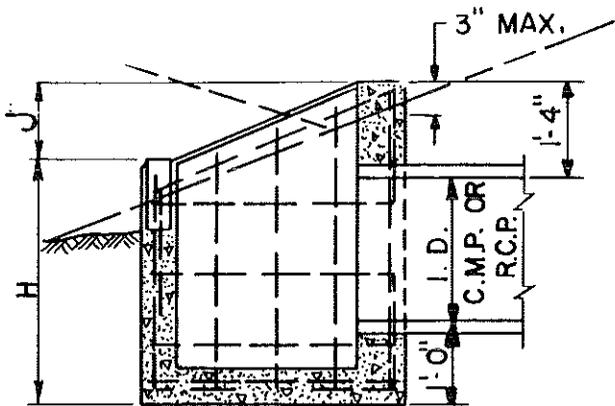
DETAIL NO.  
501-4



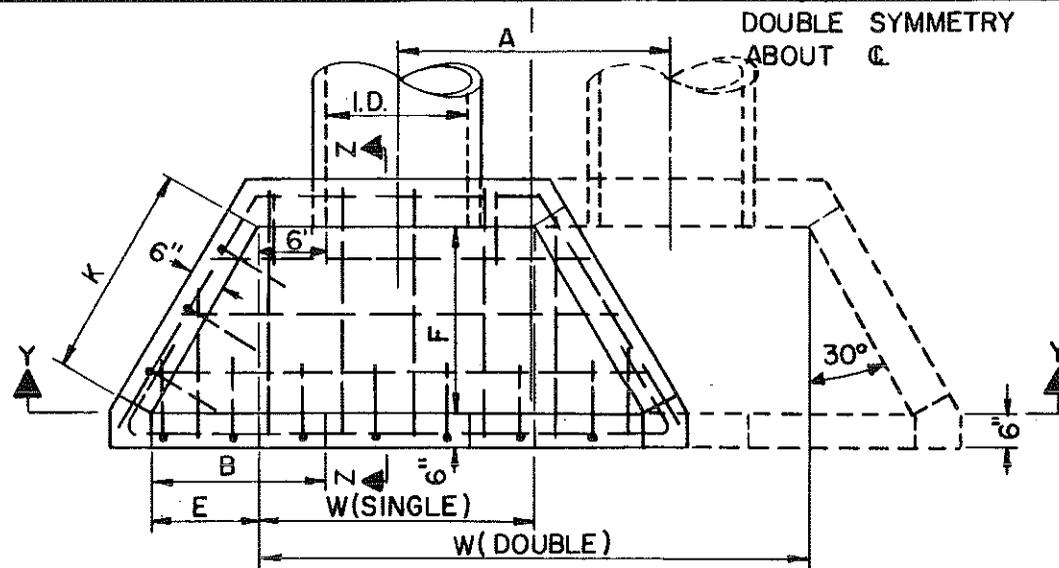
STANDARD DETAIL

HEADWALL IRRIGATION 18" TO 60" PIPE

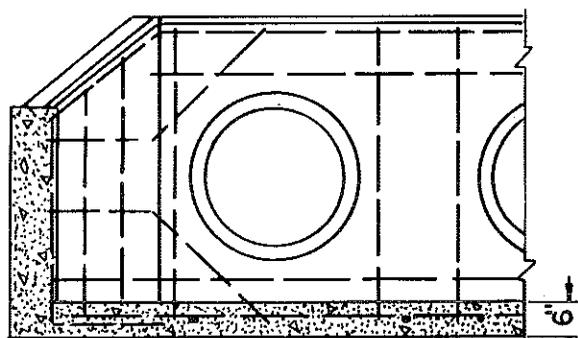
DETAIL NO.  
501-4



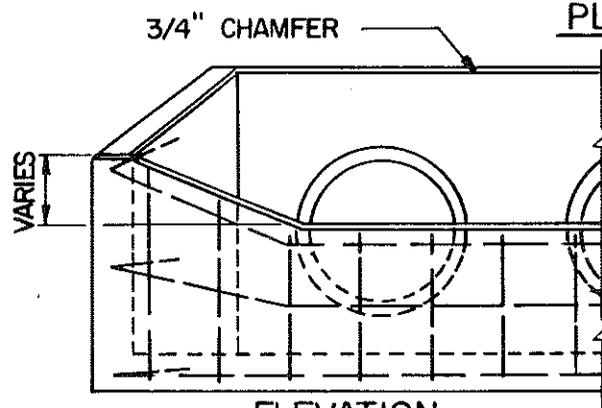
SECTION Z-Z



PLAN



SECTION Y-Y



ELEVATION

**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, 1'-0" C TO C AND 3" CLEAR TO INSIDE OF WALLS AND FLOOR.

PIPE I.D.	DIMENSIONS										QUANTITIES				
	W		A	B	E	F	H	J	K	CONC. C.Y.		REIN. STEEL LBS.			
	SINGLE	DOUBLE								SINGLE	DOUBLE				
18"	2'-6"	5'-2"	2'-8"	1'-3"	9"	1'-3 5/8"	3'-1"	9"	1'-6"	0.76	0.03	1.12	0.06	75	107
24"	3'-0"	6'-6"	3'-6"	1'-7 1/2"	1'-1 1/2"	1'-11 3/8"	3'-5"	11"	2'-3"	1.00	0.04	1.55	0.09	92	136
30"	3'-6"	7'-10"	4'-4"	2'-0"	1'-6"	2'-7 1/4"	3'-9"	1'-1"	3'-0"	1.50	0.06	2.29	0.13	112	166
36"	4'-0"	9'-2"	5'-2"	2'-4 1/2"	1'-10 1/2"	3'-3"	4'-0"	1'-4"	3'-9"	1.96	0.09	3.01	0.17	145	214
42"	4'-6"	10'-6"	6'-0"	2'-9"	2'-3"	3'-10 3/4"	4'-4"	1'-6"	4'-6"	2.49	0.11	3.85	0.23	189	279

DETAIL NO.  
501-5

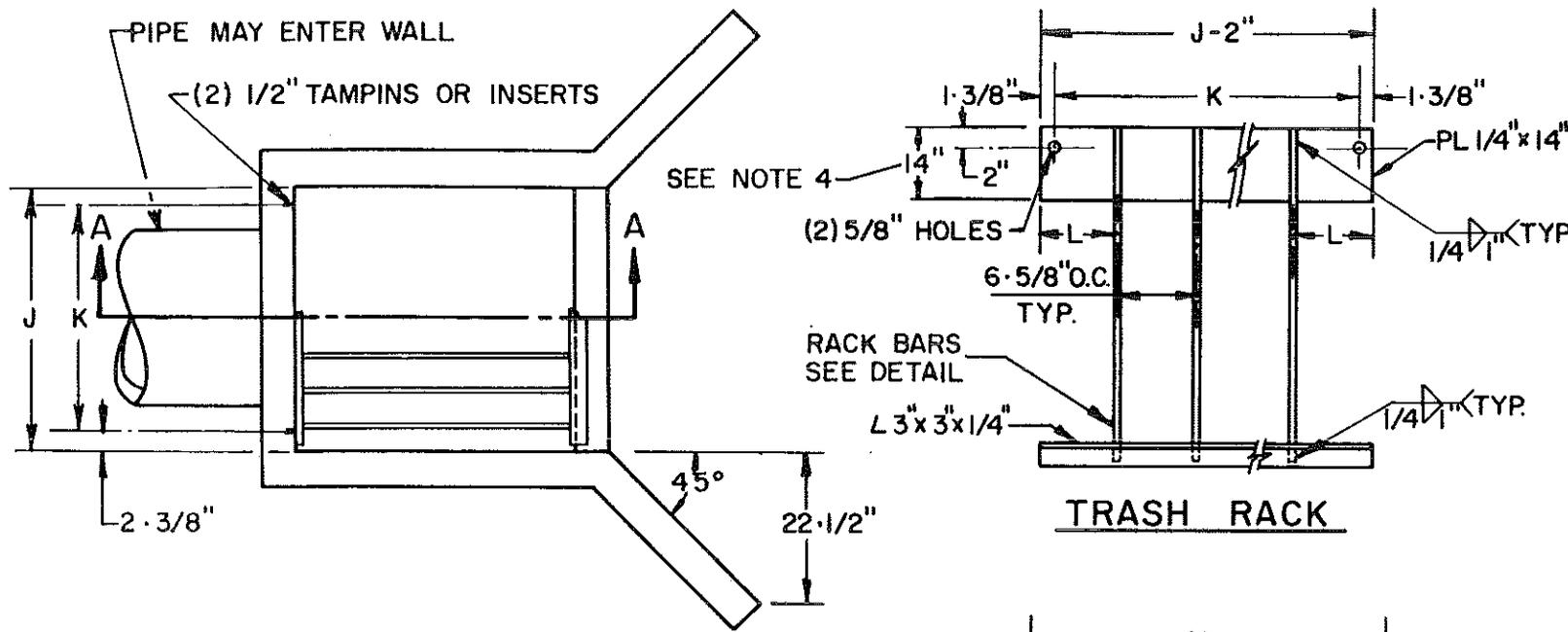


STANDARD DETAIL

HEADWALL, DROP INLET

DETAIL NO.  
501-5





**POURED WALLS**

6" MIN.

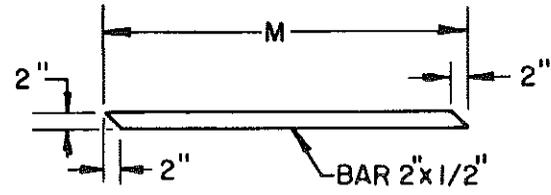
#4 REINFORCED BARS 12" O.C. BOTH WAYS, CLASS A CONCRETE SECT. 505, 725, AND 727.

**BLOCK WALLS**

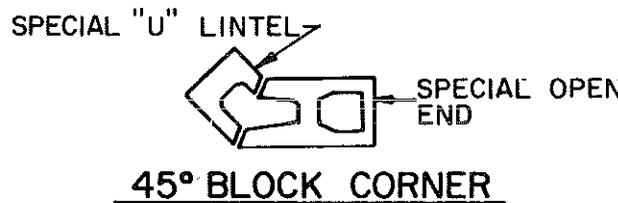
8" MIN.

BLOCK HEADWALL TO HAVE ONE #4 REINF. BAR CENTERED IN EACH CORE FOR FULL HEIGHT AND CORES FILLED WITH CONCRETE OR CEMENT GROUT (3:1 RATIO). ALL BLOCKS TO BE JOINTED WITH MORTAR. PLASTERED ON EXPOSED SURFACES THEN SPRAYED WITH WHITE PIGMENTED CURING COMPOUND. SECT. 510, 727 AND 776.

**TRASH RACK**

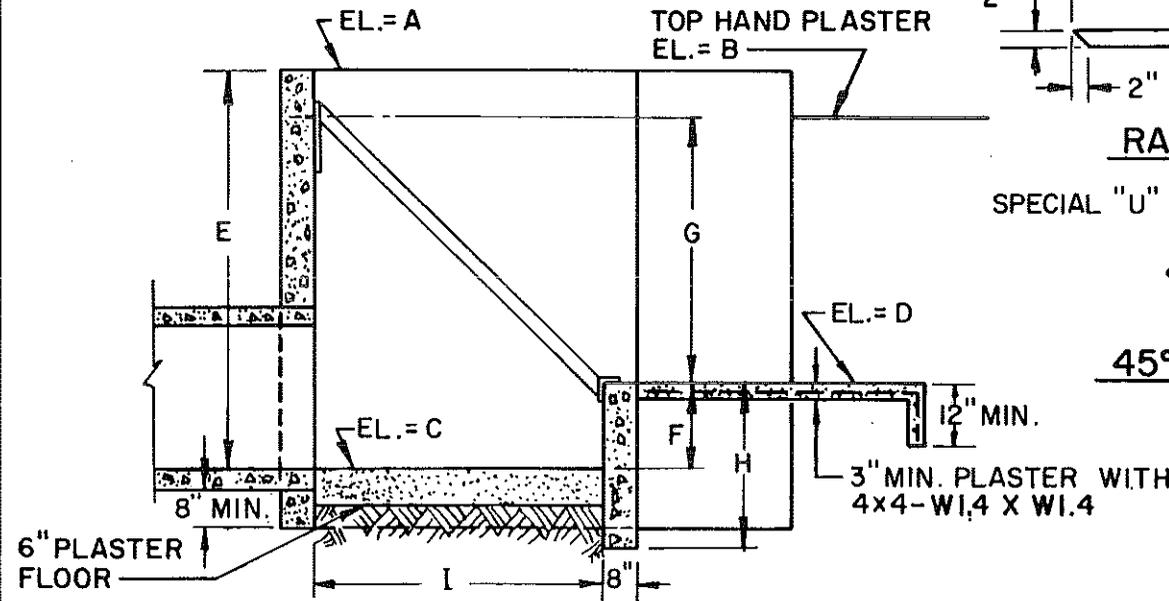


**RACK BARS**



**45° BLOCK CORNER**

**SECTION A-A**



**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 MIN. EL. NOTED 3 FEET BEYOND CONNECTION TO UNDISTURBED EXISTING DITCH.
3. ELEVATIONS A, B, C, D AND DIMENSIONS E, F, G, H, I, J, K, L, M WILL BE SHOWN ON PLANS. DIMENSIONS SHOULD PROVIDE STANDARD SIZE BLOCK.
4. 14" PLATE SHALL NOT EXTEND BELOW TOP OF PIPE.

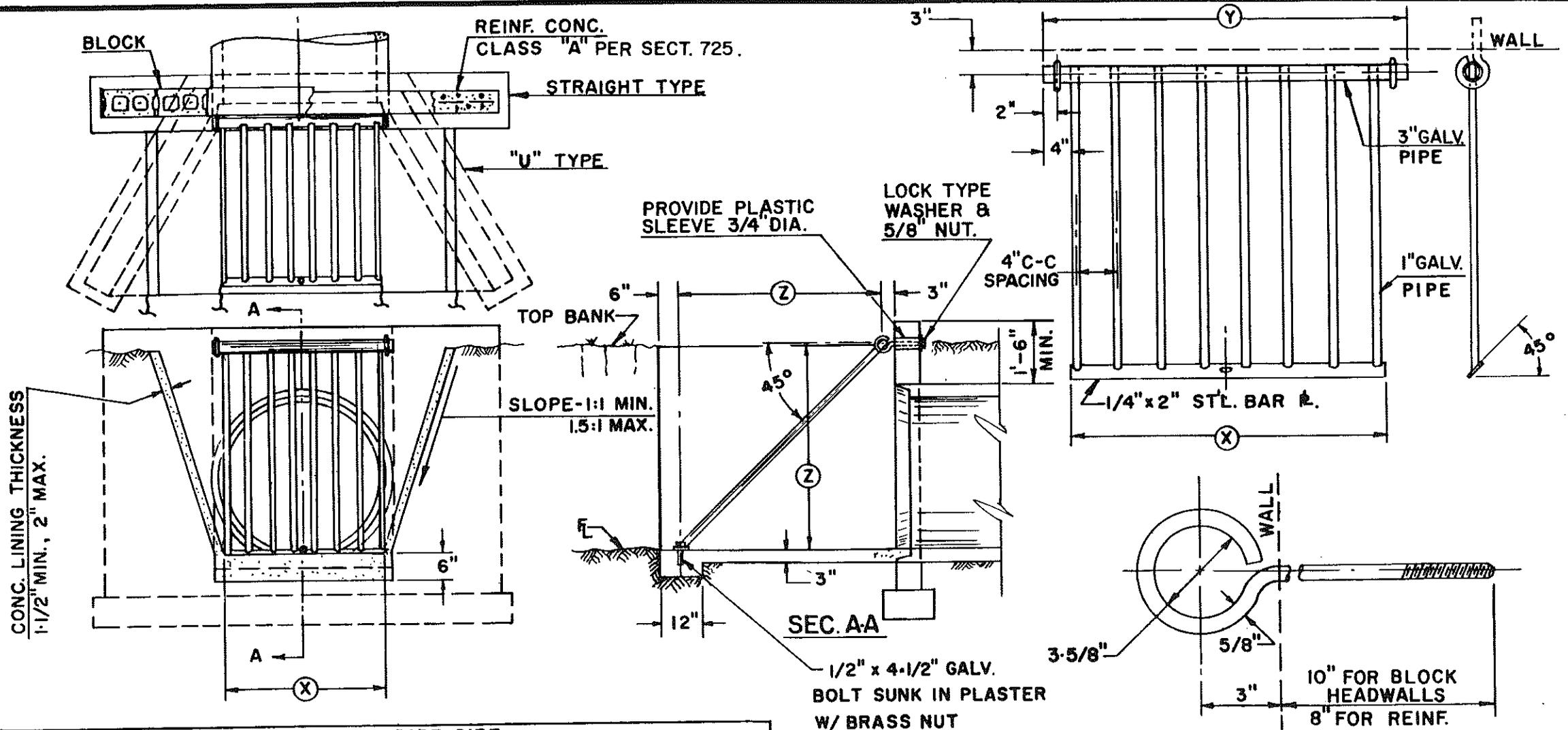
DETAIL NO.  
502-1



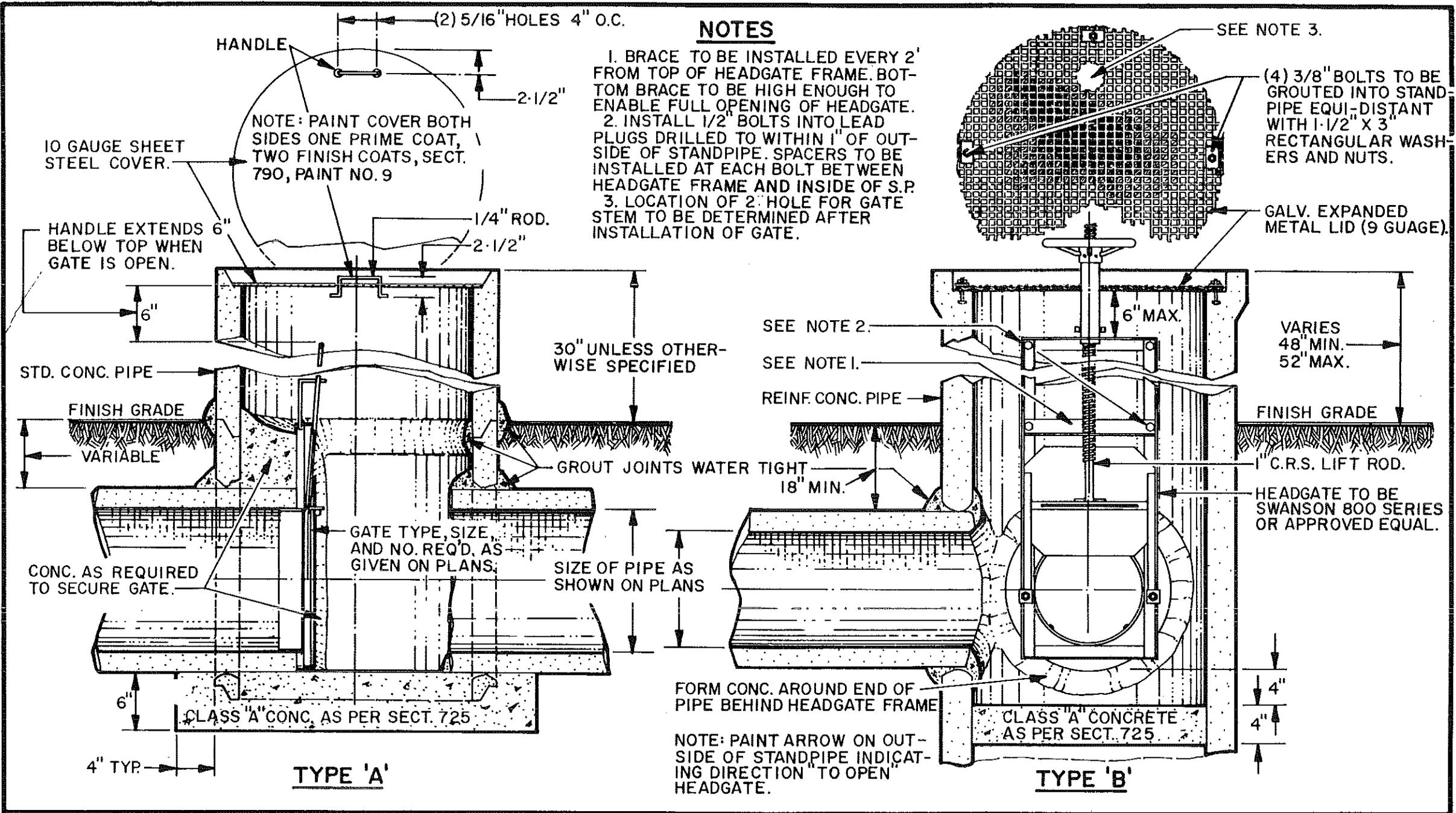
STANDARD DETAIL

TRASH RACK

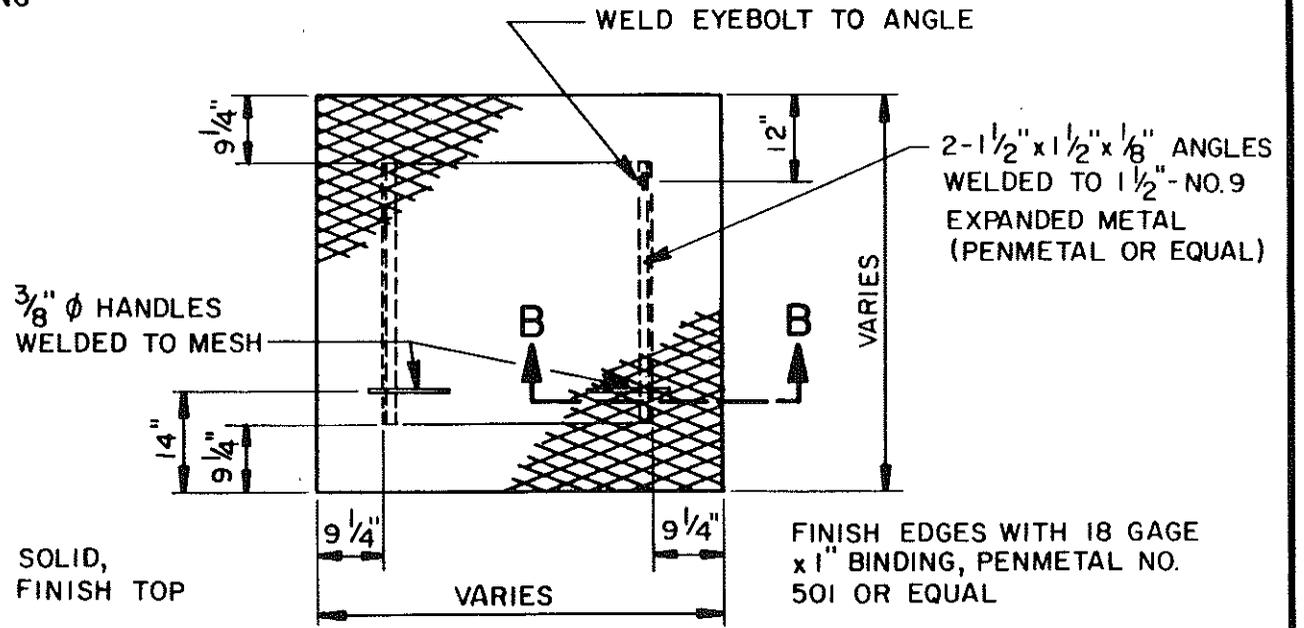
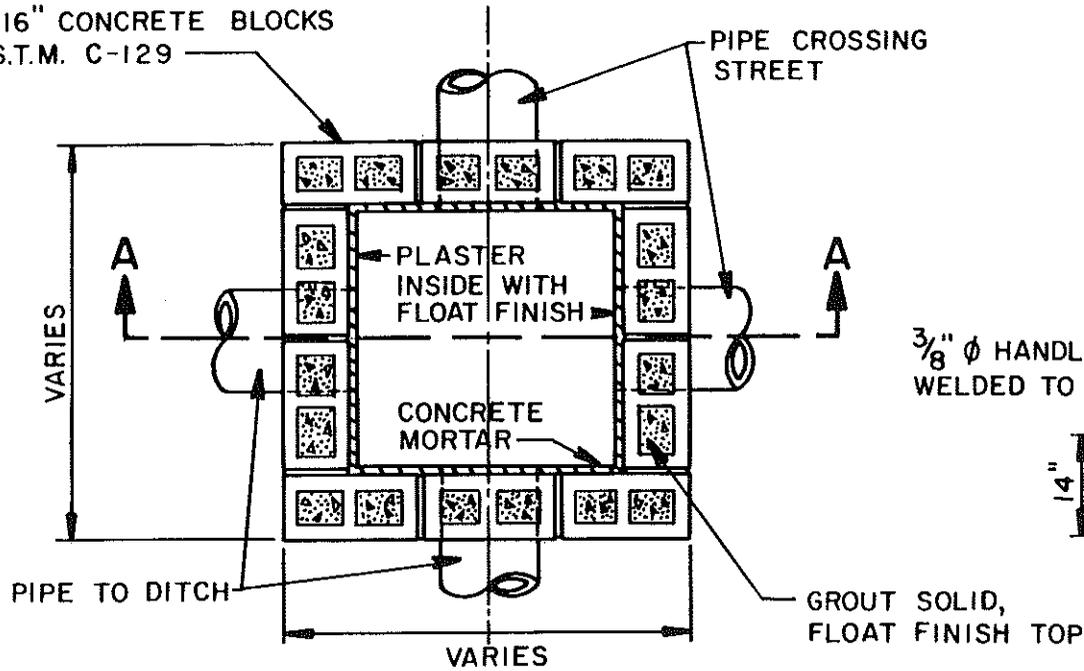
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502-1



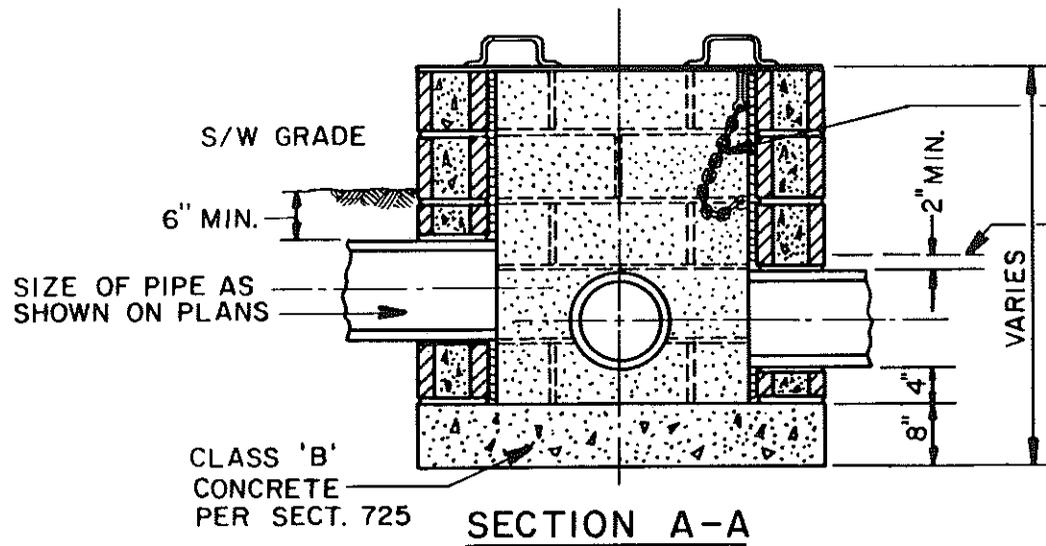
TYPE BASED ON PIPE SIZE				DIMENSIONS		
TYPE	PIPE SIZE	NO. OF BARS	LENGTH OF BARS	X	Y	Z
A	18"	6	3'-7"	1'-9"	2'-5"	2'-5"
	24"	8	3'-7"	2'-5"	3'-1"	2'-5"
B	30"	10	4'-4 1/4"	3'-1"	3'-9"	2'-11 1/2"
C	36"	10	5'-1 1/2"	3'-1"	3'-9"	3'-6"
D	42"	12	5'-10 5/8"	3'-9"	4'-5"	4'-1/2"
E	48"	14	6'-7 3/4"	4'-5"	5'-1"	4'-7"



STD. 8"x8"x16" CONCRETE BLOCKS  
AS PER A.S.T.M. C-129



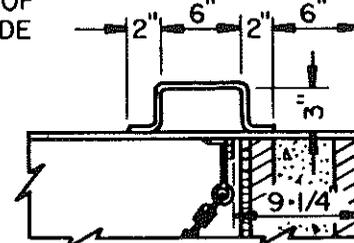
PLAN OF COVER



SECTION A-A

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

ELEV. OF BOTTOM OF PAVEMENT SUBGRADE



SECTION B-B

NOTES:

1. SIZE OF JUNCTION BOX TO BE DETERMINED BY THE ENGINEER
2. GATE TYPE, SIZE, AND NUMBER REQUIRED AS SHOWN ON PLANS OR AS SPECIFIED

DETAIL NO.  
504



STANDARD DETAIL

CONCRETE BLOCK JUNCTION BOX

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 USE NEXT SIZE LARGER.

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

5. WHERE REINFORCING IS REQUIRED, THE DIAMETER OF THE CIRCULAR TIES SHALL BE .....  
OUTSIDE DIAMETER OF PIPE + T.

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

\*A= ANGLE OF DEFLECTION

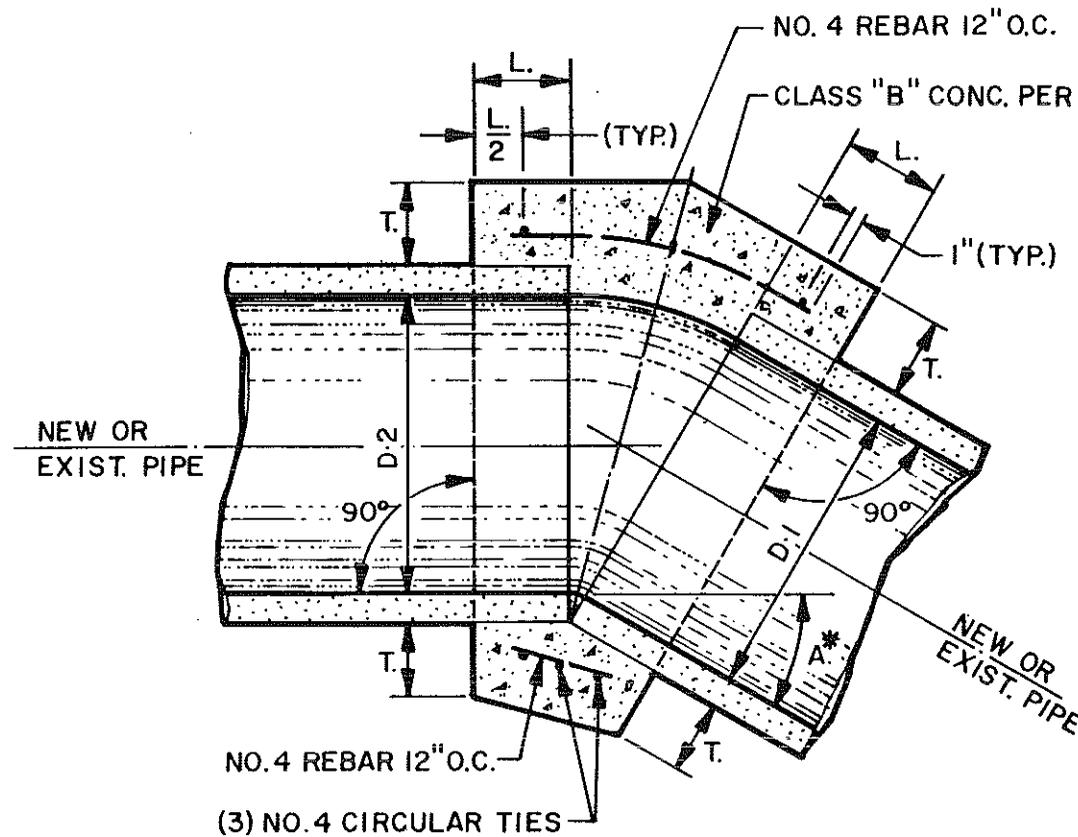


TABLE		
D.	L.	T.
12"	1.0'	4"
18"	1.0'	5"
24"	1.0'	6"
36"	1.5'	8"
48"	1.5'	10"
57"	1.5'	10"
60"	1.75'	11"
66"	1.75'	11"

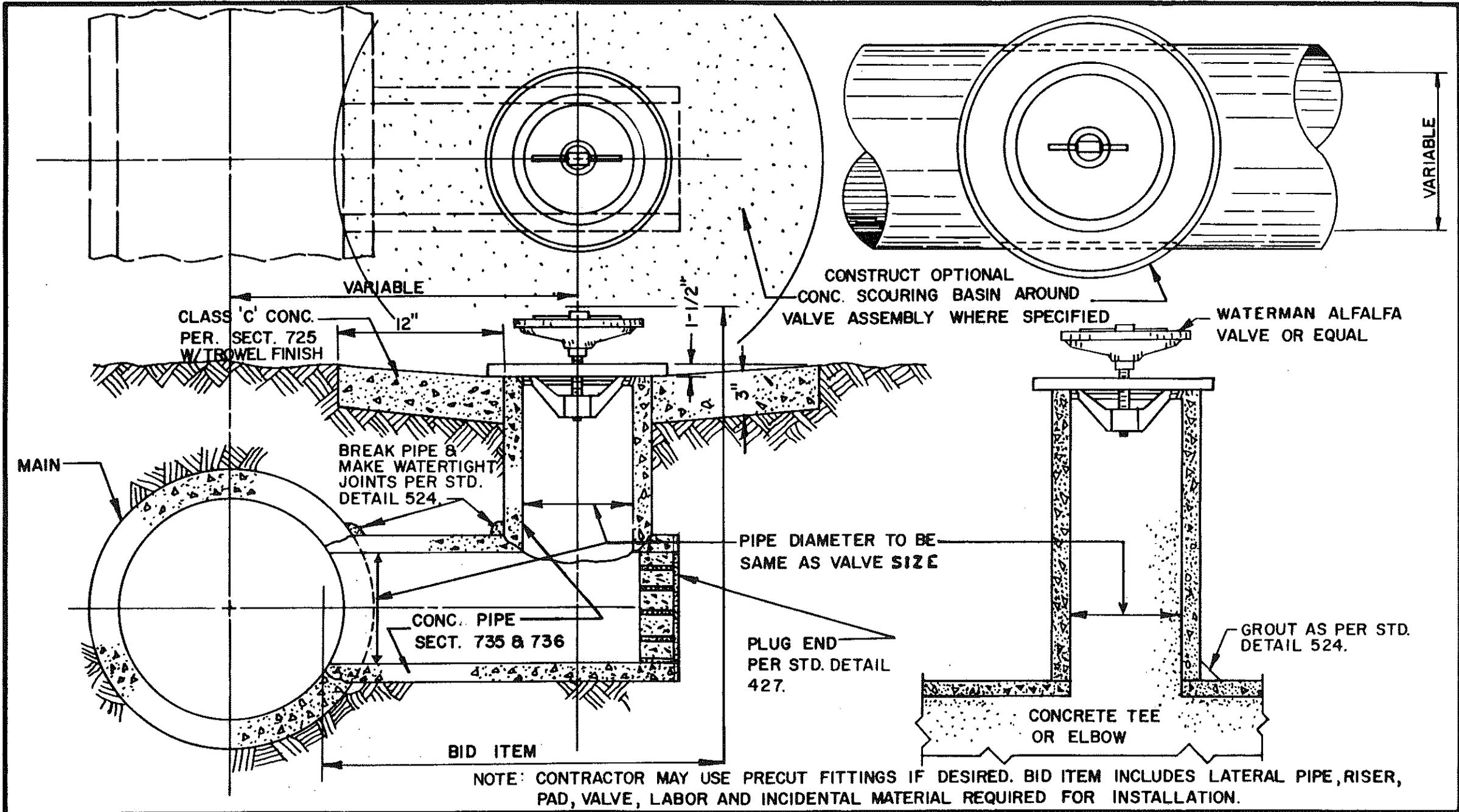
DETAIL NO.  
505



STANDARD DETAIL

CONCRETE PIPE COLLAR

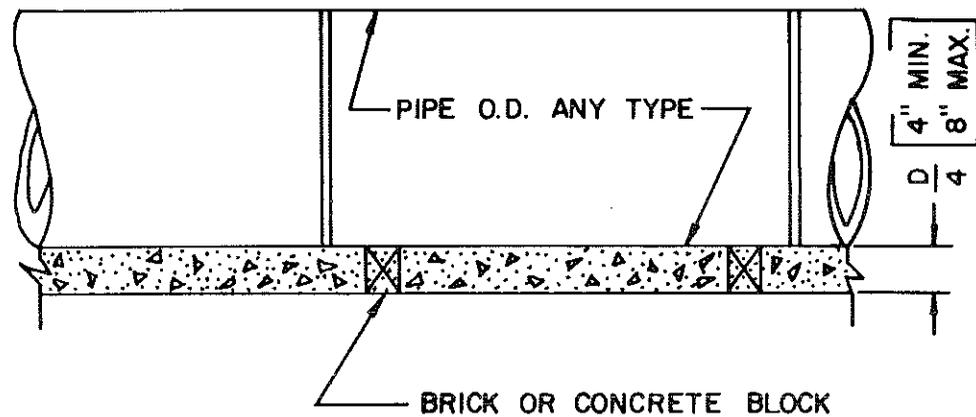
DETAIL NO.  
505



DETAIL NO. <b>506</b>	 <b>STANDARD DETAIL</b>	<b>IRRIGATION VALVE INSTALLATION</b>		DETAIL NO. <b>506</b>
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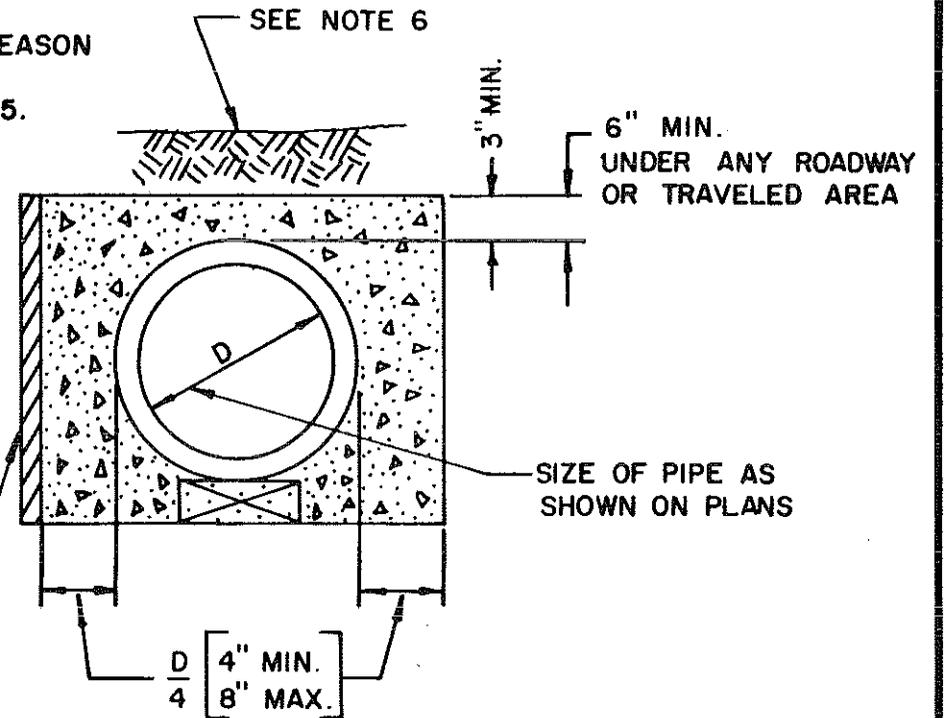
**NOTES:**

1. THIS DETAIL SHALL BE REQUIRED WHEN NEW OR EXISTING PIPE INSTALLATIONS WILL BE SUBJECT TO DAMAGE ANYTIME IN THE FUTURE DUE TO LACK OF PROPER COVER, AS DETERMINED BY THE ENGINEER.
2. FOR PIPE OVER 18" I.D. WOOD, METAL OR GYPSUM BOARD FORMS MUST BE USED TO FORM THE SIDES OF THE ENCASEMENT. GYPSUM BOARD FORMS MAY BE LEFT IN THE GROUND BELOW THE TOP OF THE ENCASEMENT. THIS SHALL BE OPTIONAL WITH POURING AGAINST TRENCH WALLS FOR ENCASEMENT OF 18" AND SMALLER PIPE.
3. FOR ALL SITUATIONS WHERE SIDE FORMS ARE USED, TRENCH WALLS SHALL BE OVER-EXCAVATED TO ALLOW SUFFICIENT ROOM TO OPERATE PROPER MECHANICAL COMPACTION EQUIPMENT.
4. CONCRETE WHICH SPILLS BEYOND 12" FROM THE SIDES OF THE PIPE FOR ANY REASON SHALL BE REMOVED BACK TO THE PROPER LINE PRIOR TO BACKFILLING.
5. SEE SECT. 601 FOR TRENCH PREPARATION. CONCRETE TO BE CLASS 'A' PER SECT. 725.
6. COVER TO BE APPROVED BY ENGINEER.



LONGITUDINAL SECTION

SIDE FORMS AS REQUIRED. SEE NOTE 2



END SECTION

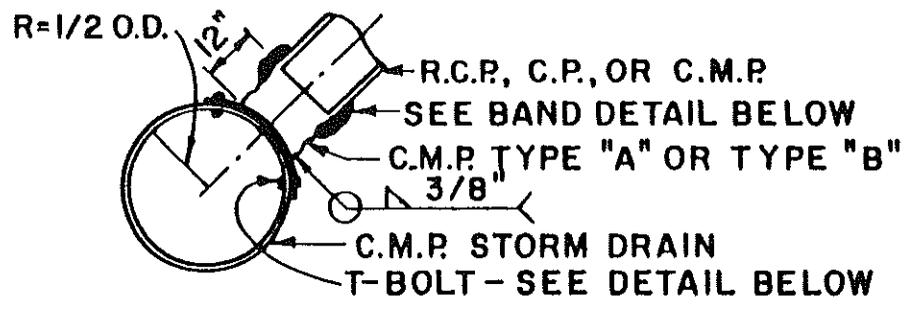
DETAIL NO.  
507



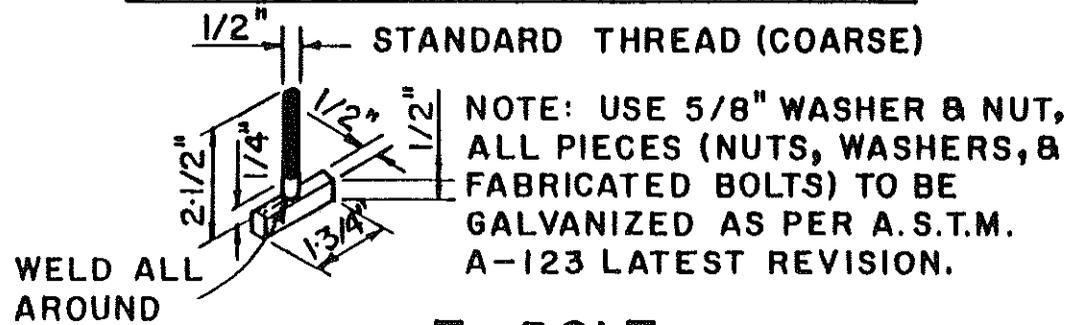
STANDARD DETAIL

ENCASED CONCRETE PIPE (FOR SHALLOW INSTALLATION)

DETAIL NO.  
507

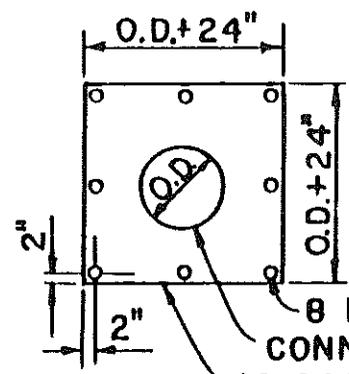


**CONNECTOR CROSS SECTION**



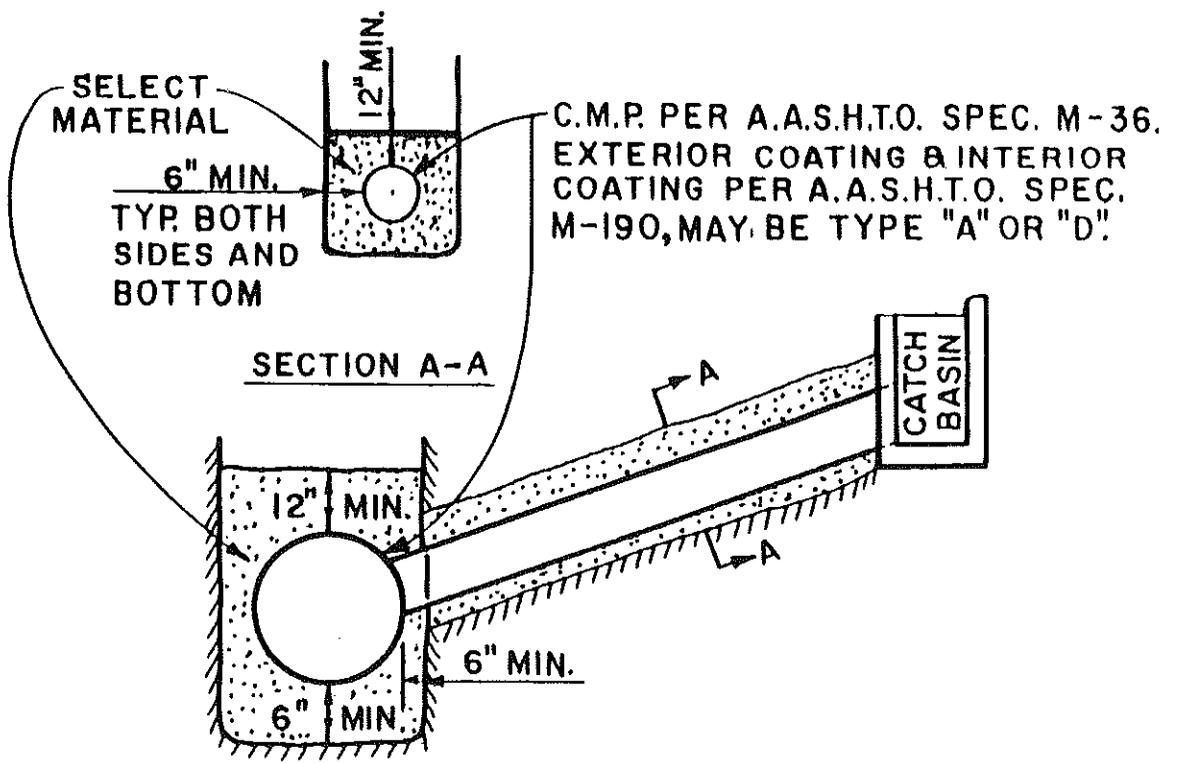
**T-BOLT**

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

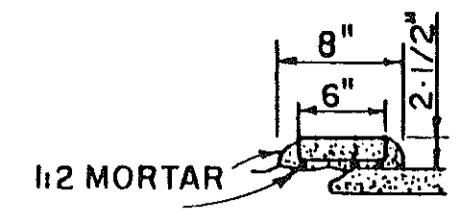


12 GAGE BITUMINOUS COATED GALVANIZED METAL PLATE.

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



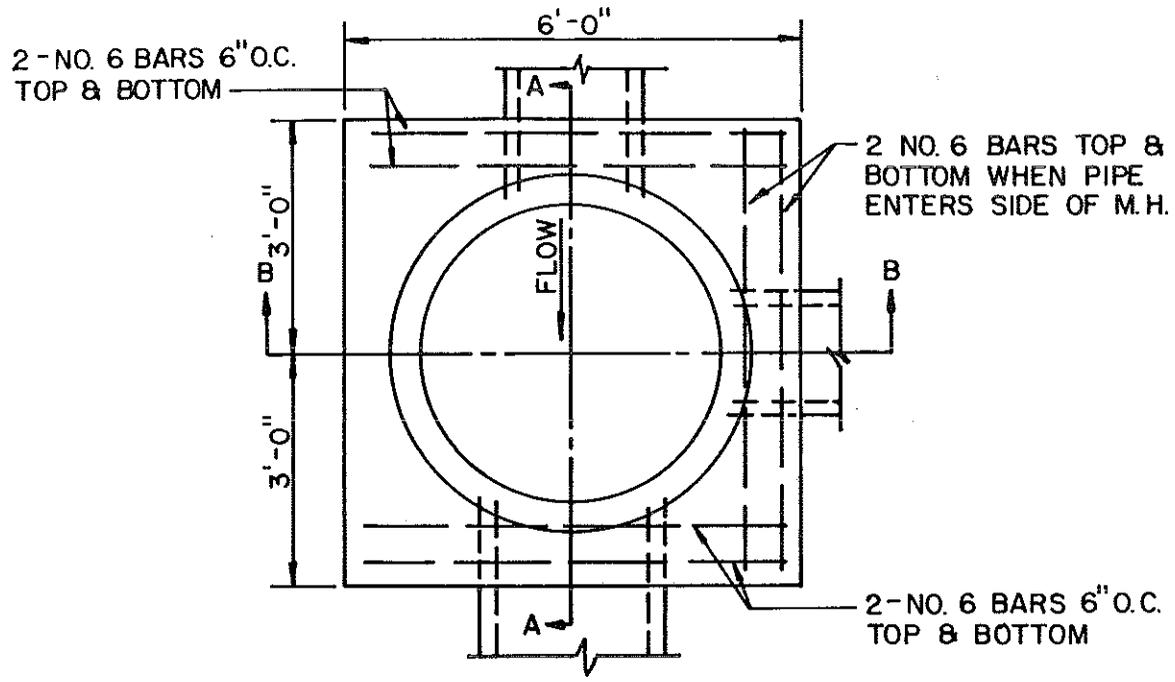
**C.M.P. MAIN STORM DRAIN**



2" X 2" X 12 GA. WELDED WELDED WIRE FABRIC W/12" CIRCUMFERENTIAL OVERLAP.

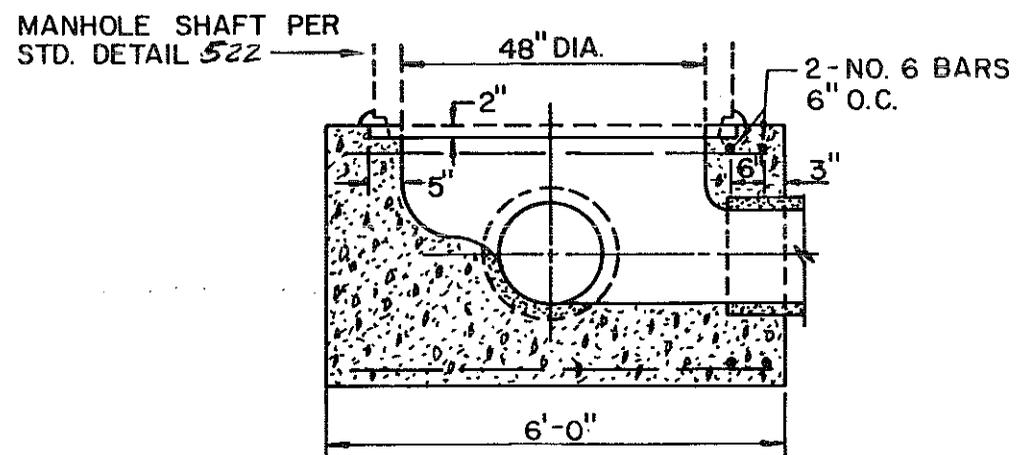
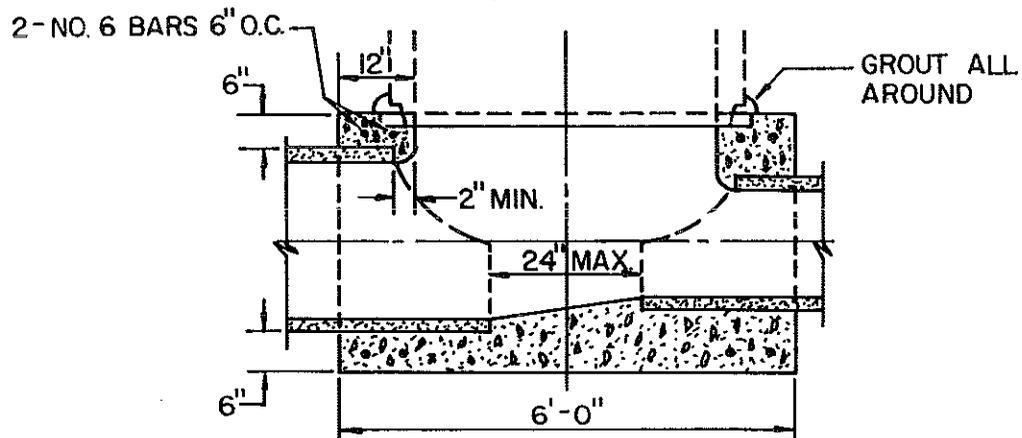
**BAND DETAIL**

DETAIL NO. 510	STANDARD DETAIL	CORRUGATED METAL PIPE & INSTALLATION	DETAIL NO. 510
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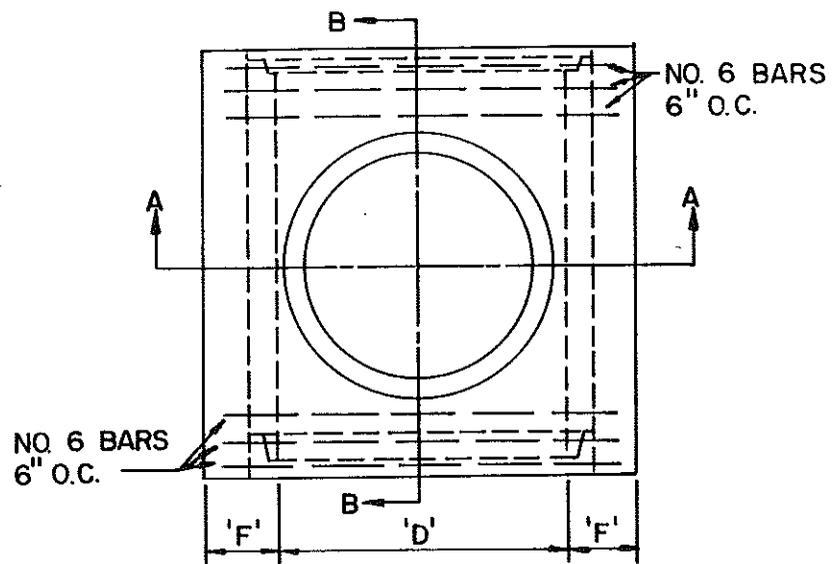


**NOTES**

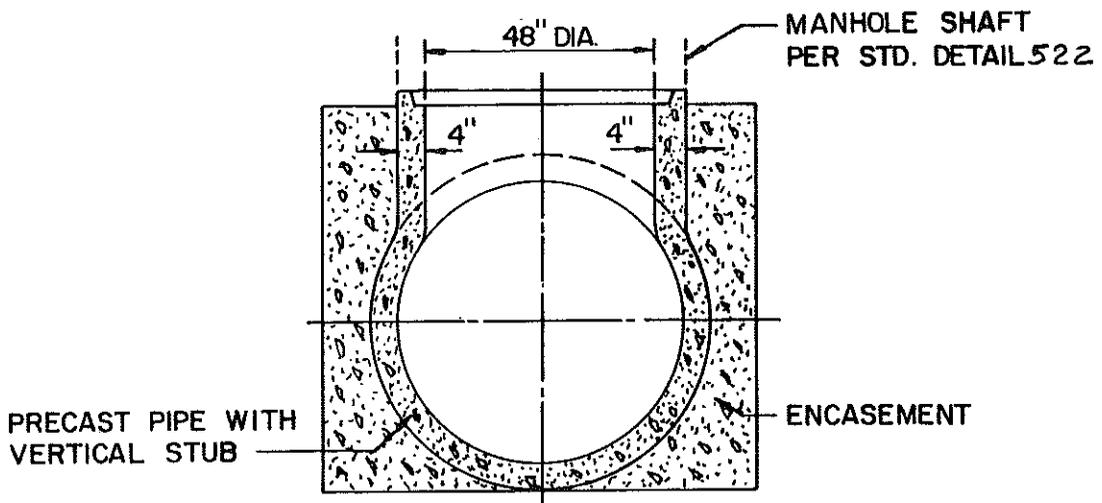
1. ALL CONCRETE TO BE CLASS 'A' PER SECTION 725,505.
2. MATCH SPRING LINES OF PIPES ENTERING M.H. UNLESS OTHERWISE NOTED.
3. CUT PIPES TO ALLOW SETTING OF 4' DIA. CYLINDRICAL FORM FROM 6" ABOVE MAIN LINE PIPE TO SPRING LINE. CUT PIPE 2" LARGER THAN FORM TO ALLOW 2" CONC. OVER ENDS OF ALL CUT PIPE.
4. INVERT AND BASE OF M.H. TO BE POURED AND INVERT TO BE SHAPED BY HAND TO MAKE SMOOTH TRANSITION. FINISH WITH RUBBER FLOAT.
5. CENTER M.H. ON PIPE JOINT, WHERE PIPE CHANGES SIZES, LEAVING A GAP OF 12" MIN., 24" MAXIMUM.



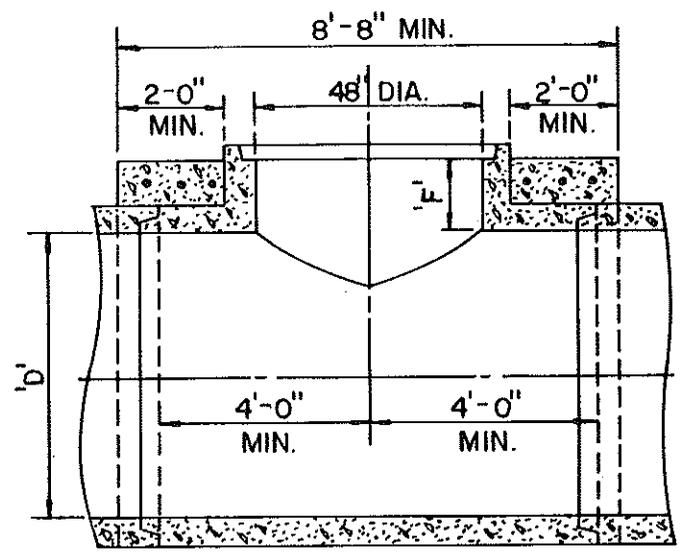
DETAIL NO. 520		<b>STANDARD DETAIL</b>	<b>STORM DRAIN MANHOLE BASE (48" AND SMALLER)</b>	DETAIL NO. 520
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**PLAN**



**SECTION A-A**



**SECTION B-B**

**NOTES**

1. LINE PIPE & 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. 725,505.

**TABLE OF VALUES FOR 'F'**

'D'	51"	54"	57"	60"	63"	66"	69"	72"	78"	84"	90"	96"
'F'	13 3/4	14 1/2	15	15 1/2	16 1/4	16 3/4	17 1/2	18	19 1/4	20 1/2	21 3/4	23

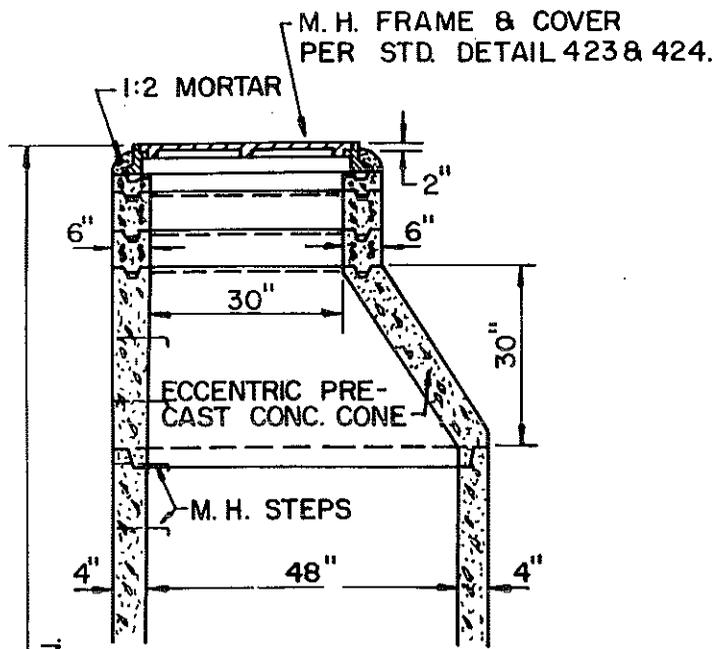
DETAIL NO.  
**521**



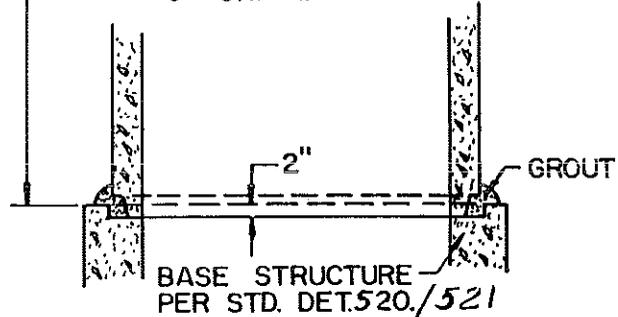
**STANDARD DETAIL**

**STORM DRAIN MANHOLE BASE  
(51" AND LARGER)**

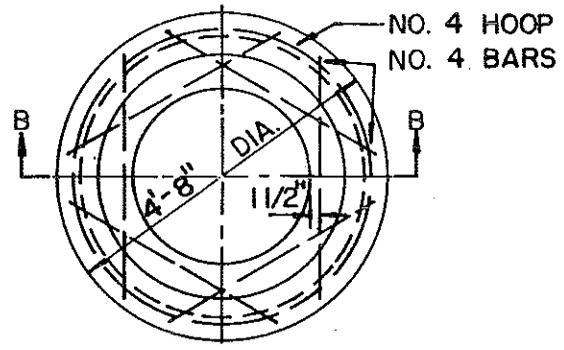
DETAIL NO.  
**521**



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

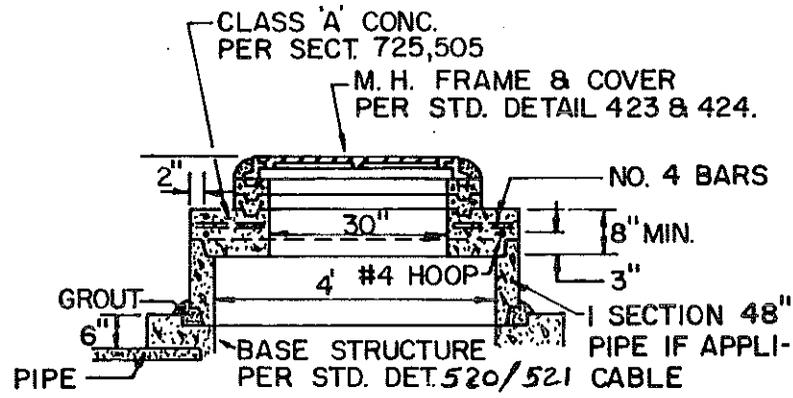


**VERTICAL SECTION OF  
ECCENTRIC MANHOLE SHAFT**

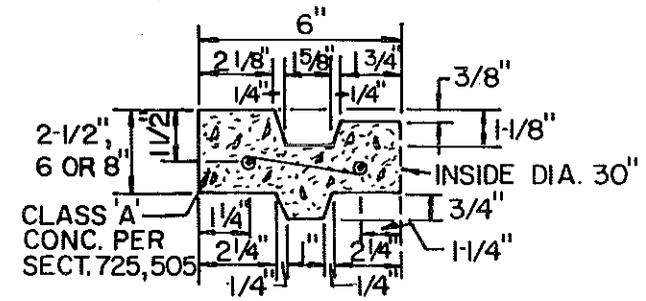


**PLAN**

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



**SECTION B-B  
SHALLOW MANHOLE**

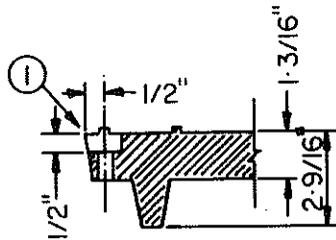


2-1/2" RINGS SHALL BE REINFORCED WITH TWO 1/4" ROUND STEEL HOOPS; 6" AND 8" RINGS SHALL BE REINFORCED WITH FOUR 1/4" HOOPS, TIED WITH NO. 14 A.S. & W. GAUGE WIRE 8" O.C.

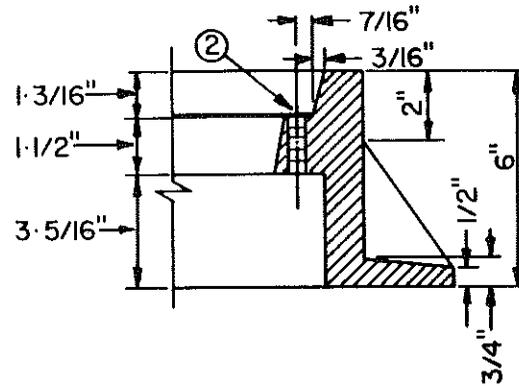
**REINFORCED CONCRETE  
ADJUSTING RING**

**NOTES**

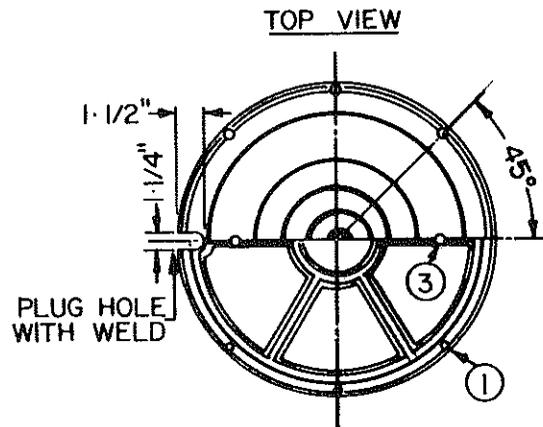
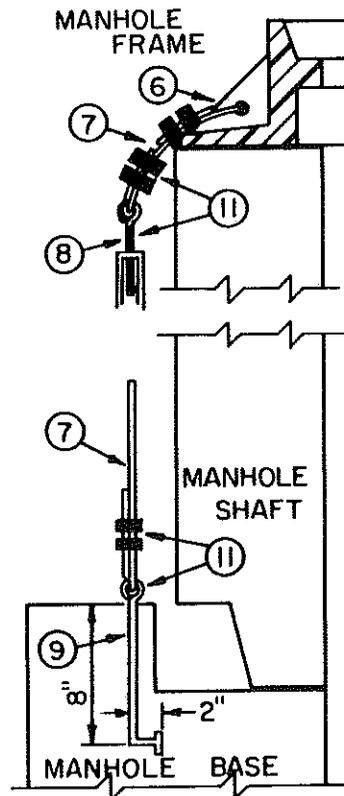
1. PRECAST CONCRETE CONES & SECTIONS TO BE A.S.T.M. & A.S.T.M. 478.
2. BRICK MAY BE USED IN LIEU OF, OR IN COMBINATION WITH CONC. ADJUSTING RINGS.
3. PRECAST CONC. SECTIONS 48" DIA. PIPE MAY BE FURNISHED IN STANDARD LENGTHS.
4. UNLESS OTHERWISE SHOWN ON PLANS, USE 2-2-1/2" PRECAST CONC. ADJUSTING RINGS ON IMPROVED STREETS & 4-2-1/2" RINGS ON UNIMPROVED STREETS.
5. M.H. STEPS SHALL BEGIN 2' BELOW FIN. GRADE & CONTINUE AT 1' INTERVALS TO APPROX. 2' ABOVE M.H. SHELF. (AS REQUIRED BY AGENCY)



**COVER SECTION**



**FRAME SECTION**



**TOP VIEW**  
**BOTTOM VIEW**  
**STANDARD 24" M.H.**  
**FRAME & COVER**

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 THROUGH 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 STD. DET. 424 , 24" MANHOLE FRAME AND COVER.
- BOTH 24" & 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" X 9" HOOK & 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 & CABLE CLAMPS WITH 1" WIDE TAPE, SAFE-T-CLAD, F.O.S. 655, OR APPROVED EQUAL.

DETAIL NO.  
**523**

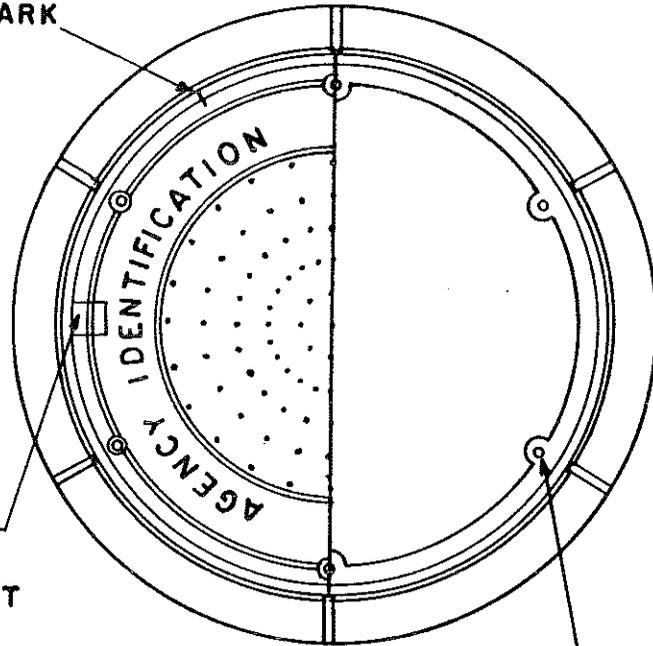


**STANDARD DETAIL**

**PRESSURE MANHOLE**

DETAIL NO.  
**523**

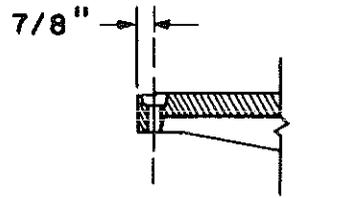
GROUND MATCH MARK  
1/4" W x 1/8" D



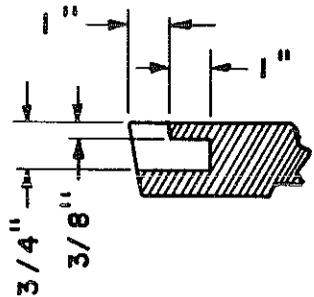
(2) CONCEALED  
PICKHOLES  
180 DEG. APART

**NOTES:**

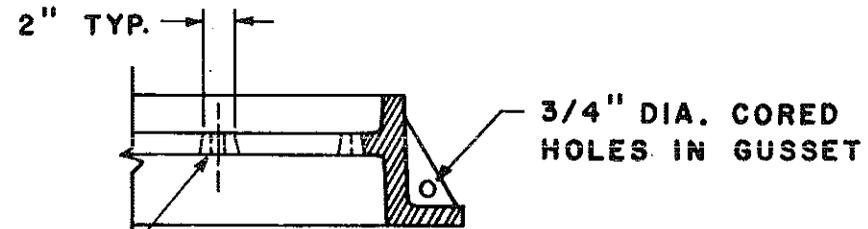
- 1 DRILL (6) HOLES IN 30" COVER (4 HOLES IN 24" COVER) 17/32" CORED RECESS FOR 1/2" CAPSCREWS. SPACE EQUALLY (304 S.S.)
- 2 DRILL (6) HOLES IN 30" FRAME (4 HOLES IN 24" FRAME) AND TAP FOR 1/2" - NATIONAL COARSE BOLT (HEX HEAD).
- 3 COVER AND FRAME MUST BE MATCH MARKED, DRILLED AND TAPPED IN SETS.
- 4 DIMENSIONS, LETTERING, WEIGHTS AND MATERIALS SHALL CONFORM TO STD. DET. 424.
- 5 REFER TO STD. DET. 523-1 FOR INSTALLATION PROCEDURES.



BOLT HOLE DETAIL



PICKHOLE DETAIL



TYP. BOLT PAD

3/4" DIA. CORED  
HOLES IN GUSSET

COVER SECTION

FRAME SECTION

DETAIL NO.  
523-2

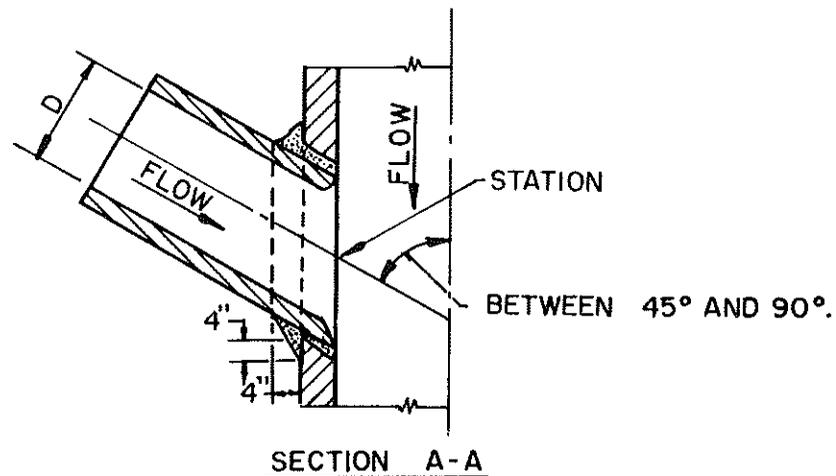


STANDARD DETAIL

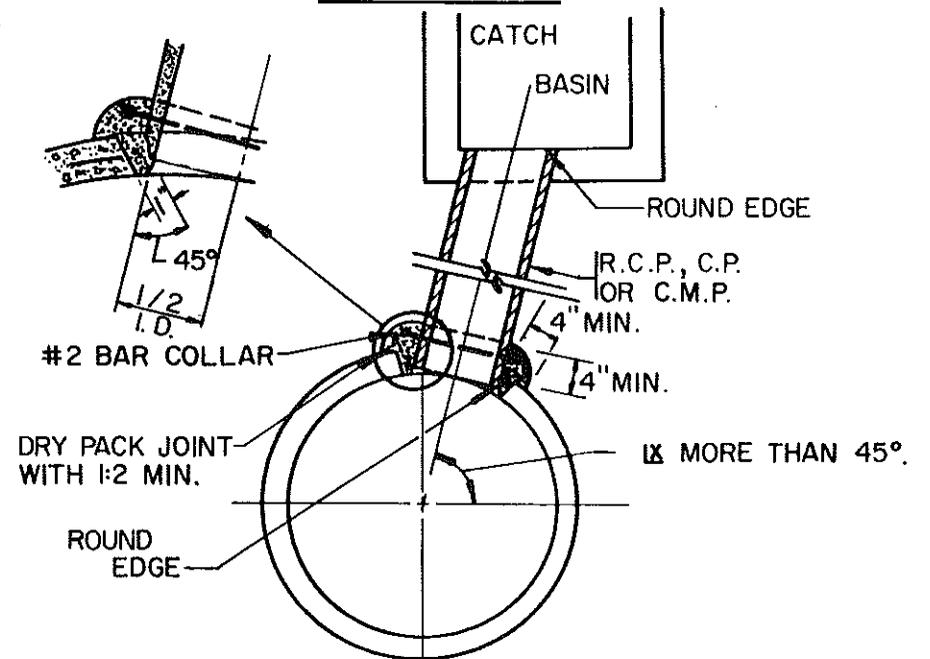
PRESSURE MANHOLE

DETAIL NO.  
523-2

**TOP VIEW**



**FRONT VIEW**



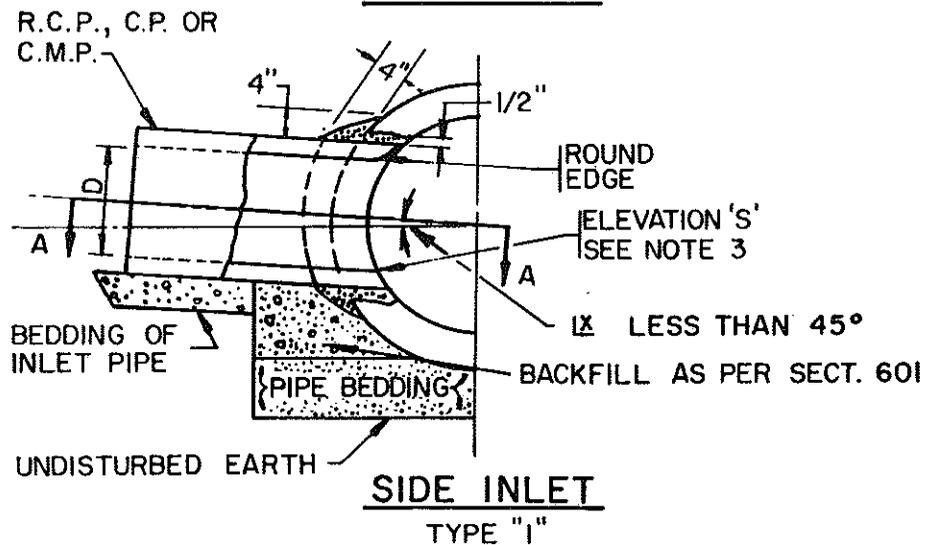
**CATCH BASIN ABOVE STORM DRAIN**

**TYPE "2"**

**NOTES**

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

**FRONT VIEW**



DETAIL NO.  
**524**

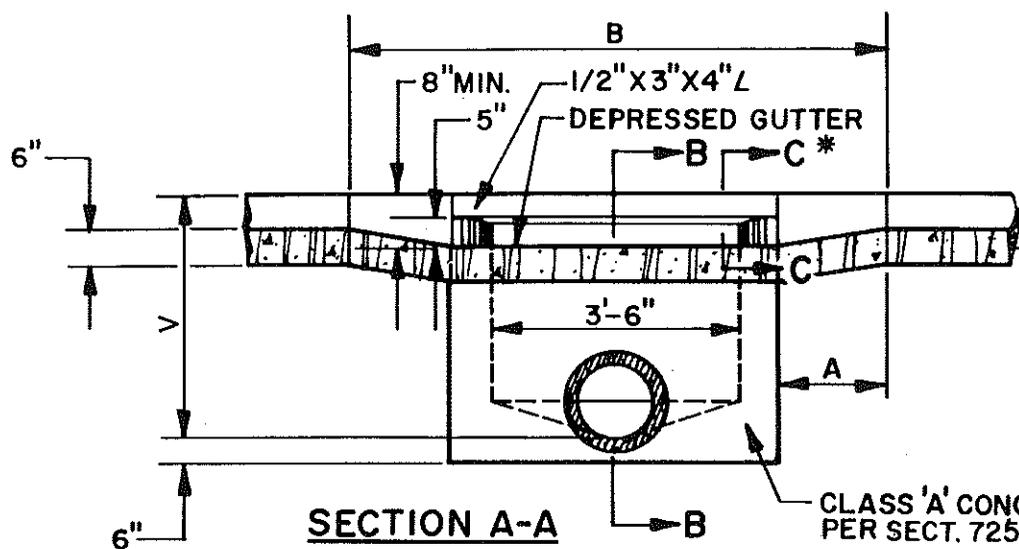


**STANDARD DETAIL**

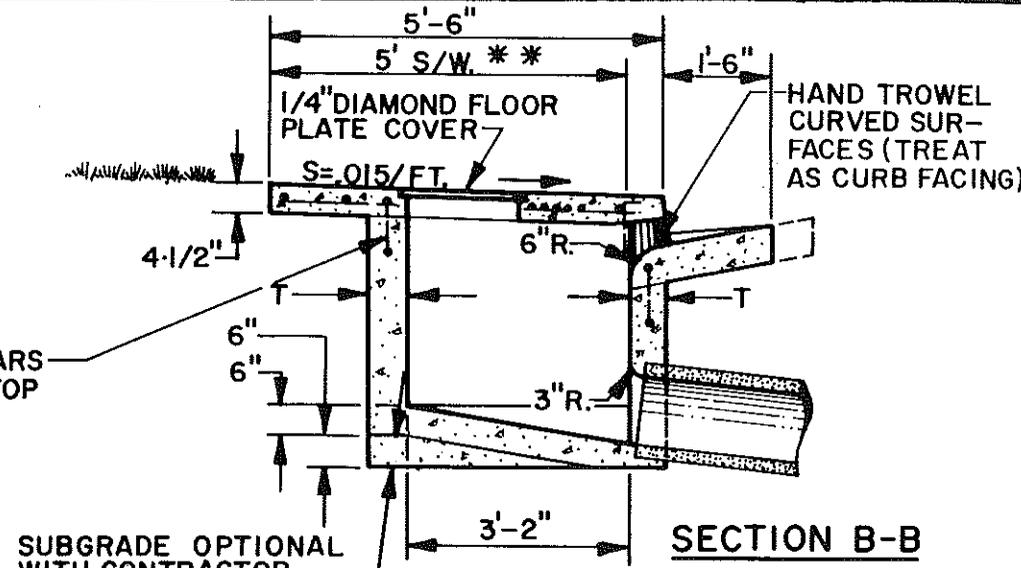
**STORM DRAIN LATERAL PIPE CONNECTIONS**

DETAIL NO.  
**524**





NO. 3 DOWEL BARS  
(NOT USED IF TOP  
IS PRECAST)  
SEE DETAIL \*



SECTION A-A

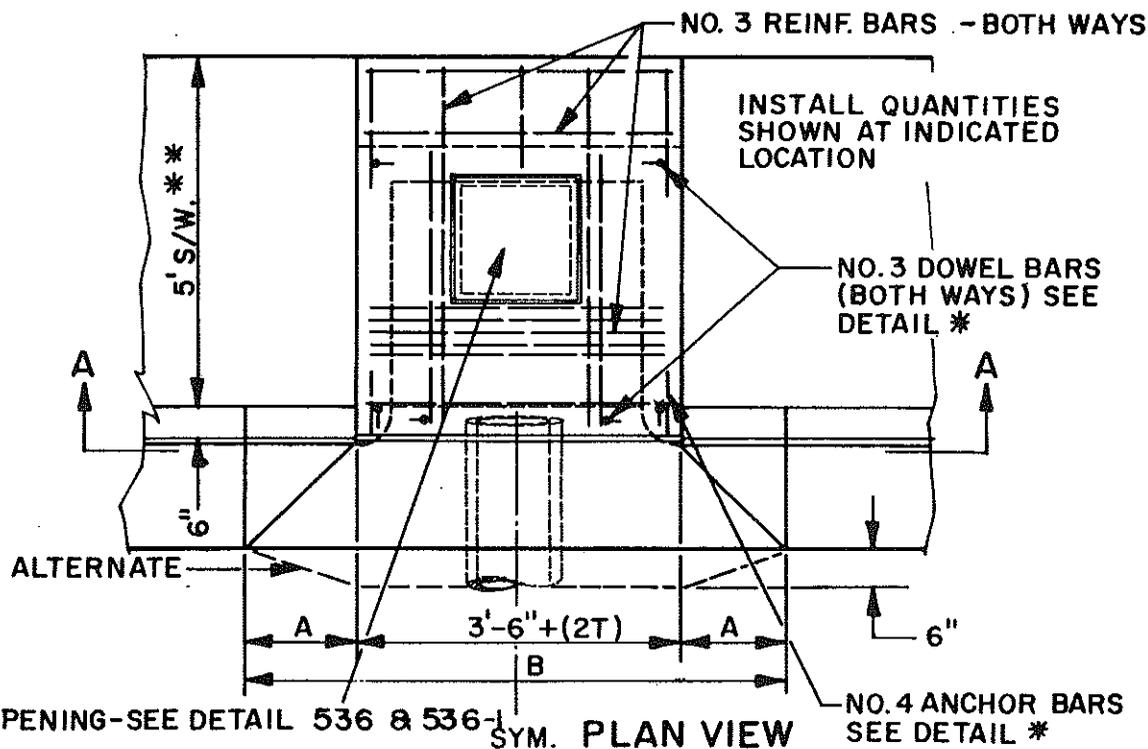
CLASS 'A' CONC. AS  
PER SECT. 725

SUBGRADE OPTIONAL  
WITH CONTRACTOR

SECTION B-B

**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 & TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790



**DIMENSIONS**

CURB	A	B
4"	3'-3"	11'
6"	1'-9"	8'
7"	1'-0"	6'-6"

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 STD. DETAIL 536 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.

\*\* 4' IN LOCATIONS WHERE 4' S/W IS REQUIRED.

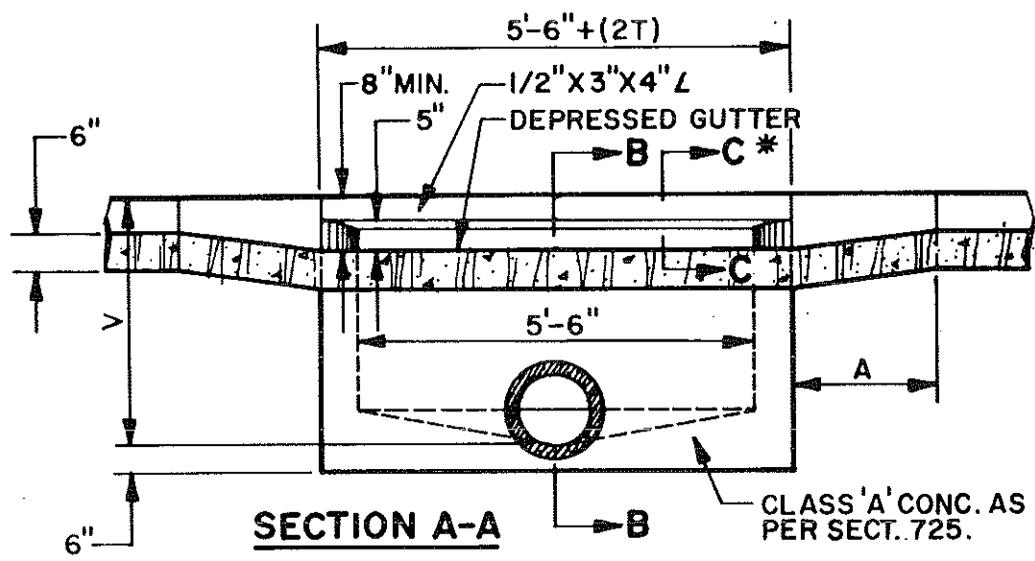
DETAIL NO.  
**530**



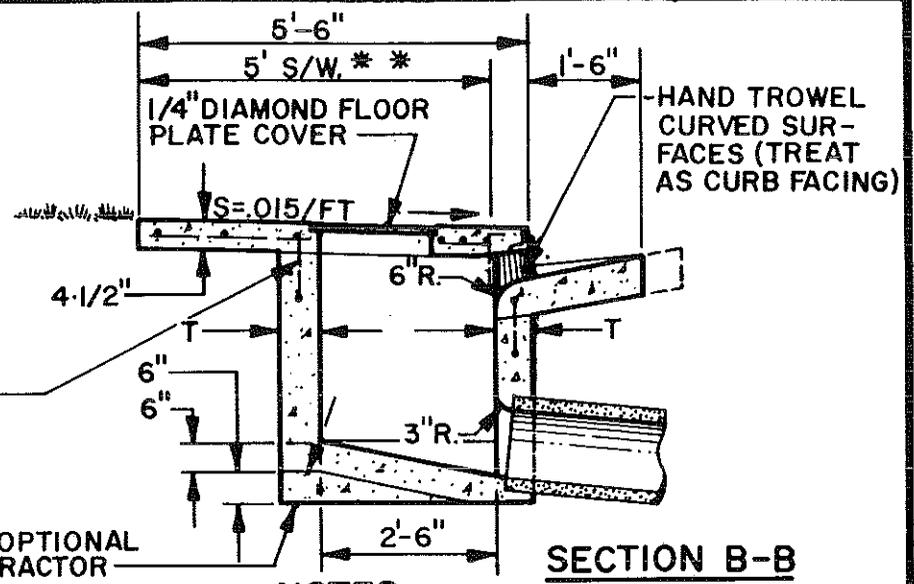
**STANDARD DETAIL**

**3'-6" CURB OPENING CATCH BASIN · TYPE "A"**

DETAIL NO.  
**530**



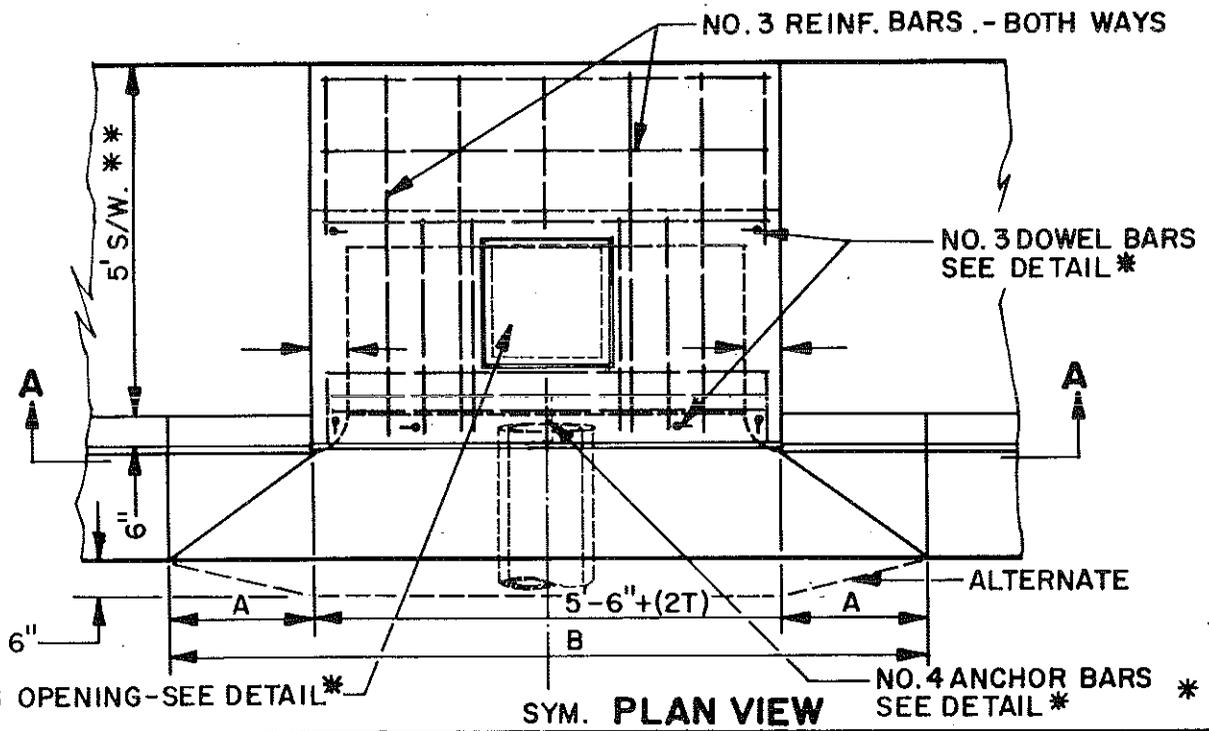
NO. 3 DOWEL BARS  
(NOT USED IF TOP  
IS PRECAST)  
SEE DETAIL\*



SUBGRADE OPTIONAL  
WITH CONTRACTOR

**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. 10 PAINT & TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.



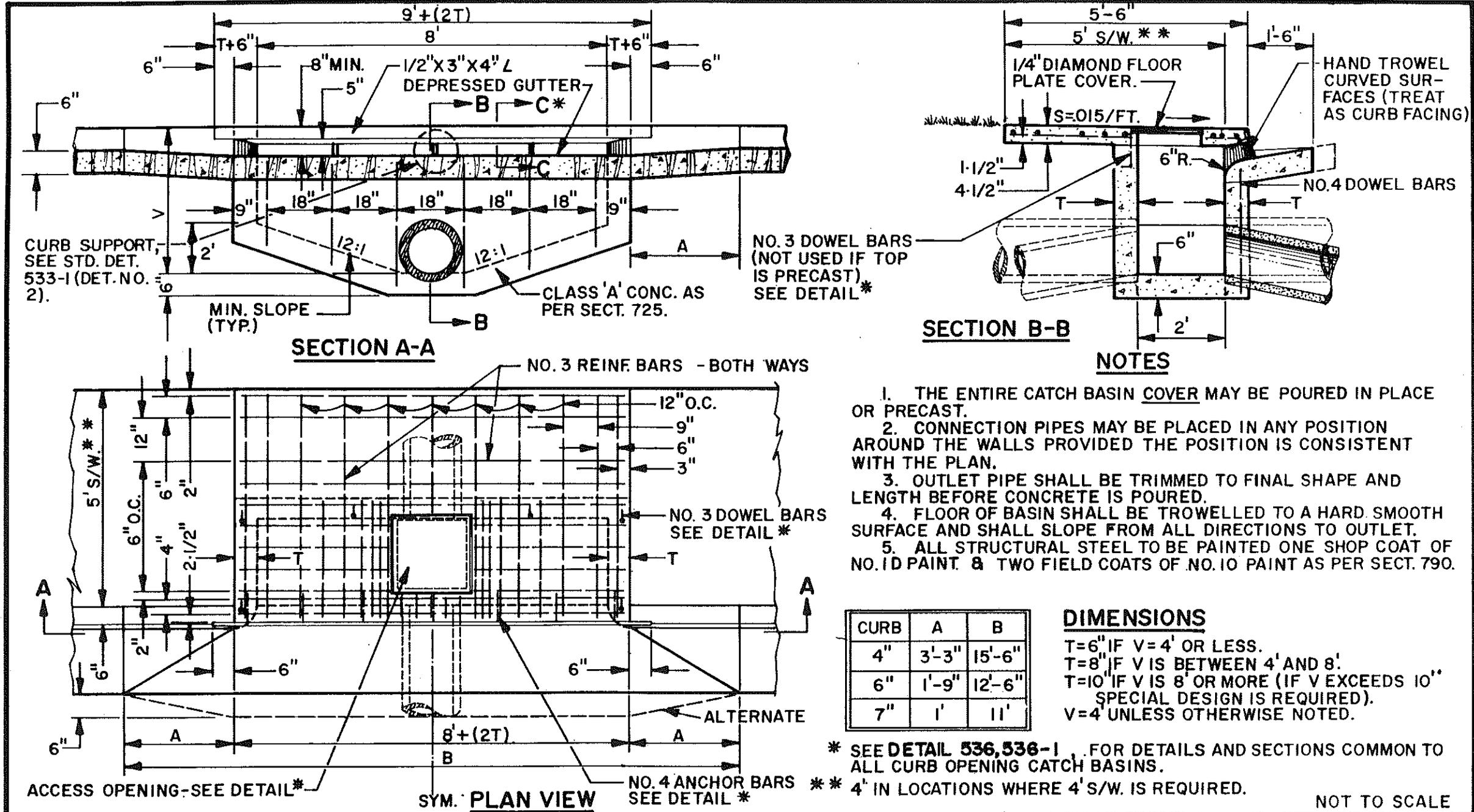
CURB	A	B
4"	3'-3"	13'
6"	1'-9"	10'
7"	1'	8'-9"

**DIMENSIONS**

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

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

\*\* 4' IN LOCATIONS WHERE 4' S/W IS REQUIRED.



- NOTES**
1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.
  2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
  3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
  4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
  5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 10 PAINT & TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.

**DIMENSIONS**

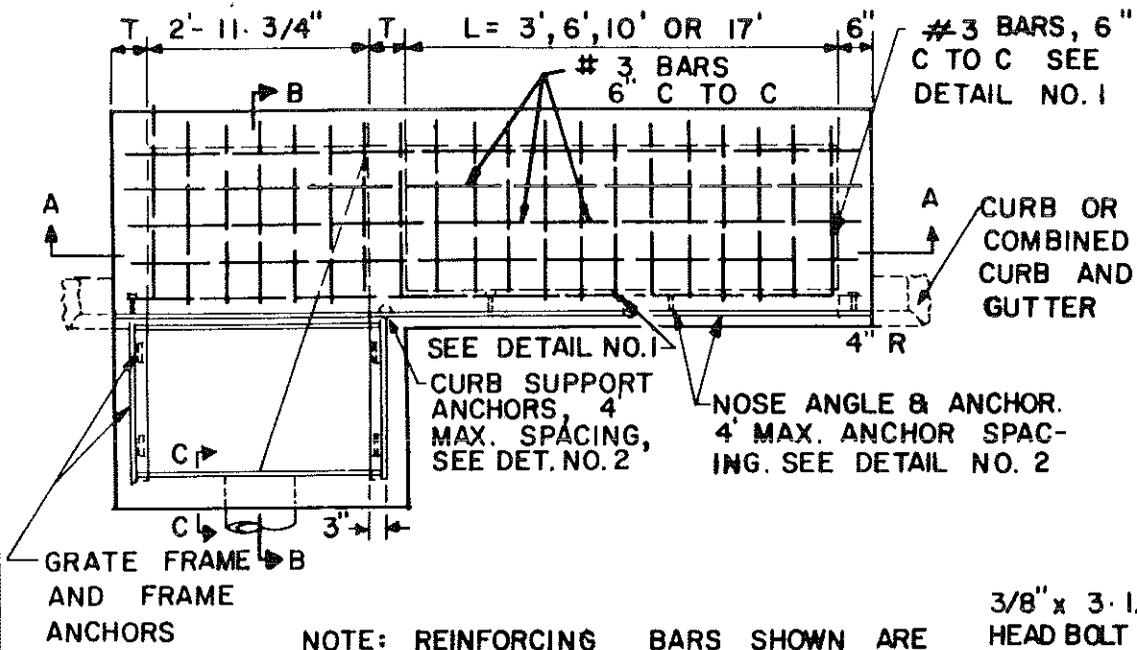
CURB	A	B
4"	3'-3"	15'-6"
6"	1'-9"	12'-6"
7"	1'	11'

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 NOTED.

\* SEE DETAIL 536, 536-1 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.  
 \*\* 4' IN LOCATIONS WHERE 4' S/W IS REQUIRED.

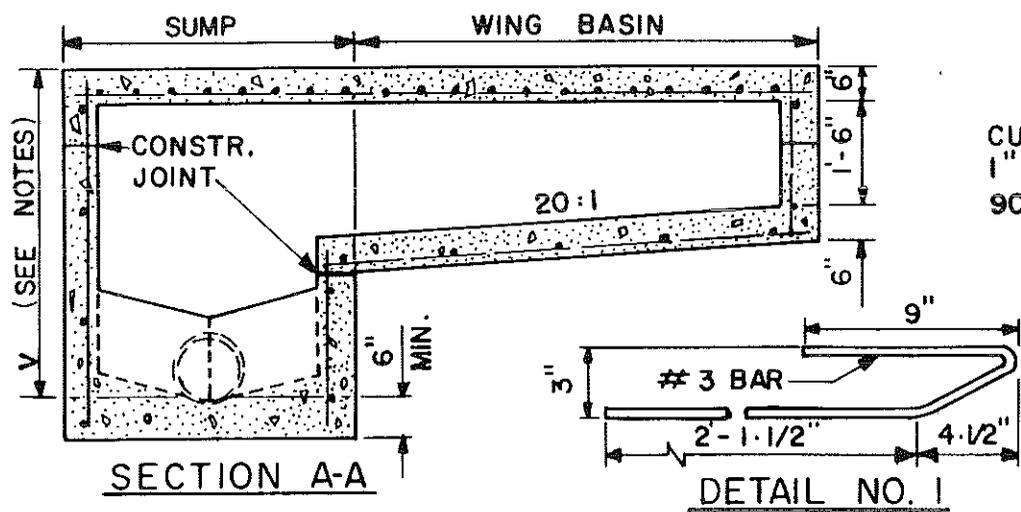
NOT TO SCALE

DETAIL NO. <b>532</b>	 <b>STANDARD DETAIL</b>	<b>8' CURB OPENING CATCH BASIN · TYPE "C"</b>	DETAIL NO. <b>532</b>
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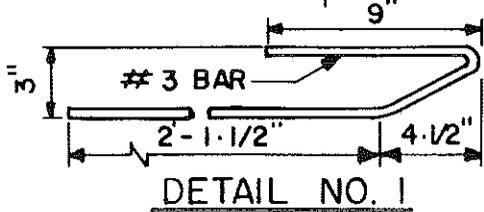


NOTE: REINFORCING BARS SHOWN ARE FOR ROOF SLAB ONLY. SEE SECTIONS FOR OTHER REINFORCING.

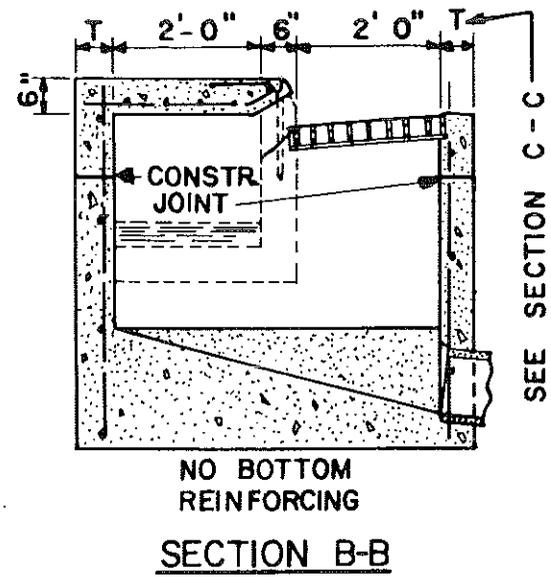
PLAN



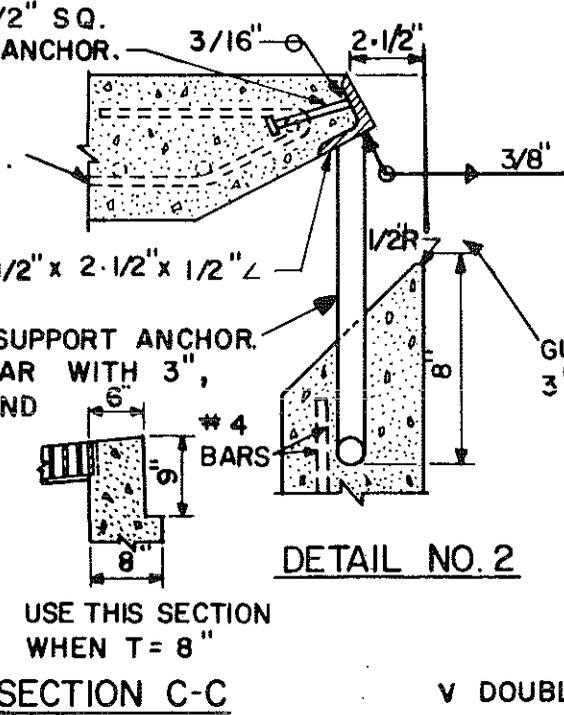
SECTION A-A



DETAIL NO. 1



SECTION B-B



DETAIL NO. 2

SECTION C-C

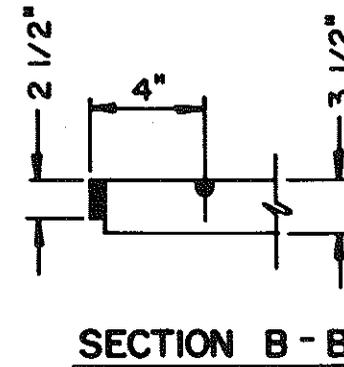
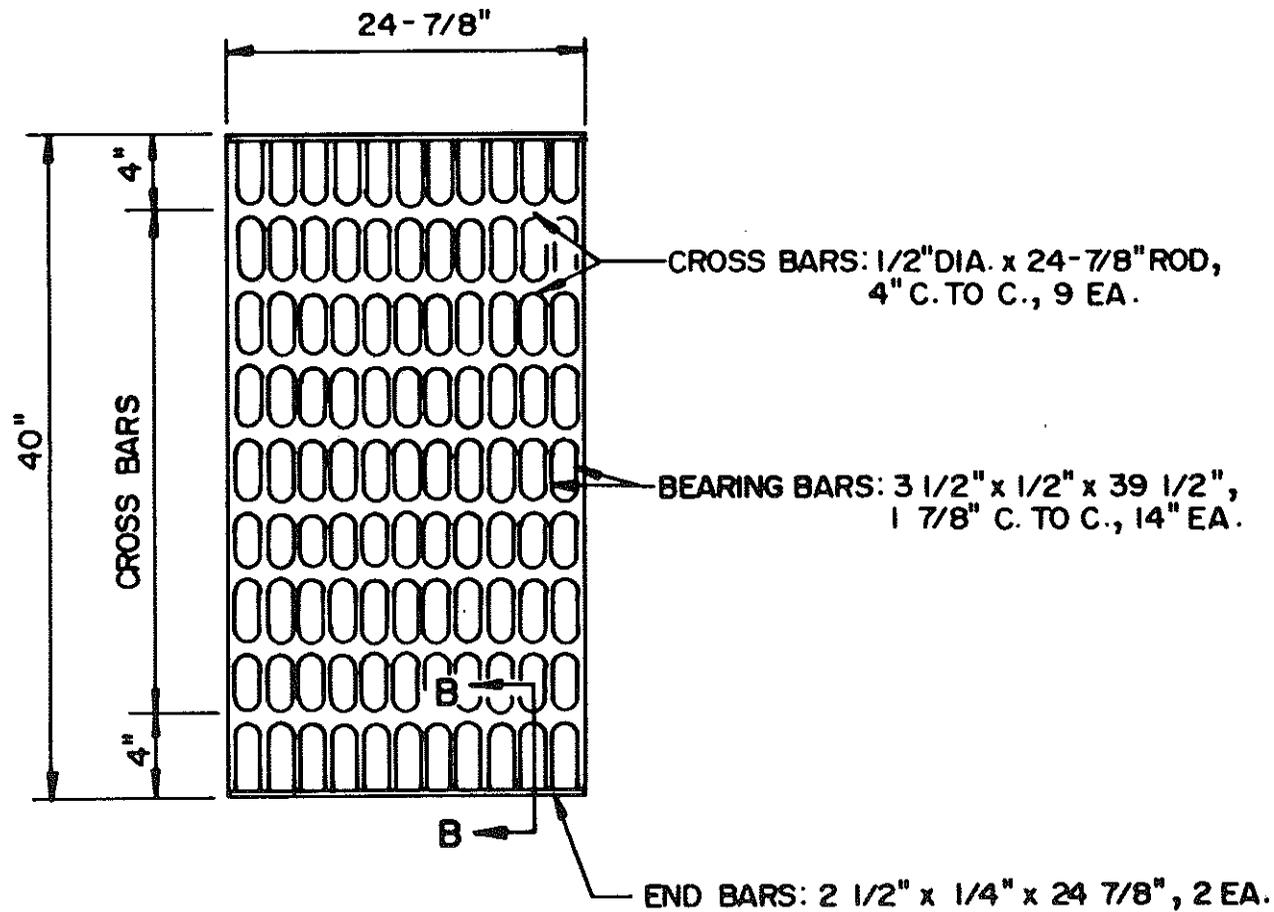
**NOTES:**

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.
  4. SUMP FLOOR SHALL HAVE A WOOD TROWEL FINISH AND A MIN. SLOPE OF 4:1 IN ALL DIRECTIONS TOWARD OUTLET PIPE.
  5. ALL REINFORCING BARS SHALL BE #4, 18" C TO C BOTH WAYS AND 1-1/2" CLEAR TO INSIDE OF WALLS AND OUTSIDE OF WING BASIN FLOOR EXCEPT AS SHOWN. SEE SECT. 727.
  6. ALL CONCRETE SHALL BE CLASS A, PER SECT. 725.
  7. CONSTR. JOINTS SHALL BE PLACED TO MEET FIELD CONDITIONS.
  8. T = 6" WHEN V IS LESS THAN 8'; 8" WHEN GREATER THAN 8'. SEE SECTION C-C.
- GUTTER DEPRESSION AS SPECIFIED. 3" MAX., 1" MIN.

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'

V DOUBLES FOR SYMMETRICAL WINGS.

DETAIL NO. <b>533-1</b>	<b>STANDARD DETAIL</b>	<b>CATCH BASIN , TYPE D</b>	DETAIL NO. <b>533-1</b>
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**GRATE DETAIL**

N.T.S.

GRATE OPENING: 4.344 SQ.FT.

DETAIL NO.  
533-4

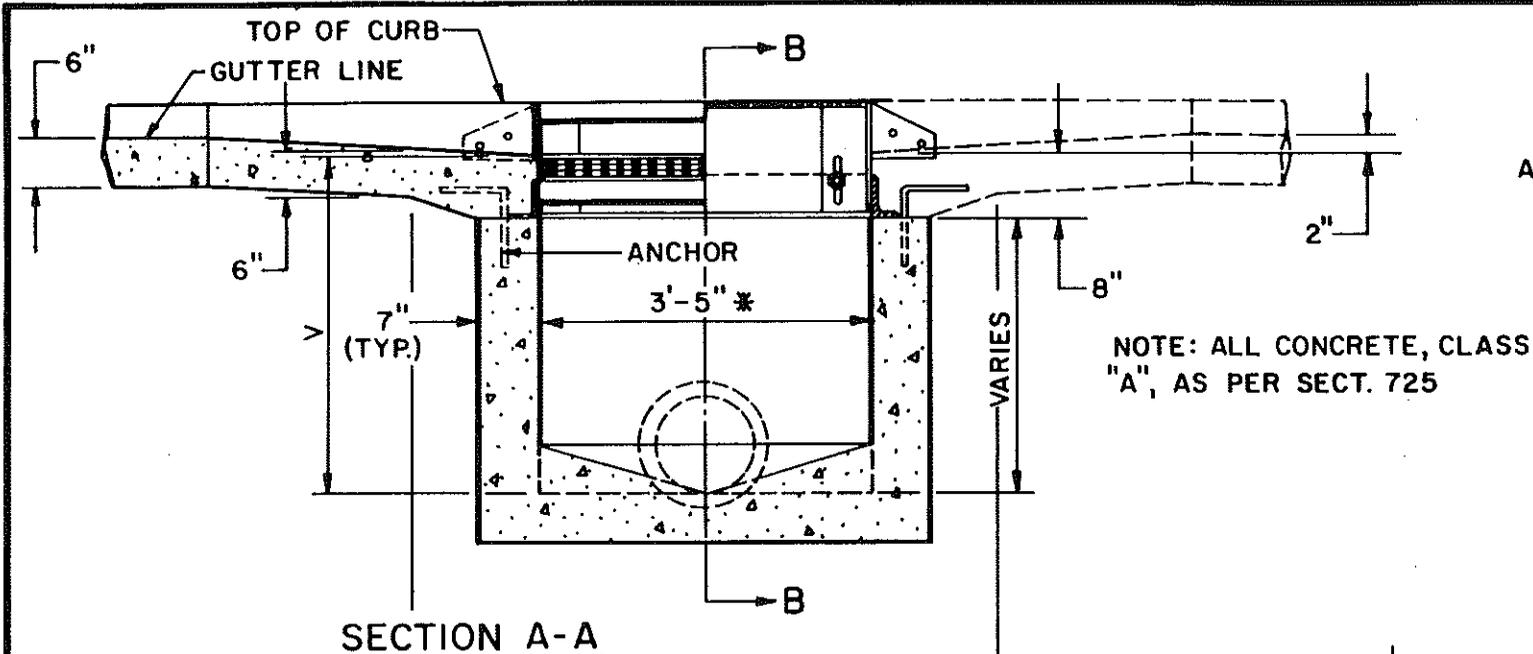


STANDARD DETAIL

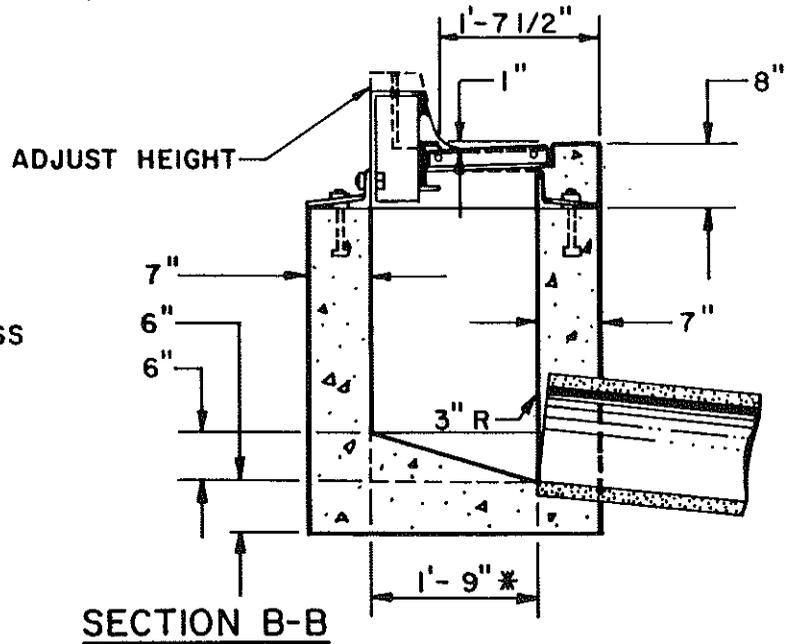
7' CURB OPENING CATCH BASIN - TYPE "D"  
GRATE DETAILS

DETAIL NO.  
533-4

THIS PAGE RESERVED FOR FUTURE USE



NOTE: ALL CONCRETE, CLASS "A", AS PER SECT. 725

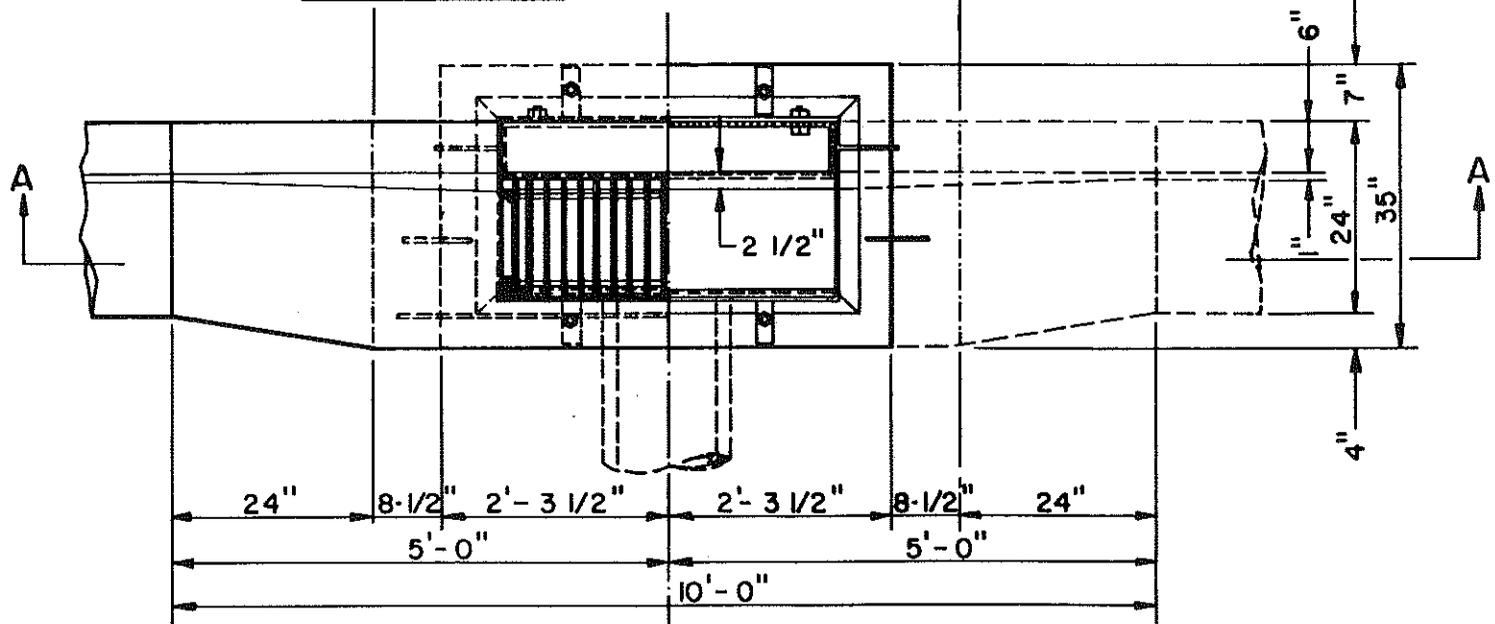


**NOTES**

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.

**DIMENSION**

V = 3'-0" UNLESS OTHERWISE SPECIFIED.  
 \*DIMENSIONAL CHANGE WITH STD. DETAIL 534-3 AND STD. DETAIL 534-4.



HALF PLAN GUTTER & GRATE SYM. HALF PLAN FRAME & ANCHORS

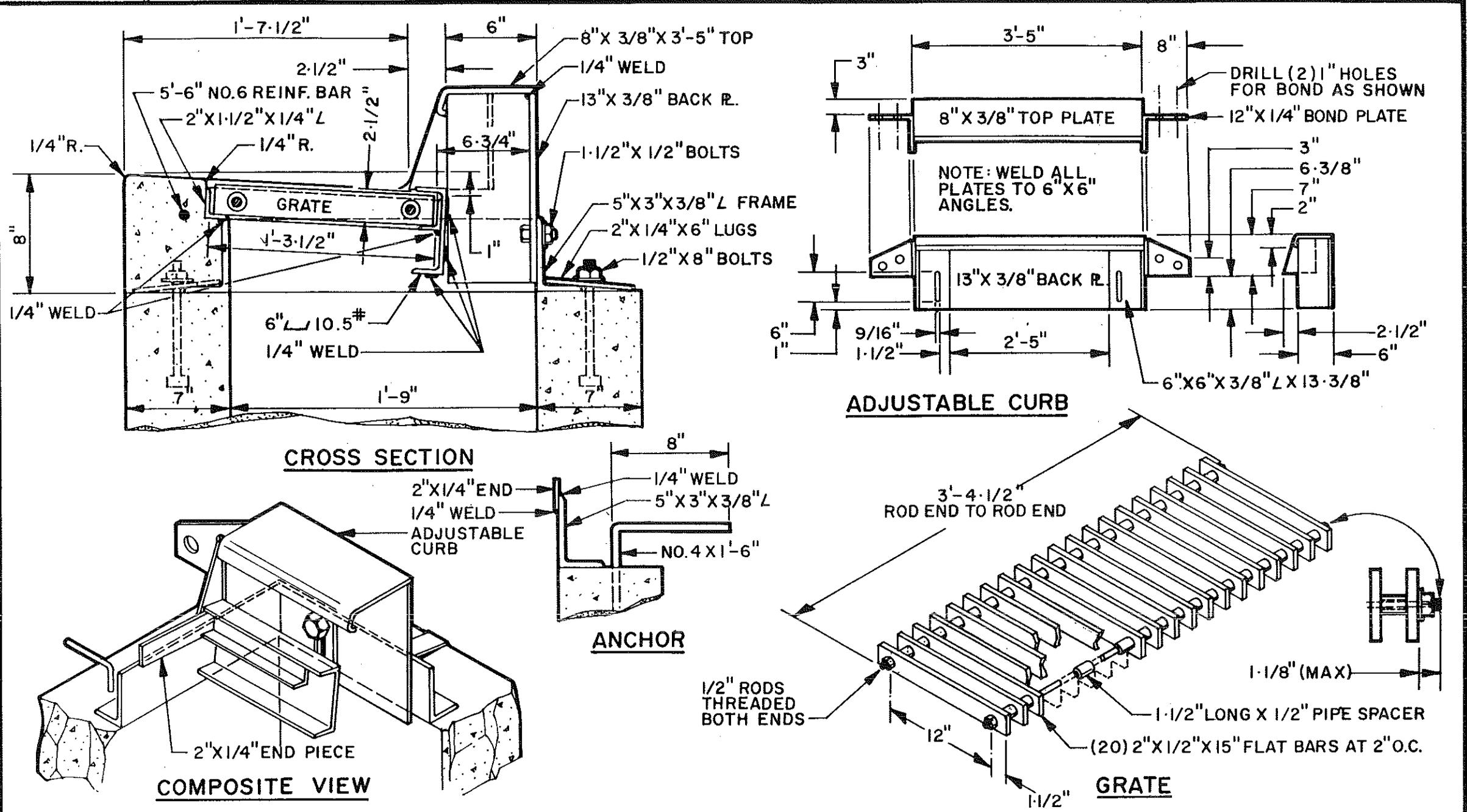
DETAIL NO.  
534-1



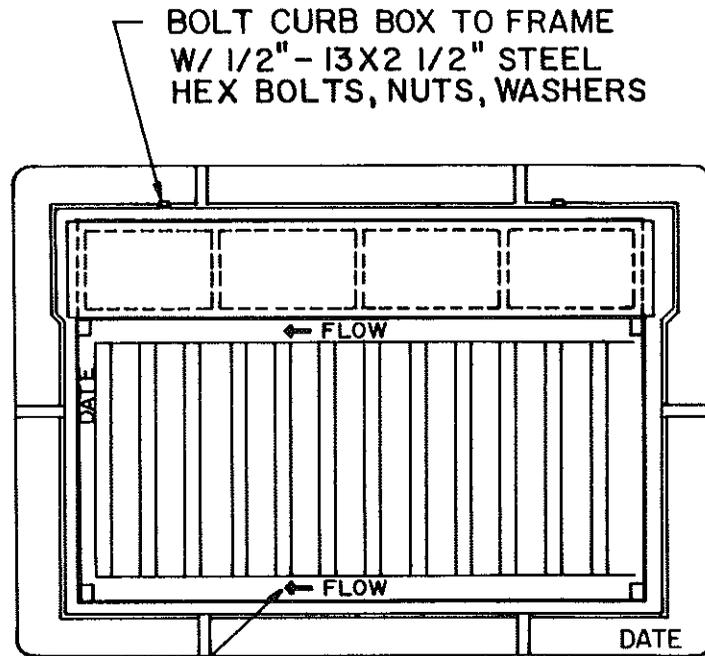
STANDARD DETAIL

CATCH BASIN - TYPE "E"

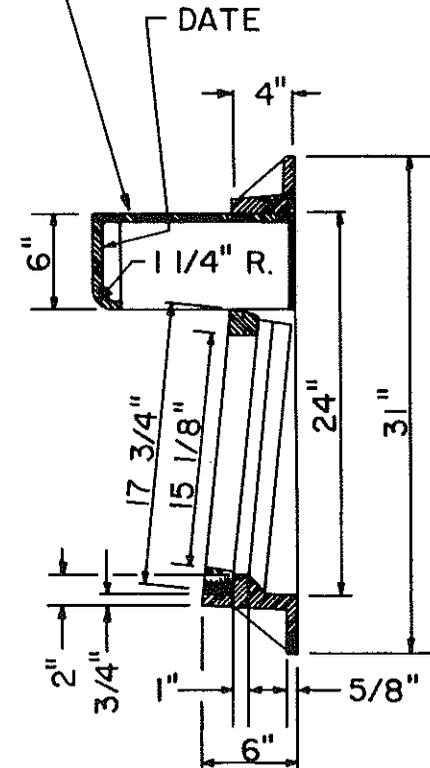
DETAIL NO.  
534-1



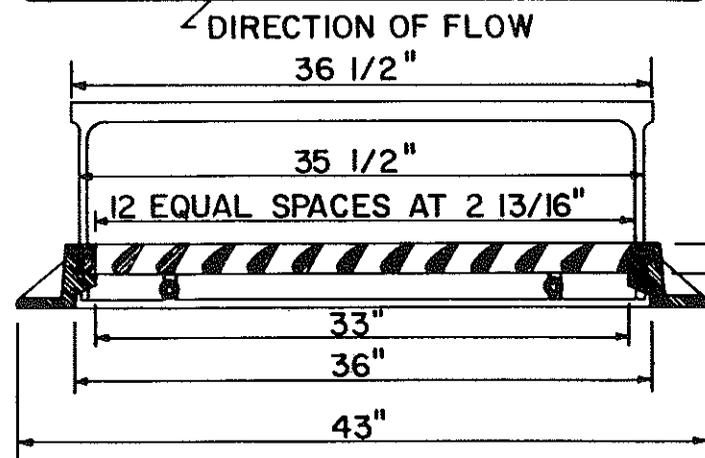
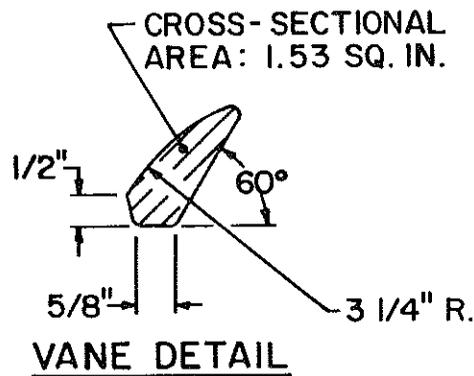
DETAIL NO. 534-2	 <b>STANDARD DETAIL</b>	<b>CATCH BASIN - TYPE "E"</b> ( DETAILS )		DETAIL NO. 534-2
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CURB BOX ADJUST.  
TO 9" HIGH.



SECTION B-B



SECTION A-A

CAST IRON FRAME - GRATE - CURB BOX

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

DETAIL NO.  
534-3



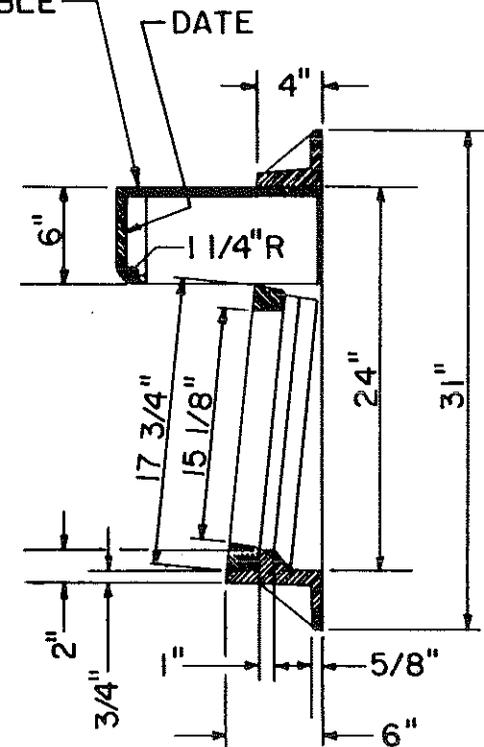
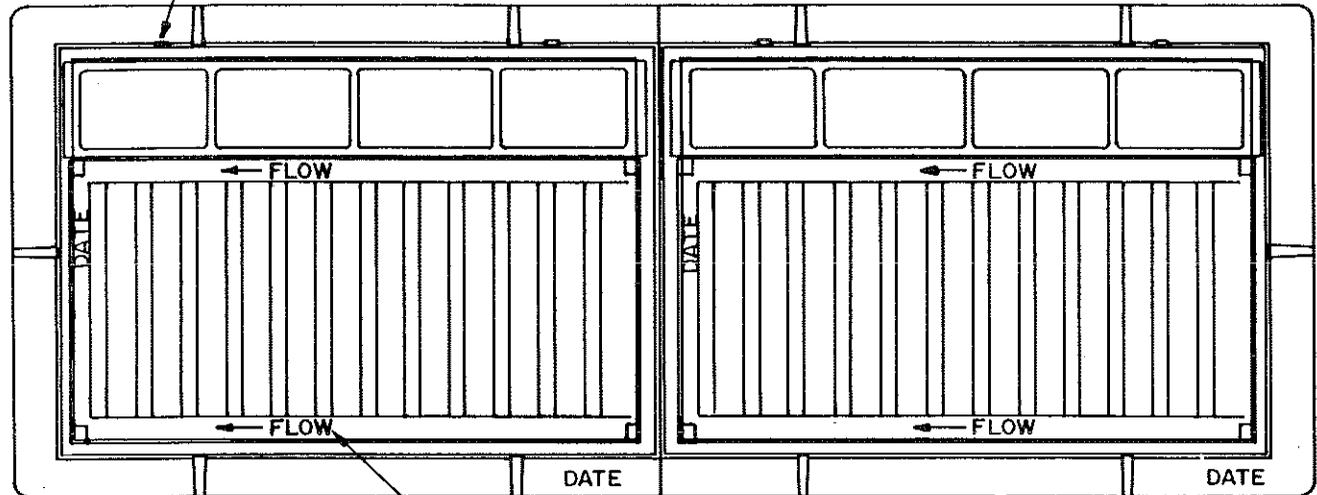
STANDARD DETAIL

CATCH BASIN-TYPE "E" (DETAILS)

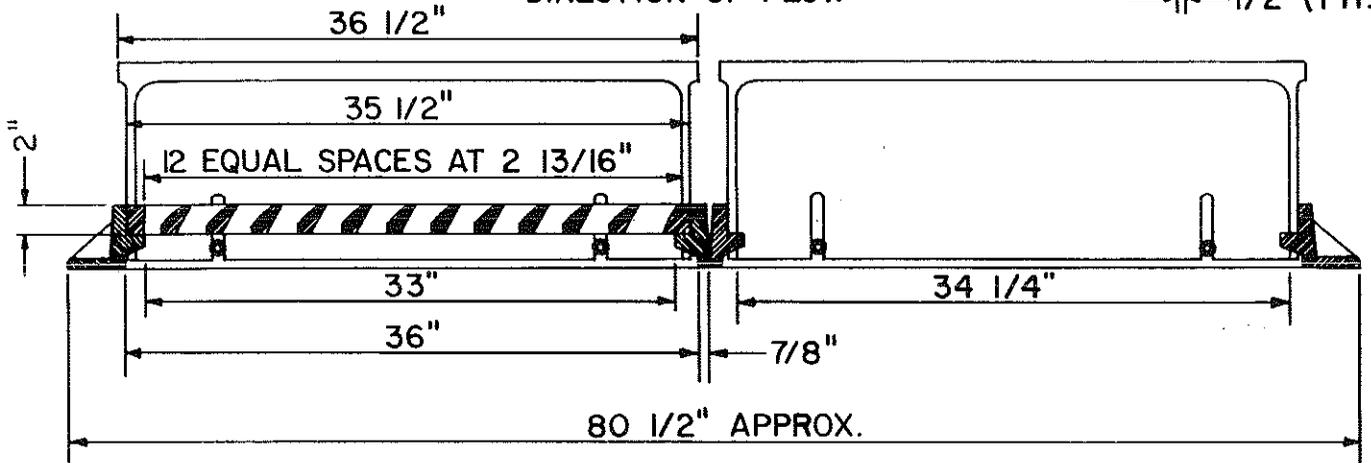
DETAIL NO.  
534-3

BOLT CURB BOX TO FRAME W/  
(2) 1/2"-13x2 1/2" STEEL HEX HEAD  
BOLTS, NUTS & WASHERS

CURB BOX ADJUSTABLE  
TO 9" HIGH.

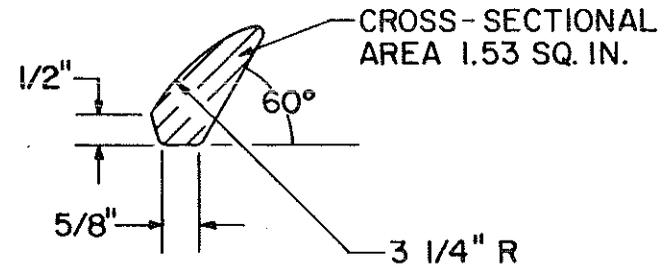


SECTION B-B



SECTION A-A

DOUBLE UNIT CAST IRON FRAME - GRATE - CURB BOX



VANE DETAIL

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.

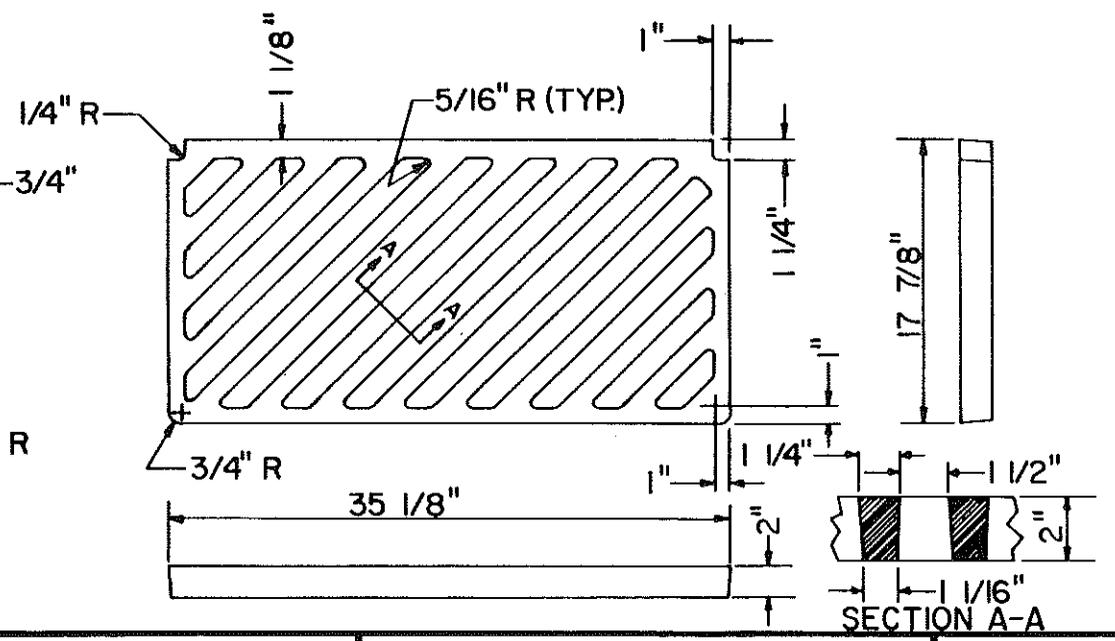
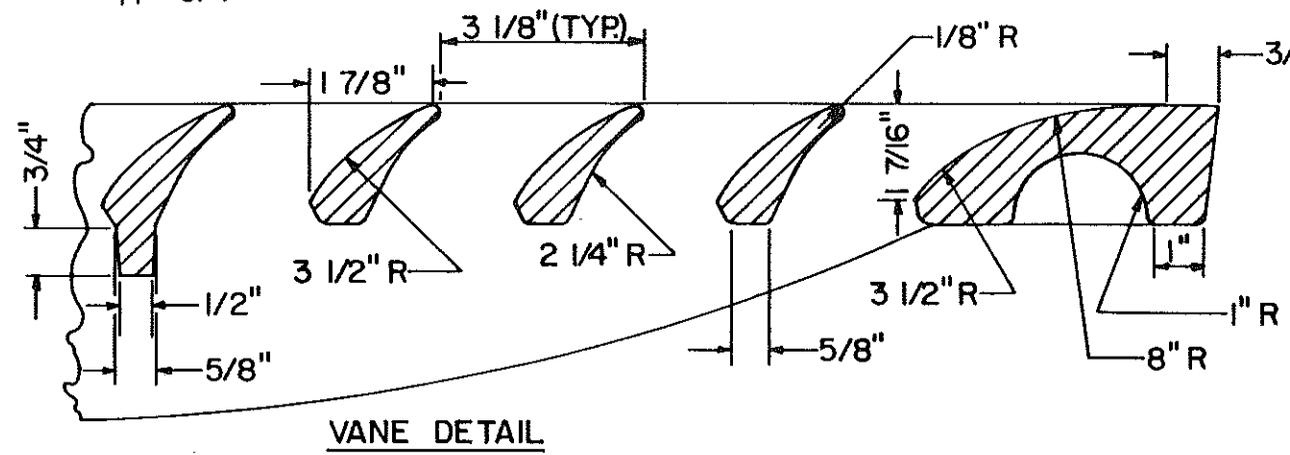
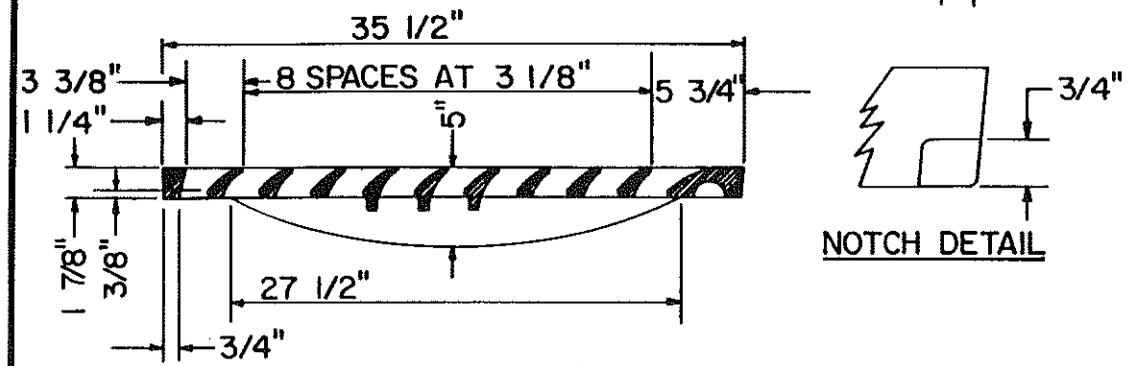
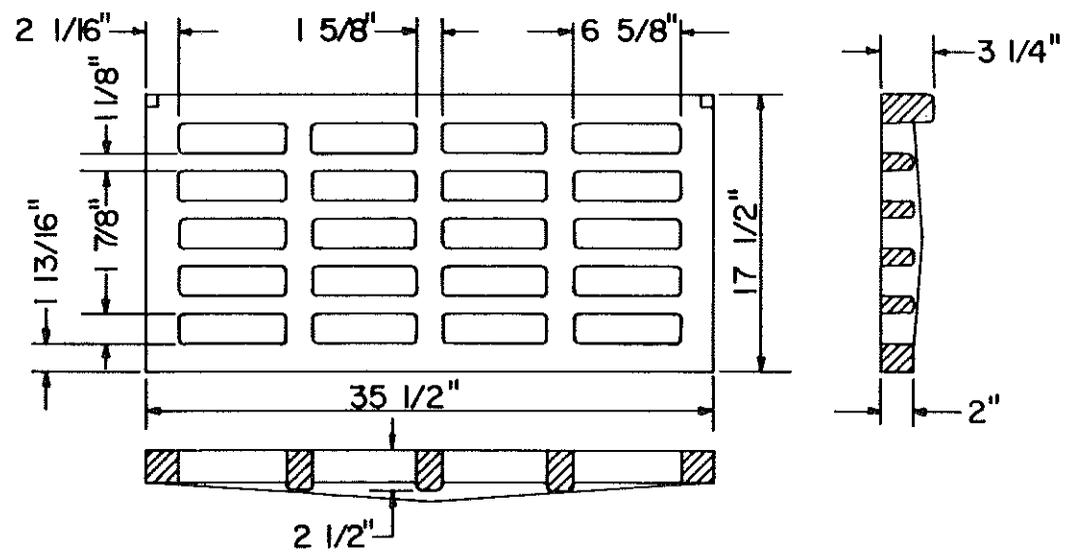
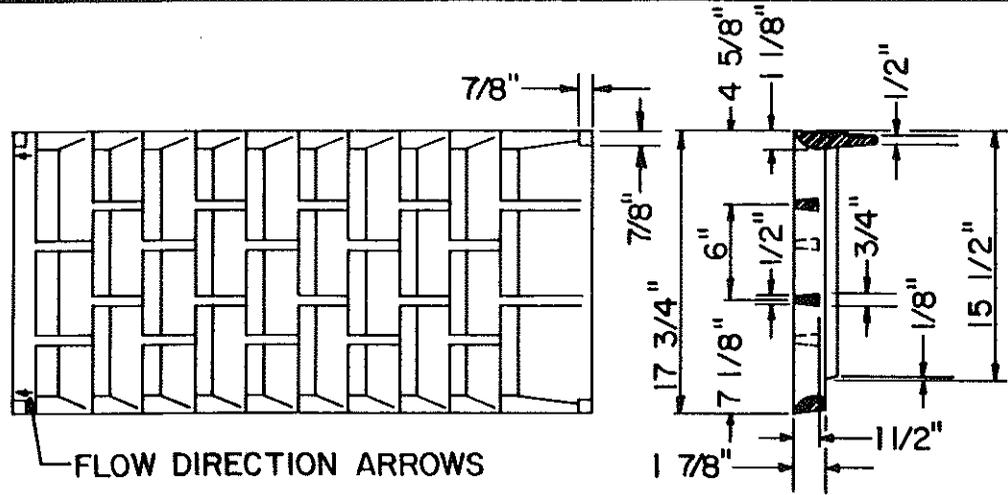
DETAIL NO.  
534-4



STANDARD DETAIL

CATCH BASIN TYPE "E" (DETAILS)

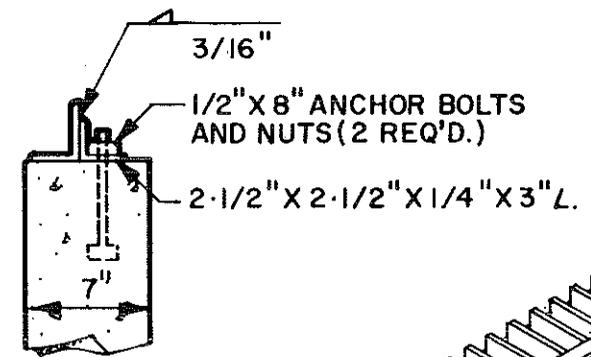
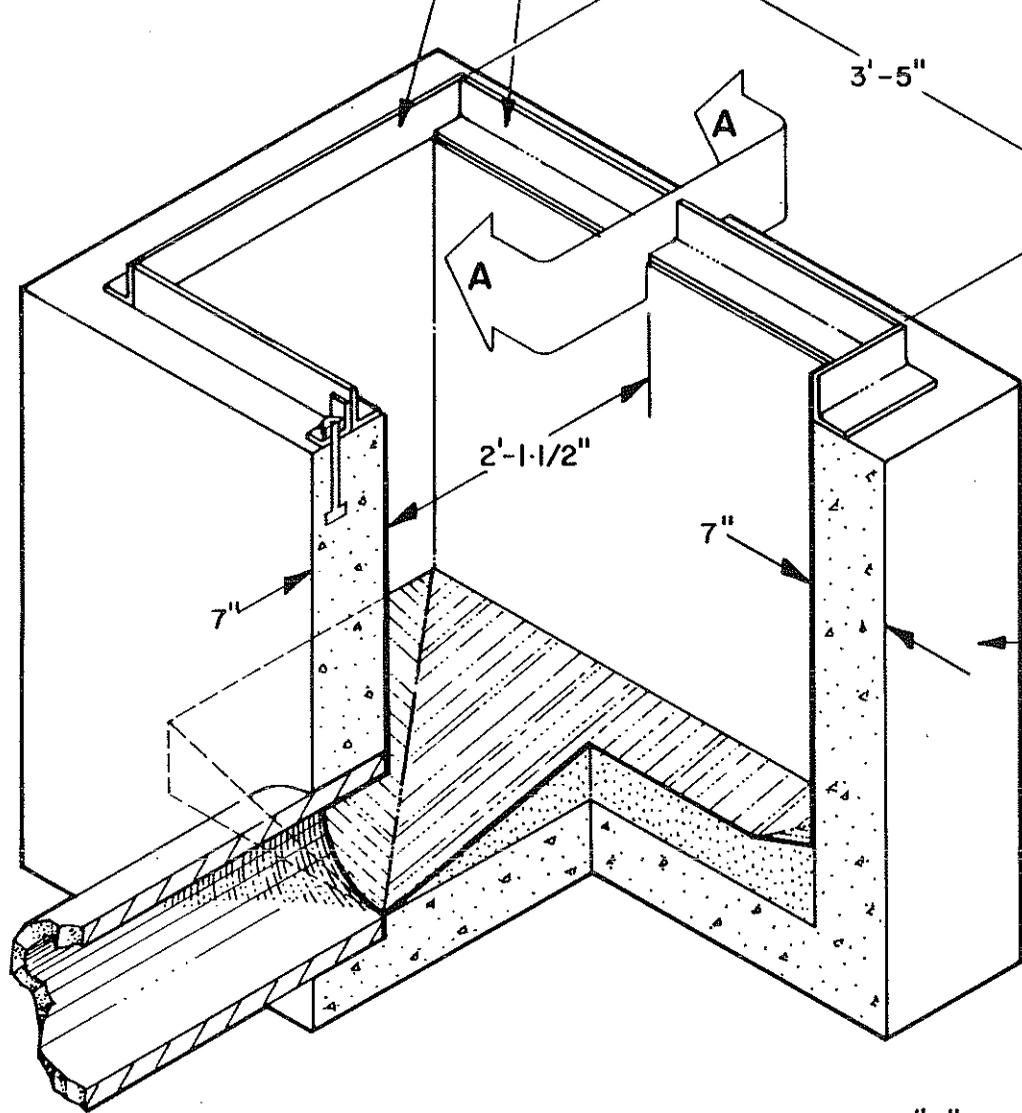
DETAIL NO.  
534-4



DETAIL NO. 534-5	 <b>STANDARD DETAIL</b>	<b>ALTERNATE GRATE STYLES - SUMP LOCATION</b>		DETAIL NO. 534-5
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3-1/2" X 3" X 3/8" X 3'-5" L.

3-1/2" X 3" X 3/8" X 2'-8" L.



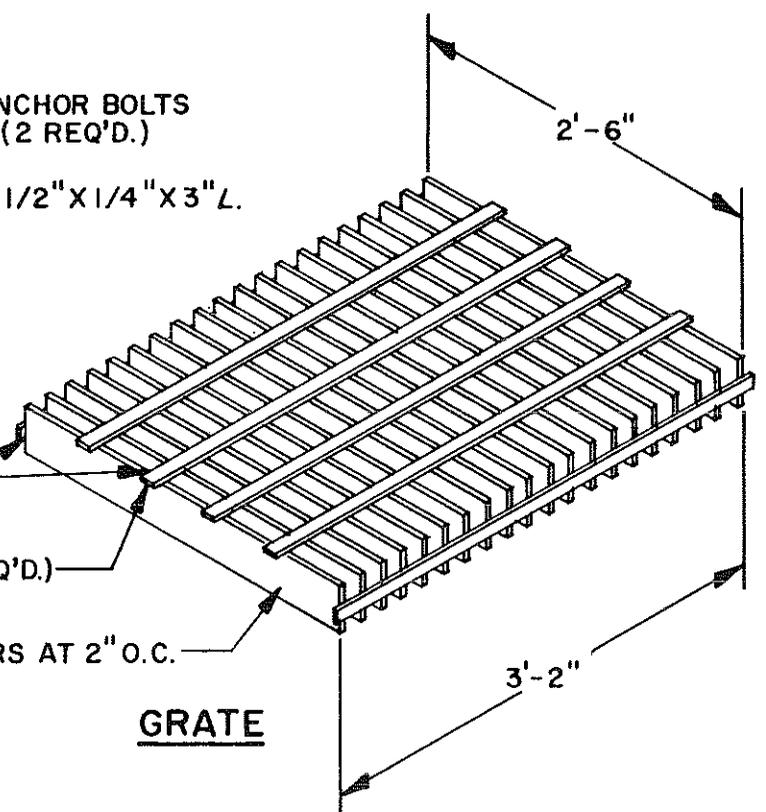
**SECTION A-A**

3/16" EACH BAR

1" X 1/4" X 3'-3" STRAPS (6 REQ'D.)

(20) 3" X 1/2" X 2'-6" FLAT BARS AT 2" O.C.

CLASS 'A' CONC. AS PER SECT. 725.



**GRATE**

**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.

NOTE: CONSTRUCT BOX AS PER CATCH BASIN TYPE "E" (LOWER PORTION ONLY)

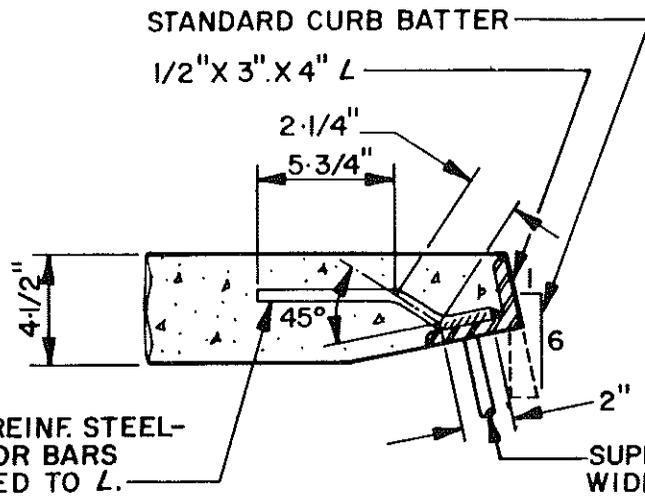
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535



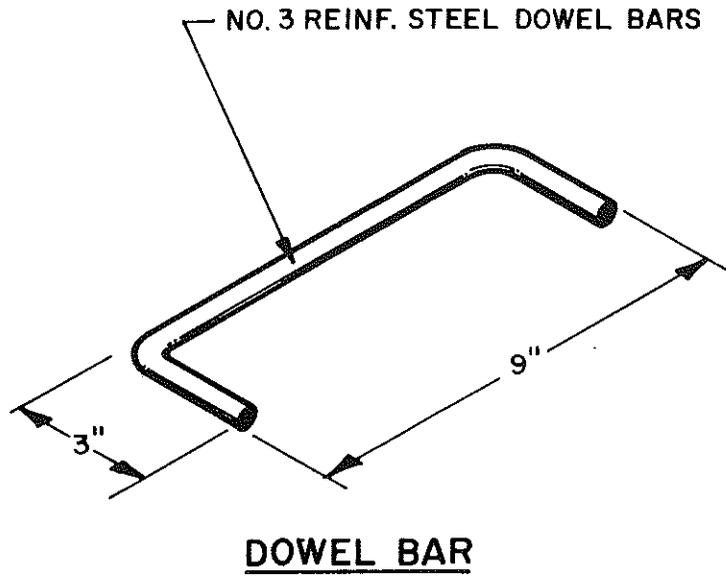
**STANDARD DETAIL**

**CATCH BASIN - TYPE "F"**  
( FOR USE WITHOUT CURB )

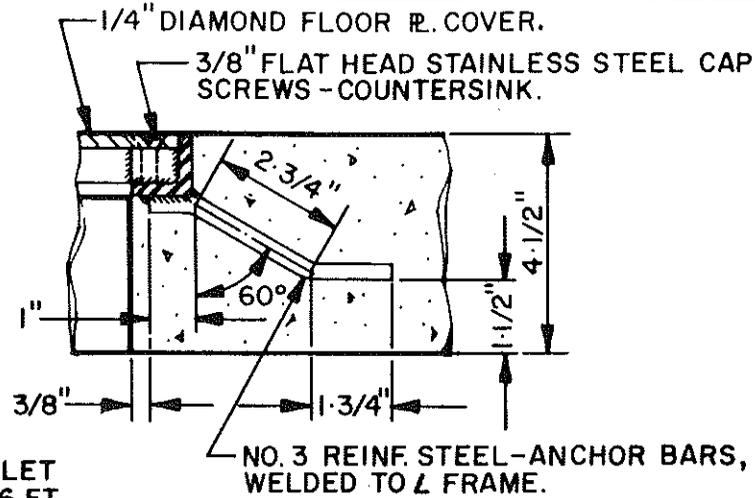
DETAIL NO.  
535



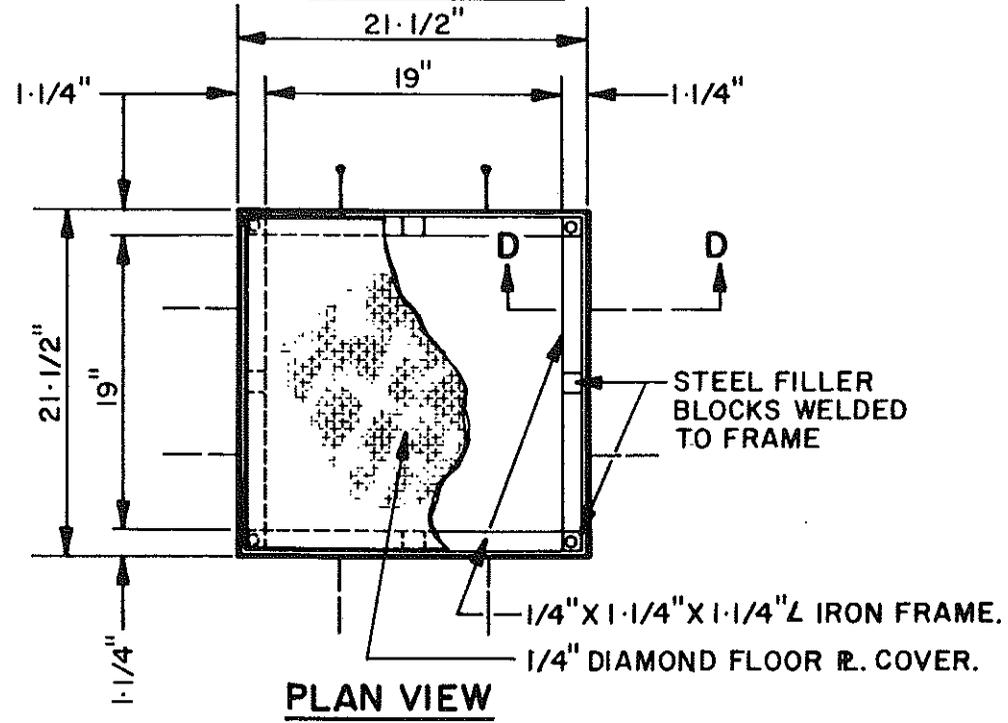
**SECTION C-C**  
AS PER STD. DETAIL 531,  
532 & 533.



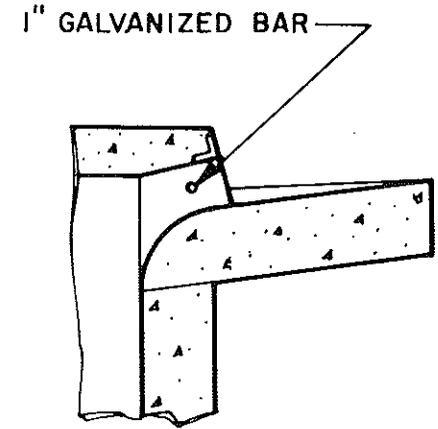
**DOWEL BAR**



**SECTION D-D**



**PLAN VIEW**



**PROTECTION BAR**

**NOTE** HORIZONTAL PLAIN ROUND GALVANIZED STEEL PROTECTION BAR SHALL BE USED WHEN CURB FACE IS 9 INCHES OR MORE. THE BAR SHALL BE EMBEDDED 5 INCHES AT EACH END.

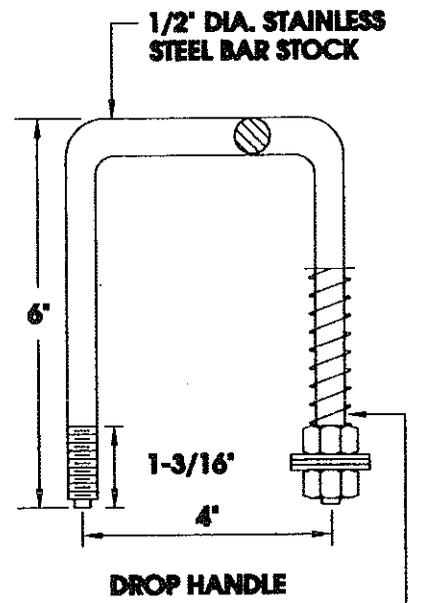
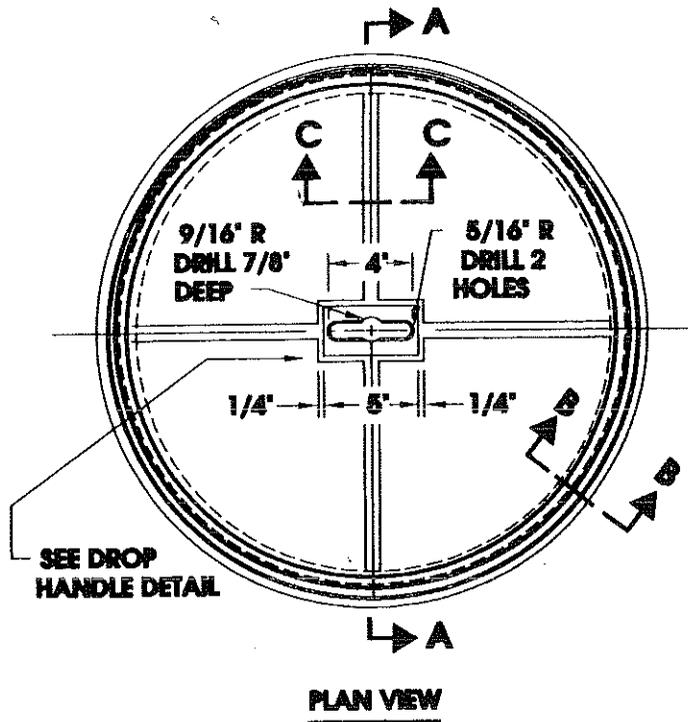
DETAIL NO.  
**536**



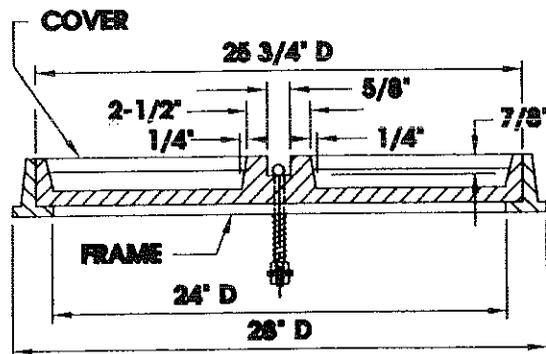
**STANDARD DETAIL**

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

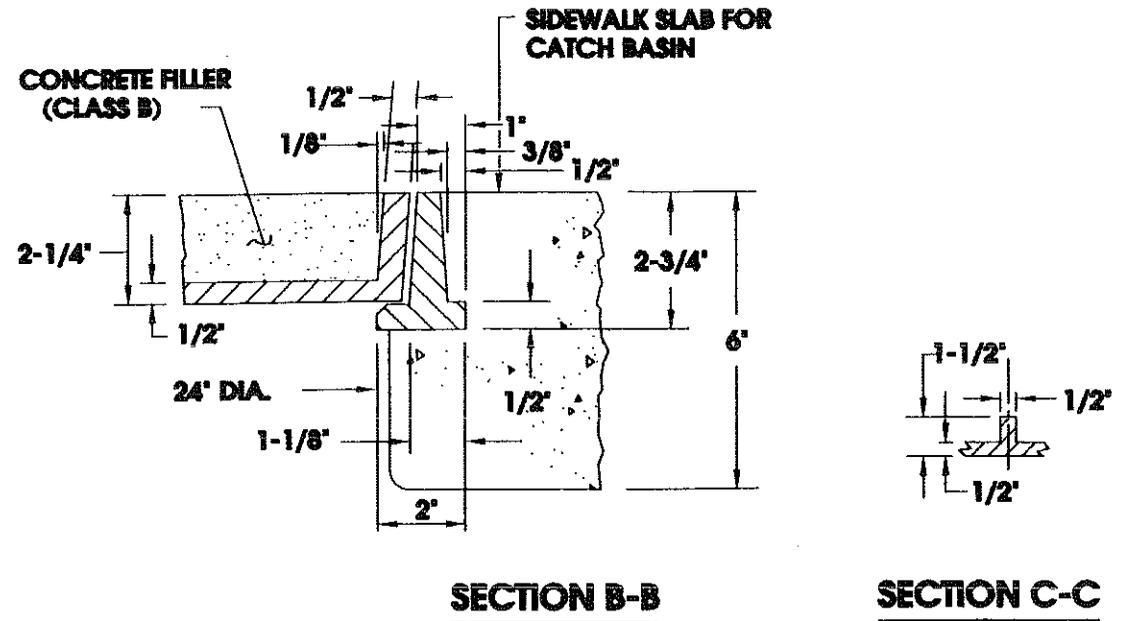
DETAIL NO.  
**536**



- FURNISH FOR EACH  
SIDE OF HANDLE:
- 1 EA. 304-S.STL SPRING  
2-1/2 X 17/32 I.D. X 3/32
  - 2 EA. 1/2" HEX NUT
  - 3 EA. 1/2" FLAT WASHER
  - 1 EA. 1/2" LOCK WASHER



SECTION A-A



**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 INCH.
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.

DETAIL NO.  
536-I



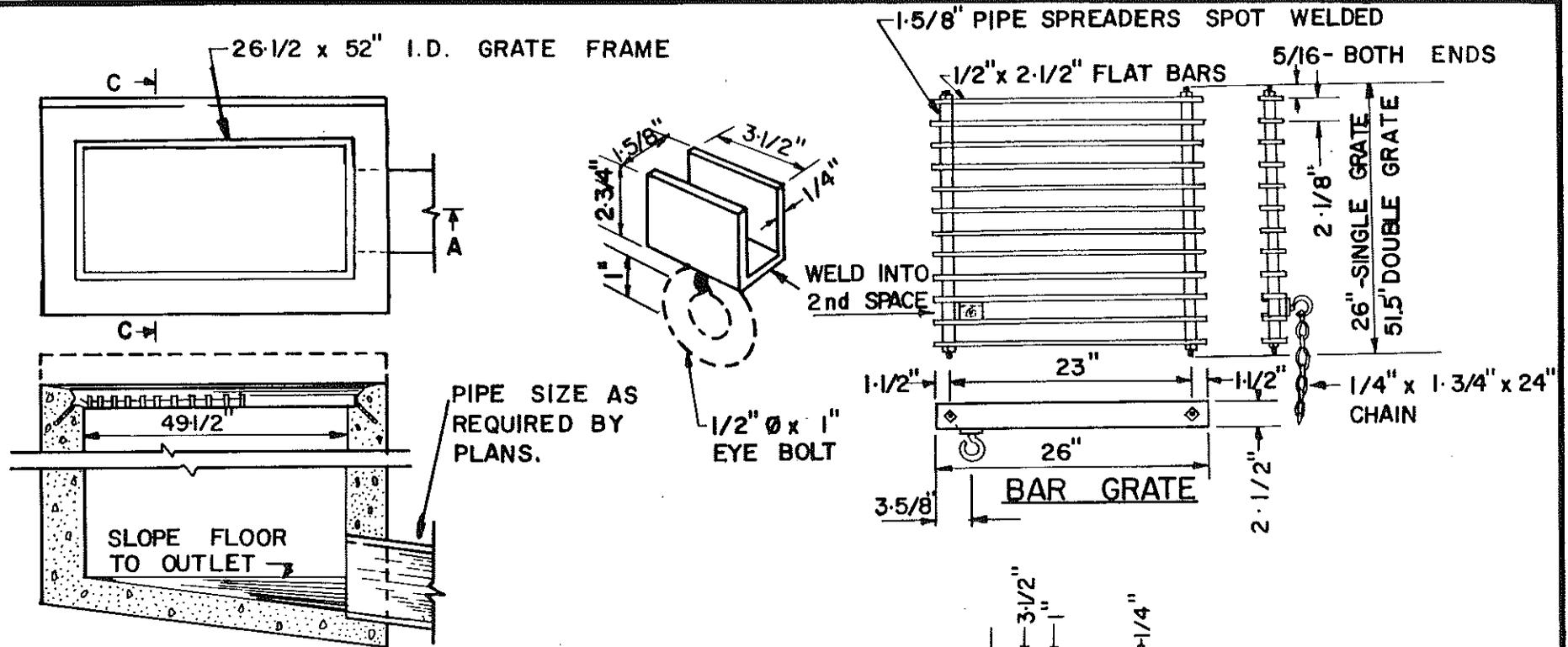
STANDARD DETAIL

CATCH BASIN ACCESS FRAME AND COVER

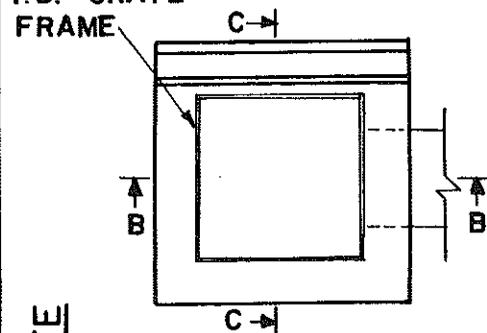
DETAIL NO.  
536-I

ALL CONCRETE SHALL BE CLASS "A". PER SECT. 725 EXPOSED EDGES SHALL BE FINISHED WITH A 1/2" RADIUS.

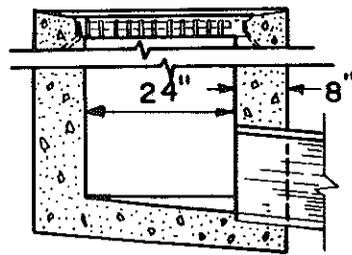
DOUBLE GRATE



26 1/2" x 26 1/2" I.D. GRATE FRAME

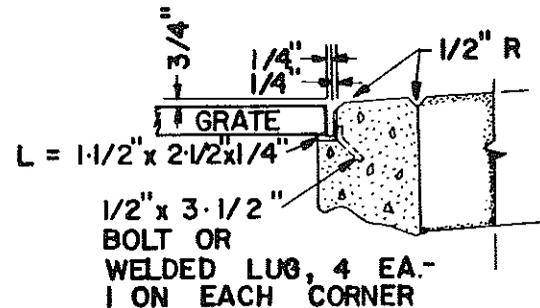


SINGLE GRATE

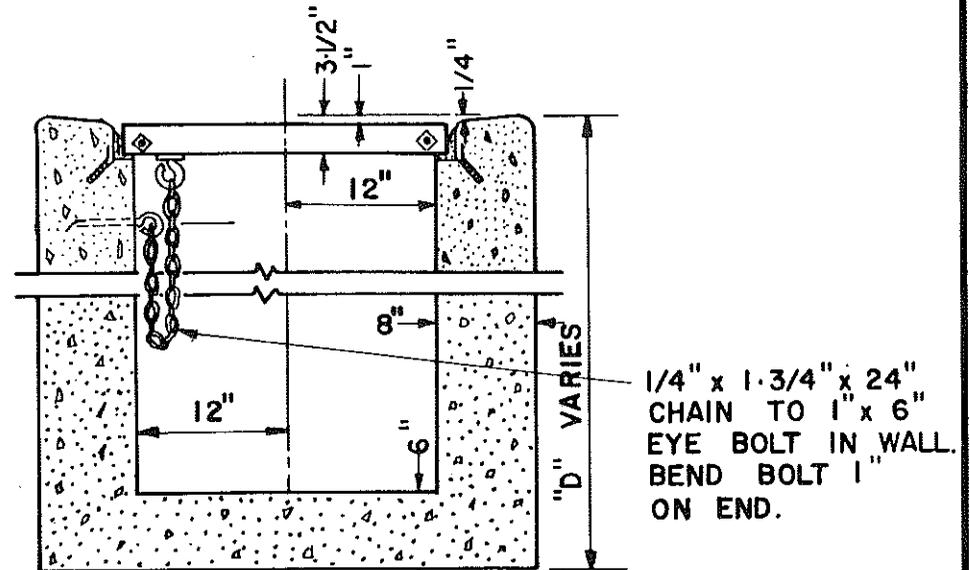


SECTION B-B

SECTION A-A



DETAIL OF ANGLE FRAME GRATE SUPPORT



SECTION C-C

DETAIL NO. 537



STANDARD DETAIL

CATCH BASIN - TYPE G

APPROVED PUBLIC WORKS COMMITTEE

CHAIRMAN

DATE

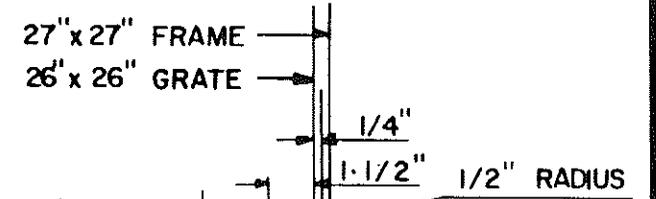
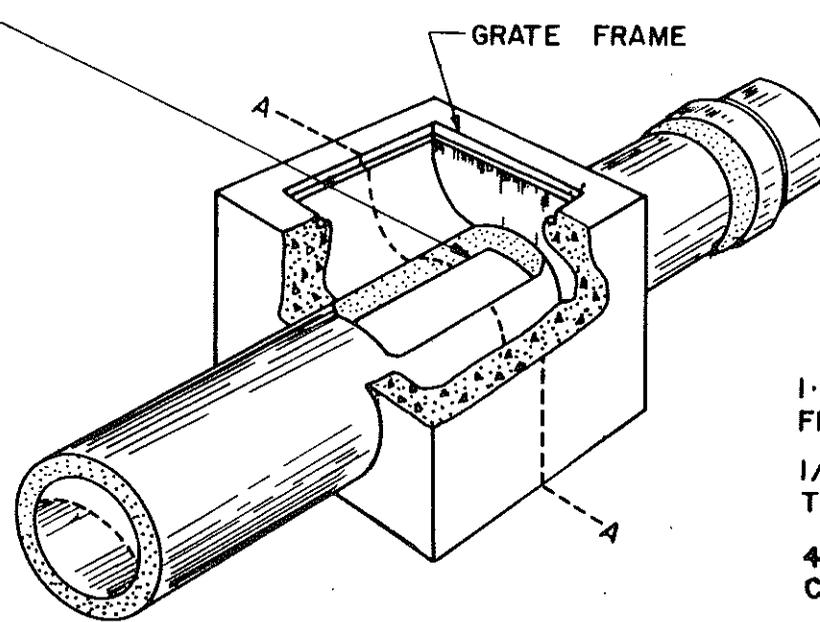
DETAIL NO.

537



CUT HOLE IN PIPE 24" LONG FOR SINGLE GRATE STRUCTURES AND 49" LONG FOR DOUBLE GRATE. WIDTH DEPENDS ON DIA. OF PIPE, NOT TO EXCEED 22" MIN. WIDTH TO BE SET BY PROJECT ENGINEER.

WHEN DOUBLE GRATE IS USED INCREASE THE LENGTH OF THE STRUCTURE ACCORDINGLY.

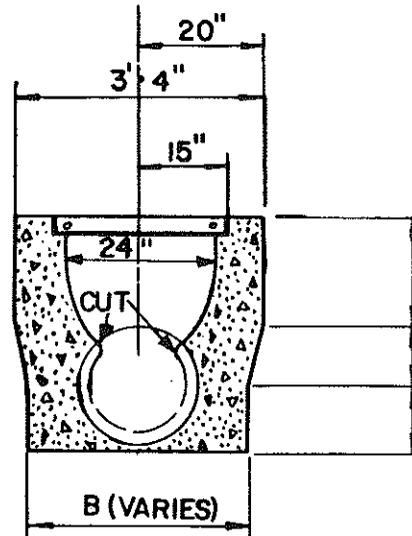


1-1/2" x 2-1/2" ANGLE IRON FRAME

1/2" Ø x 6" LUGS WELDED TO FRAME,

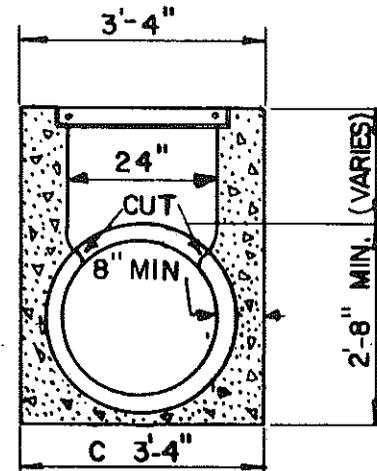
4 EA.- 1 ON EACH COR. OF FRAME

DETAIL OF ANGLE FRAME GRATE SUPPORT

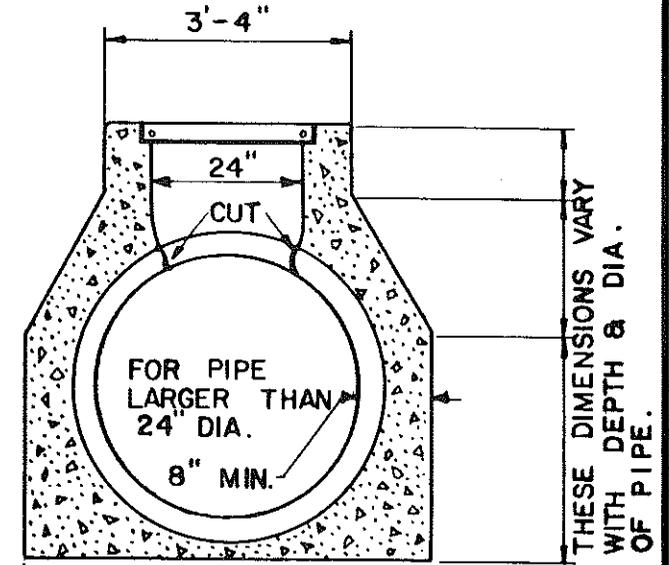


THESE DIMENSIONS VARY WITH DEPTH & DIA. OF PIPE.

SECTION A-A



SECTION A-A  
24" PIPE



THESE DIMENSIONS VARY WITH DEPTH & DIA. OF PIPE.

SECTION A-A

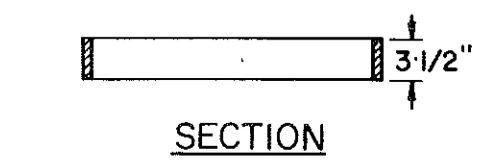
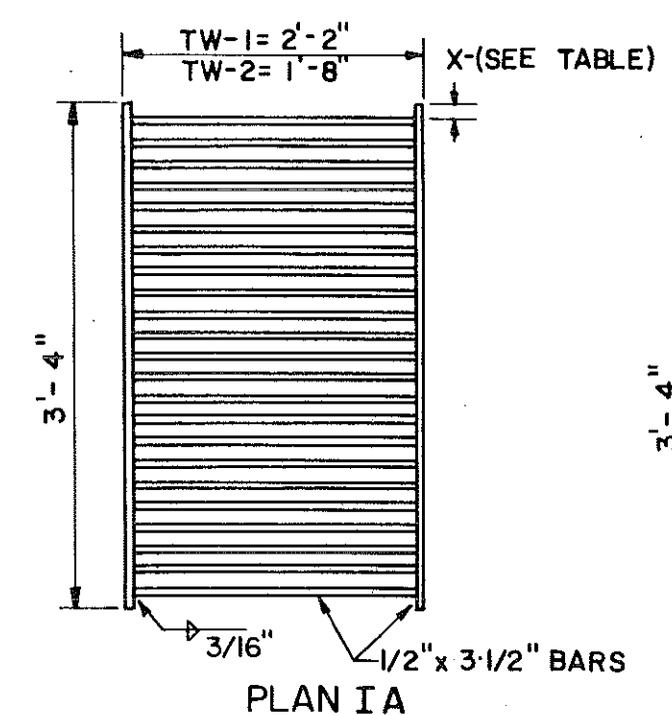
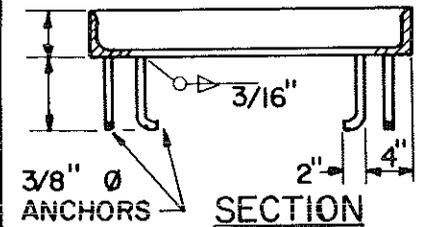
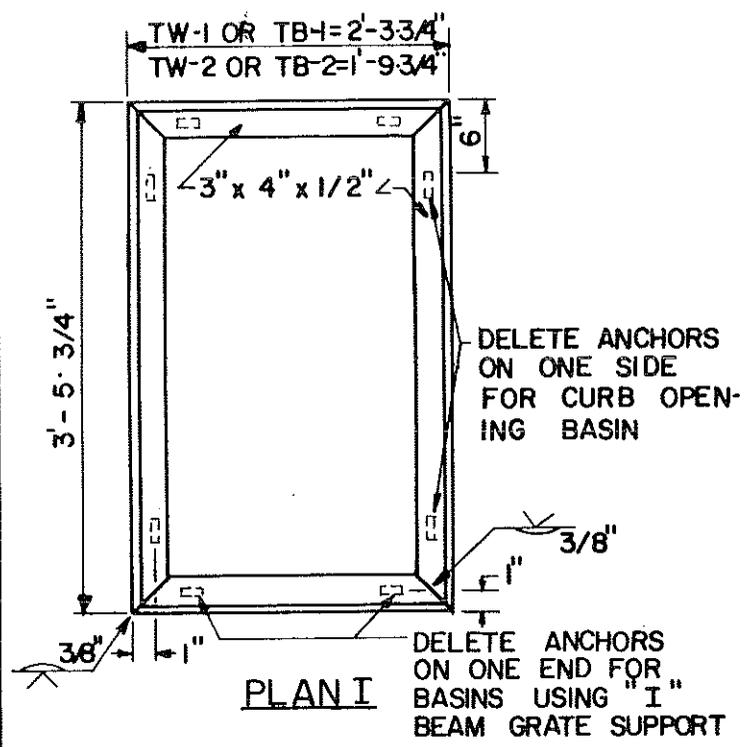
DETAIL NO.  
538



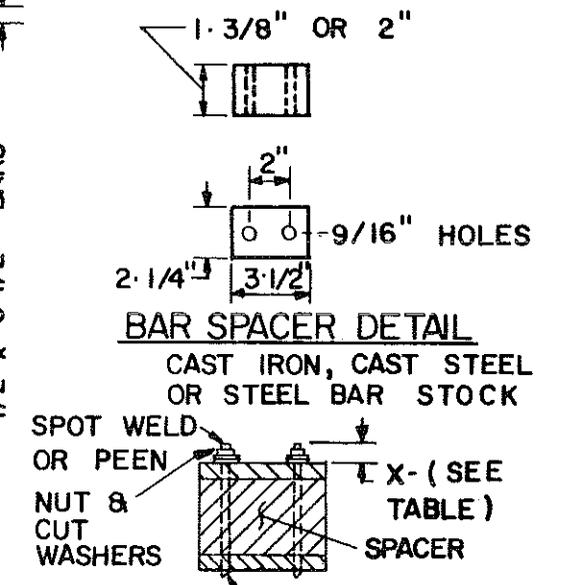
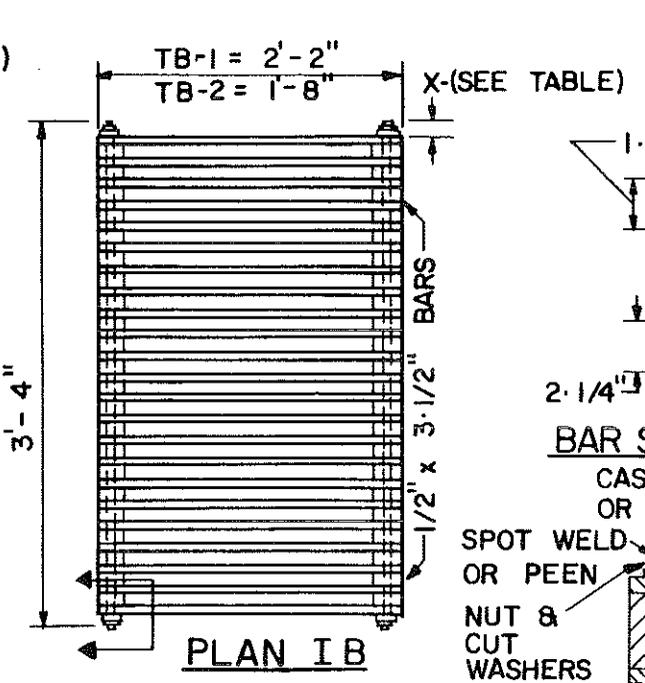
STANDARD DETAIL

CATCH BASIN - TYPE H

DETAIL NO.  
538



GRATE TYPES TW-1 & TW-2



SECTION A-A

GRATE TYPES TB-1 & TB-2

TYPE	CLEAR SPACING	NO. BARS	X	GRATE OPENING SQ. FT.
TW OR TB-1.0	1"	26	1"	3.21
TW OR TB-1.1	1-3/8"	21	1"	3.32
TW OR TB-1.2	2"	16	1"	4.66
TW OR TB-2.0	1"	26	1"	2.32
TW OR TB-2.1	1-3/8"	21	1"	2.41
TW OR TB-2.2	2"	16	1"	2.65

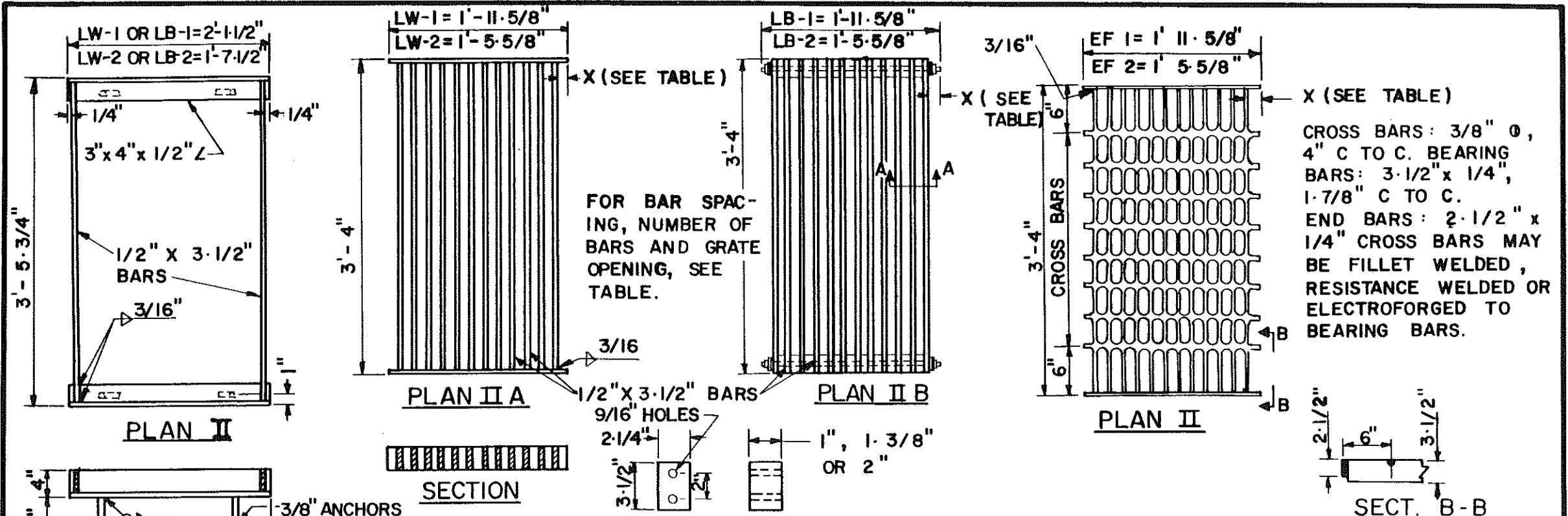
FOR BARS SPACING, NUMBER OF BARS AND GRATE OPENING, SEE TABLE.

- NOTES:**
1. GRATING UNITS AND FRAMES SHALL BE FABRICATED FROM STRUCTURAL STEEL EXCEPT AS NOTED.
  2. WELDING SHALL BE IN ACCORDANCE WITH STD. WELDING SPEC.
  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.

DETAIL NO. 540-1 STANDARD DETAIL

CATCH BASIN - GRATES

DETAIL NO. 540-1



FOR BAR SPACING, NUMBER OF BARS AND GRATE OPENING, SEE TABLE.

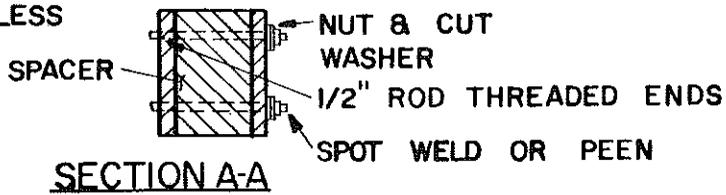
CROSS BARS: 3/8" Ø, 4" C TO C. BEARING BARS: 3-1/2" x 1/4", 1-7/8" C TO C. END BARS: 2-1/2" x 1/4" CROSS BARS MAY BE FILLET WELDED, RESISTANCE WELDED OR ELECTROFORGED TO BEARING BARS.

GRATE TYPE LW & EF RESTRICTED TO SLOPES OF 3% OR LESS

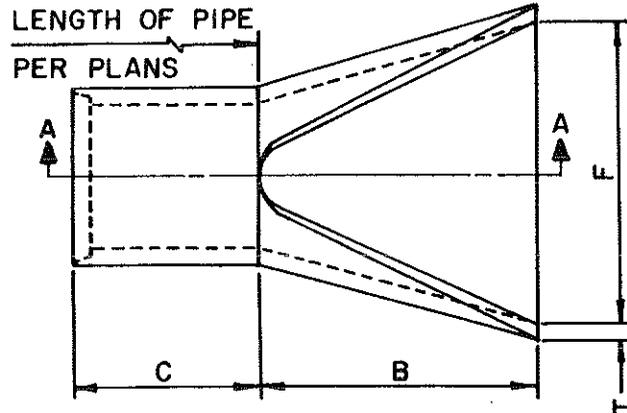
BAR SPACER DETAIL  
CAST IRON, CAST STEEL OR STEEL BAR STOCK

- NOTES:**
1. LW INDICATES LONGITUDINAL WELDED.
  2. LB INDICATES LONGITUDINAL BOLTED.
  3. EF INDICATES ELECTROFORGED.
  4. GRATING UNITS AND FRAMES SHALL BE FABRICATED FROM STRUCTURAL STEEL "A-36" EXCEPT AS NOTED.
  5. ALL WELDING SHALL BE IN ACCORDANCE WITH STANDARD WELDING SPECIFICATIONS.
  6. THE COMPLETED ASSEMBLY SHALL BE GIVEN ONE SHOP COAT OF NO.1 PAINT.
  7. FRAMES AND GRATES SHALL FIT TO A MAXIMUM ROCK OF 0.093 AT ANY POINT.

GRATE TYPE	CLEAR BAR SPACING	NO. BARS	X	GRATE OPENING SQ. FT.
LW OR LB-1.0	1"	16	5/16"	3.97
" " -1.1	1-3/8"	13	5/16"	4.34
" " -1.2	2"	9	1-9/16"	4.84
EF-1	1-5/8"	13	7/16"	4.66
LW OR LB-2.0	1"	12	5/16"	2.98
" " -2.1	1-3/8"	9	1-1/16"	3.35
" " -2.2	2"	7	1-1/16"	3.60
EF-2	1-5/16"	10	1/4"	3.48



SECTION A-A  
GRATES TYPES LB USE ON LONGITUDINAL GRADES IN EXCESS OF 3% OR AS AN ALTERNATE TO TYPES LW OR EF ON GRADES OF 3% OR LESS.

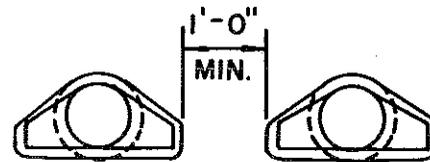


PLAN

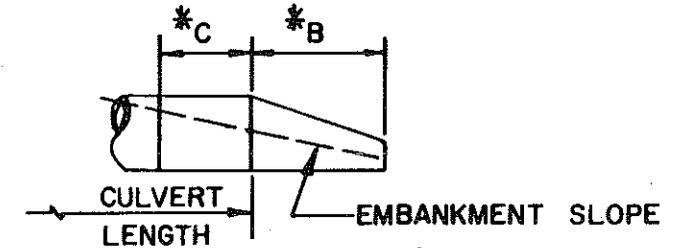
PIPE DIA.	APPROX. WEIGHT	DIMENSIONS-INCHES						APPROX. SLOPE
		T	A	B	C	E	F	
24"	1520 lbs.	3	9-1/2	43-1/2	30	73-1/2	48	3
27"	1930 lbs.	3-1/4	10-1/2	49-1/2	24	73-1/2	54	3
30"	2190 lbs.	3-1/2	12	54	19-3/4	73-3/4	60	3
36"	4100 lbs.	4	15	63	34-3/4	97-3/4	72	3
42"	5380 lbs.	4-1/2	21	63	35	98	78	3
48"	6550 lbs.	5	24	72	26	98	84	3
54"	8240 lbs.	5-1/2	27	65	33-1/4	98-1/4	90	2-1/2

**NOTES**

1. DESIGN OF END SECTION SHALL CONFORM TO STANDARDS FOR REINFORCED CONC. 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.

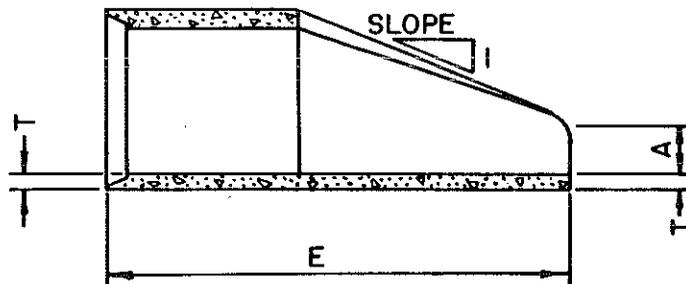


SPACING FOR MULTIPLE INSTALLATION

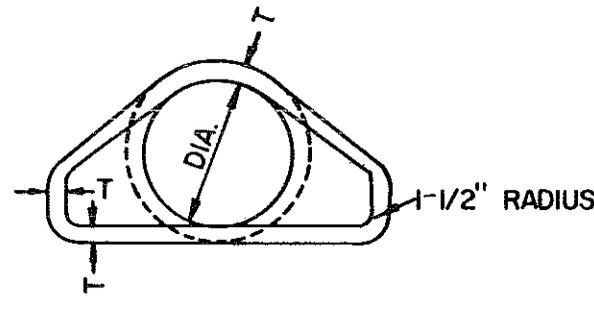


\*SEE TABLE

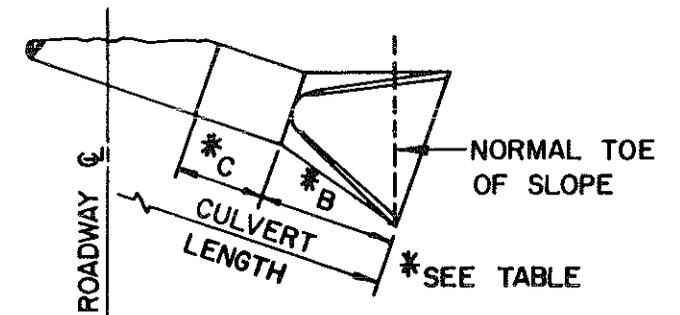
RIGHT ANGLE CULVERT



SECTION A-A



FRONT ELEVATION



\*SEE TABLE

SKEWED CULVERT

DETAIL NO.  
545

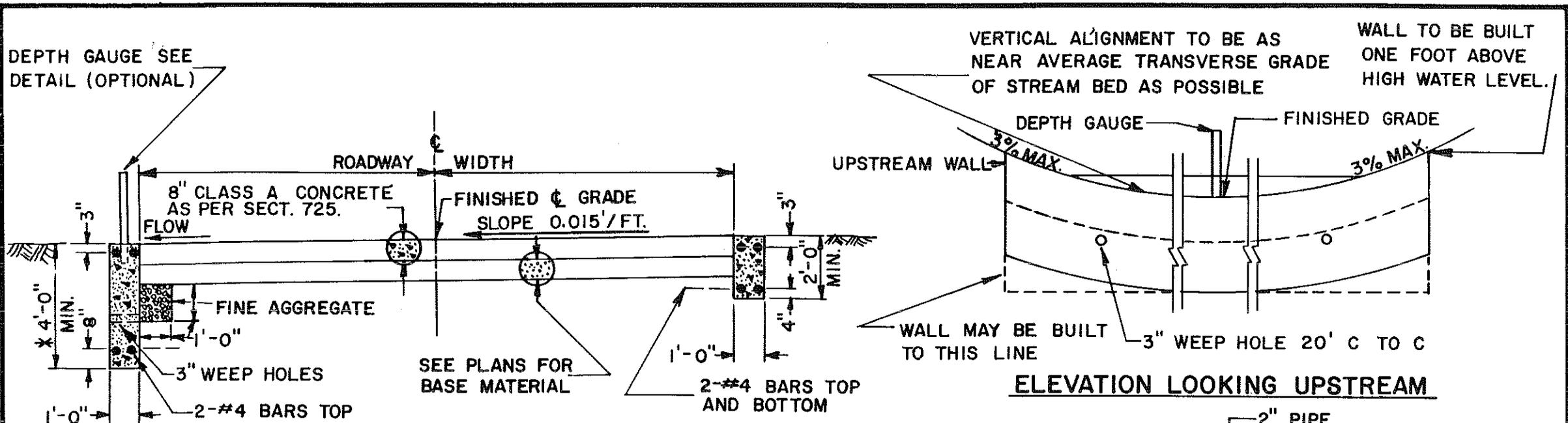


STANDARD DETAIL

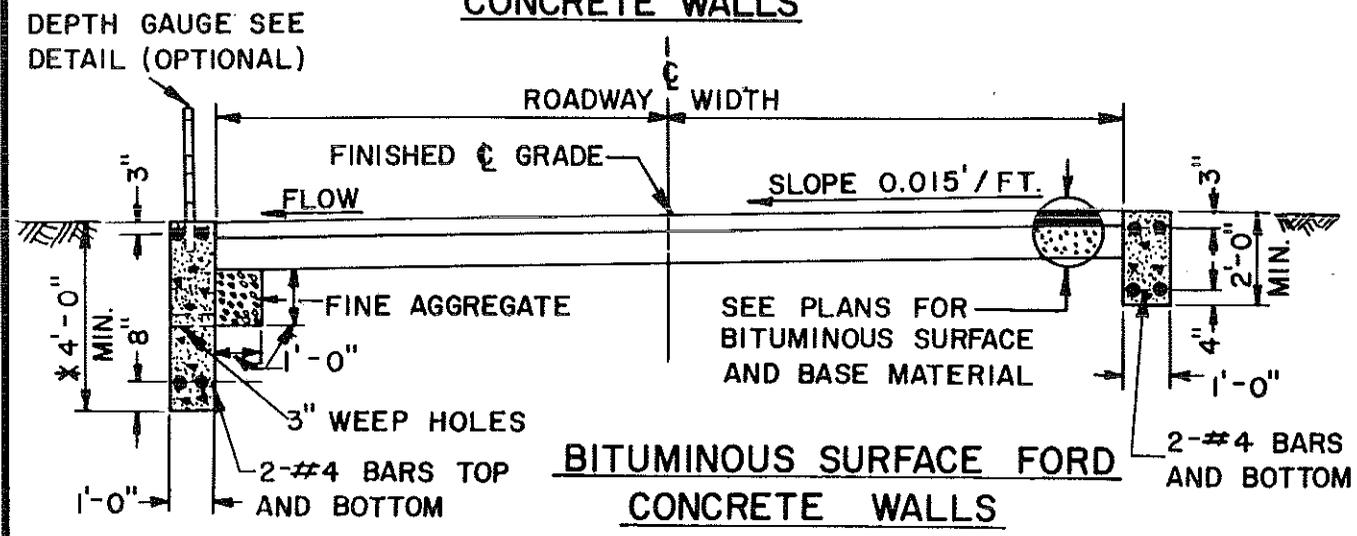
END SECTION - REINFORCED CONCRETE PIPE

DETAIL NO.  
545



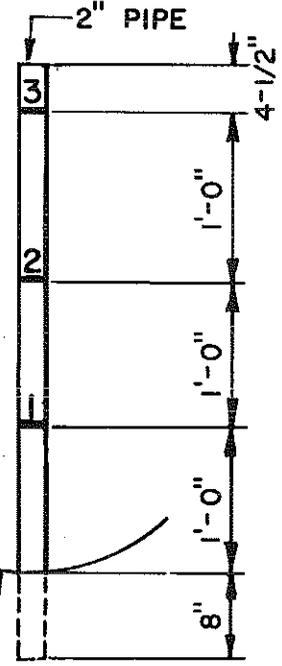


**CONCRETE SURFACE FORD CONCRETE WALLS**



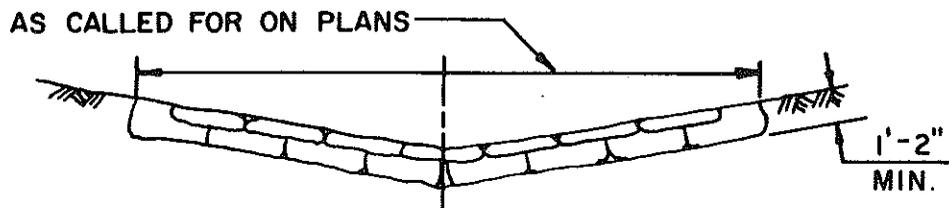
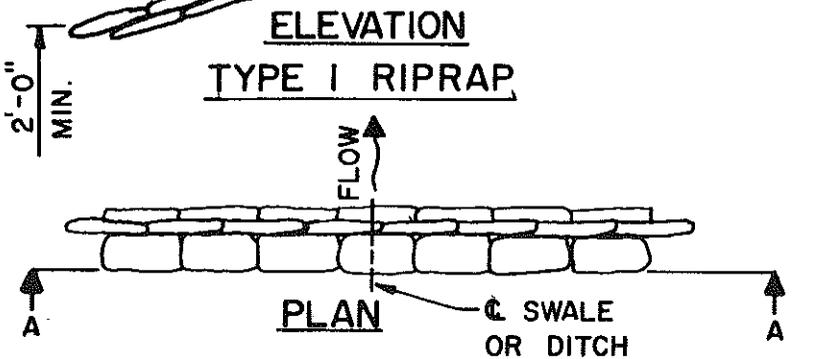
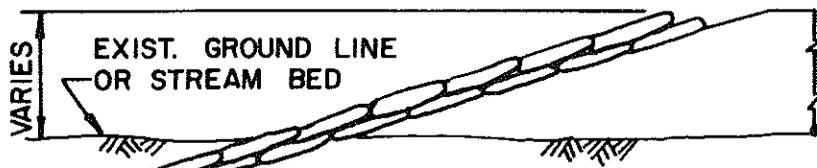
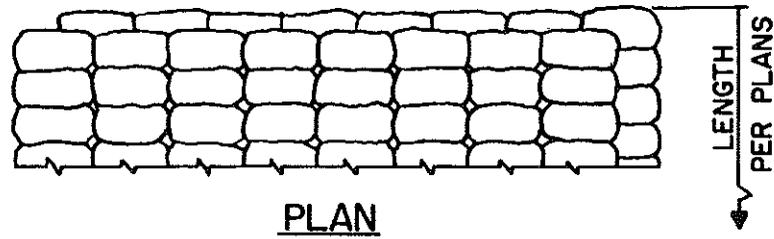
**NOTES**

1. FORD WALLS SHALL BE CLASS A CONC. 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'.

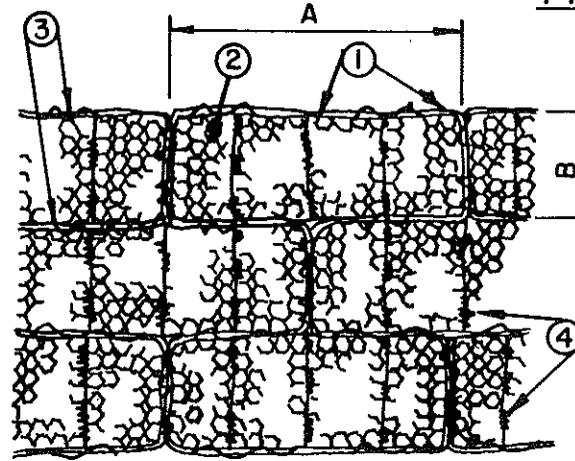


**DEPTH GAUGE DETAIL (OPTION OF THE CONTRACTING AGENCY)**

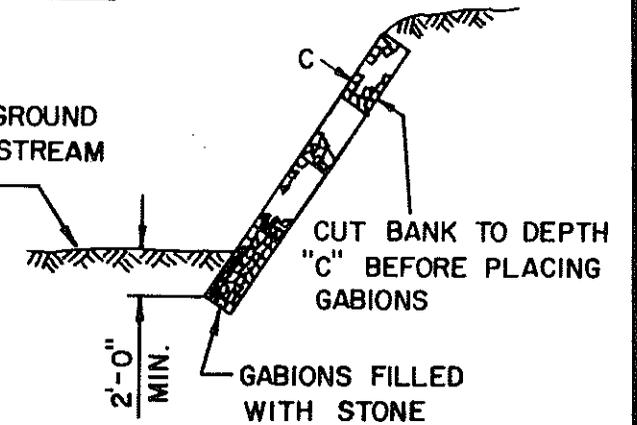
DETAIL NO. <b>552</b>	 <b>STANDARD DETAIL</b>	<b>CONCRETE CUT-OFF WALLS</b>	DETAIL NO. <b>552</b>
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**TYPICAL GABIONS**



EXISTING GROUND LINE OR STREAM BED.



**NOTES**

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

**NOMINAL SIZE COMBINATIONS**

LENGTH	WIDTH	DEPTH
A	B	C
6'	3'	1', 1.5', 3'
9'	3'	1', 1.5', 3'
12'	3'	1', 1.5', 3'

OTHER SIZES AVAILABLE FROM MANUFACTURER.

- ① HEAVY GAUGE FRAME WIRE.
- ② HEAVY GAUGE TRIPLE-TWIST HEXOGANAL 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.

DETAIL NO.  
555



STANDARD DETAIL

EROSION PROTECTION / RIPRAP

DETAIL NO.  
555

(1)

(2)

(3)

(4)

(5)

(6)

(7)