BY WAY OF EXPLANATION

This edition of Standard Plans for Public Works Construction is the fruition of several decades of intensive work by a multi-governmental agency subcommittee of the Public Works Standards, Inc., American Public Works Association, and the Southern California Districts, Associated General Contractors of California.

These plans, representing the professional thinking of the leading public works officials and private members of the construction industry, were prepared to answer a need for uniform design governing public works construction performed for the many cities, counties and public agencies. This need dates back to the very founding of these governmental jurisdictions.

Uniform plans, embracing the most modern design and construction techniques, will greatly benefit both the general public and the private contracting industry. Such plans will eliminate conflicts and confusion, lower construction costs and encourage more competitive bidding by private contractors.

The prime sponsors of this effort have been the City and County of Los Angeles, County of Ventura, City and County of San Diego, City of Long Beach, City of Burbank and County of Orange. In the case of Los Angeles County, this includes the Road Department, Flood Control District, County Engineer/Facilities Department and the Sanitation Districts. In addition to these major organizations, numerous municipal agencies, large and small, served a key role on the various task forces.

The Standard Plans are to be used in conjunction with the Standard Specifications for Public Works Construction as a companion document. This latter document has been in existence since 1967 and is commonly referred to as the “Greenbook”. The Standard Plans, being engineering plans, are subject to the provisions of Chapter 7, Division 3, Business and Professions Code, State of California when used in that state. As such, they must be approved by a registered professional engineer to indicate his or her responsibility for them. In addition, they do not have the legal effect of a contract document or construction plan until officially adopted by the particular user agency.

The plans are numbered with a three digit prefix and a single digit suffix. The first number denotes the section in which the plan is located. The suffix is used to denote changes. All plans when originally approved will bear the suffix “0”. As they are amended, the suffix will be numbered to denote the change number.

The Standard Plans for Public Works Construction will be revised periodically and reprinted to reflect advanced thinking and the changing technology of the construction industry. Amendments and additions, together with an updated Table of Contents. Subsequent editions will be published as additional material is prepared. To this end, the Public Works Standards, Inc. will continue to study and recommend changes to both the Standard Plans and Standard Specifications. Interested parties who wish to suggest additions or amendments may communicate with the Public Works Standards, Inc., c/o Associated General Contractors of California, 1906 W. Garvey Avenue South, Suite 100, West Covina, CA 91790.

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**Standard Plans for Public Works Construction**

TEROLOGY SYMBOLS AND STANDARD ABBREVIATIONS

STANDARD PLAN 100-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

Sheet 1 of 4
EXISTING  PROPOSED

SIGNAL CONTROL BOX
SIGNAL
   FLASHING
   TRAFFIC
   LOOP

SMALL STREAM
OR DITCH

SPRINKLER HEAD

STREET LIGHT

TREE
   PALM
   OAK
   OTHER

UTILITY POLE

VALVE

VAULT

WALL
   BRICK (BLOCK)
   CONCRETE
   STONE

WELL
<table>
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<tr>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway Transportation Officials</td>
</tr>
<tr>
<td>ABS</td>
<td>Asphalt Concrete</td>
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<tr>
<td>APPROX</td>
<td>Approximately</td>
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<tr>
<td>AS</td>
<td>All Sides</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing Materials</td>
</tr>
<tr>
<td>ASSY</td>
<td>Assembly</td>
</tr>
<tr>
<td>BC</td>
<td>Beginning of Curve</td>
</tr>
<tr>
<td>BCR</td>
<td>Beginning of Curb Return</td>
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<tr>
<td>CB</td>
<td>Catch Basin</td>
</tr>
<tr>
<td>CB'ORE</td>
<td>Centerbore</td>
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<tr>
<td>CP</td>
<td>Cast Iron Pipe</td>
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<td>CF</td>
<td>Curb Face</td>
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<td>CL</td>
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<tr>
<td>CMB</td>
<td>Crushed Miscellaneous Base</td>
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<td>Construct, Construction</td>
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<td>D</td>
<td>Designation for RCP Load Rating</td>
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<td>ECR</td>
<td>End of Curb Return</td>
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<td>EF</td>
<td>Each Face</td>
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<td>EL</td>
<td>Elevation</td>
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<td>EXIST, EXST</td>
<td>Existing</td>
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<td>Expansion Joint</td>
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<td>$f_c$</td>
<td>Designation for Compressive Strength of Concrete</td>
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<td>FL</td>
<td>Flowline</td>
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<td>GP</td>
<td>Ground Profile</td>
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<td>GALV</td>
<td>Galvanized</td>
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<tr>
<td>HEX</td>
<td>Hexagonal</td>
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<td>ID</td>
<td>Inner Diameter</td>
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<td>MAX</td>
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<td>MIN</td>
<td>Minimum</td>
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<tr>
<td>MH</td>
<td>Manhole</td>
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<tr>
<td>NC</td>
<td>National Coarse Thread Series</td>
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</tr>
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<td>NPT</td>
<td>(National Pipe Thread?)</td>
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<tr>
<td>OC</td>
<td>On Center</td>
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<td>OD</td>
<td>Outer Diameter</td>
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<td>Original Ground</td>
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ABBREVIATIONS (CONTINUED)

PCC  Portland Cement Concrete
PE   Polyethylene
PRCB Precast Reinforced Concrete Box
PT   Point
PVMT Pavement

R    Radius
RC   Reinforced Concrete
RCB  Reinforced Concrete Box
RCP  Reinforced Concrete Pipe
REINF Reinforced
RR   Railroad
R/W  Right of Way

SPPWC Standard Plans for Public Works Construction
SSPWC Standard Specifications for Public Works Construction
STD  Standard
STL  Steel
STR GR Straight Grade

T&G  Tongue and Groove
TRANS Transverse
TYP  Typical

VCP  Vitrified Clay Pipe

W/   With
WPJ  Weakened Plane Joint

XING Crossing
LEGEND

● FIRE HYDRANT (SEE NOTE 4)
○ VENTS AND POLES
○ STREET LIGHTS
□ PEDESTAL
NOTES:

1. NO ABOVE-GROUND UTILITIES ARE ALLOWED IN CONCRETE SIDEWALKS LESS THAN 6' (1800 mm) WIDE.

2. WHEN SIDEWALK IS 6' (1800 mm) WIDE OR MORE, ABOVE-GROUND UTILITIES ARE ALLOWED AT LOCATIONS NOTED ON PLAN.

3. IN THE RETURN AND SIDEWALK TRANSITION AREAS, ONLY UTILITIES CONSISTING OF STREET LIGHTS, TRAFFIC SIGNALS AND FIRE HYDRANTS ARE ALLOWED.

4. FIRE HYDRANTS SHALL NOT BE PLACED AT THE SAME CURB RETURN OCCUPIED BY A STREET LIGHT.

5. PEDESTALS SHALL BE PLACED AT INCONSPICUOUS LOCATIONS.

6. IN THE ABSENCE OF CURBS, THE FACE OF ALL ABOVE-GROUND STRUCTURES SHALL BE LOCATED A MINIMUM OF 10' (3000 mm) AWAY FROM THE TRAVELED WAY ON ALL RURAL HIGHWAYS AND 6' (1800 mm) ON RESIDENTIAL STREETS.
4' (1220 mm) MIN

TRANSITION 4:1 MIN

NOTE 2

CURB FACE

NOTE 2

CURB FACE

CASE A

PARTS OF THIS STANDARD PLAN SHOW INSTALLATION FOR TYPICAL RETROFIT CONDITIONS, AND ARE NOT FULLY COMPLIANT WITH CALIFORNIA BUILDING CODE REQUIREMENTS FOR NEW DEVELOPMENT.
### Type A

<table>
<thead>
<tr>
<th>Curb Face, Inches (mm)</th>
<th>X, Inches (mm)</th>
<th>Y, Inches (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; (150) or less</td>
<td>3'-0&quot; (900)</td>
<td>4'-0&quot; (1200)</td>
</tr>
<tr>
<td>7&quot; (175)</td>
<td>3'-6&quot; (1050)</td>
<td>4'-9&quot; (1425)</td>
</tr>
<tr>
<td>8&quot; (200)</td>
<td>4'-0&quot; (1200)</td>
<td>5'-6&quot; (1700)</td>
</tr>
<tr>
<td>9&quot; (225)</td>
<td>4'-6&quot; (1350)</td>
<td>6'-6&quot; (1950)</td>
</tr>
<tr>
<td>10&quot; (250)</td>
<td>5'-0&quot; (1500)</td>
<td>7'-3&quot; (2175)</td>
</tr>
<tr>
<td>11&quot; (275)</td>
<td>5'-6&quot; (1650)</td>
<td>8'-0&quot; (2400)</td>
</tr>
<tr>
<td>12&quot; (300) or more</td>
<td>6'-0&quot; (1800)</td>
<td>8'-9&quot; (2625)</td>
</tr>
</tbody>
</table>

### Notes:

1. Residential driveways shall be 4" (100 mm) thick PCC.
2. Commercial driveways shall be 6" (150 mm) thick PCC.
3. Weakened plane joints shall be installed at both sides of a driveway and at 10' (3.0 m) intervals.
4. Curb for Type C driveway shall be integral and match adjacent construction.
5. Refer to local development regulations for Americans with Disabilities access requirements and maximum permitted driveway widths.
WHERE PLANTING AREA IS ADJACENT TO THE CURB RAMP, USE CASE A, TYPE 6

TYPE 3

WHERE PLANTING AREA IS ADJACENT TO THE CURB RAMP, USE CASE A, TYPE 6

TYPE 4

CASE A
A OR B

4' (1220 mm)

R

R

4' (1220 mm)

Note 2

8.33%

2% max

Grade Break

PLANTING AREA

NOTE 8

Curb Face

Curb

PARKWAY

PLANTING AREA

NOTE 2

8.33%

2% max

4' (1200 mm)

A OR B

SEE FIGURE 1

TYPE 5

CURB -•~

CURB FACE +

120Q mm

AORB

SEE FIGURE 1

PLANTING AREA

NOTE 2

PLANTING AREA

NOTE 8

CURB

CURB FACE

PARKWAY

PCC WALK
4' (1220 mm) min

4' (1220 mm)

Z

8.33%

2% max

8.33%

2% max

PLANTING AREA

NOTE 2

NOTE 8

4' (1220 mm) angle

SEE NOTE 7

A OR B

SEE FIGURE 1

TYPE 6

CASE A

IF PLANTING AREA IS NOT ADJACENT TO SIDE FLARE, USE "X" PER TABLE 2 FOR THAT FLARE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CURB RAMP

STANDARD PLAN

SHEET 3 OF 10
TYPE 1

CASE B

CURB RAMP
SKEW ANGLE $\alpha = 45'$
OFFSET $b = 0$
UNLESS OTHERWISE NOTED ON PLANS

CASE C

SEE DETAIL A, B, C, OR D

NOTE 2

CURB FACE

TYPE 1

SEE DETAIL A, B, C, OR D

NOTE 2

CURB FACE

TYPE 2

CASE D

CURB RAMP
SECTION A — A

SECTION B — B

SECTION C — C

SECTION R — R

SECTION S — S

USE FIGURE 1 TO DETERMINE WHICH OF SECTIONS A — A, B — B OR C — C IS APPROPRIATE.

DEPRESS BACK OF WALK
SEE DETAIL A, B, C OR D,
SHEET 10.

DEPRESS BACK OF WALK
SEE DETAIL A, B, C OR D,
SHEET 10.

DEPRESS BACK OF WALK
SEE DETAIL A, B, C OR D,
SHEET 10.

DEPRESS BACK OF WALK
SEE DETAIL A, B, C OR D,
SHEET 10.
PARKWAY WIDTH, FT (m)

4' 5' 6' 7' 8' 9' 10' 11' 12' 13' 14' 15' 16' 17' 18' 19' 20'

(1.2 MIN (1.5) (1.8) (2.1) (2.4) (2.7) (3.0) (3.3) (3.6) (3.9) (4.2) (4.5) (4.8) (5.1) (5.4) (5.7) (6.0)

FIGURE 1 — SECTION USAGE

SECTION A-A
LANDING = 4' (1220 mm)

SECTION B-B
CALCULATE Z DIMENSION
PER FORMULA BELOW

<table>
<thead>
<tr>
<th>NORMAL CURB FACE, INCHES (mm)</th>
<th>X, FT (mm)</th>
<th>SECTION Y-Y</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Y, FT (mm)</td>
</tr>
<tr>
<td>2&quot; (50)</td>
<td>4.00' (1220) MIN</td>
<td>2.63' (790)</td>
</tr>
<tr>
<td>3&quot; (75)</td>
<td>4.00' (1220) MIN</td>
<td>3.95' (1185)</td>
</tr>
<tr>
<td>4&quot; (100)</td>
<td>4.00' (1220) MIN</td>
<td>5.26' (1580)</td>
</tr>
<tr>
<td>5&quot; (125)</td>
<td>4.17' (1275)</td>
<td>6.58' (1975)</td>
</tr>
<tr>
<td>6&quot; (150)</td>
<td>5.00' (1525)</td>
<td>7.90' (2370)</td>
</tr>
<tr>
<td>7&quot; (175)</td>
<td>5.83' (1775)</td>
<td>9.21' (2765)</td>
</tr>
<tr>
<td>8&quot; (200)</td>
<td>6.67' (2035)</td>
<td>10.53' (3160)</td>
</tr>
<tr>
<td>9&quot; (225)</td>
<td>7.50' (2285)</td>
<td>11.84' (3555)</td>
</tr>
<tr>
<td>10&quot; (250)</td>
<td>8.33' (2540)</td>
<td>13.16' (3950)</td>
</tr>
<tr>
<td>11&quot; (275)</td>
<td>9.17' (2795)</td>
<td>14.47' (4340)</td>
</tr>
<tr>
<td>12&quot; (300)</td>
<td>10.00' (3050)</td>
<td>15.79' (4735)</td>
</tr>
</tbody>
</table>

WHERE FIGURE 1 SHOWS USE OF SECTION B-B, FIGURE Z DIMENSION AS FOLLOWS:

W = PARKWAY WIDTH
L = LANDING WIDTH, 4' (1220 mm) TYP
Z = [(Y+L) - W] x 0.760

IF (Y+L) < W, THEN Z = 0

SEE SHEET 9 FOR STREET SLOPE
ADJUSTMENT FACTORS, ALL STREETS

TABLE 1 — X AND Y VALUES

TABLE 1 REFERENCE FORMULAS:

X = CF / 8.333%

Y = CF / (8.333% - 2% WALK CROSS SLOPE)
For sloped streets, multiply the dimensions parallel to the street, X and Z, upstream and downstream of the ramp, by the factors in the following table.

For example, X.DOWN = X × K.DOWN

<table>
<thead>
<tr>
<th>S</th>
<th>K.DOWN</th>
<th>K.UP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>0.2%</td>
<td>0.977</td>
<td>1.025</td>
</tr>
<tr>
<td>0.5%</td>
<td>0.943</td>
<td>1.064</td>
</tr>
<tr>
<td>1%</td>
<td>0.893</td>
<td>1.136</td>
</tr>
<tr>
<td>2%</td>
<td>0.806</td>
<td>1.316</td>
</tr>
<tr>
<td>3%</td>
<td>0.735</td>
<td>1.563</td>
</tr>
<tr>
<td>4%</td>
<td>0.676</td>
<td>1.923</td>
</tr>
<tr>
<td>5%</td>
<td>0.625</td>
<td>2.500</td>
</tr>
</tbody>
</table>

**TABLE 2 - SLOPE ADJUSTMENTS**

**TABLE 2 REFERENCE FORMULAS:**
K.DOWN = 8.333 / (8.333 + S)
K.UP = 8.333 / (8.333 - S)

**STREET SLOPE ADJUSTMENTS**

**STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION**

**CURB RAMP**

**STANDARD PLAN**

**111-5**

**SHEET 9 OF 10**
GENERAL NOTES:

1. CONCRETE SHALL BE CLASS 520-C-2500 (310-C-17) CONFORMING TO SSPWC 201-1.1.2 AND SHALL BE 4" (100 mm) THICK.

2. THE RAMP SHALL HAVE A 12" (305 mm) WIDE BORDER WITH 1/4" (6 mm) GROOVES APPROXIMATELY 3/4" (19 mm) OC. SEE GROOVING DETAIL.

3. THE RAMP SURFACE SHALL HAVE A TRANSVERSE BROomed SURFACE TEXTURE CONFORMING TO SSPWC 303-1.9.

4. USE DETAIL "A" OR "B" IF EXISTING SURFACE BEHIND LANDING IS PAVED.

5. USE DETAIL "C" OR "D" IF EXISTING SURFACE BEHIND LANDING IS UNPAVED.

6. R = 3' (900 mm) UNLESS OTHERWISE SHOWN ON PLAN. SEE SHEET 7.

7. ANGLE = Δ/2 UNLESS OTHERWISE SHOWN ON PLAN.

8. CONSTRUCT DETECTABLE WARNING SURFACE PER DETAIL THIS SHEET. MATERIALS SHALL BE PER CONTRACT DOCUMENTS.
ABBREVIATIONS:

WPJ  WEAKENED PLANE JOINT    BCR  BEGINNING OF CURB RETURN
EXP JT  EXPANSION JOINT    ECR  END OF CURB RETURN

NOTES:

1. WEAKENED PLANE JOINTS SHALL BE USED FOR ALL JOINTS, EXCEPT THAT EXPANSION JOINTS SHALL BE PLACED AT THE BCR AND ECR IN CURB, GUTTER AND SIDEWALK, AND AROUND UTILITY POLES LOCATED IN SIDEWALK AREAS.

2. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED AT REGULAR INTERVALS NOT EXCEEDING 10' (3000 mm) IN WALKS AND 20' (6000 mm) IN GUTTERS. JOINTS IN CURB AND WALK SHALL BE ALIGNED.

3. CURB AND GUTTER SHALL BE CONSTRUCTED SEPARATELY FROM SIDEWALK.
WALK OR FILL-IN REPLACEMENT FOR EXCAVATIONS MADE PARALLEL TO CURB OR PROPERTY LINE

WALK ADJACENT TO PROPERTY LINE

WALK LESS THAN 5' (1500 mm) WIDE
- WALK PL
- SAWCUT IF SCORELINE
- EARTH OR CONCRETE FILL-IN CURB
- GUTTER

WALK 5' (1500 mm) WIDE OR MORE
- IF LESS THAN 30"
- SAWCUT
- REPLACE 30" (750 mm) MIN
- ENTIRE WALK

WALK ADJACENT TO CURB

WALK LESS THAN 5' (1500 mm) WIDE
- WALK PL
- SAWCUT IF SCORELINE
- EARTH OR CONCRETE FILL-IN CURB
- GUTTER

WALK 5' (1500 mm) WIDE OR MORE
- IF LESS THAN 30"
- SAWCUT
- REPLACE 30" (750 mm) MIN
- ENTIRE WALK

FILL-IN REPLACEMENT

FILL-IN LESS THAN 5' (1500 mm) WIDE
- WALK PL
- SAWCUT IF SCORELINE
- EARTH OR CONCRETE FILL-IN CURB
- GUTTER

FILL-IN 5' (1500 mm) WIDE OR MORE
- IF LESS THAN 30"
- SAWCUT IF SCORELINE
- ENTIRE FILL-IN

WALK OR FILL-IN REPLACEMENT FOR EXCAVATIONS MADE NORMAL TO CURB OR PROPERTY LINE

WALK PL
- SAWCUT 30" (750 mm) MIN
- FILL-IN
- CURB
- GUTTER

THESE REQUIREMENTS ALSO APPLY TO ENDS OF PARALLEL EXCAVATIONS.

IF AN EXCAVATION FALLS WITHIN 30" (750 mm) OF AN EXPANSION JOINT, CONSTRUCTION JOINT, WEAKENED PLANE JOINT, OR EDGE, THE CONCRETE SHALL BE REMOVED AND REPLACED TO THE JOINT OR EDGE.

IF AN EXCAVATION FALLS WITHIN 12" (300 mm) OF A SCORELINE, THE CONCRETE SHALL BE REMOVED AND REPLACED TO THE SCORELINE. THE SCORELINE SHALL BE SAWCUT BEFORE CONCRETE REMOVAL. THE MINIMUM LENGTH OF REPLACEMENT IN BOTH CASES SHALL BE 30" (750 mm).
NOTES

1. CONCRETE WALK, FILL-IN AND DRIVEWAYS REMOVED IN CONNECTION WITH CONSTRUCTION SHALL BE REPLACED TO NEATLY SAWED EDGES. ALL CUTS SHALL BE PARALLEL TO OR PERPENDICULAR TO THE CURB; ON CURVES, THE CUT SHALL BE RADIAL TO THE CURB.

2. DRIVEWAY APRONS IN WHICH THE "W" DISTANCE IS LESS THAN 11' (3300 mm) SHALL BE REPLACED IN THEIR ENTIRETY IF CUT IN ANY AREA.

3. DRIVEWAY APRONS IN WHICH THE "W" DISTANCE IS 11' (3300 mm) OR MORE MAY BE CUT WITHIN THE "W" SECTION. THE MINIMUM REPLACEMENT SHALL BE 30" (750 mm) IN LENGTH. THE MINIMUM DISTANCE ALLOWED BETWEEN SUCH CUTS SHALL BE 14' (4200 mm).

4. DRIVEWAY APRONS IN WHICH THE "W" DISTANCE IS 11' (3300 mm) OR MORE MAY BE CUT IN THE "X" OR "R" SECTION. REPLACEMENT SHALL BE THE ENTIRE "X" OR "R" SECTION.

5. DRIVEWAY APRONS SHALL BE REPLACED FROM THE BACK OF THE CURB TO THE FRONT EDGE OF THE WALK, EXCEPT, WHERE WALK IS ADJACENT TO CURB, REPLACEMENT SHALL BE FROM BACK OF CURB TO BACK OF WALK.

6. WALK PORTIONS OF DRIVEWAYS SHALL BE REPLACED AS SHOWN ABOVE FOR EXCAVATIONS MADE PARALLEL OR NORMAL TO CURB.

7. REPLACEMENT OF THE "X" OR "R" SECTION SHALL MATCH EXISTING CONSTRUCTION.
A1-6(150) AND A1-8(200)

A2-6(150) AND A2-8(200)

A3-6(150) AND A3-8(200)

D1-6(150) AND D1-8(200)

C1-6(150) AND C1-8(200)

NOTES:

1. THE LAST NUMBER IN THE DESIGNATION IS THE CURB FACE (CF) HEIGHT, INCHES (mm).
2. GUTTER WIDTH, W, IS 24" (600 mm) UNLESS OTHERWISE SPECIFIED.
3. TYPES A1, A2, A3 AND C1 SHALL BE CONSTRUCTED FROM PCC.
4. TYPE D1 CURB SHALL BE CONSTRUCTED FROM ASPHALT CONCRETE.
5. TYPE C1 CURB SHALL BE ANCHORED WITH STEEL DOWELS AS SHOWN OR WITH AN EPOXY APPROVED BY THE ENGINEER.
6. ALL EXPOSED CORNERS ON PCC CURBS AND GUTTERS SHALL BE ROUNDED WITH A 1/2" (15 mm) RADIUS.

STANDARD PLAN FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC.

CURB AND GUTTER – BARRIER

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
NOTES:

1. THE LAST NUMBER IN THE DESIGNATION IS THE CURB FACE (CF) HEIGHT, INCHES (mm).

2. GUTTER WIDTH, W, IS 24" (600 mm) UNLESS OTHERWISE SPECIFIED.

3. TYPES B1, B2, B3 AND C2 SHALL BE CONSTRUCTED FROM PCC.

4. TYPE D2 CURB SHALL BE CONSTRUCTED FROM ASPHALT CONCRETE.

5. TYPE C2 CURB SHALL BE ANCHORED WITH STEEL DOWELS AS SHOWN OR WITH AN EPOXY APPROVED BY THE ENGINEER.

6. ALL EXPOSED CORNERS ON PCC CURBS AND GUTTERS SHALL BE ROUNDED WITH A 1/2" (15 mm) RADIUS.
LONGITUDINAL GUTTER

STREET SLOPE LESS THAN 4%

TYPICAL CROSS GUTTER PLAN

SECTION A-A

STREET SLOPE 4% OR GREATER

TYPICAL CROSS GUTTER PLAN

SECTION B-B

SECTION C-C

SECTION D-D

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CROSS AND LONGITUDINAL GUTTERS

STANDARD PLAN 122-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
WEAKENED PLANE JOINT OR OPTIONAL CONTACT JOINT PER NOTES 1, 2 AND 3

WEAKENED PLANE JOINTS PER NOTES 1 AND 2

WEAKENED PLANE JOINTS PER NOTES 1 AND 2

JOINT NEEDED WHEN W = 46' (14 m) OR MORE

(1500 mm) TYP CROSS GUTTER

5'

GUTTER

TYPICAL JOINT PLAN

NOTES:

1. WEAKENED PLANE AND/OR CONTACT JOINTS SHALL BE PLACED IN CURB AND GUTTER AT LOCATIONS SHOWN ON THE TYPICAL JOINT PLAN HEREON.

2. WEAKENED PLANE JOINTS SHALL BE PLASTIC CONTROL JOINTS OR 1-1/2" (40 mm) DEEP SAW CUTS. CONCRETE SAWING SHALL TAKE PLACE WITHIN 24 HOURS AFTER CONCRETE IS PLACED.

3. DOWELS FOR CONTACT JOINTS SHALL BE #4 BARS 18" LONG (#13 M BARS 450 mm LONG).

4. PLACE A WEAKENED PLANE OR CONTACT JOINT WHERE LONGITUDINAL ALLEY GUTTER JOINS CONCRETE ALLEY INTERSECTION.

5. ALL EXPOSED CORNERS ON PCC GUTTERS SHALL BE ROUNDED WITH 1/2" (15 mm) RADIUS.

6. CONCRETE SHALL BE INTEGRAL WITH CURB UNLESS OTHERWISE SPECIFIED.
NOTES:

1. WEAKENED PLANE JOINTS SHALL BE PLASTIC CONTROL JOINTS OR 1-1/2" (35 mm) DEEP SAW CUTS. CONCRETE SAWING SHALL TAKE PLACE WITHIN 24 HOURS AFTER CONCRETE IS PLACED.

2. DOWELS FOR CONTACT JOINTS SHALL BE #4 BARS 18" LONG (#13M BARS 450 mm LONG).

3. ALL EXPOSED CORNERS SHALL BE ROUNDED WITH 1/2" (15 mm) RADIUS.

4. CONCRETE SHALL BE INTEGRAL WITH CURB UNLESS OTHERWISE SPECIFIED.
1. For Case A, the radius of the curb return, R, is equal to the parkway width.

2. Alley intersection shall be PCC, Class 520-C-2500 (310-C-17), 6" (150 mm) thick. Curb shall be integral type "A".

3. Asterisks, *, show maximum grades.

---

**TABLE**

<table>
<thead>
<tr>
<th>W, ft</th>
<th>8' (2400mm)</th>
<th>10' (3000mm)</th>
<th>15' (4500mm)</th>
<th>20' (6000mm)</th>
<th>25' (7500mm)</th>
<th>30' (9000mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>d1, ft</td>
<td>0.33' (100 mm)</td>
<td>0.42' (125 mm)</td>
<td>0.63' (188 mm)</td>
<td>0.83' (250 mm)</td>
<td>1.04' (313 mm)</td>
<td>1.25' (375 mm)</td>
</tr>
<tr>
<td>d2, ft</td>
<td>0.17' (50 mm)</td>
<td>0.25' (75 mm)</td>
<td>0.25' (75 mm)</td>
<td>0.25' (75 mm)</td>
<td>0.25' (75 mm)</td>
<td>0.25' (75 mm)</td>
</tr>
</tbody>
</table>

---

**NOTES:**

1. For Case A, the radius of the curb return, R, is equal to the parkway width.

2. Alley intersection shall be PCC, Class 520-C-2500 (310-C-17), 6" (150 mm) thick. Curb shall be integral type "A".

3. Asterisks, *, show maximum grades.
NOTES:

1. DIMENSIONS: (UNLESS OTHERWISE SHOWN)
   - L = 85' (26 m)
   - T = 8" (200 mm)
   - W = 10' (3 m)
   - B = 6" (150 mm)

2. USE SECTION B—B FOR EXISTING CURB AND GUTTER THAT IS TO REMAIN.
   USE SECTION C—C FOR NEW CURB AND GUTTER.
   USE SECTION D—D FOR EXISTING CURB THAT IS TO REMAIN.
   USE SECTION E—E FOR EXISTING AC PAVEMENT.
   USE SECTION F—F FOR NEW AC PAVEMENT.

3. AT LOCATIONS WHERE PCC PAVEMENT WILL ABUT EXISTING CONCRETE, AN EPOXY APPROVED BY THE ENGINEER SHALL BE APPLIED TO THE EXISTING CONCRETE SURFACES PRIOR TO CONCRETE PLACEMENT.

4. IF B + T IS \( \geq 300 \text{ mm} \) (12"), CMB SHALL EXTEND UNDER NEW CURB AND GUTTER.

5. CONSTRUCT LONGITUDINAL WEAKENED—PLANE JOINT TO MATCH ADJOINING EXISTING GUTTER WIDTH, OR 2' (600 mm) IF NO ADJOINING GUTTER EXISTS.

6. USE 2"x4" (50x100) HEADER TO FORM 3-1/2" (90 mm) STEP. TOP OF HEADER SHALL BE SET TO LINE AND GRADE.

7. ALL EXPOSED PCC CORNERS SHALL BE ROUNDED WITH A 1/2" (15 mm) RADIUS.

8. SURFACE OF CONCRETE SHALL HAVE A ROUGH TRANSVERSE BROOM FINISH.

9. WHERE DESIGNATED BY THE ENGINEER, UNDESIRABLE SUBGRADE MATERIAL SHALL BE REMOVED AND REPLACED WITH CMB.

10. WHERE NEW CURB AND GUTTER IS CONSTRUCTED ADJACENT TO EXISTING SIDEWALK, SIDEWALK SHALL BE REMOVED AND REPLACED TO NEAREST SCORELINE.

11. CONSTRUCT TRANSVERSE WEAKENED PLANE JOINTS IN BUS PAD PAVEMENT AT APPROX. 10' (3 m) INTERVALS.

12. CONSTRUCT TRANSVERSE WEAKENED PLANE JOINTS IN BUS PAD PAVEMENT AT ALL EXISTING CURB/CURB & GUTTER CONSTRUCTION JOINTS AND WEAKENED—PLANE JOINTS.

EXISTING LONGITUDINAL JOINT

EXCAVATION

EXISTING TRANSVERSE JOINT

DIRECTION OF TRAFFIC

SAWCUTS PERPENDICULAR TO EXISTING JOINTS

EXIST PCC PAVEMENT

PCC, 520-A-2500 (310-A-17)

BACKFILL

TRENCH WIDTH

PLAN

REPLACEMENT SECTION

3' (900 mm) MIN

3' (900 mm) OR MORE

PCC REMOVAL AND REPLACEMENT

LESS THAN 3' (900 mm)

LESS THAN 3' (900 mm) OR MORE

MIN

(900 mm) MIN

(900 mm)

3'

1" (25 mm) SLOUGH

PER SSPWC 308-1/5.2

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CONCRETE PAVEMENT REPLACEMENT

STANDARD PLAN 132-3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE

SHEET 1 OF 2
NOTES:

1. THE EXTENT OF REPAIRS FOR CONCRETE CUTS NOT SHOWN ON THIS STANDARD OR CUTS MADE WITHIN 3' (900 mm) OF EXISTING PATCHES, CRACKS, OR DETERIORATED SLABS SHALL BE DETERMINED BY THE ENGINEER.

2. CONCRETE PAVEMENT SHALL BE REMOVED PER SSPWC 300-1.3.

3. BACKFILL AND DENSIFICATION SHALL CONFORM TO SSPWC 306-1.3.

4. TEMPORARY RESURFACING SHALL BE PLACED PER SSPWC 306-1.5.1.
CASE I – WITHOUT BASE

CASE II – WITH BASE

CASE III – AC PAVMT ON PCC PAVMT
NOTES:

1. BACKFILL AND DENSIFICATION SHALL CONFORM TO SSPWC 306-1.3.

3. TEMPORARY RESURFACING SHALL BE PLACED PER SSPWC 306-1.5.1.
NOTES:

1. LONGITUDINAL JOINTS SHALL BE LOCATED AS SHOWN ON PLAN. CONTACT OR WEAKENED PLANE JOINTS MAY BE USED AT THE CONTRACTOR'S OPTION.

2. TRANSVERSE WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED AT INTERVALS OF 15' (4500 mm) AND SHALL BE AT LEAST 5' (1500 mm) FROM ANY TRANSVERSE CONTACT JOINT. (SEE NOTE 5.)

3. TRANSVERSE CONTACT JOINTS SHALL BE CONSTRUCTED AS SHOWN HEREON AT ALL CONSTRUCTION JOINTS AND AS DIRECTED BY THE ENGINEER.

4. SPACE TIE BARS AT 36" (900 mm) ON-CENTER FOR TRANSVERSE JOINTS AND 45" (1200 mm) FOR LONGITUDINAL JOINTS. PLACE IN MIDDLE THIRD OF SLAB.

5. SEE SSPWC 302-6.5 FOR DETAILS ON CONCRETE PAVEMENT JOINTS.

6. CONSTRUCT CONTACT JOINTS IN THE APPROACH SLABS AT THE FIRST THREE TRANSVERSE JOINTS OF CONCRETE INTERSECTIONS.
The formula provided is: \[ Y = 2.25W \left( \frac{X^2}{L} \right) \]

where:
- \( Y \) = Offset from base line
- \( L \) = Length of taper (in feet or meters)
- \( W \) = Maximum offset distance
- \( X \) = Distance along base line

### Table: Distance X, L/12 Increments, ft (m)

<table>
<thead>
<tr>
<th>L, ft (m)</th>
<th>DISTANCE X, L/12 INCREMENTS, ft (m)</th>
<th>W, ft (mm)</th>
<th>OFFSET Y, ft (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' (18.00)</td>
<td>5' (1.50) 10' (3.00) 15' (4.50) 20' (6.00) 25' (7.50) 30' (9.00) 35' (10.50) 40' (12.00) 45' (15.00) 50' (16.50) 55' (18.00) 60' (18.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72' (21.60)</td>
<td>6' (1.80) 12' (3.60) 18' (5.40) 24' (7.20) 30' (9.00) 36' (10.80) 42' (12.60) 48' (14.40) 54' (16.20) 60' (18.00) 66' (19.80) 72' (21.60)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90' (27.00)</td>
<td>7.5' (2.25) 15' (4.50) 22.5' (6.75) 30' (9.00) 37.5' (11.25) 45' (13.50) 52.5' (15.75) 60' (18.00) 67.5' (20.25) 75' (22.50) 82.5' (24.75) 90' (27.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120' (36.00)</td>
<td>10' (3.00) 20' (6.00) 30' (9.00) 40' (12.00) 50' (15.00) 60' (18.00) 70' (21.00) 80' (24.00) 90' (27.00) 100' (30.00) 110' (33.00) 120' (36.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150' (45.00)</td>
<td>12.5' (3.75) 25' (7.50) 37.5' (11.25) 50' (15.00) 62.5' (18.75) 75' (22.50) 87.5' (26.25) 100' (30.00) 112.5' (33.75) 125' (37.50) 137.5' (41.25) 150' (45.00)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Diagram:

The diagram illustrates a median taper with a tangent and parabolic curves. The taper is described for portions AB' and C'D', which are parabolic curves. The portion B'C' is tangent. When the base line is curved, the offsets are applied to the curved base line, and B'C' is no longer a tangent.

### Note:

To determine offset distance for any length of taper, use the formula \( Y = 2.25W \left( \frac{X^2}{L} \right) \) for the portions AB' and C'D' which are parabolic curves. The portion B'C' is a tangent. When the base line is curved, the offsets are applied to the curved base line, and B'C' is no longer a tangent.
L = LENGTH OF FLARE  
W = MAXIMUM OFFSET DISTANCE  
X = DISTANCE ALONG BASE LINE  
Y = OFFSET FROM BASE LINE  
T = TANGENT LENGTH  
R = RADIUS OF NOSE  
θ = MAXIMUM FLARE DEFLECTION ANGLE

\[ Y = W \left( \frac{X}{L} \right)^2 \]

IF STATION OF RADIUS POINT IS NOT GIVEN ON PLAN, TANGENT DISTANCE T MAY BE IGNORED

<table>
<thead>
<tr>
<th>L, ft (m)</th>
<th>W, ft (m)</th>
<th>X, ft (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10' (3.0)</td>
</tr>
<tr>
<td>25' (7.5)</td>
<td>5' (1500)</td>
<td>0.60' (240)</td>
</tr>
<tr>
<td>50' (1500)</td>
<td>10' (3000)</td>
<td>0.40' (160)</td>
</tr>
<tr>
<td>50' (1500)</td>
<td>15' (4500)</td>
<td>0.20' (80)</td>
</tr>
<tr>
<td>100' (3000)</td>
<td>20' (6000)</td>
<td>0.10' (40)</td>
</tr>
<tr>
<td>100' (3000)</td>
<td>25' (7500)</td>
<td>0.07' (28)</td>
</tr>
</tbody>
</table>

W/L = 1:5

<table>
<thead>
<tr>
<th>L, ft (m)</th>
<th>W, ft (m)</th>
<th>X, ft (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45' (13.5)</td>
<td>3' (900)</td>
<td>0.15' (60)</td>
</tr>
<tr>
<td>75' (22.5)</td>
<td>5' (1500)</td>
<td>0.09' (36)</td>
</tr>
<tr>
<td>90' (27.0)</td>
<td>6' (1800)</td>
<td>0.07' (28)</td>
</tr>
</tbody>
</table>

W/L = 1:15

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MEDIAN FLARE

STANDARD PLAN 141-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
RIW ~ I PIPE PER IMPROVEMENT OR GRADING PLAN

MAX. SLOPE 1:1

HINGE COVER AT TOP OF FRAME

RECTANGULAR FRAME AND COVER PER SPPWC 152

SEE NOTE 1

(75 mm)

1° (150 mm), TYP

(600 mm)

A ° I ~ I ~eF

~* 1'~~ ~~ (150 mm). TYPR/W LINE

A (600 mm)

CASE I INLET

FRAME & GRATE — NOTE 9

SEE NOTE 5

RAW FRAME & GRATE — NOTE 9

(10 mm) (15 mm E, ~ 21° 600 mm

SEE CURB PROFILES BELOW RIGHT PLAN

CURB & GUTTER UP TO CURB PROF. E ~ 1/2' (150 mm) CURB FACE

PARKWAY WIDTH PER IMPROVEMENT PLAN

FINISHED PARKWAY GRADE

PCC WALK, 8° (200 mm) CF - NOTE 4

PCC WALK, 6° (150 mm) CF - NOTE 4

GALV WIRE FABRIC - NOTE 10

SEE INLET DETAILS

GUTTER TO MATCH EXISTING

SECTION A-A

CURB DRAIN

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

150-3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE 1984


SHEET 1 OF 2
NOTES

1. IF THE TOP OF SLOPE IS ALLOWED WITHIN THE R/W, INLET CASE I BEGINS AT THE TOP RATHER THAN THE R/W LINE.

2. FOR OPEN DITCH (CASE INLET III), THE 24" (600 mm) EXTENSION BEYOND THE R/W LINE IS NOT REQUIRED WHEN BACK OF WALK IS 24" (600 mm) OR MORE FROM THE R/W LINE; HOWEVER, PIPE SHALL EXTEND TO R/W LINE.

3. TOP OF INLET STRUCTURE (CASE I AND II) TO BE FLUSH WITH ADJACENT SURFACE WHERE PRACTICAL.

4. CONSTRUCT PCC WALK WHEN SPECIFIED ON PLANS. THE CONTRACT PRICE PAID FOR PCC WALK ITEM SHALL INCLUDE WALK CONSTRUCTED IN CONJUNCTION WITH PARKWAY CULVERT.

5. "N" EQUALS NUMBER OF PIPES (MAXIMUM OF THREE) AS SPECIFIED ON PLANS.

6. INLET CASE TO BE SPECIFIED ON PLANS.

7. ANGLE A EQUALS 0', UNLESS OTHERWISE SPECIFIED.

8. TYPE, DIMENSIONS AND ELEVATIONS OF P.C.C. CURB AND GUTTER PER PLANS.

9. UNLESS OTHERWISE SPECIFIED, FRAME AND GRATE FOR CASE II INLET SHALL BE GALVANIZED CAST IRON. WEIGHT OF FRAME AND GRATE SHALL BE 80 LBS (36 kg).

10. AT LOCATIONS WITH LESS THAN 8" (200 mm) CURB FACE, USE 6x6-10/10 (152x152-MW9.1xMW9.1) GALVANIZED WIRE FABRIC. WIRE FABRIC SHALL EXTEND 8" (200 mm) BEYOND THE EDGE OF CAST IRON PIPES.

---

**Grate for Case II Inlet**

- Top of Grate
- Open Area 52%
- Section Thru Frame

---

**Standard Plans for Public Works Construction**

**Curb Drain**

**Standard Plan**

150-3

**Sheet 2 of 2**
NOTES

1. FLOOR OF BOX SHALL BE TROWELED SMOOTH.

2. IF THE TOE OF SLOPE IS ALLOWED WITHIN THE R/W, INLET TYPE 1 BEGINS AT THE TOE RATHER THAN AT THE R/W LINE.

3. FOR OPEN DITCH (TYPE 2), THE 24" (600 mm) EXTENSION BEYOND THE R/W LINE IS NOT REQUIRED WHEN BACK OF WALK IS 24" (600 mm) OR MORE FROM THE R/W LINE; HOWEVER, THE PIPE SHALL EXTEND TO THE R/W LINE IN ANY EVENT.

4. TOP OF INLET STRUCTURE (TYPE 1 & 2) SHALL BE FLUSH WITH ADJACENT SURFACE WHERE PRACTICAL.

5. A HEADED STEEL STUD 5/8" x 6-3/8" WITH A 1" HEAD (16 x 160 mm, 25 mm HEAD) ATTACHED BY A FULL PENETRATION BUTT WELD MAY BE USED AS AN ALTERNATE ANCHOR.

6. NORMAL CURB FACE AT POINT M AND Q. CURB FACE IS B + 5" (125 mm) AT POINT N AND P.

7. THE 3" (75 mm) LEG OF THE 5/8" (16 mm) DIA ANCHORS SHALL BE PARALLEL TO THE TOP OF SIDEWALK.

8. SLOPE = 2.0%. 
RECTANGULAR FRAME AND COVER

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

152-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBLOW COMMITTEE
1963
REV. 1998, 2009

SHET 1 OF 2
NOTES

1. FRAME AND COVER SHALL BE CAST IRON.

2. A PLAIN 1/4" (6 mm) BORDER SHALL BE TYPICAL FOR ALL BORDERS ON FRAME AND COVER.

3. ALL CASTING RADII SHALL BE 1/4" (6 mm) UNLESS OTHERWISE SHOWN.

4. WEIGHT OF FRAME AND COVER SHALL BE 43 LBS (19.5 kg).

5. USE ONE 3/8"-16x1" STAINLESS STEEL SOCKET CAP SCREW. APPLY HIGH ADHESIVE, OPEN GEAR GREASE TO THREADED PORTION PRIOR TO INSERTION.

6. USE 4" x 4" (102 mm x 102 mm) CAST ALUMINUM LINK HINGE WITH SST PIN FOR 180° OPENING.
TWO-WAY LEFT TURN LANES

DETAIL 31

DETAIL 32

CHANNELIZING LINE

DETAIL 38

BIKE LANE LINE

DETAIL 39

INTERSECTION LINE

BIKE LANE

DETAIL 39A

LANE LINE EXTENSIONS

THROUGH INTERSECTIONS

DETAIL 40

CENTER LINE EXTENSIONS

THROUGH INTERSECTIONS

DETAIL 41

DIMENSIONS

A = 7'-0" (2.10 m)
B = 8'-6" (2.55 m)
C = 12'-0" (3.60 m)
D = 17'-0" (5.10 m)
LEGEND

MARKERS
- TYPE A WHITE NON-REFLECTIVE
- TYPE AY YELLOW NON-REFLECTIVE
- TYPE B CLEAR TWO-WAY RETROREFLECTIVE
- TYPE RED/CLEAR RETROREFLECTIVE
- TYPE D YELLOW TWO-WAY RETROREFLECTIVE
- TYPE G CLEAR ONE-WAY RETROREFLECTIVE
- TYPE H YELLOW ONE-WAY RETROREFLECTIVE
- TYPE I BLUE TWO-WAY RETROREFLECTIVE

LINES
- 4" WHITE
- 4" YELLOW
- DIRECTION OF TRAVEL

MARKER DETAILS
STREETS WITHOUT LANE STRIPING

STREETS WITH CENTER LINE OR SINGLE LANE STRIPING

STREETS WITH MULTIPLE LANE STRIPING

AT DRIVEWAY OR SOME DISTANCE FROM STREET

FIRE HYDRANT MARKERS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PAVEMENT MARKERS AND TRAFFIC LINES
6' -0" (1.83 m)  1' -0" x 1' -0" GRID (305 x 305 mm)  A = 15 FT² (1.39 m²)  TYPE II (L) ARROW  (FOR TYPE II (R) ARROW, USE MIRROR IMAGE)

7' -3"  1' -0" (2.21 m)  1' -0" x 1' -0" GRID (305 x 305 mm)  A = 27 FT² (2.51 m²)  TYPE III (L) ARROW  (FOR TYPE III (R) ARROW, USE MIRROR IMAGE)

1' -0"  3' -6" (305 mm)  10' -0" (1.065 m)  A = 14 FT² (1.30 m²)  TYPE I 10' (3 m) ARROW

6" x 6" GRID  (150 x 150 mm)  A = 7 FT² (0.65 m²)  BIKE LANE ARROW

4" x 8" GRID  (100 x 200 mm)  4" x 4" GRID  (100 x 100 mm)  BIKE LANE SYMBOL

A = 17.5 FT² (1.63 m²)  A = 16.5 FT² (1.53 m²)  A = 19.5 FT² (1.81 m²)  NUMERALS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PAVEMENT MARKINGS
ARROWS AND SYMBOLS

STANDARD PLAN
171-0

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
NOTES:

1. IF A MESSAGE CONSISTS OF MORE THAN ONE WORD, IT SHALL READ "UP"; THAT IS, THE FIRST WORD SHALL BE NEAREST THE DRIVER.

2. THE SPACE BETWEEN WORDS SHALL BE AT LEAST FOUR TIMES THE HEIGHT OF THE CHARACTERS FOR LOW SPEED ROADS, BUT NOT MORE THAN TEN TIMES THE HEIGHT OF THE CHARACTERS. THE SPACE MAY BE REDUCED APPROPRIATELY WHERE THERE IS LIMITED SPACE BECAUSE OF LOCAL CONDITIONS.

3. MINOR VARIATIONS IN DIMENSIONS MAY BE ACCEPTED BY THE ENGINEER.

4. PORTIONS OF A LETTER, NUMBER, OR SYMBOL MAY BE SEPARATED BY CONNECTING SEGMENTS NOT TO EXCEED 2" (50 mm) IN WIDTH.
4" x 8" GRID (100 x 200 mm)

STOP
A = 22 FT² (2.04 m²)

SLOW
A = 23 FT² (2.14 m²)

WAIT
A = 19 FT² (1.77 m²)

YIELD
A = 24 FT² (2.23 m²)

TURN
A = 24 FT² (2.23 m²)

HERE
A = 26 FT² (2.42 m²)

ONLY
A = 22 FT² (2.04 m²)

XING
A = 21 FT² (1.95 m²)

LEFT
A = 19 FT² (1.77 m²)

RIGHT
A = 26 FT² (2.42 m²)

WY
A = 16 FT² (1.49 m²)

PED
A = 18 FT² (1.67 m²)

SIGNAL
A = 32 FT² (2.97 m²)

NO SIGNAL
A = 14 FT² (1.30 m²)

DISABLED PERSONS PARKING SYMBOL

A (WHITE) = 9 FT² (0.84 m²)
A (BLUE) = 14 FT² (1.30 m²)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PAVEMENT MARKINGS
ARROWS AND SYMBOLS

STANDARD PLAN
171-0
SHEET 3 OF 5
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PAVEMENT MARKINGS, ARROWS AND SYMBOLS

STANDARD PLAN 171-0

SHEET 4 OF 5
4" x 8" GRID
(100 x 200 mm)

A = 24 FT² (2.23 m²)

A = 21 FT² (1.95 m²)

2'—D" (610 mm)
x WIDTH OF LANE

A = 23 FT² (2.14 m²)

A = 20 FT² (1.86 m²)

A = 17 FT² (1.58 m²)

A = 11 FT² (1.02 m²)

1'—D" x 1'—D" GRID
(305 x 305 mm)

A = 70 FT² (1.86 m²)*

* DOES NOT INCLUDE THE 2'-0" (610 mm)
TRANSVERSE LINES.

RAILROAD CROSSING SYMBOL

DIAMOND SYMBOL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PAVEMENT MARKINGS
ARROWS AND SYMBOLS

STANDARD PLAN 171-0

SHEET 5 OF 5
12'' WHITE
(300 mm)

-20' (7 m) RED CURB
OR SEE PLANS

LEGEND SHALL BE CENTERED
ON THE TRAFFIC LANE
EXCLUDING PARKING
AND/OR BIKE LANE

50' MIN
(15.0 m)

8' (2.4 m)

DETAIL 22 OR
SEE PLANS

STOP AND STOP BAR

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STOP AND STOP BAR

STANDARD PLAN

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
2011

172-0

SHEET 1 OF 1
1. Arrows shall be installed at the beginning of all left turn and right turn pockets.

2. Arrows shall optionally be installed at the end of left and right turn pockets 100' (30 m) or more in length.
NOTES:
1. ALL CROSSWALKS SHALL BE WHITE UNLESS NOTED OTHERWISE ON THE PLANS.
2. CASE II SHALL BE USED ONLY IF THE 5' (1.5 m) MINIMUM DIMENSION FOR CASE I CANNOT BE MAINTAINED.
3. CASE I SHALL BE USED WITH 90° DELTA AND 25' (7.5 m) OR GREATER CURB RETURN RADIUS.
NOTES:

1. LEGEND SHALL BE INSTALLED IN EACH TRAFFIC LANE APPROACHING A SCHOOL OR PEDESTRIAN CROSSING UNLESS THE PLANS SHOW A DOUBLE SET OF LEGEND MARKINGS INSTALLED IN ONE EXCEPTIONALLY WIDE LANE.

2. LEGEND SHALL BE CENTERED ON THE TRAFFIC LANE EXCLUDING PARKING AND/OR BIKE LANE.

3. MINIMUM RED CURB ON APPROACH CROSSWALK SHALL BE 25' (7.5 m), WITH 15' (4.5 m) ON DEPARTURE LEGS.

4. ALL SCHOOL AND PEDESTRIAN WARNING SIGNS (W54, W54A, W63, SW24, SW25 and SR4) SHALL BE HIGH-VISIBILITY FLOURESCENT YELLOW-GREEN.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PEDESTRIAN CROSSINGS

175-0

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
TYPE F, CLASS 2 DELINEATORS
EACH 200 FT (60 m)
3 MINIMUM

TYPE IV ARROWS

CENTER DIVIDER

ADVANCE PLACEMENT DISTANCE, d

EDGE OF TRAVELED WAY

LANE DROP
SPEED 40 MPH
(65 km/H)
OR LESS

LANE DROP
SPEED 45 MPH
(70 km/H)
OR MORE

R4-1 NOT USED WHERE TWO OR MORE LANES REMAIN BEYOND LANE DROP

SEE PLANS FOR DIMENSIONS d, L, AND W

SEE SHEET 2 FOR MUTCD (CA) GUIDELINES FOR DISTANCE d

NOT TO SCALE
**LEFT TRAP LANE**

**W73A(CA)(L)**

**DETAIL 37B OR 37C**

**R3-7(L)**

**CURB LINE**

**NOT TO SCALE**

**SEE PLANS FOR DIMENSION d, ADVANCE PLACEMENT DISTANCE**

**POST SIGNS IN MEDIAN WHERE POSSIBLE**

**MUTCD (CA) EXCERPT:**

"TYPICAL CONDITIONS ARE LOCATIONS WHERE THE ROAD USER MUST USE EXTRA TIME TO ADJUST SPEED AND CHANGE LANES IN HEAVY TRAFFIC BECAUSE OF A COMPLEX DRIVING SITUATION. TYPICAL SIGNS ARE MERGE AND RIGHT LANE ENDS. THE DISTANCES ARE DETERMINED BY PROVIDING THE DRIVER A PIEV TIME OF 14.0 TO 14.5 SECONDS FOR VEHICLE MANEUVERS (2001 AASHTO POLICY, EXHIBIT 3-3, DECISION SIGHT DISTANCE, AVOIDANCE MANEUVER E) MINUS THE LEGIBILITY DISTANCE OF 175 FEET OF THE APPROPRIATE SIGN."

---

**RIGHT TRAP LANE**

**W73A(CA)(R)**

**DETAIL 37B OR 37C**

**W4-7(R)**

---

**MUTCD (CA) GUIDELINES FOR ADVANCE PLACEMENT DISTANCE**

<table>
<thead>
<tr>
<th>POSTED OR 85th PERCENTILE SPEED</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mph</td>
<td>225'  (59 m)</td>
</tr>
<tr>
<td>25 mph</td>
<td>325'  (99 m)</td>
</tr>
<tr>
<td>30 mph</td>
<td>450'  (137 m)</td>
</tr>
<tr>
<td>35 mph</td>
<td>550'  (168 m)</td>
</tr>
<tr>
<td>40 mph</td>
<td>650'  (198 m)</td>
</tr>
<tr>
<td>45 mph</td>
<td>750'  (229 m)</td>
</tr>
<tr>
<td>50 mph</td>
<td>850'  (259 m)</td>
</tr>
<tr>
<td>55 mph</td>
<td>950'  (290 m)</td>
</tr>
<tr>
<td>60 mph</td>
<td>1100' (335 m)</td>
</tr>
<tr>
<td>65 mph</td>
<td>1200' (366 m)</td>
</tr>
<tr>
<td>70 mph</td>
<td>1250' (381 m)</td>
</tr>
<tr>
<td>75 mph</td>
<td>1350' (411 m)</td>
</tr>
</tbody>
</table>
NOTE:

ALL BICYCLE STRIPING AND MARKINGS SHALL BE WHITE REFLECTIVE PAINT EXCEPT AS NOTED FOR TWO-WAY BIKE PATH.
WHEN REQUIRED—SEE PLANS

STANDARD SPACE DETAIL

LOADING AREA

 Accessible space detail

60° DIAGONAL SPACE DETAIL

* LOADING AREA SHALL BE 8' (2.40 m) WIDE ADJACENT TO VAN ACCESSIBLE PARKING SPACES — SEE PLANS.

NOTES:

1. STRIPING SHALL BE 4" (100 mm) WIDE WHITE NON-REFLECTORIZED PAINT, EXCEPT AS SHOWN. PAVEMENT MARKINGS SHALL ALSO BE NON-REFLECTORIZED PAINT.

2. SIGNS SHALL CONFORM TO SECTION 56, SIGNS, OF THE STATE STANDARD SPECIFICATIONS, AND THE STATE SPECIFICATIONS FOR ALUMINUM SINGLE SHEET PANEL SIGNS.

3. SEE LOCAL ZONING CODE FOR REQUIREMENTS FOR USAGE OF COMPACT AND ACCESSIBLE PARKING SPACES AND LOT LAYOUT.

PARKING LOT STRIPING & SIGNING

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC.
GREENBROOK COMMITTEE 2011

STANDARD PLAN

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
DISABLED—ACCESSIBLE PARKING SIGNS

Note: Not for street use
SECTION 2

Sewers and Sanitation
PLAN
SHOWING BASE

MANHOLE FRAME AND
COVER PER
SPPWC 210

ONE 3" (75 mm) ADJUSTING
RING (OPTIONAL)

REDUCER RING

STEPS PER
SPPWC
635 OR 636
WITH LEGS
SHORTENED
TO FIT

24" (600 mm)
MAX. - 12"
(300 mm) MIN
IF DEPTH
OF MANHOLE
PERMITS

STEPS TO
INLET

OUTLET

SECTION A-A

ADJUSTING
RING DETAIL

TAPERED CONE

MORTAR NOT MORE THAN 3/8"
(10 mm) THICK OR APPROVED
JOINT SEALING COMPOUND

JOIN DETAIL
NON-REINFORCED

REDUCER RING AND
ADJUSTING RINGS

INLET

OUTLET

INLET

OUTLET

CLASS 330-C-23
(560-C-3250)
CONCRETE
IN BASE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST CONCRETE
SEWER MANHOLE

STANDARD PLAN
200-3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1994

SHEET 1 OF 2
NOTES:

1. EXCEPT AS NOTED HEREON, THE PRECAST UNITS SHALL BE MANUFACTURED AND TESTED IN ACCORDANCE WITH ASTM C 478. AS AN ALTERNATE CURING METHOD, THE UNITS MAY BE CURED USING SATURATED STEAM FOR A MINIMUM OF 12 HOURS FOLLOWED BY 6 DAYS OF WATER CURING OR MEMBRANE CURING. IF THE UNITS ARE CURED BY THE ALTERNATE METHOD, THEY SHALL NOT BE SHIPPED PRIOR TO 8 DAYS AFTER CASTING NOR UNTIL THE CONCRETE HAS ATTAINED A STRENGTH OF 3500 PSI (25 MPa).

2. MANHOLE STEPS SHALL CONFORM TO SPPWC 635 TYPE 1 OR 3 OR SPPWC 636. THE MANHOLE STEPS SHALL BE UNIFIED SPACED AT A MAXIMUM OF 16" (400 mm). THE LOWEST STEP SHALL BE PLACED NOT LESS THAN 8" (200 mm) NOR MORE THAN 18" (450 mm) ABOVE THE SHELF. THE STEPS SHALL PROJECT 5" (125 mm) INSIDE THE MANHOLE.

3. RISER SECTIONS MAY BE REINFORCED OR UNREINFORCED. REINFORCED SECTIONS SHALL BE REINFORCED IN ACCORDANCE WITH ASTM C 478 AND SHALL HAVE A MINIMUM WALL THICKNESS OF 5" (125 mm). UNREINFORCED RISER SECTIONS SHALL HAVE A MINIMUM WALL THICKNESS OF 6" (150 mm).

4. THE 24"x48" (600 mm x 1200 mm) ECCENTRIC CONES MAY BE REINFORCED OR UNREINFORCED. IF REINFORCED, THE WALL THICKNESS SHALL BE NOT LESS THAN 5" (125 mm). IF UNREINFORCED, THE WALL THICKNESS SHALL NOT BE LESS THAN 6" (150 mm).

5. JOINTS SHALL BE TONGUE AND GROOVE. JOINTS FOR REINFORCED STRUCTURES SHALL CONFORM WITH ASTM C 478 SECTION 14.

6. PRECAST UNITS SHALL BE ASSEMBLED USING CLASS "B" MORTAR.

7. IF 30" (762 mm) DIAMETER MANHOLE FRAME AND COVER IS REQUIRED, IT SHALL BE INSTALLED WHERE THE REDUCER RING IS SHOWN IN THE SECTION.

8. FOR REINFORCED PRECAST STRUCTURES, ALL REINFORCEMENT SHALL HAVE A MINIMUM OF 2" (50 mm) OF COVER OVER THE STEEL ON THE INSIDE FACE.


10. CONCRETE BASE AND STUB WALLS SHALL BE POURED IN ONE OPERATION TO A POINT 2" (50 mm) ABOVE THE INLET AND OUTLET PIPES. ALL PIPES SHALL BE RIGIDLY SUPPORTED BY TEMPORARY PIERS OR OTHER METHODS DURING THE OPERATION. CONCRETE SHALL SET FOR 24 HOURS BEFORE PLACING PRECAST UNITS.
FRAME & COVER PER SPPWC 632

MORTAR, 3" (75 mm) MAX

ADJUSTING RINGS AS REQUIRED

30" (750 mm) DIA

TAPERED CONE MIN (450 mm) MAX

24" (600 mm) MIN (450 mm) MAX

W

PCC BASE, 560-B-3250 (330-B-33)

UNDISTURBED EARTH

SECTION A-A

INLET

OUTLET

SHELF

BASE MAY BE SQUARE OR ROUND

SHELF SLOPE 1:12

EXCEPT AS SHOWN HEREON, MANHOLES SHALL CONFORM TO SPPWC 200.

SECTION B-B

PLAN

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST CONCRETE SHALLOW MANHOLE

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

201-2

SHEET 1 OF 1
NOTES:

1. EXCEPT AS SHOWN ON THIS PLAN, MANHOLES SHALL CONFORM TO SPPWC 200 OR 203.

2. PIPE FOR THE DROP INLET SHALL BE THE SAME MATERIAL AS THE SEWER UNLESS APPROVED ADAPTERS ARE USED. IF SO, THE PIPE MAY BE VCP, ABS SOLID WALL, ABS COMPOSITE, PVC PLASTIC, OR POLYETHYLENE.

3. FOR BRICK MANHOLES, A BRICK ARCH IS ALSO REQUIRED OVER THE UPPER INLET PIPE.

4. IF TWO OR MORE DROP INLETS ARE REQUIRED IN A SINGLE MANHOLE, EACH SHALL BE CONSTRUCTED SEPARATELY.
COVER AND FRAME PER SPPWC 210

1/2" (15 mm) MIN, 3 1/4" 80 mm MAX, BUT MAX MAY BE EXCEEDED ON SLOPES

ROWLOCK COURSE

CLASS D MORTAR, 1/2" (15 mm)

CLASS B MORTAR

STEP PER SPPWC 635

STRETCHER COURSE (BEHIND)

(CHANNEL NOT SHOWN)

PCC BASE / 560-C-3250 (330-C-23)

BASE COURSE (FAN)

SOLDIER COURSE

ARCH

24" (600 mm) MAX

310" (800 mm) MIN

 SECTION A-A

(1150 mm) MIN

310" (800 mm)

UNDISTURBED EARTH

SECTION B-B

STRETCHER COURSE

SOLDIER COURSE

BASE COURSE

CHANNEL

TYPICAL SECTION

PLAN

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1993
REV. 2006, 2009

BRICK SEWER MANHOLE

STANDARD PLAN

203-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
NOTES:

1. CONCRETE BASE: DURING CONSTRUCTION, ALL PIPES SHALL BE RIGIDLY SUPPORTED BY BRICK PIERS 12" (300 mm) DEEP, LOCATED JUST OUTSIDE THE STRUCTURE. CONSTRUCT TOP OF CONCRETE BASE 2" (50 mm) BELOW INVERT OF LOWEST PIPE. FILL SPACE BENEATH PIPE WITH MORTAR AND SHOVE FROM BOTH SIDES WITH BASE COURSE BRICK TO FORM A WATER-TIGHT JOINT.

2. BASE OF FAN COURSE: LAY BRICK FLAT ON RADIAL LINES WITH TOPS TO SAME LEVEL.

3. ARCHES: LAY SPALLED BRICK ON EDGE TO FORM A TRUE RADIAL ARCH WITH FULL MORTAR JOINT AROUND ALL PIPE OPENINGS. TURN ARCH OF TWO SUCH COURSES OVER PIPES 15" (375 mm) OR MORE IN DIAMETER.

4. SOLDIER COURSES: LAY INSIDE BRICK ON RADIAL LINES WITH FIRST FOUR COURSES VERTICAL. LAY SUCCEEDING COURSES WITH A UNIFORM BATTER TO OBTAIN AN INSIDE DIAMETER OF 24" (600 mm) AT TOP OF LAST OR FRACTIONAL SOLDIER COURSE. USE SPLIT BRICK TO CLOSE SOLDIER COURSE.

5. STRETCHER COURSES: LAY OUTSIDE BRICK FLAT IN A DEEP BED OF MORTAR. SHOVE BRICK TOGETHER AGAINST ADJACENT SOLDIER COURSE.

6. ROWLOCK COURSE: LAY LAST COURSE OF BRICK ON EDGE ACROSS SOLDIER AND STRETCHER COURSES ON RADIAL LINES, WITH TOPS PARALLEL AND 4 1/2" (120 mm) BELOW FINISHED GRADE.

7. JOINTS: INSIDE JOINTS SHALL BE NEATLY STRUCK AND SHALL NOT EXCEED 3/8" (10 mm) IN THICKNESS.

8. STEPS: MANHOLE STEPS SHALL CONFORM WITH SPPWC 635 TYPE 3. THE TOP STEP SHALL BE PLACED JUST UNDER THE MANHOLE FRAME. THE LOWEST STEP SHALL BE PLACED BETWEEN 8" (200 mm) AND 24" (600 mm) ABOVE THE SHELF.

9. WALL THICKNESS: BRICKWORK SHALL BE 8" (200 mm) THICK TO A DEPTH OF 22' (6.5 m). BRICKWORK BELOW 22' (6.5 m) DEEP SHALL BE 12" (300 mm) THICK.

10. A FLEXIBLE JOINT SHALL BE INSTALLED AT THE FIRST JOINT FROM MANHOLE FOR ALL CONNECTIONS EXCEPT THOSE WITH REINFORCED CONCRETE PIPE.
ACCESS COVER

SECTION A-A

ACCESS FRAME

SECTION B-B

SECTION C-C

ACCESS FRAME & COVER
ACCESS CAP 11" (275 mm) DIA x 1/2" (15 mm) THICK w/ 3/4" (20 mm) FINGER HOLE

SECTION D-D

TERMINAL CLEANOUT STRUCTURE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION


STANDARD PLAN

TERMINAL CLEANOUT STRUCTURE

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

204-2 SHEET 1 OF 2
NOTES:

1. SEE PLANS FOR VALUES OF DIMENSION D AND ELEVATION E.

2. PIPE AND FITTINGS, UNLESS OTHERWISE NOTED, SHALL BE OF THE SAME MATERIALS AS THE SEWER, UNLESS APPROVED ADAPTORS ARE USED, AND MAY BE ANY OF THE FOLLOWING:
   A. VC PIPE
   B. PE PIPE
   C. ABS SOLID WALL PIPE
   D. ABS COMPOSITE PIPE
   E. PVC PLASTIC PIPE

3. PIPE AND FITTINGS SHALL BE BEDDED AND ENCASED IN PCC AS SHOWN. PCC SHALL BE CLASS 450-C-2000(265-C-14). JOIN AND ALIGN PIPE AND FITTINGS BEFORE PLACING CONCRETE. MAINTAIN ALIGNMENT WHILE PLACING AND ALLOWING PCC TO SET.

4. THE ACCESS FRAME, COVER AND CAP SHALL BE CAST IRON. THE FINGER HOLES MAY BE DRILLED OR BLOCKED OUT PRIOR TO CASTING. THEY SHALL NOT BE PUNCHED OUT.

5. THE CONTRACTOR MAY PLACE EITHER CIRCULAR OR SQUARE CONCRETE PIPE WALL SUPPORTS.
INSTALL MANHOLE FRAME AND COVER (SEE NOTE 1C) FOR PROPOSED GRADE OR TOP OF MANHOLE.

EXISTING GRADE OR TOP OF EXISTING MANHOLE (SEE NOTE 1B).

REMOVE EXISTING BRICKWORK TO AN ELEVATION AT WHICH INSIDE DIAMETER OF EXISTING MANHOLE IS NOT LESS THAN 30" (750 mm).

RAISING EXISTING PRECAST CONCRETE SEWER MANHOLES.

LOWER MANHOLE FRAME AND COVER (SEE NOTE 1C) FOR PROPOSED GRADE OR TOP OF MANHOLE.

EXISTING GRADE OR TOP OF EXISTING MANHOLE (SEE NOTE 1B).

REMOVE EXISTING BRICKWORK TO AN ELEVATION AT WHICH UPPER PORTION OF MANHOLE CAN BE RECONSTRUCTED ON A TAPER NOT TO EXCEED TWO HORIZONTAL TO FIVE VERTICAL.

LOWER MANHOLE FRAME AND COVER (SEE NOTE 1C) FOR PROPOSED GRADE OR TOP OF MANHOLE.

EXISTING GRADE OR TOP OF EXISTING MANHOLE (SEE NOTE 1B).

REMOVE EXISTING BRICKWORK TO AN ELEVATION AT WHICH INSIDE DIAMETER OF EXISTING MANHOLE IS NOT LESS THAN 30" (750 mm).

RAISING EXISTING PRECAST CONCRETE SEWER MANHOLES.

LOWER MANHOLE FRAME AND COVER (SEE NOTE 1C) FOR PROPOSED GRADE OR TOP OF MANHOLE.

EXISTING GRADE OR TOP OF EXISTING MANHOLE (SEE NOTE 1B).

REMOVE EXISTING BRICKWORK TO AN ELEVATION AT WHICH INSIDE DIAMETER OF EXISTING MANHOLE IS NOT LESS THAN 30" (750 mm).

RAISING EXISTING PRECAST CONCRETE SEWER MANHOLES.
1. GENERAL
   A. EXCEPT AS INDICATED HEREON OR ON THE PLANS, MANHOLES SHALL CONFORM TO: SPPWC 200, PRECAST CONCRETE SEWER MANHOLE AND SPPWC 203, BRICK SEWER MANHOLE.
   B. DIMENSION "D" SHALL BE THE SAME AS THE SIZE OF MANHOLE FRAME AND COVER TO BE USED.
   C. THE CONTRACTOR MAY REUSE THE EXISTING MANHOLE FRAME AND COVER, UNLESS DAMAGED DURING THE WORK OR WHEN OTHERWISE SHOWN IN THE CONTRACT DOCUMENTS. ITEMS DAMAGED BY THE CONTRACTOR SHALL BE REPLACED WITH IDENTICAL NEW ITEMS AT NO EXPENSE TO THE AGENCY.
   D. EXISTING STEPS LOCATED WITHIN REMOVAL LIMITS SHALL BE REPLACED. WHEN REMOVAL OF EXISTING STEPS BEYOND THE MANHOLE REMOVAL LIMITS IS SHOWN ON THE PLANS, THE STEPS SHALL BE REMOVED TO A DEPTH OF 2" (50 mm) BEYOND THE INSIDE FACE OF THE BRICK MANHOLE AND THE HOLES SHALL BE FILLED WITH CLASS "D" MORTAR.

2. RAISING EXISTING BRICK MANHOLES
   A. BRICK MANHOLES TO BE RAISED LESS THAN 1' (300 mm) MAY BE EXTEND VERTICALLY, PROVIDED THAT AT A DEPTH OF 2 1/2' (750 mm) BELOW THE TOP OF THE MANHOLE AT ITS NEW ELEVATION, THE INSIDE DIAMETER OF THE MANHOLE IS 30" (750 mm) OR GREATER.
   B. BRICK MANHOLES TO BE RAISED LESS THAN 3 1/2" (90 mm) MAY BE RAISED BY APPLYING CLASS "D" MORTAR TO THE TOP OF THE EXISTING BRICKWORK. IF THE BRICK MANHOLE IS TO BE RAISED 3 1/2" (90 mm) OR MORE, A NEW COURSE OR COURSES OF BRICKWORK SHALL BE PLACED ON TOP OF THE EXISTING BRICKWORK.

3. LOWERING EXISTING BRICK MANHOLES
   A. WHERE A BRICK MANHOLE IS TO BE LOWERED LESS THAN 1' (300 mm), THE FRAME MAY BE RESET ON THE EXISTING BRICKWORK AND THE 40" (1 m) MINIMUM BRICKWORK RECONSTRUCTION OMITTED, PROVIDED THAT THE BASE OF THE FRAME DOES NOT OVERHANG THE BRICKWORK ON THE INSIDE SURFACE OF THE MANHOLE MORE THAN AN AVERAGE OF 1 1/2" (35 mm) IN ANY QUADRANT NOR MORE THAN 2" (50 mm) AT ANY POINT.

4. RAISING EXISTING PRECAST CONCRETE SEWER MANHOLES
   A. PRECAST CONCRETE MANHOLES TO BE RAISED LESS THAN 3" (75 mm) MAY BE RAISED BY APPLYING CLASS "D" MORTAR TO THE TOP OF THE EXISTING MANHOLE, PROVIDED THE TOTAL HEIGHT OF MORTAR, EXISTING AND NEWLY APPLIED, DOES NOT EXCEED 3" (75 mm).
   B. WHERE THE PRECAST CONCRETE MANHOLE IS TO BE RAISED 3" (75 mm) OR MORE, OR WHERE THE TOTAL HEIGHT OF MORTAR, EXISTING AND NEWLY APPLIED, WOULD EXCEED 3" (75 mm), GRADE RINGS SHALL BE UTILIZED. CLASS "D" MORTAR MAY BE USED FOR FINAL ADJUSTMENT, BUT NOT MORE THAN 3" (75 mm) IN HEIGHT. WHERE RAISING THE MANHOLE WOULD RESULT IN THE UPPER SEGMENT OF THE SHAFT BEING MORE THAN 30" (750 mm) IN HEIGHT, REMOVE THE REDUCER AND THE UPPER SEGMENT OF THE SHAFT, INSTALL ADDITIONAL RINGS OR PIPE TO THE LOWER SEGMENT OF THE SHAFT, AND REINSTALL THE REDUCER AND GRADE RINGS AS REQUIRED.
5. LOWERING EXISTING PRECAST CONCRETE SEWER MANHOLES
   A. REMOVE SUFFICIENT GRADE RINGS TO LOWER THE MANHOLES AS REQUIRED,
      APPLY CLASS "D" MORTAR TO A HEIGHT NOT EXCEEDING 3" (75 mm)
      FOR ADJUSTMENT TO FINAL GRADE.
   B. WHERE REMOVAL OF GRADE RINGS WOULD RESULT IN THE UPPER SEGMENT OF
      THE SHAFT BEING LESS THAN 12" (300 mm) IN HEIGHT, REMOVE THE REDUCER
      AND SUFFICIENT SECTIONS OF THE LOWER SEGMENT OF THE SHAFT AND
      REINSTALL ANY NECESSARY SEGMENT OF THE LOWER SHAFT, THE REDUCER, AND
      THE GRADE RINGS TO CONFORM TO THE REQUIREMENTS OF THIS PLAN.
   C. EXISTING GRADE RINGS NEED NOT BE REMOVED IF EXISTING MORTAR IS REMOVED,
      AND AT LEAST 1 1/2" (35 mm) OF MORTAR MAY BE PLACED ON TOP OF THE
      EXISTING GRADE RINGS TO RESEAT THE FRAME.

6. REPLACEMENT OF BRICK REDUCER WITH PRECAST CONCRETE REDUCER AND SHAFT
   UNLESS OTHERWISE INDICATED ON THE PLANS, THE CONTRACTOR MAY INSTALL
   A PRECAST CONCENTRIC CONCRETE REDUCER, CONCRETE GRADE RINGS, AND
   CONCRETE PIPE IN LIEU OF RECONSTRUCTING A BRICK REDUCER, PROVIDED:
   A. THE MAXIMUM ID OF SEWER PIPE CONNECTED TO THE MANHOLE DOES NOT
      EXCEED 8" (200 mm).
   B. THE CONTRACTOR SECURES PRIOR APPROVAL FROM THE ENGINEER TO INSTALL
      THE CONCENTRIC REDUCER ONTO THE MANHOLE SHAFT. THE ENGINEER MAY,
      AS PART OF THE INSTALLATION REQUIREMENTS, REQUIRE THE CONTRACTOR
      TO COAT THE INSIDE OF THE REDUCER, RINGS, AND PIPE WITH AN APPROVED
      COATING.
   C. THE CONCRETE GRADE RINGS, THE CONCRETE REDUCER, AND ANY CONCRETE PIPE
      SHALL BE JOINED TOGETHER AND BEDDED ONTO THE EXISTING BRICK MANHOLE
      WITH CLASS "D" MORTAR. THE DEPTH, WIDTH, AND THICKNESS OF THE MORTAR
      SHALL BE OF SUFFICIENT DIMENSIONS TO PROPERLY AND ADEQUATELY JOIN AND
      BED THE COMPONENT PARTS.
RAISING RINGS TO BE MADE OF STEEL, ASTM DESIGNATION AT MERCHANT QUALITY.

WELD JOINTS AND GRIND FLUSH, WELD PENETRATION TO BE 1/8" (3 mm).

RAWL LENGTH EQUALS D+1 1/2" (40 mm) MIN

STANDARD MANHOLE FRAME PER SPPWC 210

SECTION B–B

STEEL RAISING RINGS

CAST IRON RAISING RINGS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MANHOLE RAISING RINGS

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

206–2

SHEET 1 OF 2
NOTES:

1. MACHINE SEATS FROM CAST IRON RINGS.

2. THE CAST IRON USED SHALL CONFORM TO SSPWC 206-3.

3. THE METAL RAISING RINGS MAY BE USED IN LIEU OF THE REGULAR METHOD OF ADJUSTMENT UTILIZING MORTAR OR BRICK AND MORTAR UNDER THE FOLLOWING CONDITIONS.
   A. ONLY ONE ADJUSTMENT WITH RAISING RINGS WILL BE ALLOWED ON ANY MANHOLE.
   B. MAXIMUM "D" SHALL BE 3" (75 mm).
MIN. DISTANCE BETWEEN HOLES APPROX. 1/2 OF SMALLEST PIPE OD

PRECAST CONCRETE MANHOLE PER SSPWC 200

MAX OD = 0.707 x MH ID

MANHOLE WALL

90° DEFLECTION

45° DEFLECTION

PIECE SPACINGS

PLAN VIEW

24" (600 mm) MIN

6" (150 mm)

6" (150 mm)

6" (150 mm)

OUTLET

INLET

OUTLET

INLET

PRECAST CONCRETE MANHOLE PER SSPWC 200

SLOPE SHELF TOWARDS CHANNEL

DO NOT MORTAR EXTERIOR PERIMETER OF PIPE OPENING (TYPICAL FOR ALL PIPES)

PIPE TO MANHOLE FLEXIBLE CONNECTOR PER SSPWC 208-6

SECTION A-A

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE MANHOLE BASE

STANDARD PLAN

207-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
NOTES

1. CONCRETE BASE AND STUB WALLS SHALL BE POURED IN ONE OPERATION.

2. CONCRETE FOR ALL PRECAST UNITS SHALL BE COMPACTLY VIBRATED IN THE FORMS. IT SHALL BE CURED ACCORDING TO APPROVED PRACTICE EITHER BY STEAM, SPRINKLING, MEMBRANE SOLUTION, OR A COMBINATION OF THESE. IT SHALL DEVELOP 3500 PSI (25 MPa) OR GREATER STRENGTH IN 28 DAYS.

3. THE DEPTH OF CHANNEL SHALL EQUAL THE PIPE DIAMETER FOR ALL SIZES OF PIPE. FOR SPECIAL CHANNELS IN TRAP OR GAUGING MANHOLES, SEE SPECIAL PLANS.

4. CEMENT MORTAR INSIDE JOINTS SHALL BE NEATLY STRUCK AND POINTED AND SHALL NOT EXCEED 3/8" (10 mm) IN THICKNESS.

5. STUB WALLS AND BASE SHALL CONFORM TO ASTM C 478 AND SHALL HAVE A MINIMUM OF 2" (50 mm) COVER THE STEEL ON THE INSIDE FACE.

6. INVERT CHANNELS AND SHELF MAY BE POURED AT THE FACTORY OR IN THE FIELD AT THE OPTION OF THE CONTRACTOR.

7. BEDDING FOR PRECAST BASE SHALL BE EQUAL TO BEDDING FOR PIPE. IF PIPE IS PLACED ON NATIVE MATERIAL USE 6" (150 mm) MINIMUM CRUSHED ROCK UNDER BASE.
**SECTIONAL ELEVATION A–A**

- Existing Brick Manhole
- Existing Inlet
- Core Cut Hole or Break Out Bricks Carefully and Neatly to Form Minimum Opening of $OD + 2'' (50 mm). Securely Fasten "D"x1 (300 mm) Stub into Hole with Cement Mortar.
- D"x1 (300 mm) Stub
- Installing "D"x6 (150 mm) Wye or Tee
- Stopper
- 1/8 Bend
- "D"x6 (150 mm) Wye or Tee
- Existing Shelf
- Existing Outlet

**SECTIONAL ELEVATION B–B**

- Channel Base
- Existing Concrete Manhole
- Existing Outlet
- Existing Shelf
- Existing Inlet
- Core Cut Hole (Dia=OD+2" (50 mm) Max)
- Securely Fasten "D"x1 (300 mm) Stub into Cored Hole with Cement Mortar
- "D"x1 (300 mm) Stub
- Installing "D"x6 (150 mm) Wye or Tee
- Stopper
- Existing Shelf
- Existing Outlet
- Existing Manhole

**SECTIONAL ELEVATION C–C**

- Existing Precast Concrete Manhole
- Core Cut Hole (Dia=OD+2" (50 mm) Max)
- "D"x300 mm (1") Stub
- Existing Inlet
- Existing Shelf
- Existing Channel
- Chisel Out Existing Concrete Shelf to Form New Channel
- Smooth Channel Surface with 1/2" (15 mm) Cement Mortar
- "D"x1 DIA= OD+2" (50 mm) Max
- Securely Fasten "D"x1 (300 mm) Stub into Cored Hole with Cement Mortar
- "D"x1 (300 mm) Stub
- Installing "D"x6 (150 mm) Wye or Tee
- Stopper
- Existing Shelf
- Existing Outlet

**SECTIONAL PLAN OF BASE**

- New Channel
- Existing Shelf
- Existing Outlet
- Existing Conc. Shelf to Remain
- Existing Outlet
- Stopper
- "D"x1 (300 mm) Stub
- 1/2" (15 mm) Cement Mortar
- "D"x6 (150 mm) Wye or Tee
- House Lateral

**SECTIONAL PLAN OF BASE**

- New Channel
- Existing Shelf
- Existing Outlet
- Existing Conc. Shelf to Remain
- Existing Outlet
- Stopper
- "D"x1 (300 mm) Stub
- 1/2" (15 mm) Cement Mortar
- "D"x6 (150 mm) Wye or Tee
- House Lateral

**STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION**

**BREAKING INTO EXISTING MANHOLES**

**STANDARD PLAN 208-2**

**USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION**

**PROMULGATED BY THE PUBLIC WORKS STANDARDS, INC., GREENBOOK COMMITTEE, 1984, 1996, 2009**

**REV. 1996, 2009**

**SHEET 1 OF 2**
NOTES:

1. Invert elevation of "D" x 1' (300 mm) stub at the inside face of manhole to be 0.10' (30 mm) higher than existing outlet invert elevation.

2. The core cut hole shall be made with equipment specially designed to cut a smooth hole without spalling or damage to the reinforcing steel or structure.

3. "D" to be 8" (200 mm) minimum.

4. All work shall be uncovered and convenient for the inspection.

5. All cement mortar shall be class "D" per SSPWC 201-5.1.

HOUSE LATERAL NOTES:

1. Wye shall be laid with 1/8' (3 mm) rise per 1" (300 mm) and 6" (150 mm) spur at 45' from horizontal unless otherwise noted on plans.

2. "D" x 4" (100 mm) WYE or TEE and 4" (100 mm) HOUSE LATERAL may be substituted for "D" x 6" (150 mm) WYE or TEE and 6" (150 mm) HOUSE LATERAL.

3. Use type "D" or "G" joints per SSPWC 208-2.
NOTES:

1. THE CAST IRON USED SHALL CONFORM TO ASTM A-48 CLASS 35B.

2. THE FRAME AND COVER SHALL BE COATED WITH ASPHALTUM OR BITUMINOUS PAINT AFTER TESTING AND INSPECTION.

3. COVERS SHALL BE CAST WITH THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS AND THE AGENCY IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. THE LETTER "D" OR "S" SHALL BE APPROXIMATELY 2 1/2" (65 mm) HIGH WITH 1/2" (13 mm) LINE WIDTH AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.

4. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.

5. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.

6. WEIGHT OF FRAME SHALL BE 160 POUNDS (73 kg). WEIGHT OF COVER SHALL BE 200 POUNDS (91 kg). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.

7. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOBSITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.

8. THE PROOF-LOAD FOR TEST METHOD B OF SSPWC 206-3.2 IS 55,300 POUNDS (228 kN).

9. COVERS FOR MANHOLES LOCATED IN EASEMENTS, ALLEYS, PARKWAYS AND ALL OTHER PLACES EXCEPT PAVED STREETS SHALL BE PROVIDED WITH SOCKET SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF 1" (25 mm) AT 90° TO PICK HOLE AND INSTALL 3/4" x 3/4" (19 mm x 19 mm) STAINLESS STEEL SOCKET SET SCREWS WITH 3/8" (10 mm) RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.
NOTES:

1. EXCEPT AS OTHERWISE INDICATED, THE MANHOLE FRAME AND COVER SHALL CONFORM TO SPPWC 632, 30" (762 mm) MANHOLE FRAME AND COVER.

2. THE PRESSURE PLATE SHALL BE STEEL CONFORMING TO ASTM A36 (A 36M), AND SHALL BE GALVANIZED AFTER FABRICATION, BUT BEFORE INSTALLATION OF SCREWS AND BOLTS.

3. CAP SCREWS AND EYEBOLTS, INCLUDING WASHERS AND NUTS ATTACHED THERETO, SHALL BE FABRICATED FROM ANY SERIES 300 STAINLESS STEEL.

4. ALL HOLES IN CAST IRON SHALL BE DRILLED AFTER CASTING, OR PLUGGED PRIOR TO CASTING. THEY SHALL NOT BE PUNCHED.

5. ALL IRON CASTING SHALL RECEIVE AN ASPHALTIC COATING AFTER FABRICATION.

6. GASKET MATERIAL SHALL BE 1/16" (2 mm) THICK NEOPRENE RUBBER. PRESSURE PLATE GASKET SHALL BE 2'-7 1/4" (794 mm) O.D.

7. ALL NUTS AND BOLTS SHALL BE TIGHTENED TO A MINIMUM TORQUE OF 25 FOOT-POUNDS (34 Nm).

8. FRAME SHALL BE SET ON 1/2" (13 mm) THICK MINIMUM WET MORTAR BASE, CLASS "B" MORTAR.

9. MANHOLE FRAME AND COVER AND PRESSURE PLATE ASSEMBLY SHALL BE TESTED FOR ACCURATE FIT PRIOR TO DELIVERY TO JOBSITE AND MARKED IN SETS.
GROUND SURFACE FRAME & COVER

GROUNDSURFACE

FRAME & COVER
SPPWC 211

ANCHOR BOLT (TYP)
SEE DETAIL B

CLASS "B"
MORTAR
(SEE NOTE 3)

BRICK MANHOLE SHAFT

PRECAST CONCRETE CONE

5'-6" (1.65 m)

PLAN

SECTION A-A

1/2" (13 mm) N.C. ANCHOR BOLT
8" (200 mm) LONG (TYP)

1 1/2" (40 mm) TYP

1/2" (13 mm) N.C.
NUT (TYP)

12-#3 (#10M) @ 30'

12" (300 mm) MIN

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS, INC.,
GREENBOOK COMMITTEE
1986
REV. 1996, 2009

ANCHOR SYSTEM FOR
PRESSURE COVER

STANDARD PLAN
212-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
NOTES:

1. ANCHOR SYSTEM DESIGNED FOR LESS THAN 10' (3 m) OF HEAD.

2. MINIMUM EMBEDMENT OF 1/2" (13 mm) Ø ANCHOR BOLT WITH HEAD SHALL BE 5" (130 mm).

3. SET CONCRETE ANCHOR ON WET, CLASS "B" MORTAR ON TOP OF BRICK MANHOLE SHAFT OR PRECAST CONCRETE CONE.

4. UNLESS OTHERWISE NOTED, 1/2" (13 mm) Ø ANCHOR BOLTS AND NUTS ARE REQUIRED AND SHALL BE FABRICATED FROM ANY SERIES 300 STAINLESS STEEL.

5. NUTS ON ANCHOR BOLTS SHALL BE TIGHTENED TO A MINIMUM TORQUE OF 25 FOOT-POUNDS (34 Nm).
BARS ARE TO BE LEFT VERTICAL AND BENT IN PLACE WHEN BEAM IS FORMED

#3 (~#10M) BARS

10" (250 mm) MIN ON SOLID GROUND

16" (400 mm) PAPER TUBING

SECTION A-A

SECTION B-B

SECTION D-D

CHIMNEY BASE
CASE II

SECTION E-E

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CHIMNEYS

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE 1984

STANDARD PLAN 220-3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
NOTES

1. THE UPPER END OF THE CHIMNEY PIPE SHALL BE AT LEAST 8' (2.5 m) BELOW THE GRADE OF THE LOWER CURB.

2. NO CONNECTION SHALL BE MADE DIRECTLY TO TOP OF CHIMNEY PIPE.

3. WHERE ONE HOUSE LATERAL IS TO BE JOINED TO THE CHIMNEY PIPE, USE A SINGLE WYE AND FACE WYE TOWARDS PROPERTY TO BE SERVED.

4. WHERE TWO OR MORE HOUSE LATERALS ARE TO BE JOINED TO THE CHIMNEY PIPE, INSTALL WYE BRANCHES AS FOLLOWS:
   A. FOR TWO HOUSE LATERALS, ONE SERVING EACH SIDE OF STREET, USE A DOUBLE WYE BRANCH.
   B. FOR TWO HOUSE LATERALS SERVING THE SAME SIDE OF THE STREET, USE TWO SINGLE WYES STACKED WITH BRANCHES FACING THE PROPERTIES SERVED.
   C. FOR THREE OR FOUR HOUSE LATERALS, USE TWO DOUBLE WYE BRANCHES OR ONE DOUBLE AND ONE SINGLE WYE BRANCH STACKED.

5. EACH DOUBLE OR SINGLE WYE BRANCH AND EIGHTH BEND SHALL BE SUPPORTED BY A CONCRETE BEAM AS SHOWN.

6. FOR CHIMNEY BASE, 6" (150 mm) TEE BRANCH OR WYE SHALL BE INSTALLED VERTICALLY ON TOP OF THE MAIN LINE SEWER AS SHOWN. THE CHIMNEY BASE MUST BE POURED AND SET WITH DOWELS AS SHOWN 24 HOURS BEFORE THE CHIMNEY CONCRETE IS POURED.

7. ALL CONCRETE SHOWN SHALL BE CLASS 520-C-2500 (310-C-17).

8. CASE I SHALL BE FOR VITRIFIED CLAY PIPE ONLY.

9. CASE II SHALL BE FOR ALL ALLOWABLE PIPE MATERIALS.

10. FOR ABS PIPE USE SOLVENT WELDED JOINTS ONLY.

11. A CAP SHALL BE INSTALLED AT THE OPENING OF THE PIPE RISER AND AT EACH UNCONNECTED BRANCH, SEALED AROUND ITS CIRCUMFERENCE WITH 1" (25 mm) THICK TYPE "F" MORTAR.
ANALYZE

NOTES:

1. ANCHORS SHALL BE CLASS 450-C-2000 (265-C-14) CONCRETE.
2. FOR CLAY PIPE, ANCHORS SHALL NOT BE PLACED WITHIN 6" (150 mm) OF THE PIPE JOINT.
3. TRENCH SHALL BE BACKFILL PER NOTE 4 ON SHEET 2.
4. SPACING OF ANCHORS FOR PIPE SLOPES BETWEEN VALUES SHOWN IN TABLE "A" MAY BE PROPORTIONED.

### TABLE A

<table>
<thead>
<tr>
<th>PIPE SLOPE (%)</th>
<th>L DISTANCE (MAX)</th>
<th>Z DISTANCE (MAX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>12' (3.65 m)</td>
<td>4' (1.20 m)</td>
</tr>
<tr>
<td>67</td>
<td>14' (4.25 m)</td>
<td>8' (2.40 m)</td>
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<td>50</td>
<td>16' (4.90 m)</td>
<td>12' (3.65 m)</td>
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<tr>
<td>40</td>
<td>18' (5.50 m)</td>
<td>18' (5.50 m)</td>
</tr>
<tr>
<td>33</td>
<td>20' (6.00 m)</td>
<td>20' (6.00 m)</td>
</tr>
</tbody>
</table>
NOTES:

1. REDWOOD BOARDS SHALL BE 2" x 12" (50 x 300 mm) WHERE DEPTH OF COVER OVER PIPE PERMITS, OTHERWISE USE 2" x 10" (50 x 250 mm).
2. REDWOOD BOARDS SHALL BE PLACED ON THE HIGH GROUND SIDE OF THE POSTS.
3. EACH REDWOOD BOARD SHALL BE FASTENED BY USING 2-16d NAILS TO EACH REDWOOD POST OR A 3/8" (10 mm) BOLT AND NUT WITH WASHERS TO EACH GALVANIZED PIPE. ALL HARDWARE SHALL BE GALVANIZED.
4. TRENCH BACKFILL SHALL BE CONSOLIDATED BY MECHANICAL COMPACTION. IN LIEU OF MECHANICALLY COMPACTION, SOIL CEMENT MAY BE USED; HOWEVER, THE TOP 12" (300 mm) OF BACKFILL SHALL BE NATIVE SOIL, MECHANICALLY COMPACTED.
5. SPACING OF STABILIZERS FOR GROUND SLOPES BETWEEN VALUES SHOWN IN TABLE "B" MAY BE PROPORTIONED.
6. THE CONTRACTOR MAY, AT ITS OPTION, SUBSTITUTE DOUGLAS FIR FOR THE REDWOOD PROVIDED IT HAS BEEN TREATED WITH PRESERVATIVES.
NOTES

1. EXCEPT AS OTHERWISE INDICATED ON THE PLANS, ALL HOUSE CONNECTION SEWERS SHALL BE TYPE "A" AND SHALL BE CONSTRUCTED ON STRAIGHT LINES AND GRADES BETWEEN CONTROL POINTS AND ELEVATIONS.

2. DIMENSIONS:
   A. Y = 6' (1.85 m)
   B. LENGTHS "A" AND "B" — SEE PLANS
   C. HEIGHT "H" — SEE PLANS
   D. ELEVATIONS "E" AND "F" — SEE PLANS

3. ALL HOUSE CONNECTION SEWER PIPE SHALL BE 150 mm (6") UNLESS OTHERWISE INDICATED AND MAY BE ANY OF THE FOLLOWING:
   A. VC PIPE
   B. PE PIPE
   C. ABS SOLID WALL PIPE
   D. ABS COMPOSITE PIPE
   E. PVC PLASTIC PIPE

   PROVIDED THAT CHANGES FROM ONE TYPE OF MATERIAL OR SIZE TO ANOTHER SHALL BE MADE ONLY BY MEANS OF SUITABLE ADAPTERS APPROVED BY THE ENGINEER.

4. THE UPPER END OF THE HOUSE CONNECTION SHALL BE SEALED BY INSTALLING A CAP AND SEALING THE CAP WITH 1" (25 mm) THICK TYPE "F" MORTAR AROUND THE CIRCUMFERENCE OF THE CAP.

5. EXCEPT AS CONTROLLED BY ELEVATIONS INDICATED ON THE PROJECT PLANS, THE MINIMUM SLOPE FOR ALL PIPE SHALL BE 2% (S=0.02 MINIMUM).

6. THE FIGURE IN A CIRCLE ON THE PLANS ADJACENT TO A HOUSE CONNECTION SEWER STATION INDICATES THE DEPTH IN FEET (METERS) BELOW THE EXISTING TOP OF CURB TO WHICH THE INVERT OF THE UPPER END OF THE HOUSE CONNECTION SEWER SHALL BE CONSTRUCTED. IF NO DEPTH IS INDICATED, THE INVERT OF THE UPPER END SHALL BE THE ELEVATION SHOWN ON THE PROFILE. WHERE NEITHER DEPTH NOR ELEVATION IS INDICATED, THE INVERT SHALL BE 6' (1.85 m) BELOW THE TOP OF THE EXISTING CURB.

7. BRANCHES SHALL BE EITHER TEES OR WYES AND SHALL BE ROTATED UPWARD FROM THE HORIZONTAL TO AN ANGLE OF 22-1/2' TO 45' WHEN TEES ARE USED. BENDS ARE NOT REQUIRED BUT MAY BE USED AT THE OPTION OF THE CONTRACTOR. WHEN THE BRANCH ROTATION DOES NOT CONFORM TO THE SLOPE OF THE HOUSE CONNECTION SEWER, PULLED JOINTS MAY BE USED FOR ADJUSTMENT.

8. THE MAXIMUM DEFLECTION AT EACH JOINT FOR 4" (100 mm) AND 6" (150 mm) VITRIFIED CLAY PIPE HOUSE CONNECTION SEWERS SHALL BE 4", WHICH IS EQUAL TO A PULL OF 9/16" (14 mm) FOR A 6" (150 mm) PIPE AND 3/8" (10 mm) FOR A 4" (100 mm) PIPE. (PULL IS DEFINED AS THE SEPARATION OF THE ABUTTING PIPE ENDS ON THE CONVEX SIDE OF THE CURVE MEASURED AT THE OUTSIDE PIPE BARREL.)

9. CONNECTION OF A BUILDING SEWER SMALLER THAN 6" (150 mm) TO A 6" (150 mm) HOUSE CONNECTION SEWER SHALL BE MADE USING AN APPROVED INCREASE TEE OR AN INCREASE FOLLOWED BY A TEE.

10. ALL HOUSE CONNECTION SEWERS OR PORTIONS THEREOF CONSTRUCTED ON A SLOPE EXCEEDING 45' SHALL BE ANCHORED PER SPPWC 221.

11. HOUSE CONNECTION SEWERS CONSTRUCTED PURSUANT TO A HOUSE CONNECTION PERMIT SHALL CONFORM TO ALL APPLICABLE STATUTES AND ORDINANCES.
CONCRETE SUPPORT WALL (SEE NOTE 10) —

CASE A

CASE D

CASE B

CASE E

CASE C

CASE F

1" (25 mm) THICK EXPANSION JOINT FILLER

1" (25 mm) SAND CUSHION OR APPROVED EXPANSION JOINT MATERIAL (SEE NOTE 8)

UNDISTURBED EARTH

SADDLE

UNDISTURBED EARTH

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

HOUSE CONNECTION REMODELING

STANDARD PLAN

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 3
UNDISTURBED EARTH

A 1° (25 mm) SAND CUSHION OR APPROVED EXPANSION JOINT MATERIAL (SEE NOTE 8)

NEW SEWER

1° (25 mm) SAND CUSHION OR APPROVED EXPANSION JOINT MATERIAL (SEE NOTE 8)

CONCRETE ENCASEMENT AS DETAILED HEREON SHALL BE USED FOR TEES OR WYES AND PIPE WHERE THE SLOPE OF THE PIPE IS STEEPER THAN 1:1 OR SEE NOTE 6

TEE OR WYE

4’ (1.2 m) MIN.

NEW SEWER

TEE OR WYE

4’ (1.2 m) MIN.

EXIST. SEWER

SECTION A-A
CONCRETE ENCASEMEN DETAIL
(SEE NOTE 5)

NOMINAL DIAMETER OF PIPE INCHES (mm)

MINIMUM DIMENSIONS X INCHES (mm)

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<tr>
<th>Diameter</th>
<th>Minimum Dimension</th>
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<tr>
<td>6 (150)</td>
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<tr>
<td>10 (250)</td>
<td>5 (125)</td>
</tr>
<tr>
<td>12 (300)</td>
<td>6 (150)</td>
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</table>

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

HOUSE CONNECTION REMODELING
1. EXCEPT AS OTHERWISE INDICATED HEREON OR ON THE PLANS, ALL HOUSE CONNECTION REMODELING SHALL CONFORM TO THE APPLICABLE PORTIONS OF SPPWC 222, HOUSE CONNECTION SEWER.


3. EXISTING SEWERS ARE INDICATED BY DASHED LINES. HOUSE CONNECTION SEwers TO BE CONSTRUCTED ARE INDICATED BY SOLID LINES AND SHALL BE OF THE SAME MATERIAL AS THE EXISTING SEWER. THE CONTRACTOR MAY CONSTRUCT THE SEWER WITH OTHER MATERIALS ALLOWED BY SPPWC 222 PROVIDED APPROVED ADAPTORS ARE UTILIZED.

4. 1/16 (22.5') OR 1/8 (45') BENDS SHALL BE USED TO REMODEL OR CONSTRUCT ANY SEWER ON A CURVE OR AT ANY CHANGE IN ALIGNMENT. WHERE PHYSICAL OR GEOMETRIC LIMITATIONS PRECLUDE THE USE OF 1/16 (22.5') OR 1/8 (45') BENDS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL THE PROPOSED METHOD OF REMODELING OR CONSTRUCTION.

5. ALL HOUSE CONNECTION SEWERS TO BE CONSTRUCTED UNDER A PROPOSED CONDUIT SHALL BE ENCASED IN CONCRETE AS SHOWN HEREON. WHEN THE HOUSE CONNECTION SEWER SLOPE EXCEEDS 1:1 THE CONTRACTOR MAY, AT ITS OPTION, PLACE A CIRCULAR CROSS SECTION WITH MINIMUM COVER EQUAL TO DIMENSION "X" AS SHOWN ON SECTION A—A HEREON IN LIEU OF A SQUARE CROSS SECTION OF CONCRETE. CONCRETE BEDDING AND ENCASEMENT SHALL BE CLASS 450-C-2000 (250-C-14) AND SHALL EXTEND TO THE FIRST PIPE JOINT AT LEAST 1' (300 mm) BEYOND THE OD OF EACH SIDE OF THE PROPOSED CONDUIT.

6. FOR CASE R AND S, WHEN THE SLOPE OF THE PIPE EXCEEDS 1:1, THE CONTRACTOR MAY, AT ITS OPTION, CONSTRUCT A CHIMNEY CONFORMING TO SPPWC 220 ON THE NEW SEWER IN LIEU OF CONSTRUCTING THE ENCASEMENT SHOWN HEREON.

7. FOR CASES E AND F, SADDLES SHALL BE CONNECTED EITHER TO THE LENGTH OF PIPE CONTAINING THE EXISTING TEE OR WYE OR TO THE ADJACENT DOWNSTREAM PIPE LENGTH.

8. CONDUITS TO BE INSTALLED OVER OR WITHIN 1" (25 mm) OF ANY CONCRETE ENCASEMENT OR STRUCTURE, WHETHER EXISTING OR TO BE PLACED IN CONFORMITY WITH THE REQUIREMENTS HEREIN, SHALL BE INSTALLED ON A 1" (25 mm) SAND CUSHION OR APPROVED EXPANSION JOINT MATERIAL. CONCRETE ENCASEMENT INSTALLED PURSUANT TO THIS STANDARD PLAN SHALL BE SEPARATED FROM EXISTING CONDUIT WITH 1" (25 mm) THICK EXPANSION JOINT MATERIAL.

9. THOSE PORTIONS OF AN ABANDONED PIPE LOCATED BENEATH OR WITHIN 6" (150 mm) OF A RELOCATED HOUSE CONNECTION SEWER SHALL BE REMOVED. THE EXCAVATION SHALL BE REFILLED TO THE GRADE OF THE NEW PIPE INVERT WITH CLASS 100—E—100 (60—E—0.7) CONCRETE. THE CONTRACTOR MAY, AT ITS OPTION, SUBSTITUTE MECHANICALLY COMPACTED BACKFILL IN LIEU OF THE CLASS 100—E—100 (60—E—0.7) CONCRETE. THOSE PORTIONS OF ABANDONED PIPE NOT REMOVED SHALL BE SEALED. WHERE CAPS ARE USED, THEY SHALL BE SEALED BY FILLING THE SPACE ABOVE THE CAP WITH SAND AND A 1" (25 mm) THICK COATING OF TYPE "F" MORTAR.

10. SUPPORT WALLS SHALL CONFORM TO SPPWC 224.

11. WHEN INDICATED ON THE PLANS OR THE SPECIAL PROVISIONS, A CLEANOUT SHALL BE CONSTRUCTED IN CONJUNCTION WITH CASE E AS FOLLOWS:
   A. SUBSTITUTE A "Y" FOR THE 45' BEND.
   B. PLACE A 45' BEND ON THE UPPER END OF THE "Y".
   C. CAP TOP OF 45' BEND WITH A CAP AND SEAL WITH 1" (25 mm) THICK TYPE "F" MORTAR AROUND THE CIRCUMFERENCE OF THE CAP.
CASE I
REINFORCED CONCRETE BEAM
FOR 4" (100 mm) TO 24" (610 mm) ID PIPE

NOTES:
1. WIDTH OF BEAM SHALL EQUAL OD OF SUPPORTED PIPE. MINIMUM WIDTH SHALL BE 6" (150 mm).
2. IF SUPPORTED PIPE IS BEDDED IN CONCRETE, BEAM WIDTH SHALL EQUAL BEDDING WIDTH.
3. IF BEAM IS PRECAST, ENDS OF BEAM SHALL BE FULLY BEDDED IN 450-C-2000 (265-C-14) CONCRETE FOR LENGTH "B". THE BEDDING SHALL HAVE A MINIMUM THICKNESS OF 4" (100 mm). CLASS "C" MORTAR SHALL BE PLACED BETWEEN TOP OF BEAM AND SUPPORTED PIPE TO PROVIDE MINIMUM BEARING SHOWN.
4. THIS CASE IS PERMITTED ONLY IF THE TRENCH WALLS ARE FIRM AND UNYIELDING.
5. MAXIMUM SPACING OF BARS SHALL BE 4" (100 mm) OC.

SEE REINFORCED CONCRETE BEAM TABLE (DIMENSIONS AND REINFORCEMENT) ON PAGE 2, THIS SECTION.
<table>
<thead>
<tr>
<th>SUPPORTS FOR CONDUITS ACROSS TRENCHES</th>
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<tbody>
<tr>
<td>STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION</td>
</tr>
<tr>
<td>SHEET 2 OF 4</td>
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</table>

### Reinforced Concrete Beam (Dimensions and Reinforcement)

#### Pipe Cover

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<thead>
<tr>
<th>T</th>
<th>BARS</th>
<th>B</th>
<th>T</th>
<th>BARS</th>
<th>B</th>
<th>T</th>
<th>BARS</th>
<th>B</th>
<th>T</th>
<th>BARS</th>
<th>B</th>
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<td>#4 (13M)</td>
<td>1&quot;-6&quot; (0.50m)</td>
<td>8&quot; (200mm)</td>
<td>#4 (13M)</td>
<td>1&quot;-6&quot; (0.50m)</td>
<td>9&quot; (200mm)</td>
<td>#4 (13M)</td>
<td>1&quot;-6&quot; (0.50m)</td>
<td>10&quot; (200mm)</td>
<td>#4 (13M)</td>
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<td>#4 (13M)</td>
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<td>11&quot; (200mm)</td>
<td>#4 (13M)</td>
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<td>12&quot; (200mm)</td>
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<td>13&quot; (255mm)</td>
<td>#5 (16M)</td>
<td>2&quot;-0&quot; (0.6m)</td>
<td>14&quot; (255mm)</td>
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<td>#5 (16M)</td>
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<td>#5 (16M)</td>
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<td>16&quot; (255mm)</td>
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<td>33&quot; (1085mm)</td>
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**CASE 2**

**CONCRETE WALL**

**EXISTING CONDUIT TO BE SUPPORTED**

**MIN. BEARING SHALL BE 0.5 OD OF PIPE**

**CONDUIT THROUGH WALL**

**MIN. 6 150 mm CONSTRUCTION CONDUIT THROUGH JOINT WALL TYPE "Q" TYPE "Q" WALL SECTION**

**NOTES**

1. THE SUPPORTING WALL SHALL HAVE A FIRM BEARING ON THE SUBRADE AND AGAINST THE SIDES OF THE EXCAVATION.

2. ANY CONDUIT PASSING THROUGH THE WALL SHALL HAVE 2" (50 mm) CLEARANCE FROM THE WALL.

3. 4" (100 mm) DIA OPENING THROUGH THE WALL AT 2" (600 mm) OC HORIZONTALLY AND AT 5" (1.5 m) OC VERTICALLY SHALL BE PROVIDED TO PREVENT UNEQUAL PRESSURE RESULTING FROM JETTED BACKFILL.

4. IF SUPPORTED PIPE IS BEDDED IN CONCRETE, MINIMUM THICKNESS OF WALL SHALL EQUAL BEDDING WIDTH.

5. BRICK WITH MORTAR JOINTS MAY BE USED IN LIEU OF CONCRETE FOR WALLS UP TO 5' (1.5 m) IN HEIGHT OR LENGTH.

**CASE 3**

**DUCTILE IRON PIPE**

**DUCTILE IRON CLASS 53 SPUN RCP CONTINUOUS (SEE NOTE 1)**

**CONCRETE BEDDING**

**CONDUIT (SEE NOTE 2)**

**EXISTING ACP, RCP, CIP, OR CLAY PIPE FOR CLAY PIPE SEWERS CUT EXIST PIPE AND JOIN WITH TYPE "D" JOINTS WITH ADAPTER RING, IF REQUIRED ON EACH SIDE OF TRENCH OR REMOVE TO NEAREST JOINT BEYOND**

**NOTES**

1. 2000-D (100-D) SPUN RCP OF SAME DIAMETER AS THE EXISTING PIPE MAY BE USED ONLY WHEN THE EXISTING PIPE IS ACP, NRCP OR RCP AND THE TRENCH WIDTH IS 5" (1.5 m) OR LESS.

2. THE CONCRETE COLLAR JOINT SHALL BE USED FOR JOINTS IN STORM DRAIN PIPE.

**ALLOWABLE SPANS AND MIN. REQUIRED BEARING FOR DUCTILE IRON PIPE**

<table>
<thead>
<tr>
<th>DEPTH OF</th>
<th>8&quot; (150 mm) PIPE</th>
<th>8&quot; (200 mm) PIPE</th>
<th>10&quot; (250 mm) PIPE</th>
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<tr>
<td>COVER</td>
<td>S (Max)</td>
<td>B (Min)</td>
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<td>20/6&quot; (5.03 m)</td>
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**SECTION E-E**

**STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION**

**SUPPORTS FOR CONDUITS ACROSS TRENCHES**

**STANDARD PLAN**

**224-2**

**SHEET 3 OF 4**
COLUMN SUPPORT WITH REINFORCED CONCRETE BEAM

CASE 4

NOTES

1. SPAN "S" SHALL BE MAXIMUM 18' (5.5 m) FOR EARTH COVER 8' (2.45 m) OR LESS, 12' (3.65 m) FOR EARTH COVER 16' (4.9 m) OR LESS, AND 10' (3.0 m) FOR OVER 16' (4.9 m) EARTH COVER.

2. CONCRETE SHALL BE CLASS 560-C-3250 (330-C-23).

3. WHEN THE PIPE TO BE SUPPORTED CROSSES THE TRENCH ON A SKEW ANGLE, THE WALL OR BEAM WHICH SUPPORTS THE COLUMN SHALL BE CONSTRUCTED AT RIGHT ANGLE TO THE TRENCH.

4. SUPPORT SYSTEM MAY BE USED OVER CAST-IN-PLACE STRUCTURES.

5. BACKFILL ABOVE THE SUPPORT BEAM SHALL NOT BE PLACED UNTIL 72 HOURS AFTER THE SUPPORT IS POURED.

6. REINFORCED CONCRETE BEAM DIMENSIONED AND REINFORCED PER TABLE UNDER CASE 4.

GENERAL NOTES

1. "S" IS THE SPAN OF THE PIPE SUPPORT MEASURED ALONG ITS CENTERLINE.

2. "B" IS THE LENGTH OF BEARING OF THE SUPPORT AGAINST UNDISTURBED EARTH MEASURED ALONG THE PIPE CENTERLINE.

3. CASE 2 SHALL BE USED FOR PARTIAL CROSSINGS, EXCEPT THAT WHERE THE DISTANCE FROM A SEWER CHIMNEY TO UNDISTURBED EARTH IS 18" (450 mm) OR LESS, THE TRENCH BACKFILL MAY BE DENSIFIED TO 18" (450 mm) ABOVE A HOUSE CONNECTION SEWER AND THEN RE-EXCAVATED FOR THE PIPE INSTALLATION.

4. ANY SEWER OR STORM DRAIN EXPOSED OR PARTIALLY EXPOSED IN A TUNNEL EXCAVATION SHALL BE SUPPORTED WITH A WALL, CASE 2.

5. IF BEDDING IS REMOVED FROM THE EXISTING PIPE THAT WILL REMAIN IN PLACE, THE PIPE SHALL BE EMBEDDED WITH CONCRETE AT NO EXTRA COST TO THE AGENCY.

6. UNLESS OTHERWISE INDICATED, CONCRETE SHALL BE CLASS 450-C2000 (265-C-14).
CONCRETE BLANKET

(FOR EXISTING PIPES CROSSED OVER BY A NEW PIPE)

NOTES:
1. CONCRETE BLANKET IS REQUIRED WHEN THE CLEARANCE BETWEEN THE TOP OF THE EXISTING PIPE AND THE BOTTOM OF THE CROSSING PIPE IS LESS THAN 18" (450 mm).
2. \[ y = \frac{D}{6} \] (6" (150 mm) MIN), WHERE THE CLEARANCE BETWEEN THE TOP OF THE EXISTING PIPE AND THE BOTTOM OF THE CROSSING PIPE IS LESS THAN \( y \), THE CONCRETE SHALL BE PLACED BETWEEN THE PIPES AND AROUND THE SIDES OF THE CROSSING PIPE UP TO A LEVEL EQUAL TO \( y \) ABOVE THE EXISTING PIPE, OR AS REQUIRED BY NOTE 3 BELOW, WHICHEVER IS HIGHER.
3. \[ x = \frac{D}{12}, \text{MINIMUM} \], TO PROVIDE BEDDING MATERIAL FOR THE CROSSING CONDUIT. WHEN \( x \) IS LESS THAN THIS MINIMUM, THE ENTIRE TOP SURFACE OF THE BLANKET SHALL BE RAISED TO MAKE CONTACT WITH THE LOWER 30° OF THE CROSSING PIPE.
4. THE BLANKET SHALL EXTEND LONGITUDINALLY TO THE FIRST JOINT BEYOND THE TRENCH ExcAVATION AT EACH END OF THE BLANKET, EXCEPT THAT THE BLANKET NEED NOT BE EXTENDED MORE THAN 4' (1.2 m) BEYOND THE TRENCH.
5. WHENEVER A PIPE BELL IS ENCOUNTERED WITHIN THE LIMITS OF THE BLANKET, ALL DIMENSIONS SHALL REFER TO THE BELL.

COMPRESSIBLE BLANKET

(FOR EXISTING PIPES CROSSED OVER BY A NEW BOX OR ARCH)

NOTES:
1. COMPRESSIBLE BLANKET IS REQUIRED WHEN THE CLEARANCE BETWEEN THE TOP OF THE EXISTING PIPE AND THE BOTTOM OF THE CROSSING CONDUIT (BOX OR ARCH) IS LESS THAN 18" (450 mm).
2. THE BLANKET SHALL EXTEND LONGITUDINALLY FOR THE FULL CROSSING CONDUIT TRENCH WIDTH.
SECTION 3

Flood Control and Storm Drain Facilities
SECTION A-A

STRUCTURAL DATA

WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS

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<th>MAX V</th>
<th>t</th>
<th>t_F</th>
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<tr>
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<td>8' (200 mm)</td>
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FOR W > 28' (9 m), V > 12' (3.5 m) OR B > 4' (1.2 m) SEE PLANS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CATCH BASIN OPENING CURB

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

300-3

Sheet 1 of 2
WHERE THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF EXISTING OR PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH SIDEWALK, THE TOP SLAB OF THE BASIN MAY BE POURED EITHER MONOLITHIC WITH THE SIDEWALK OR SEPARATELY, USING THE SAME CLASS OF CONCRETE AS IN THE BASIN. WHEN POURED MONOLITHICALLY, THE SIDEWALK SHALL BE PROVIDED WITH A WEAKENED PLANE OR A 1" (25 mm) DEEP SAWCUT CONTINUOUSLY AROUND THE EXTERNAL PERIMETER OF THE CATCH BASIN WALLS, INCLUDING ACROSS THE FULL WIDTH OF THE SIDEWALK. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN.

2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8%, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

4. DIMENSIONS:

\[ B = 3'-2" \text{ (970 mm)} \]

\[ V = \text{THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE CATCH BASIN AT THE OUTLET} = 4.5" \text{ (1.35 m)}. \]

\[ V_U = \text{THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT AT THE UPSTREAM END OF THE BASIN, AND SHALL BE DETERMINED BY THE REQUIREMENTS OF NOTE 3, BUT SHALL NOT BE LESS THAN CURB FACE PLUS 12" (300 mm)}. \]

\[ V_I = \text{THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE INLET, NOTED ON THE PLANS}. \]

\[ H = \text{NOTED ON THE PLANS}. \]

\[ W = \text{NOTED ON THE PLANS}. \]

\[ A = \text{THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED}. \]

5. PLACE CONNECTOR PIPES AS INDICATED ON THE PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECESSARY TO INSURE MINIMUM 3" (80 mm) PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL AND 3" (75 mm) RADIUS OF ROUNDED STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70° OR GREATER THAN 110°, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

6. STEPS SHALL BE LOCATED AS SHOWN. IF THE CONNECTOR PIPE INTERFERES WITH THE STEPS, THEY SHALL BE LOCATED AT THE CENTERLINE OF THE DOWNSTREAM END WALL. STEPS SHALL BE SPACED 12" (300 mm) APART. THE TOP STEP SHALL BE 7" (175 mm) BELOW THE TOP OF THE MANHOLE AND PROJECT 2-1/2" (65 mm). ALL OTHER STEPS SHALL PROJECT 5" (130 mm).

7. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7' (2 m) ON CENTER (MAXIMUM) ALONG THE BACKWALL.

8. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:

- 308 MONOLITHIC CATCH BASIN CONNECTION
- 309 CATCH BASIN REINFORCEMENT
- 310 CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
- 312 CATCH BASIN MANHOLE FRAME AND COVER
- 635 STEEL STEP
- 636 POLYPROPYLENE PLASTIC STEP
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CURB OPENING CATCH BASIN WITH
GRATING(S) AND DEBRIS SKIMMER

STANDARD PLAN

301–3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 3
### Structural Data

#### Wall and Slab Dimensions and Reinforcement Requirements

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<th>Grates</th>
<th>V</th>
<th>t</th>
<th>Wall Front</th>
<th>Wall Rear</th>
<th>Wall End</th>
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<tr>
<td>7' (2.0 m)</td>
<td>1</td>
<td>8' (2.4 m)</td>
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</tr>
<tr>
<td>7' (2.0 m)</td>
<td>1</td>
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For W > 28' (9 m), V > 12' (3.5 m) or No. of Grates > 7 see plans.
NOTES:

1. WHERE THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF EXISTING OR PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH SIDEWALK, THE TOP SLAB OF THE BASIN MAY BE POURED EITHER MONOLITHIC WITH THE SIDEWALK OR SEPARATELY, USING THE SAME CLASS OF CONCRETE AS IN THE BASIN. WHEN POURED MONOLITHICALLY, THE SIDEWALK SHALL BE PROVIDED WITH A WEAKENED PLANE OR A 1" (25 mm) DEEP SAWCUT CONTINUOUSLY AROUND THE EXTERNAL PERIMETER OF THE CATCH BASIN WALLS, INCLUDING ACROSS THE FULL WIDTH OF THE SIDEWALK. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN.

2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH. FLOOR OF GRATING PORTION SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8%, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE, SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

4. DIMENSIONS:

   H = NOTED ON THE PLANS.
   W = 7' (2 m) UNLESS OTHERWISE NOTED ON THE PLANS.
   W_G = 2'-11 3/8" (900 mm) FOR ONE GRATING; ADD 3'-5 3/8" (1051 mm) FOR EACH ADDITIONAL GRATING. ONE GRATING IS REQUIRED UNLESS OTHERWISE SHOWN ON THE PLANS.
   A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.

5. PLACE CONNECTOR PIPES AS INDICATED ON THE PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECESSARY TO INSURE MINIMUM 3" (80 mm) PIPE EMBEMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" (75 mm) RADIUS OF ROUNDING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70° OR GREATER THAN 110°, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

6. STEPS SHALL BE LOCATED AS SHOWN. IF THE CONNECTOR PIPE INTERFERES WITH THE STEPS, THEY SHALL BE LOCATED ON THE FRONT WALL AT THE CENTERLINE OF THE DOWNSTREAM GRATING. STEPS SHALL BE SPACED 12" (80 mm) APART. THE TOP STEP SHALL BE 7" (175 mm) BELOW THE TOP OF THE GRATING AND PROJECT 2'-1/2" (65 mm). ALL OTHER STEPS SHALL PROJECT 5'-1/2" (165 mm).

7. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7' (2 m) ON CENTER (MAXIMUM) ALONG THE BACKWALL.

8. THE FOLLOWING SSPWC ARE INCORPORATED HEREIN:

   308 MONOLITHIC CATCH BASIN CONNECTION
   309 CATCH BASIN REINFORCEMENT
   310 CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
   311 FRAME AND GRATING FOR CATCH BASINS
   635 STEEL STEP
   636 POLYPROPYLENE PLASTIC STEP

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
CURB OPENING CATCH BASIN WITH GRATING(S) AND DEBRIS SKIMMER

STANDARD PLAN
301-3
SHEET 3 OF 3
Dowel Detail

**Plan**

**Structural Data**

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</table>

**Standard Plans for Public Works Construction**

**Curb Opening Catch Basin with Grating(s)**

**Standard Plan 302-3**

Use with Standard Specifications for Public Works Construction

Sheet 1 of 2
NOTES:

1. WHERE THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF EXISTING OR PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH SIDEWALK, THE TOP SLAB OF THE BASIN MAY BE POURED EITHER MONOLITHIC WITH THE SIDEWALK OR SEPARATELY, USING THE SAME CLASS OF CONCRETE AS IN THE BASIN. WHEN POURED MONOLITHICALLY, THE SIDEWALK SHALL BE PROVIDED WITH A WEAKENED PLANE OR A 1" (25 mm) DEEP SAWCUT CONTINUOUSLY AROUND THE EXTERNAL PERIMETER OF THE CATCH BASIN WALLS, INCLUDING ACROSS THE FULL WIDTH OF THE SIDEWALK. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM TO SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN.

2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

3. ONE GRATING IS REQUIRED UNLESS OTHERWISE SHOWN ON THE PROJECT PLAN.

4. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8%, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

5. DIMENSIONS:

\[ V = \text{the difference in elevation between the top of the curb and the invert of the catch basin at the outlet} = 4.5' (1.35 m). \]

\[ V_U = \text{the difference in elevation between the top of the curb and the invert at the upstream end of the basin, and shall be determined by the requirements of Note 4, but shall not be less than curb face plus 12" (300 mm).} \]

\[ V_I = \text{the difference in elevation between the top of the curb and the invert of the inlet, noted on the plans.} \]

\[ H = \text{noted on the project plans.} \]

\[ W = 2' - 11 3/8" (900 mm) \text{ for one grating; add 3' - 5 3/8" (1051 mm) for each additional grating.} \]

\[ A = \text{the angle, in degrees, intercepted by the centerline of the connector pipe and the catch basin wall to which the connector pipe is attached.} \]

6. PLACE CONNECTOR PIPES AS INDICATED ON THE PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECESSARY TO INSURE MINIMUM 3" (80 mm) PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" (75 mm) RADIUS OF Rounding OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70° OR GREATER THAN 110°, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

7. STEPS SHALL BE LOCATED AS SHOWN. IF THE CONNECTOR PIPE INTERFERES WITH THE STEPS, THEY SHALL BE LOCATED ON THE FRONT WALL AT THE CENTERLINE OF THE DOWNSTREAM GRATING. STEPS SHALL BE SPACED 12" (300 mm) APART. THE TOP STEP SHALL BE 7" (175 mm) BELOW THE TOP OF THE GRATING AND PROJECT 2 1/2" (65 mm). ALL OTHER STEPS SHALL PROJECT 5" (130 mm).

8. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7' (2.1 m) ON CENTER (MAXIMUM) ALONG THE BACKWALL.

9. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:

- MONOLITHIC CATCH BASIN
- CATCH BASIN REINFORCEMENT
- CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
- FRAME AND GRATING FOR CATCH BASINS
- STEEL STEP
- POLYPROPYLENE PLASTIC STEP
A DEPRESSED DRIVEWAY CURB

GRATE CURB

CURB FACE + H FRAME AND GRATING

STREET, GUTTER OR LOCAL DEPRESSION ~ 4" (5 mm) R

STEPS ~ SURFACE ~

CENTER SUPPORT FOR MULTIPLE GRATES

CONNECTOR PIPE OR MONOLITHIC CATCH BASIN CONNECTION (TYPICAL)

OPTIONAL ROUGHENED CONSTRUCTION JOINT (TYPICAL)

SECTION A—A

PLAN

STRUCTURAL DATA

WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS

<table>
<thead>
<tr>
<th>NO. OF GRATES</th>
<th>MAX V</th>
<th>t</th>
<th>REINFORCEMENT FOR WALLS AND SLABS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–2</td>
<td>4' (1.2 m)</td>
<td>6&quot; (150 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>1–2</td>
<td>8' (2.4 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>1–2</td>
<td>10' (3.0 m)</td>
<td>10&quot; (250 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>1–2</td>
<td>12' (3.5 m)</td>
<td>10&quot; (250 mm)</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>3–4</td>
<td>4' (1.2 m)</td>
<td>6&quot; (150 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>3–4</td>
<td>7' (2.0 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>3–4</td>
<td>8' (2.4 m)</td>
<td>8&quot; (200 mm)</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>3–4</td>
<td>12' (3.5 m)</td>
<td>10&quot; (250 mm)</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>5–6</td>
<td>4' (1.2 m)</td>
<td>6&quot; (150 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>5–6</td>
<td>6' (1.8 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>5–6</td>
<td>8' (2.4 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
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<tr>
<td>5–6</td>
<td>12' (3.5 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>&gt; 6</td>
<td>4' (1.2 m)</td>
<td>6&quot; (150 mm)</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>&gt; 6</td>
<td>8' (2.4 m)</td>
<td>8&quot; (200 mm)</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>&gt; 6</td>
<td>12' (3.5 m)</td>
<td>10&quot; (250 mm)</td>
<td>REQUIRED</td>
</tr>
</tbody>
</table>

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CURBSIDE GRATING CATCH BASIN

STANDARD PLAN

303–3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
NOTES:

1. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE GRADE, COLOR, FINISH, AND
SCORING TO THE EXISTING OR PROPOSED CURB ADJACENT TO THE BASIN.

2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE
SHAPED BY PASTERING.

3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL
AND LATERTAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE
EXCEEDS 8%, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE
THE SAME AS THE GUTTER GRADE. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

4. ONE GRATING IS REQUIRED UNLESS OTHERWISE SHOWN ON THE PLANS.

5. DIMENSIONS:

V = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF
THE CATCH BASIN AT THE OUTLET = 4.5' (1.35 m).

V_I = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT AT
THE UPSTREAM END OF THE BASIN, AND SHALL BE DETERMINED BY THE REQUIREMENTS
OF NOTE 3, BUT SHALL NOT BE LESS THAN CURB FACE PLUS 12" (300 mm).

V_U = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT AT
THE INLET. NOTED ON THE PLANS.

H = NOTED ON THE PLANS.

W = 2' - 11 3/8" (900 mm) FOR ONE GRATING; ADD 3' - 5 3/8" (1051 mm) FOR EACH ADDITIONAL
GRATING.

A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE
AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.

6. PLACE CONNECTOR PIPES AS INDICATED ON THE PLANS. UNLESS OTHERWISE SPECIFIED,
THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN,
WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL
INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A
SKED NECESSARY TO ENSURE MINIMUM 3" (80 mm) PIPE EMBEDMENT, ALL AROUND, WITHIN THE
CATCH BASIN WALL AND 3" (80 mm) RADIUS OF ROUNDED STRUCTURE CONCRETE, ALL
AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED
TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70°
OR GREATER THAN 110°, OR WHENEVER THE CONNECTOR PIPE IS LOCATED
IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE
IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID
CUTTING STANDARD LENGTHS OF PIPE.

7. STEPS SHALL BE LOCATED AS SHOWN. IF THE CONNECTOR PIPE INTERFERES WITH THE STEPS,
THEY SHALL BE LOCATED AT THE CENTERLINE OF THE DOWNSTREAM GRATING. STEPS SHALL
BE SPACED 12" (300 mm) APART, THE TOP STEP SHALL BE 7" (175 mm) BELOW THE TOP OF
THE GRATING AND PROJECT 1 1/2" (65 mm). ALL OTHER STEPS SHALL PROJECT 5" (130 mm).

8. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
308 MONOLITHIC CATCH BASIN CONNECTION
309 CATCH BASIN REINFORCEMENT
311 FRAME AND GRATING FOR CATCH BASINS
635 STEEL STEP
636 POLYPROPYLENE PLASTIC STEP
LOCATION TIE

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CENTER SUPPORT FOR
MULTIPLE GRATES

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(75 mm) R

— OPTIONAL ROUGHENED
CONSTRUCTION JOINT
(TYPICAL)

OPTIONAL
SUBGRADE

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.`CONNECTOR PIPE OR I

SECTION A-A

SECTION

B —B

BA~SINLCON CTION

STRUCTURAL DATA
WALL AND SLAB DIMENSIONS AND
REINFORCEMENT REQUIREMENTS
N0. OF
GRATES

MAX
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3-4
3-4
3-4
3-4
5-6
5-6
5-6
5-6
>6
>6
>6

4~ (1.2 m)
8~ 2.4 m
10' (3.0 m)
12' (3.5 m)
4' 1.2 m
7' 2.0 m
8' (2.4 m)
12' 3.5 m
4' 1.2 m
6' (1.8 m)
8' 2.4 m
12' 3.5 m
4' (1.2 m)
8' (2.4 m)
12~ 3.5 m

t
6" (150 mm)
8" 200 mm
10" (250 mm)
10" 250 mm
6° (150 mm)
8" 200 mm
8" (200 mm)
10° (250 mm
6" (150 mm)
8" (200 mm)
8 200 mm
10" (250 mm)
6° 150 mm)
8" 200 mm
10° (250 mm)

REINFORCEMENT
FOR
WALLS AND SLABS
NOT REQUIRED
REQUIRED
NOT REQUIRED
REQUIRED
NOT REQUIRED

REQUIRED

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
PROMULGATED BY lHE
PUBLIC WORKS STANDARDS, ING,
GREENBOOK COMMITTEE

1984

STANDARD PLAN

GRATING CATCH BASIN-ALLEY
LONGITUDINAL

304-3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2


NOTES:

1. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

2. ONE GRATING IS REQUIRED UNLESS OTHERWISE SHOWN ON THE PLANS.

3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE SURFACE GRADE EXCEEDS 8%, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE SURFACE GRADE, SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

4. DIMENSIONS:
   \[ B = 3'-6" \text{ (1.0 m)} \]
   \[ V_u = \text{THE DEPTH AT THE UPSTREAM END OF THE BASIN AND SHALL BE DETERMINED BY THE REQUIREMENTS OF NOTE 3, BUT SHALL NOT BE LESS THAN 2.5' (750 mm).} \]
   \[ V_i = \text{THE DEPTH AT THE INVERT OF THE INLET. NOTED ON THE PLANS.} \]
   \[ W = 2'-11 \frac{3}{8}" (900 mm) \text{ FOR ONE GRATING; ADD 3'-5 \frac{3}{8}" (1051 mm) FOR EACH ADDITIONAL GRATING.} \]
   \[ A = \text{THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.} \]

5. PLACE CONNECTOR PIPES AS INDICATED ON THE PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN, WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECESSARY TO INSURE MINIMUM 3" (80 mm) PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" (75 mm) RADIUS OF ROUNING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70° OR GREATER THAN 110°, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

6. STEPS SHALL BE LOCATED AS SHOWN. IF THE CONNECTOR PIPE INTERFERES WITH THE STEPS, THEY SHALL BE LOCATED ON THE OPPOSITE WALL AT THE CENTERLINE OF THE DOWNSTREAM GRATING. STEPS SHALL BE SPACED 12" (300 mm) APART. THE TOP STEP SHALL BE 7" (175 mm) BELOW THE TOP OF THE GRATING AND PROJECT 2 1/2" (65 mm). ALL OTHER STEPS SHALL PROJECT 5" (130 mm).

7. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
   308 MONOLITHIC CATCH BASIN CONNECTION
   309 CATCH BASIN REINFORCEMENT
   311 FRAME AND GRATING FOR CATCH BASINS
   635 STEEL STEP
   636 POLYPROPYLENE PLASTIC STEP
LOCATION TIE

PLAN

SURFACE FLOWLINE

CONNECTOR PIPE OR MONOLITHIC CATCH BASIN CONNECTION

OPTIONAL SUBGRADE

SECTION A-A

CUT BEND AND WELD ANGLE TO MAINTAIN GRATING IN PLANE OF FINISHED SURFACE

FINISHED SURFACE

GRAFTINGS AND MODIFIED FRAME

OPTIONAL ROUGHENED CONSTRUCTION JOINT (TYPICAL)

SECTION B-B

STRUCTURAL DATA

WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS

<table>
<thead>
<tr>
<th>NO. OF GRATES</th>
<th>MAX V</th>
<th>t</th>
<th>REINFORCEMENT FOR WALLS AND SLABS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3</td>
<td>4' (1.2 m)</td>
<td>6&quot; (150 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>2-3</td>
<td>8' (2.4 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>2-3</td>
<td>10' (3.0 m)</td>
<td>10&quot; (250 mm)</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>2-3</td>
<td>12' (3.5 m)</td>
<td>6&quot; (150 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>4-5</td>
<td>4' (1.2 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>4-5</td>
<td>8' (2.4 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>4-5</td>
<td>12' (3.5 m)</td>
<td>10&quot; (250 mm)</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>7-9</td>
<td>4' (1.2 m)</td>
<td>6&quot; (150 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>7-9</td>
<td>6' (1.8 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>7-9</td>
<td>8' (2.4 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>7-9</td>
<td>12' (3.5 m)</td>
<td>10&quot; (250 mm)</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>&gt; 9</td>
<td>4' (1.2 m)</td>
<td>6&quot; (150 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>&gt; 9</td>
<td>8' (2.4 m)</td>
<td>8&quot; (200 mm)</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>&gt; 9</td>
<td>12' (3.5 m)</td>
<td>10&quot; (250 mm)</td>
<td>REQUIRED</td>
</tr>
</tbody>
</table>

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

GRATING CATCH BASIN - ALLEY (TRANSVERSE)

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 305-3

SHEET 1 OF 2
NOTES:

1. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

2. TWO GRATINGS ARE REQUIRED UNLESS OTHERWISE SHOWN ON THE PLANS.

3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

4. DIMENSIONS:
   \[ V = 3' - 6" (1.0 \text{ m}) \]
   \[ V_i = \text{THE DEPTH AT THE INVERT OF THE INLET. NOTED ON THE PLANS.} \]
   \[ W = 4' - 3\frac{1}{2}" (1308 \text{ mm}) \text{ FOR TWO GRATINGS; ADD } 2' - 2" (660 \text{ mm}) \text{ FOR EACH ADDITIONAL GRATING.} \]
   \[ A = \text{THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.} \]

5. PLACE CONNECTOR PIPES AS INDICATED ON THE PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECESSARY TO INSURE MINIMUM 3" (80 mm) PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" (75 mm) RADIUS OF ROUNDELING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70° OR GREATER THAN 110°, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

6. STEPS SHALL BE LOCATED AS SHOWN. IF THE CONNECTOR PIPE INTERFERES WITH THE STEPS, THEY SHALL BE LOCATED ON THE OPPOSITE WALL. STEPS SHALL BE SPACED 300 mm (12") APART. THE TOP STEP SHALL BE 7" (175 mm) BELOW THE TOP OF THE GRATING AND PROJECT 2-1/2" (65 mm). ALL OTHER STEPS SHALL PROJECT 5" (130 mm).

7. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
   308 MONOLITHIC CATCH BASIN CONNECTION
   309 CATCH BASIN REINFORCEMENT
   311 FRAME AND GRATING FOR CATCH BASINS
   635 STEEL STEP
   636 POLYPROPYLENE PLASTIC STEP
CATCH BASIN LOCATION AT DRIVEWAYS

<table>
<thead>
<tr>
<th>STRUCTURAL DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS</td>
</tr>
<tr>
<td>MAX W</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>3.5' (1.0 m)</td>
</tr>
<tr>
<td>3.5' (1.0 m)</td>
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<tr>
<td>21' (6.4 m)</td>
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<tr>
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<tr>
<td>21' (6.4 m)</td>
</tr>
<tr>
<td>21' (6.4 m)</td>
</tr>
</tbody>
</table>

FOR W > 28' (8.0 m), V > 12' (3.5 m) OR B > 4' (1.2 m) SEE PLANS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CURB OPENING CATCH BASIN AT DRIVEWAY

STANDARD PLAN

306-3

SHEET 2 OF 3
NOTES:
1. WHERE THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF EXISTING OR PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH SIDEWALK, THE TOP SLAB OF THE BASIN MAY BE POURED EITHER MONOLITHIC WITH THE SIDEWALK OR SEPARATELY, USING THE SAME CLASS OF CONCRETE AS IN THE BASIN. WHEN POURED MONOLITHICALLY, THE SIDEWALK SHALL BE PROVIDED WITH A WEAKENED PLANE OR A 1" (25 mm) DEEP SAWCUT CONTINUOUSLY AROUND THE EXTERNAL PERIMETER OF THE CATCH BASIN WALLS, INCLUDING ACROSS THE FULL WIDTH OF THE SIDEWALK. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN.
2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.
3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8%, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE, SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.
4. CATCH BASIN SHALL BE CASE A UNLESS OTHERWISE SPECIFIED.
5. DIMENSIONS:
   W = 10' (3 m)
   B = 3'-2" (970 mm)
   M = 3' (900 mm)
   V = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE CATCH BASIN AT THE OUTLET = 5'0" (1.5 m).
   V1 = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE INLET, NOTED ON THE PLANS.
   A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.
6. PLACE CONNECTOR PIPES AS INDICATED ON THE PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECESSARY TO INSURE MINIMUM 3" (80 mm) PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" (75 mm) RADIUS OF BOUNDARY OR STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70' OR GREATER THAN 110', OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.
7. STEPS SHALL BE LOCATED AS SHOWN. IF THE CONNECTOR PIPE INTERFERES WITH THE STEPS, THEY SHALL BE LOCATED AT THE CENTERLINE OF THE DOWNSTREAM WALL. STEPS SHALL BE SPACED 12" (300 mm) APART. THE TOP STEP SHALL BE 7" (175 mm) BELOW THE TOP OF THE MANHOLE AND PROJECT 1/2" (~13 mm). ALL OTHER STEPS SHALL PROJECT 5" (130 mm).
8. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7' (2.1 m) ON CENTER (MAXIMUM) ALONG THE BACKWALL.
10. FACE PLATE ASSEMBLY:
   THE FACE PLATE FOR THE CIRCULAR PORTION OF THE CATCH BASIN OPENING SHALL BE CAST STEEL OF MILD TO MEDIUM STRENGTH. SEGMENTED CASTINGS SHALL BE BEVELED AND BUTT WELDED TO THE REQUIRED FULL LENGTH ALONG A TRUE ARC AND SECURED TO THE TOP SLAB BY ANCHORS. ONE ANCHOR SHALL BE PLACED AT EACH END OF THE ASSEMBLY AND THE OTHERS SPACED EQUALLY BETWEEN THE END ANCHORS. THERE SHALL BE AT LEAST ONE ANCHOR ON EACH CASTING. BEND PROTECTION BAR TO 4" (100 mm) RADIUS AROUND CURB RETURN. WELD TO SUPPORT BOLTS AT POINTS D, F, & H. END BAR AT POINT D.
11. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
   308 MONOLITHIC CATCH BASIN CONNECTION
   309 CATCH BASIN REINFORCEMENT
   310 CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
   312 CATCH BASIN MANHOLE FRAME AND COVER
   635 STEEL STEP
   636 POLYPROPYLENE PLASTIC STEP
NOTES:

1. WHERE THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF EXISTING OR PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH SIDEWALK, THE TOP SLAB OF THE BASIN MAY BE POURED EITHER MONOLITHIC WITH THE SIDEWALK OR SEPARATELY, USING THE SAME CLASS OF CONCRETE AS IN THE BASIN. WHEN POURED MONOLITHICALLY, THE SIDEWALK SHALL BE PROVIDED WITH A WEAKENED PLANE OR A 1" (25 mm) DEEP SAWCUT CONTINUOUSLY AROUND THE EXTERNAL PERIMETER OF THE CATCH BASIN WALLS, INCLUDING ACROSS THE FULL WIDTH OF THE SIDEWALK. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN.

2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH, FLOOR OF MANHOLE CHAMBER SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

4. CATCH BASIN SHALL BE CASE A UNLESS OTHERWISE SPECIFIED.

5. DIMENSIONS:
   \[ W = 7' (2 \text{ m}) \]
   \[ B = 20" (500 \text{ mm}) \]
   \[ Y = 24" (600 \text{ mm}) \]
   \[ V = \text{THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE CATCH BASIN AT THE OUTLET} = 4.5' (3.5 \text{ m}). \]
   \[ V_1 = \text{THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE INLET, NOTED ON THE PLANS.} \]
   \[ H = \text{NOTED ON THE PLANS.} \]
   \[ A = \text{THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.} \]

6. PLACE CONNECTOR PIPES AS INDICATED ON THE PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECESSARY TO INSURE MINIMUM 3" (80 mm) PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" (75 mm) RADIUS OF ROUNding OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70° OR GREATER THAN 110°, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER, THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

7. STEPS SHALL BE LOCATED AS SHOWN. IF THE CONNECTOR PIPE INTERFERES WITH THE STEPS, THEY SHALL BE LOCATED ON THE FRONT WALL OF THE MANHOLE CHAMBER OR THE DOWNSTREAM WALL OF THE MANHOLE CHAMBER AND THE MANHOLE MOVED DOWNSTREAM 12" (300 mm). STEPS SHALL BE SPACED 12" (300 mm) APART. THE TOP STEP SHALL BE 7" (175 mm) BELOW THE TOP OF THE MANHOLE AND PROJECT 2-1/2" (65 mm). ALL OTHER STEPS SHALL PROJECT 5" (130 mm).

8. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7' (2.1 m) ON CENTER (MAXIMUM) ALONG THE BACKWALL.

9. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:

   308 MONOLITHIC CATCH BASIN CONNECTION
   309 CATCH BASIN REINFORCEMENT
   310 CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
   630 24" (610 mm) MANHOLE FRAME AND COVER
   635 STEEL STEP
E BARS - 2 ABOVE & 2 BELOW OPENING

C BARS ~ 4 ~ 18" ~

#13 M Ø 450 mm

3° (75 mm) MIN

PLAN
CORNER CONNECTION

SECTION A-A

PLAN
SIDE CONNECTION

C BARS

#13 M Ø 450 mm

3° (75 mm) MIN

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
MONOLITHIC CATCH BASIN CONNECTION

STANDARD PLAN
308-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PUBLIC WORKS STANDARDS, INC.
GREENBOOK COMMITTEE
1984

REV. 1996, 2009

SHEET 1 OF 2
**NOTES**

1. **REINFORCING STEEL SHALL BE 1-1/2" (40 mm) CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN.**

2. **REINFORCING STEEL FOR INSIDE FACE OF CATCH BASIN SHALL BE CUT AT CENTER OF OPENING AND BENT INTO WALLS OF MONOLITHIC CATCH BASIN CONNECTION. REINFORCING STEEL FOR OUTSIDE FACE OF CATCH BASIN SHALL BE CUT 2" (50 mm) CLEAR OF OPENING.**

3. **CONNECTION SHALL BE PLACED MONOLITHIC WITH CATCH BASIN. THE ROUNDED EDGE OF OUTLET SHALL BE CONSTRUCTED BY PLACING CONCRETE WITH THE SAME CLASS OF CONCRETE AS THE CATCH BASIN AGAINST A CURVED FORM WITH A RADIUS OF 3" (75 mm).**

4. **CONNECTIONS SHALL BE CONSTRUCTED WHEN:**
   
   (A) **PIPES INLET OR OUTLET THROUGH CORNER OF CATCH BASIN**
   
   (B) **ANGLE A FOR PIPES THROUGH 30" (750 mm) IN DIAMETER IS LESS THAN 70° OR GREATER THAN 110°.**
FACE PLATE ASSEMBLY

TOP SLAB REINFORCEMENT
(SEE CATCH BASIN STANDARD PLAN)

REAR WALL

G BARS

C BARS

D BARS

F BARS

A BARS

B BARS

2" CLEAR
(50 mm)

2" CLEAR
(50 mm)

FRONT WALL

X/3
(MIN)

BOTTOM SLAB

TYPICAL REINFORCEMENT DETAILS

<table>
<thead>
<tr>
<th>MAX. W</th>
<th>MAX. V</th>
<th>t</th>
<th>tf</th>
<th>A &amp; B BARS</th>
<th>C BARS</th>
<th>D BARS</th>
<th>E BARS</th>
<th>F BARS</th>
<th>G BARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5' (1 m)</td>
<td>8&quot; (200 mm)</td>
<td>6&quot; (150 mm)</td>
<td>6&quot; (150 mm)</td>
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<td>---</td>
</tr>
<tr>
<td>3.5' (1 m)</td>
<td>12&quot; (300 mm)</td>
<td>8&quot; (200 mm)</td>
<td>8&quot; (200 mm)</td>
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</tr>
<tr>
<td>7' (2 m)</td>
<td>8&quot; (200 mm)</td>
<td>6&quot; (150 mm)</td>
<td>6&quot; (150 mm)</td>
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<tr>
<td>7' (2 m)</td>
<td>12&quot; (300 mm)</td>
<td>8&quot; (200 mm)</td>
<td>8&quot; (200 mm)</td>
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<tr>
<td>14' (4 m)</td>
<td>4&quot; (100 mm)</td>
<td>8&quot; (200 mm)</td>
<td>6&quot; (150 mm)</td>
<td>---</td>
<td>---</td>
<td>#4 @ 12&quot; (13 M @ 300 mm)</td>
<td>#4 @ 18&quot; (13 M @ 450 mm)</td>
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<td>---</td>
</tr>
<tr>
<td>14' (4 m)</td>
<td>8&quot; (200 mm)</td>
<td>8&quot; (200 mm)</td>
<td>8&quot; (200 mm)</td>
<td>---</td>
<td>#4 @ 12&quot; (13 M @ 300 mm)</td>
<td>#4 @ 18&quot; (13 M @ 450 mm)</td>
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<td>---</td>
</tr>
<tr>
<td>14' (4 m)</td>
<td>12&quot; (300 mm)</td>
<td>8&quot; (200 mm)</td>
<td>10&quot; (250 mm)</td>
<td>---</td>
<td>#4 @ 6&quot; (13 M @ 150 mm)</td>
<td>#4 @ 18&quot; (13 M @ 450 mm)</td>
<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>28' (8 m)</td>
<td>4&quot; (100 mm)</td>
<td>8&quot; (200 mm)</td>
<td>6&quot; (150 mm)</td>
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<tr>
<td>28' (8 m)</td>
<td>5&quot; (125 mm)</td>
<td>8&quot; (200 mm)</td>
<td>6&quot; (150 mm)</td>
<td>---</td>
<td>---</td>
<td>#4 @ 24&quot; (13 M @ 600 mm)</td>
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</tr>
<tr>
<td>28' (8 m)</td>
<td>6&quot; (150 mm)</td>
<td>8&quot; (200 mm)</td>
<td>8&quot; (200 mm)</td>
<td>---</td>
<td>#4 @ 16&quot; (13 M @ 450 mm)</td>
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<tr>
<td>28' (8 m)</td>
<td>7&quot; (175 mm)</td>
<td>8&quot; (200 mm)</td>
<td>8&quot; (200 mm)</td>
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<tr>
<td>28' (8 m)</td>
<td>8&quot; (200 mm)</td>
<td>8&quot; (200 mm)</td>
<td>8&quot; (200 mm)</td>
<td>---</td>
<td>#4 @ 13&quot; (13 M @ 325 mm)</td>
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<tr>
<td>28' (8 m)</td>
<td>9&quot; (225 mm)</td>
<td>8&quot; (200 mm)</td>
<td>10&quot; (250 mm)</td>
<td>---</td>
<td>#4 @ 15&quot; (13 M @ 375 mm)</td>
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</tr>
<tr>
<td>28' (8 m)</td>
<td>10&quot; (250 mm)</td>
<td>8&quot; (200 mm)</td>
<td>10&quot; (250 mm)</td>
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</tr>
<tr>
<td>28' (8 m)</td>
<td>11&quot; (275 mm)</td>
<td>8&quot; (200 mm)</td>
<td>10&quot; (250 mm)</td>
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</tr>
<tr>
<td>28' (8 m)</td>
<td>12&quot; (300 mm)</td>
<td>8&quot; (200 mm)</td>
<td>10&quot; (250 mm)</td>
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</tr>
</tbody>
</table>

FOR W > 28' (9 m) OR B > 4' (1200 mm) SEE PLANS

CURB OPENING CATCH BASIN REINFORCEMENT

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS, INC.,
GREENBROOK COMMITTEE
1994
REV. 1996, 2009

CATCH BASIN REINFORCEMENT

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2

STANDARD PLAN
309-2
TYPICAL REINFORCEMENT DETAILS

<table>
<thead>
<tr>
<th>V MAX</th>
<th>t</th>
<th>SIDE AND END WALL STEEL G BARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4' (1.2 m)</td>
<td>6&quot; (150 mm)</td>
<td>#4 @ 10&quot; (#13M @ 250 mm)</td>
</tr>
<tr>
<td>8' (2.4 m)</td>
<td>8&quot; (200 mm)</td>
<td>#4 @ 6&quot; (#13M @ 150 mm)</td>
</tr>
<tr>
<td>12' (3.5 m)</td>
<td>10&quot; (250 mm)</td>
<td>#5 @ 6&quot; (#16M @ 150 mm)</td>
</tr>
</tbody>
</table>

FOR V > 12' (3.5 m) SEE PLANS

GRATING CATCH BASIN REINFORCEMENT

NOTE

UNLESS OTHERWISE SPECIFIED, REINFORCEMENT FOR CURB OPENINGS AND GRATING CATCH BASINS SHALL TERMINATE 2" (50 mm) FROM FACE OF CONCRETE.
SUPPORT BOLT AND FACE PLATE 4 1/2" (120 mm) TOP SLAB

CURB LINE 7" (180 mm)
3 - #4 (13M) BARS x (W + 6" (150 mm))
IN ADDITION TO REINFORCING STEEL PER APPLICABLE CATCH BASIN STANDARD PLAN

3/8" (10 mm) COUNTERSINK 1" (25 mm) OC ON SUPPORT BOLT FOR SET SCREW. NONE REQUIRED FOR CF LESS THAN 7" (180 mm). THREE REQUIRED FOR 7" (180 mm) CF. ADD ONE COUNTERSINK FOR EACH 1" (25 mm) OF CF MORE THAN 7" (180 mm).

1" (25 mm) SUPPORT BOLT LENGTH = CF + 6" (150 mm)

Δ A = 18" FOR CURB BATTER LESS THAN 2:12
= 9" FOR CURB BATTER 2:12 THRU 4:12
= AS SHOWN ON PLANS FOR ALL OTHER CURB BATTER

SECTION

LOCATE WELDS IN OPENING FOR CONCRETE LONGER SPAN PLACEMENT 5/16" x 10" SEGMENT INTERIOR FACE OF CATCH BASIN END WALL FACE PLATE FACE PLATE

END DETAIL

splice detail

3/4" (20 mm) HOLE 5/8" x 1 1/2" (16 x 38 mm) CARRIAGE BOLTS AND HEX. NUTS 6" x 3/8" x 8" (160 x 10 x 200 mm) SPLICE PLATE

ANCHOR 2" (50 mm)

ANCHOR (100 mm) 2" (50 mm)

JOINT (50 mm)

STANDARD PLAN

CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION


SHEET 1 OF 6
SURFACE COURSE TO BE IDENTICAL WITH ADJOINING SPECIAL SIDEWALK AS SHOWN ON PLANS.

NOTE:
FOR DETAILS NOT SHOWN, SEE SHEET 1.

END DETAIL

SPlice DETAIL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR

STANDARD PLAN
310-3
SHEET 2 OF 6
FACE PLATE ANCHORS

HOOK ANCHOR - 4 1/2" (120 mm) TOP SLAB

ROUND HEAD ANCHOR - 4 1/2" (120 mm) TOP SLAB

HOOK ANCHOR - 6" (150 mm) TOP SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR

STANDARD PLAN 310-3
SHEET 3 OF 6
PROTECTION BAR AND SUPPORT BOLT(S) WITH ADJUSTABLE STIRRUP(S) – (TYPE A)

END ANCHOR WITH COUPLING AND SET SCREW

FACE PLATE

SUPPORT BOLT WITH ADJUSTABLE STIRRUP (TYPICAL)

3/4” (20 mm) DIA PROTECTION BAR END ANCHOR

DOWNSWEEP END OF BASIN

ELEVATION

STANDARD FLATTEN BOTH ANCHOR ENDS TO PREVENT TURNING

DRILL AND TAP HOLE AND INSTALL
3/8” (10 mm)–NC x 1/2” (13 mm) SOCKET SET SCREW WITH 3/16” (5 mm) RECESSED HEX HOLE

DRILL 1/2” (13 mm) HOLE, 1/4” (6 mm) DEEP

PROTECTION BAR

STD 3/4” (20 mm) STEEL COUPLING TO FIT SNUG OVER ENTIRE LENGTH (3/4” (20 mm) NPS THREAD)

END ANCHOR DETAIL

DOUBLE PROTECTION BAR DETAIL

STIRRUP DETAIL

PROTECTION BAR & STIRRUP LOCATION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR

STANDARD PLAN

310–3

SHEET 4 OF 6
PROTECTION BAR AND SUPPORT BOLT(S) WITH FIXED STIRRUP(S) — (TYPE B)

1/2" (13 mm) PIPE CAP (NPT)
1/2" (13 mm) FACE PLATE
1/2" (13 mm) COUPLING (NPT)
3/4" (20 mm) PROTECTION BAR (2 SECTIONS MIN) THREADED EACH END (1/2" (13 mm) NPT)
1/2" (13 mm) PIPE CAP (NPT)

ELEVATION

FACE PLATE
EYE BOLT WITH HEX NUTS
5/8" (16 mm)
3/4" (20 mm) HOLE
1/2" (13 mm) DIA FIXED STIRRUP
R=5/8" (16 mm)
PROTECTION BAR
R=5/8" (16 mm)

EYE BOLT DETAIL

STIRRUP DETAIL
NOTES:

GENERAL
1. ALL PARTS SHALL BE STEEL, EXCEPT SET SCREWS, WHICH SHALL BE STAINLESS STEEL OR BRASS.
2. EXCLUDING SET SCREWS, ALL EXPOSED METAL PARTS SHALL BE GALVANIZED AFTER FABRICATION.
3. CURB FACE SHALL BE AS NOTED ON THE PLANS.
4. CURB BATTER SHALL BE 3:12 UNLESS OTHERWISE SPECIFIED.

FACE PLATE
5. FACE PLATE LENGTHS SHALL BE CATCH BASIN W PLUS 12" (300 mm) EXCEPT AS MODIFIED FOR "A" CURB OPENING CATCH BASIN AT DRIVEWAY.
6. WHEN THE LENGTH OF THE FACE PLATE IS BETWEEN 22' (6.5 m) AND 43' (13 m), TWO SECTIONS MAY BE USED. WHEN THE LENGTH EXCEEDS 43' (13 m), THREE SECTIONS MAY BE USED. SECTIONS SHALL BE SPLICED ACCORDING TO THE APPLICABLE SPLICE DETAIL. SPLICE SHALL BE PLACED 1' (300 mm) FROM A SUPPORT BOLT.
7. WHERE CATCH BASINS ARE TO BE CONSTRUCTED ON CURVES, THE MAXIMUM CHORD LENGTH FOR THE FACE PLATE SHALL BE SUCH THAT THE MAXIMUM PERPENDICULAR DISTANCE TO THE TRUE CURVE SHALL NOT EXCEED 1' (25 mm). WHERE MORE THAN ONE CHORD IS REQUIRED, CHORD LENGTHS SHALL BE EQUAL. CHORD SECTIONS SHALL BE SPLICED ACCORDING TO THE APPLICABLE SPLICE DETAIL (MODIFIED TO FIT THE CHORD DEFLECTION) AND A SUPPORT BOLT SHALL BE PLACED 1' (300 mm) FROM THE SPLICE.
8. ROUND HEAD ANCHORS FOR THE FACE PLATE SHALL BE NELSON H-4F SHEAR CONNECTOR, KSN WELDING SYSTEMS DIVISION SHEAR CONNECTOR OR EQUAL.

SUPPORT BOLT
9. SUPPORT BOLTS ARE REQUIRED WHEN THE LENGTH OF THE CATCH BASIN OPENING IS 7' (2 m) OR GREATER, AND SHALL BE EVENLY SPACED ACROSS THE OPENING. SPACING SHALL NOT BE LESS THAN 3'-6" (1 m) ON CENTER NOR GREATER THAN 5' (1.5 m) ON CENTER.

STIRRUP
10. FOR TYPE A, MATERIAL SHALL BE CAST STEEL.

PROTECTION BAR
11. TYPE A SHALL BE USED UNLESS OTHERWISE SPECIFIED.
12. FOR TYPE A, THE BAR SHALL BE CUT TO FIT IN THE FIELD. WHEN "W" IS OVER 21' (6 m), THE PROTECTION BAR SHALL CONSIST OF 2 OR MORE SECTIONS. A SPECIAL CONNECTOR BETWEEN THE PROTECTION BAR PIECES SHALL CONSIST OF A 5" (125 mm) LENGTH OF STANDARD 3/4" (20 mm) PIPE WITH STANDARD COUPLINGS FULLY THREADED ON EACH END DRILLED AND TAPPED FOR A SOCKET SET SCREW AS DETAILED FOR THE DOWNSTREAM END ANCHOR.
13. FOR TYPE B, THE BAR SHALL BE TWO PIECES. TWO EYE BOLTS AND A WELDED STIRRUP ON EACH SUPPORT BOLT ARE REQUIRED.

14. NUMBER OF PROTECTION BARS AND LOCATIONS ARE AS FOLLOWS:

<table>
<thead>
<tr>
<th>CURB BATTER</th>
<th>MAXIMUM CURB FACE, INCHES (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; (150)</td>
<td>7&quot; (175)</td>
</tr>
<tr>
<td>8&quot; (200)</td>
<td>9&quot; (225)</td>
</tr>
<tr>
<td>10&quot; (250)</td>
<td>11&quot; (275)</td>
</tr>
<tr>
<td>12&quot; (300)</td>
<td>13&quot; (325)</td>
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<th>MAXIMUM CURB FACE, INCHES (mm)</th>
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<tr>
<td>17&quot; (425)</td>
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<td>18&quot; (450)</td>
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</table>

FOR OTHER CURB FACE OR BATTER SEE PLANS
* TYPE A PROTECTION BAR ONLY
6-1/2"x25 3/8" (6-13 mm x 645 mm) STEEL RODS,
1 NUT AND STANDARD WASHER ON EACH END SO
THAT SPACES BETWEEN OUTSIDE BARS AND
FRAME ARE EQUAL 5/8" (16.5 mm) EACH SIDE.
AFTER ASSEMBLY, PEEN THREADS TO HOLD
NUTS TIGHT

1 3/4" (45 mm) 1/4"
3/4" (19 mm) 3/16"
1/2" (8 mm)

1/2"x8" (13 mm x 200 mm) BOLTS
WITH NUTS AT CORNERS OF BASIN

STANDARD 13 mm (1/2") PIPE
INTERIOR SPACERS

SECTION A-A

SECTION B-B

SECTION C-C

ELEVATION
CENTER SUPPORT ASSEMBLY
NOTES:
1. ALL PARTS SHALL BE STEEL, EXCEPT THAT END SPACERS MAY BE CAST IRON.
2. ALL PARTS SHALL BE GALVANIZED AFTER FABRICATION, EXCEPT THAT GRATINGS SHALL BE ASSEMBLED AFTER COMPONENT PARTS ARE GALVANIZED.
3. ALL DIMENSIONS ARE FINISHED DIMENSIONS AND INCLUDE GALVANIZING.
4. ALL BOLT HOLES SHALL BE 5/8" (16 mm) DIAMETER.
5. ALL THREADS SHALL BE NATIONAL COARSE SERIES (NC).
6. CENTER SUPPORT ASSEMBLY REQUIRED WHEN TWO OR MORE GRATINGS ARE SPECIFIED ON PLANS.
   \[ L = 64" \text{ (1626 mm)} \text{ FOR CURB OPENING CATCH BASIN WITH GRATING(S) AND DEBRIS SKIMMER (SPPWC 301).} \]
   \[ L = 44" \text{ (1118 mm)} \text{ FOR CURB OPENING CATCH BASIN WITH GRATING(S) (SPPWC 320.)} \]
   \[ L = 36" \text{ (914 mm)} \text{ FOR CURBSIDE GRATING CATCH BASIN (SPPWC 303).} \]
   \[ L = 36" \text{ (914 mm)} \text{ FOR GRATING CATCH BASIN—ALLEY (LONGITUDINAL) (SPPWC 304).} \]
3/4" (20 mm) DIA PICK HOLE

2" x 1" (50 mm x 25 mm) DIAMOND
MAT 1/8" (3 mm) DEEP

INSTALLATION LOCKING DEVICE

AGENCY DESIGNATED INSCRIPTION. ALL LETTERS 1" (25 mm) HIGH

INSTALL LOCKING DEVICE

DRILL AND TAP HOLE AND INSTALL
3/4" x 1 1/4" (20 mm x 32 mm) STAINLESS STEEL SOCKET SET SCREW WITH 3/8" (10 mm) RECESSED HEX HOLE ALL THREADS TO BE NC

LOCKING DEVICE

PLAN

SECTION A–A

DETAIL "B"

DETAIL "C"

BOTTOM OF MANHOLE COVER

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
CATCH BASIN MANHOLE FRAME AND COVER

312-4

STANDARD PLAN

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION


PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1994

PUBLIC WORKS CONSTRUCTION
1. THE CAST IRON USED SHALL CONFORM TO ASTM A48M CLASS 35B.

2. THE FRAME AND COVER SHALL BE COATED WITH ASPHALTUM OR BITUMINOUS PAINT AFTER TESTING AND INSPECTION.

3. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.

4. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.

5. WEIGHT OF FRAME SHALL BE 30 POUNDS (15 kg). WEIGHT OF COVER SHALL BE 85 POUNDS (40 kg). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.

6. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE WORK SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.

7. AGENCY INSCRIPTION SHALL BE AS SPECIFIED ON THE PLANS OR SPECIAL PROVISIONS.
CASE C

CURB-SIDE GRATING CATCH BASIN

W_D

CURB-OPENING CATCH BASIN W/ GRATING

POINT A

POINT B

STRAIGHT GRADE VALLEY

POINT C

POINT D

POINT E

POINT F

POINT G

CASE D

CURB OPENING CATCH BASIN

W_D

GRATING MANHOLE IN STREET

STRAIGHT GRADE VALLEY

GRATE OR MANHOLE

SECTION D-D

SECTION E-E

LOCAL DEPRESSIONS AT CATCH BASINS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

313-3

SHEET 2 OF 4
CASE E

CASE F

CASE G

LOCAL DEPRESSIONS AT CATCH BASINS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

313-3

SHEET 3 OF 4
NOTES:

1. ALL EXPOSED EDGES SHALL BE ROUNDED TO A 1/2" (15 mm) RADIUS.


3. IN EXISTING STREETS WHERE NO PAVEMENT RECONSTRUCTION IS SPECIFIED ON THE PLANS, THE ELEVATION OF THE OUTER EDGE OF THE LOCAL DEPRESSION SHALL MEET THE FINISHED STREET SURFACE.

4. IN NEW STREETS OR IN EXISTING STREETS WHERE PAVEMENT RECONSTRUCTION IS SPECIFIED ON THE PLANS:

   THE ELEVATIONS OF POINTS F AND G SHALL BE SET H1 HIGHER THAN THE GUTTER FLOW LINE ELEVATIONS AT POINTS A AND D, RESPECTIVELY.

   THE ELEVATIONS OF POINTS P AND R SHALL BE SET H2 HIGHER THAN THE GUTTER FLOW LINE ELEVATIONS AT POINTS B AND C, RESPECTIVELY.

   THE ELEVATION OF POINT S SHALL BE SET H2 HIGHER THAN THE ELEVATION AT THE NEAREST GUTTER FLOW LINE.

   WHERE THERE IS NO GUTTER ADJACENT TO THE LOCAL DEPRESSION, THE ELEVATION OF POINT E SHALL BE SET H3 HIGHER THAN THE ELEVATION AT THE NEAREST TOE OF CURB.

5. DIMENSIONS:

   H, H1, H2 AND H3 SHALL BE AS NOTED ON THE PLANS.

   G = 24" (600 mm)

   K = 5'-0" (1500 mm)

   L = 6'-0" (1800 mm)

   M = 4'-0" (1200 mm)

   N = 5'-0" (1500 mm)

   W_D = CATCH BASIN W FOR SINGLE CATCH BASIN OR DISTANCE BETWEEN EXTREME END WALLS FOR MULTIPLE CATCH BASINS.
DETAIL "A"  

SECTION X-X  

CASE 1  
CATCH BASIN MODIFICATION  
WITH REAR CULVERT ENTRANCE  
AND/OR ENTRANCE PROJECTION  

CASE 2  
CATCH BASIN MODIFICATION  
TO AVOID EXISTING UTILITY  

CASE 3  
SAFETY BAR FOR DROP  
OUTLET CATCH BASIN  

NOTES:  
UTILITY LOCATION AND TYPE  
SHOWN ON THE PLANS.  

OPTIONAL SUBGRADE—(450 mm)  
MIN  

POUR AGAINST UNDISTURBED EARTH  

SECTION  

CASE 2  
CATCH BASIN MODIFICATION  
TO AVOID EXISTING UTILITY  

OPTIONAL SUBGRADE—(450 mm)  
MIN  

POUR AGAINST UNDISTURBED EARTH  

SECTION  

CASE 3  
SAFETY BAR FOR DROP  
OUTLET CATCH BASIN  

NOTE:  
SAFETY BAR SHALL BE  
3/4" (20 mm) DIA GALV,  
HOT-ROLLED STEEL  
CONFORMING TO ASTM A36M (A36)  

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION  

MODIFICATIONS FOR SIDE OPENING CATCH-BASIN  

STANDARD PLAN  
314-3  

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION  

SHEET 1 OF 2
NOTES

1. MODIFICATIONS ARE TO BE USED AS REQUIRED BY THE PLANS. ANY ADDITIONAL CHANGES ARE SUBJECT TO THE APPROVAL OF THE ENGINEER.

2. DETAILS NOT SHOWN SHALL BE PER THE APPLICABLE CATCH BASIN STANDARD PLANS.

3. REFER TO THE PLANS FOR DETAILS OF THE UTILITY AND CULVERT.

4. INTERFERING PORTIONS OF EXISTING CULVERTS SHALL BE REMOVED ON A LINE NORMAL TO THE CULVERT CENTER LINE AND A PORTION OF THE CULVERT RECONSTRUCTED IF REQUIRED. SAWCUTTING SHALL BE USED TO PROVIDE A NEAT JOINT ON THE EXPOSED SURFACE AND TRANSVERSE STEEL SHALL BE RETAINED.

5. PLACE STEPS IN END WALL OF CATCH BASIN UNLESS OTHERWISE SHOWN.

6. WHEN REINFORCEMENT IS REQUIRED BY SPPWC 309, IT SHALL BE PLACED TO THE CONFIGURATION OF THE MODIFIED BASIN. IF ANGLE A EXCEEDS 45° THE SLOPING PORTION OF THE INVERT SHALL BE REINFORCED AS THE REAR WALL. LENGTH OF BARS SHALL BE INCREASED AS NECESSARY.

7. ELECTRICALLY WELDED STUDS 1/2" x 8" (15 mm x 200 mm), NELSON H4F OR EQUAL MAY BE USED IN LIEU OF THE DEFORMED BAR ANCHORS. IF THE TOP SLABS OF THE CATCH BASIN AND THE CULVERT ARE NOT IN THE SAME PLANE THE ANCHORS ON THE CULVERT SIDE SHALL BE OMITTED.

8. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:

- 300 CURB OPENING CATCH BASIN
- 308 MONOLITHIC CATCH BASIN CONNECTION
- 309 CATCH BASIN REINFORCEMENT
- 310 CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
- 312 CATCH BASIN MANHOLE FRAME AND COVER
- 635 STEEL STEP
- 636 POLYPROPYLENE PLASTIC STEP

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MODIFICATIONS FOR SIDE OPENING CATCH-BASIN

STANDARD PLAN

314-3

SHEET 2 OF 2
### TABLE OF VALUES FOR F

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### TABLE OF VALUES FOR M (SEE NOTE 1)

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<th>UNPAVED STREET MAX</th>
<th>UNPAVED STREET MIN</th>
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<td>A-A</td>
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<td>3'-6&quot; (1060 mm)</td>
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<td>C-C</td>
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<td>16&quot; (410 mm)</td>
<td>15&quot; (380 mm)</td>
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NOTES

1. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 2'-10 1/2" (867 mm) FOR PAVED STREETS OR 3'-6" (1060 mm) FOR UNPAVED STREETS, CONSTRUCT MONOLITHIC SHAFT PER SECTION C–C AND DETAIL "N". SHAFT FOR ANY DEPTH OF MANHOLE MAY BE CONSTRUCTED PER SECTION C–C. WHEN DIAMETER D, IS 48" (1200 mm) OR LESS, CENTER OF SHAFT MAY BE LOCATED PER NOTE 2.

2. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTER LINE OF STORM DRAIN WHEN DIAMETER D, IS 48" (1200 mm) OR LESS, IN WHICH CASE PLACE E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTERLINE AND OMIT J BARS.

3. L AND P SHALL HAVE THE FOLLOWING VALUES UNLESS OTHERWISE SHOWN ON THE PROJECT DRAWINGS:
   A. D, =96" (2400 mm) OR LESS, L=5'-6" (1.7 m), P=5" (130 mm)
   B. D, OVER 96" (2400 mm), L=6'-0" (1.8 m), P=8" (210 mm)
   L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS. WHEN L GREATER THAN THAT SHOWN ABOVE IS SPECIFIED, D BARS SHALL BE CONTINUED 6" (150 mm) OC.

4. STATIONS OF MANHOLES SHOWN ON PLANS APPLY AT CENTERLINE OF SHAFT. ELEVATIONS ARE SHOWN AT CENTERLINE OF SHAFT AND REFER TO THE PROLONGED INVERT GRADE LINES.

5. REINFORCEMENT SHALL CONFORM TO ASTM A 615M, GRADE 300 (ASTM A 615, GRADE 40), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.

6. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRING LINE.

7. BODY OF MANHOLE SHALL BE Poured IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.

8. THICKNESS OF THE DECK SHALL VARY WHEN NECESSARY TO PROVIDE A LEVEL SEAL BUT SHALL NOT BE LESS THAN THE TABULAR VALUES FOR F SHOWN ON SHEET 2.

9. D BARS SHALL BE #4 (#13M) FOR D,=39" (975 mm) OR LESS, #5 (#16M) FOR D, = 42" (1050 mm) TO 84" (2100 mm) INCLUSIVE AND #6 (#19M) FOR D, = 90" (2250 mm) OR OVER.

10. CENTERLINE OF INLET PIPE SHALL INTERSECT INSIDE FACE OF CONE AT SPRING LINE UNLESS OTHERWISE SHOWN.

11. STEPS SHALL CONFORM TO SPPWC 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC. THE LOWEST STEP SHALL NOT BE MORE THAN 24" (600 mm) ABOVE THE INVERT.

12. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:
   A. MAIN LINE = 36" (900 mm) INSIDE DIAMETER OR LARGER. EXCEPT IF THE MAIN LINE RCP DOWNSTREAM OF MANHOLE IS 36" (900 mm) TO 42" (1050 mm) INSIDE DIAMETER AND THE MAIN LINE RCP UPSTREAM IS 33" (825 mm) OR LESS SPPWC 321 SHALL BE USED.
B. The outside diameter of the lateral must be less than or equal to 1/2 the inside diameter of the main line. If the upstream and downstream diameters of the manhole are not the same, the governing inside diameter of the main line shall be considered to be that where the extended centerline of the lateral enters the manhole.

C. In no instance shall the inside diameter of the lateral to the manhole be greater than 30" (750 mm).

13. Manhole frame and cover shall conform to SPPWC 630 unless otherwise shown.

14. Manhole shaft shall conform to SPPWC 324 unless otherwise shown.

15. Where a manhole shaft — 36" (900 mm) without reducer is specified refer to SPPWC 326.

16. Where a pressure manhole shaft — with eccentric reducer is specified refer to SPPWC 328.

17. Where a pressure manhole shaft — 914 mm (36") without reducer is specified refer to SPPWC 329.

18. The following SPPWC are incorporated herein:
   324 Manhole shaft — with eccentric reducer
   326 Manhole shaft — 36" (900 mm) without reducer
   328 Pressure manhole shaft — with eccentric
   329 Pressure manhole shaft 36" (914 mm) without reducer
   630 24" (610 mm) manhole frame and cover
   633 36" (914 mm) manhole frame and cover
   635 Steel step
   636 Polypropylene plastic step
STREET GRADE MANHOLE FRAME CONCRETE RINGS AND COVER PER SPPWC 324
OMIT THIS STEP IN PAVED STREETS
16" (400 mm) FOR PAVED STREETS,
2'–2" (650 mm) STREETS FOR UN-
PAVED STREETS
5"x2" (125 mm x 50 mm) PIPE SEAT
5 INLET ELEVATION APPLIES AT THIS POINT
OPTIONAL BOTTOM GRADE POINTS, SEE NOTE 5
TABLE OF VALUES FOR M (SEE NOTE 1)

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<th>SECTION</th>
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<td>C–C</td>
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STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
MANHOLE PIPE–TO–PIPE (ONE OR BOTH MAIN LINE IDS 33" (825 mm) OR SMALLER)
USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 321–2 SHEET 1 OF 3
NOTES

1. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 2'-10 1/2" (867 mm) FOR PAVED STREETS OR 3'-0" (1060 mm) FOR UNPAVED STREETS, CONSTRUCT SHAFT PER SECTION C-C AND DETAIL "N". DEPTH M MAY BE REDUCED TO AN ABSOLUTE LIMIT OF 6" (150 mm) WHEN LARGER VALUES OF M WOULD REDUCE H IN SECTION C-C TO 3'-6" (1060 mm) OR LESS.

2. H (IN SECTION A-A AND B-B) SHALL NOT BE LESS THAN 4'-0" (1.2 m), BUT MAY BE INCREASED PROVIDED THAT THE VALUE OF M SHALL NOT BE LESS THAN THE MINIMUM SPECIFIED AND THAT THE REDUCER SHALL BE USED. FOR H (IN SECTION C-C) SEE NOTE 1.

3. L SHALL BE 4'-0" (1.2 m) UNLESS OTHERWISE SHOWN. L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS, BUT ANY CHANGE IN LOCATION OF THE SPUR MUST BE APPROVED BY THE ENGINEER.

4. T SHALL BE 8" (200 mm) FOR VALUES OF H UP TO AND INCLUDING 8'-0" (2.4 m) AND 10" (250 mm) FOR VALUES OF H OVER 8'-0" (2.4 m).

5. STATIONS OF MANHOLES SHOWN ON PLANS APPLY AT CENTERLINE OF SHAFT. ELEVATIONS ARE SHOWN AT CENTERLINE OF SHAFT AND REFER TO THE PROLONGED INVERT GRADE LINES. SEE NOTE 3.

6. REINFORCEMENT SHALL CONFORM TO ASTM A 615, GRADE 40 (ASTM A 615M, GRADE 300), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.

7. FLOOR OF MANHOLE SHALL BE STEEL TROWEL TO SPRING LINE.

8. BODY OF MANHOLE SHALL BE Poured IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.

9. THICKNESS OF THE DECK SHALL VARY WHEN NECESSARY TO PROVIDE A LEVEL SEAT BUT SHALL NOT BE LESS THAN 8" (200 mm).

10. STEPS SHALL CONFORM TO SPPWC 635 OR 636, UNLESS OTHERWISE SHOWN; STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC. THE LOWEST STEP SHALL NOT BE MORE THAN 24" (600 mm) ABOVE THE LEDGE AT THE SIDE OF THE MANHOLE.
11. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:

A. MAIN LINE = 33" (825 mm) INSIDE DIAMETER OR LESS. (EXCEPTION — IF THE MAIN LINE RCP DOWNSTREAM OF THE MANHOLE IS 36" (900 mm) TO 42" (1050 mm) INSIDE DIAMETER AND THE MAIN LINE RCP UPSTREAM IS 33" (825 mm) OR LESS.) SPPWC 320 OR 322 IS NOT APPLICABLE WHERE THE MAIN LINE CONDUIT IS LESS THAN 36" (900 mm) IN DIAMETER.

B. SEE SECTION A — A. THE MAXIMUM SIZE LATERAL THAT MAY BE CONNECTED TO THIS MANHOLE IS SUCH THAT THE DISTANCE FROM THE OUTSIDE (TOP) OF THE LATERAL TO THE BOTTOM OF THE 8" (200 mm) THICK TOP OF THE MANHOLE CHAMBER, MEASURED VERTICALLY FROM THE END OF THE RCP, SHALL BE A MINIMUM OF 6" (150 mm).

C. IF THE SIZE OF THE LATERAL IS SUCH THAT THE ABOVE—SPECIFIED MINIMUM DISTANCES CANNOT BE MAINTAINED, THEN ONE OF THE FOLLOWING ALTERNATE SOLUTIONS MUST BE USED.

1. PROVIDE A SPECIAL STRUCTURE.

2. PROVIDE TWO STANDARD STRUCTURES, CONSISTING OF THIS MANHOLE PLACED UPSTREAM OR DOWNSTREAM FROM THE APPLICABLE JUNCTION STRUCTURE OR TRANSITION STRUCTURE.

12. MANHOLE FRAME AND COVER SHALL CONFORM TO SPPWC 630 UNLESS OTHERWISE SHOWN.

13. MANHOLE SHAFT SHALL CONFORM TO SPPWC 324 UNLESS OTHERWISE SHOWN.

14. WHERE A MANHOLE SHAFT — 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 336.

15. WHERE A PRESSURE MANHOLE SHAFT — WITH ECCENTRIC REDUCER IS SPECIFIED REFER TO SPPWC 328.

16. WHERE A PRESSURE MANHOLE SHAFT — 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 329.

17. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:

324 MANHOLE SHAFT — WITH ECCENTRIC REDUCER
326 MANHOLE SHAFT — 36" (900 mm) WITHOUT REDUCER
328 PRESSURE MANHOLE SHAFT — WITH ECCENTRIC
329 PRESSURE MANHOLE SHAFT — 36" (900 mm) WITHOUT REDUCER
630 24" (610 mm) MANHOLE FRAME AND COVER
633 36" (900 mm) MANHOLE FRAME AND COVER
635 STEEL STEP
636 POLYPROPYLENE PLASTIC STEP
### Table of Bars Sizes

<table>
<thead>
<tr>
<th>D₂ or B</th>
<th>A &amp; B</th>
<th>D₁ or F</th>
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<td>#5 @ 3&quot; (#1@M 75 mm)</td>
<td>#4 @ 6&quot; (#1@M 150 mm)</td>
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<tr>
<td>42&quot; (1050 mm) - 84&quot; (2100 mm)</td>
<td>#6 @ 3&quot; (#19@M 75 mm)</td>
<td>#5 @ 6&quot; (#1@M 150 mm)</td>
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<td>90&quot; (2250 mm) - 144&quot; (3600 mm)</td>
<td>#7 @ 3&quot; (#22@M 75 mm)</td>
<td>#6 @ 6&quot; (#19@M 150 mm)</td>
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### Table of Values for M (See Note 2)

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### Table of Values for F

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### Table of Values for T

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<td>144&quot; (3600 mm)</td>
<td>16 1/2&quot; (445 mm)</td>
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NOTES

1. VALUES FOR A, B, C, D₁, D₂, ELEVATION R AND ELEVATION S ARE SHOWN ON THE PLANS. ELEVATION S APPLIES AT INSIDE WALL OF STRUCTURE.

2. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 2'-10 1/2" (867 mm) FOR PAVED STREETS OR 3'-6" (1060 mm) FOR UNPaved STREETS, CONSTRUCT MONOLITHIC SHAFT PER SECTION C-C AND DETAIL "N". SHAFT FOR ANY DEPTH OF MANHOLE MAY BE CONSTRUCTED PER SECTION C-C. WHEN DIAMETER D₁ IS 48" (1200 mm) OR LESS, CENTER OF SHAFT MAY BE LOCATED PER NOTE 3.

3. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTERLINE OF STORM DRAIN WHEN DIAMETER D₁ IS 48" (1200 mm) OR LESS, IN WHICH CASE PLACE E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTERLINE.

4. LENGTH OF MANHOLE MAY BE INCREASED AT OPTION TO MEET PIPE ENDS, BUT ANY CHANGE IN LOCATION OF SPUR MUST BE APPROVED BY THE ENGINEER.

5. P SHALL BE 5" (125 mm) FOR D₂ = 96" (2400 mm) OR LESS AND 8" (200 mm) FOR D₂ OVER 96" (2400 mm).

6. REINFORCEMENT SHALL CONFORM TO ASTM A 615, GRADE 40 (ASTM A 615M, GRADE 300), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.

7. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRING LINE.

8. BODY OF MANHOLE SHALL BE Poured IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.


10. IF LATERALS ENTER ON BOTH SIDES OF MANHOLE, SHAFT SHALL BE LOCATED ON SIDE RECEIVING THE SMALLER LATERAL.

11. STEPS SHALL CONFORM TO SPPWC 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC. THE LOWEST STEP SHALL NOT BE MORE THAN 24" (600 mm) ABOVE THE INVERT.

12. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:

A. THIS STANDARD PLAN IS USED WHEN SPPWC 320 IS INADEQUATE. MAIN LINE = 36" (900 mm) INSIDE DIAMETER OR LARGER.

B. LATERAL = 12" (300 mm) TO 144" (3600 mm) INSIDE DIAMETER; HOWEVER, THE INSIDE DIAMETER SHALL NOT EXCEED THE INSIDE DIAMETER OF THE MAIN LINE.
13. MANHOLE FRAME AND COVER SHALL CONFORM TO SPPWC 630 UNLESS OTHERWISE SHOWN.

14. MANHOLE SHAFT SHALL CONFORM TO SPPWC 324 UNLESS OTHERWISE SHOWN.

15. WHERE A MANHOLE SHAFT — 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 326.

16. WHERE A PRESSURE MANHOLE SHAFT — WITH ECCENTRIC REDUCER IS SPECIFIED REFER TO SPPWC 328.

17. WHERE A PRESSURE MANHOLE SHAFT — 36" (914 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 329.

18. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
   - 324 MANHOLE SHAFT — WITH ECCENTRIC REDUCER
   - 326 MANHOLE SHAFT — 36" (900 mm) WITHOUT REDUCER
   - 328 PRESSURE MANHOLE SHAFT — WITH ECCENTRIC REDUCER
   - 329 PRESSURE MANHOLE SHAFT — 36" (914 mm) WITHOUT REDUCER
   - 630 24" (610 mm) MANHOLE FRAME AND COVER
   - 633 36" (914 mm) MANHOLE FRAME AND COVER
   - 635 STEEL STEP
   - 636 POLYPROPYLENE PLASTIC STEP
SIZE AND SPACING OF STEEL AS SHOWN ON PROJECT DRAWINGS, EXCEPT THAT 5 BARS ON EACH SIDE OF SHAFT SHALL BE NOT SMALLER THAN #5 @ 4′ (16M @ 100 mm) OC OR EQUIVALENT

5 BARS 7′-0″ (2.1 m) LONG, 4″ (100 mm) OC, OF SIZE SHOWN FOR TRANSVERSE STEEL, BUT NOT SMALLER THAN #5 (16M) BARS. WARP THESE BARS UNDER BARS THAT HAVE BEEN CUT FOR SHAFT OPENING

SECTION A - A
MANHOLE FRAME AND COVER PER SPPWC 630

SECTION B - B
MANHOLE SHAFT PER SPPWC 324

SECTION C - C
SEE NOTE 1

TABLE OF VALUES FOR M (SEE NOTE 1)

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<th>UNPAVED STREET</th>
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<tr>
<td>MAX</td>
<td>MIN</td>
<td>MAX</td>
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<tr>
<td>B - B</td>
<td>2′-10 1/2″ (867 mm)</td>
<td>3′-6″ (1060 mm)</td>
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<tr>
<td>C - C</td>
<td>11″ (282 mm)</td>
<td>8 1/2″ (217 mm)</td>
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STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
MANHOLE - CONCRETE BOX STORM DRAIN
STANDARD PLAN 323-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE 1992
REV. 1996, 2009
NOTES

1. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 2'-10 1/2" (867 mm) FOR PAVED STREETS OR 3'-6" (1060 mm) FOR UNPAVED STREETS, CONSTRUCT SHAFT PER SECTION C-C.

2. STATIONS OF MANHOLES SHOWN ON PLANS. APPLY AT CENTERLINE LINE OF SHAFT. ELEVATIONS ARE SHOWN AT CENTERLINE OF SHAFT.

3. REINFORCEMENT SHALL CONFORM TO ASTM A 615, GRADE 40 (ASTM A 615M, GRADE 300), AND SHALL TERMINATE 40 mm (1 1/2") CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.

4. STEPS SHALL CONFORM TO SPPWC 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC. THE LOWEST STEP SHALL NOT BE MORE THAN 24" (600 mm) ABOVE THE INVERT.

5. MANHOLE FRAME AND COVER SHALL CONFORM TO SPPWC 630 UNLESS OTHERWISE SHOWN.

6. MANHOLE SHAFT SHALL CONFORM TO SPPWC 324 UNLESS OTHERWISE SHOWN.

7. WHERE A MANHOLE SHAFT - 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 326.

8. WHERE A PRESSURE MANHOLE SHAFT - WITH ECCENTRIC REDUCER IS SPECIFIED REFER TO SPPWC 328.

9. WHERE A PRESSURE MANHOLE SHAFT - 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 329.

10. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
    324 MANHOLE SHAFT - WITH ECCENTRIC REDUCER
    326 MANHOLE SHAFT - 36" (900 mm) WITHOUT REDUCER
    328 PRESSURE MANHOLE SHAFT - WITH ECCENTRIC
    329 PRESSURE MANHOLE SHAFT - 36" (900 mm) WITHOUT REDUCER
    630 24" (600 mm) MANHOLE FRAME AND COVER
    633 36" (900 mm) MANHOLE FRAME AND COVER
    635 STEEL STEP
    636 POLYPROPYLENE PLASTIC STEP
NOTES

1. UNLESS OTHERWISE INDICATED THIS STRUCTURE SHALL CONFORM TO ASTM C 478M (ASTM C 478) AND ALL CONCRETE SHALL BE PER SSPWC 201-1.2.

2. MANHOLE FRAME AND COVER SHALL CONFORM TO SSPWC 630.

3. ALL JOINTS SHALL BE SEALED BY FILLING THE ANNULAR SPACES WITH CLASS C MORTAR. THE INSIDE OF THE SHAFT AT EACH JOINT SHALL BE WIPED CLEAN OF EXCESS MORTAR.

4. PROTECTIVE PLASTIC LINER (T LOCK) OR ENGINEER-APPROVED COATINGS WHERE REQUIRED BY THE PLANS SHALL BE IN ACCORDANCE WITH SSPWC AND THE MANUFACTURER'S DIRECTIONS.

5. STEPS SHALL CONFORM TO SSPWC 635 OR 636. THE TOP STEP SHALL BE PLACED DIRECTLY BENEATH THE MANHOLE FRAME. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC.

6. THE ECCENTRIC MANHOLE SHAFT REDUCER AND RINGS MAY BE PLAIN CONCRETE. FOR PLAIN CONCRETE SECTIONS THE MINIMUM THICKNESS SHALL BE 6" (150 mm).

7. THE PRECAST CONCRETE MANHOLE STRUCTURES WILL BE INSPECTED BY THE ENGINEER WHO WILL INDICATE ACCEPTANCE FOR SHIPMENT TO THE JOB BY MARKING THE STRUCTURES WITH THE AGENCY'S STAMP.


9. CONSTRUCT MANHOLE SAFETY LEDGE PER SSPWC 330 IF DEPTH OF MANHOLE TO INVERT IS GREATER THAN 20' (6 m) AND MANHOLE SHAFT IS GREATER THAN 10' (3 m). WHEN SAFETY LEDGE IS REQUIRED AND MANHOLE SHAFT IS LESS THAN 12' (4 m) SSPWC 326 MUST BE USED.

10. THE FOLLOWING SSPWC ARE INCORPORATED HEREIN:

   630  24" (600 mm) MANHOLE FRAME AND COVER
   635  STEEL STEP
   636  POLYPROPYLENE PLASTIC STEP
36" (900 mm) MANHOLE FRAME AND COVER PER SPPWC 633

FINISHED GRADE OR SPECIFIED ELEVATION

VARIABLE LENGTH PRE-CAST CONCRETE SECTIONS:
- 6" (150 mm)
- 8" (200 mm)
- 15" (375 mm)
- 30" (750 mm)
- 45" (1125 mm)

SEE NOTE 3

VARIABLE LENGTH PRE-COLLAR, CLASS C CAST CONCRETE SECTIONS:
- 6" (150 mm)
- 8" (200 mm)
- 15" (375 mm)
- 30" (750 mm)
- 45" (1125 mm)

SEE NOTE 3

VERTICAL SECTION OF SPECIAL MANHOLE SHAFT WITH GRADE RING RISERS

VERTICAL SECTION OF SPECIAL MANHOLE SHAFT WITH REINFORCED CONCRETE PIPE

DETAL "A"

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MANHOLE SHAFT
36"(900 mm) WITHOUT REDUCER

STANDARD PLAN 326-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
NOTES

1. UNLESS OTHERWISE INDICATED THIS STRUCTURE SHALL CONFORM TO ASTM C 478 (ASTM C 478M). ALL STEEL SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES AND ALL CONCRETE SHALL BE PER SSPWC.

2. WHERE A 36" (900 mm) MANHOLE IS CONSTRUCTED WITH 36" (900 mm) MANHOLE RCP, THE RCP SECTION SHALL CONTAIN A CIRCULAR CAGE AND HAVE A LOAD CARRYING CAPACITY OF AT LEAST 1000D (50D). SPECIAL MANHOLE SHAFT SHALL BE PER THIS STANDARD AND 36" (900 mm) MANHOLE FRAME AND COVER SHALL BE PER SSPWC 633.

3. THE MANHOLE SHAFT AND RINGS MAY BE PLAIN CONCRETE. FOR PLAIN CONCRETE SECTIONS THE MINIMUM THICKNESS SHALL BE 6" (150 mm).

4. ALL JOINTS SHALL BE SEALED BY FILLING THE ANNULAR SPACES WITH CLASS C MORTAR. THE INSIDE OF THE SHAFT AT EACH JOINT SHALL BE WIPE CLEAN OF EXCESS MORTAR.

5. PROTECTIVE PLASTIC LINER (T LOCK) OR ENGINEER-APPROVED COATINGS WHERE REQUIRED BY THE PLANS SHALL BE IN ACCORDANCE WITH SSPWC AND THE MANUFACTURER’S DIRECTIONS.

6. STEPS SHALL CONFORM TO SSPWC 635 OR 636. THE TOP STEP SHALL BE PLACED 6" (150 mm) BENEATH THE MANHOLE COVER FRAME. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC.

7. THE PRECAST CONCRETE MANHOLE STRUCTURES WILL BE INSPECTED BY THE ENGINEER WHO WILL INDICATE ACCEPTANCE FOR SHIPMENT TO THE JOB BY MARKING THE STRUCTURES WITH THE AGENCY’S STAMP.

8. THE VERTICAL SIDES OF THE MANHOLE SHAFT SHALL BE LOCATED ABOVE AND IN LINE WITH THE SIDE OF THE STORM DRAIN CONDUIT.

9. CONSTRUCT MANHOLE SAFETY LEDGE PER SSPWC 330 IF DEPTH OF MANHOLE TO INVERT IS GREATER THAN 20' (6 m) AND MANHOLE SHAFT IS GREATER THAN 10' (3 m).

10. THE FOLLOWING SSPWC ARE INCORPORATED HEREIN:
   - 633 36" (900 mm) MANHOLE FRAME AND COVER
   - 635 STEEL STEP
   - 636 POLYPROPYLENE PLASTIC STEP
MANHOLE DETAIL

BREAKOUT LIMIT
RETAIN EXISTING REINF BARS AS SHOWN

DIAGONAL BARS NOT SHOWN

RETAIN EXISTING REINF BARS AS SHOWN

15° (375 mm) MIN

DRILL 3" (75 mm) HOLE (2 PER STEP)

EXIST. WALL
SET WITH HIGH STRENGTH (6000 PSI (42 MPa) MIN) NON-SHRINK GROUT

STEPS, SEE NOTE 5

SECTION B-B

5-#5 @ 4" (16M x 100 mm) OC x 7'-0" (2.1 m) LONG

18" (450 mm) (150 mm)

BREAKOUT LIMIT

6" (150 mm) DEEP HOLE INTO EXISTING SLAB AND PLACE #4 (13M) DOWELS WITH NON-SHRINK EPOXY GROUT AT INTERVALS HALFWAY BETWEEN EXISTING LONGITUDINAL BARS. EXTEND 18" (450 mm) INTO NEW SLAB

LEGEND
- EXISTING REINFORCING BARS
- ADDED REINFORCING BARS

DETAIL "A"

PLACEMENT OF STEEL STEP IN EXISTING RCB

5-#5 @ 4" (16M x 100 mm) OC x 7'-0" (2.1 m) LONG

6" (150 mm) (175 mm)

SECTION A-A

DRILL 6" (150 mm) DEEP HOLE INTO EXISTING SLAB AND PLACE #4 (13M) DOWELS WITH NON-SHRINK EPOXY GROUT AT INTERVALS HALFWAY BETWEEN EXISTING LONGITUDINAL BARS. EXTEND 18" (450 mm) INTO NEW SLAB

LEGEND
- EXISTING REINFORCING BARS
- ADDED REINFORCING BARS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
MANHOLE FOR EXISTING RCB

STANDARD PLAN
327-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1992
REV. 1996, 2009

SHEET 1 OF 3
NOTES

1. THIS STRUCTURE MAY BE USED WHEN THE DEPTH OF COVER IS NO GREATER THAN THE DESIGN COVER OF EXISTING RCB. IF THIS DEPTH IS EXCEEDED, OR PROPOSED MANHOLE SHAFT EXCEEDS 36" (900 mm) IN DIAMETER A DETAILED PLAN WITH CALCULATIONS PREPARED BY A CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA SHOWING THE PROPOSED MANHOLE SHALL BE SUBMITTED TO THE AGENCY FOR APPROVAL.

2. STRUCTURAL NOTES.
   A. DIMENSIONS FROM FACE OF CONCRETE TO REINFORCING STEEL ARE TO CENTER OF BAR UNLESS OTHERWISE SHOWN.
   B. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTER LINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
   C. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE. LATEST EDITION."
   D. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE". LATEST EDITION.
   E. TRANSVERSE REINFORCING STEEL SHALL TERMINATE 1 1/2" (40 mm) FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
   F. NO SPICES IN TRANSVERSE STEEL REINFORCEMENT SHALL BE PERMITTED OTHER THAN SHOWN ON THE PLANS.
   G. ALL STRUCTURAL CONCRETE SHALL BE PORTLAND CEMENT CONCRETE WITH A 28 DAY COMPRESSIVE STRENGTH OF 4000 PSI (28 MPa).
   H. ALL REINFORCING STEEL SHALL CONFORM TO ASTM A ASTM A 615, GRADE 40 (615M, GRADE 300).

3. WHERE REINFORCEMENT IS REQUIRED TO EXTEND THROUGH THE NEW JOINT, CONCRETE SHALL BE REMOVED IN THE FOLLOWING SEQUENCE:
   A. A SAW CUT SHALL BE MADE 1 1/2" (40 mm) DEEP AT THE REMOVAL LIMITS. CARE SHALL BE EXERCISED IN SAWING AT THE REMOVAL LIMITS SO AS NOT TO CUT THE REINFORCING STEEL WHICH SHALL BE RETAINED AND EXTENDED INTO THE NEW CONSTRUCTION AS INDICATED ON THE PLANS.
   B. USING HAND—HELD EQUIPMENT THE CONCRETE SHALL BE CAREFULLY REMOVED FOR THE FULL DEPTH OF THE WALL OR SLAB AND FOR A MINIMUM DISTANCE FROM THE SAW CUT EQUAL TO THE LONGEST EXTENSION OF THE EXISTING BARS TO BE EXTENDED INTO THE NEW CONSTRUCTION. THIS EXTENSION SHALL BE 30 BAR DIAMETERS UNLESS OTHERWISE SHOWN.
   C. EXISTING REINFORCEMENT SHALL BE CUT TO THE REQUIRED BAR EXTENSION.
   D. THE REMAINING CONCRETE MAY BE REMOVED BY ANY SUITABLE METHOD, UPON APPROVAL OF THE ENGINEER, WHO SHALL BE THE SOLE JUDGE OF THE USE OF ANY CONCRETE REMOVAL EQUIPMENT. EXPLOSIVES, WRECKING BALL OR OTHER SIMILAR DEVICES WHICH ARE LIKELY TO DAMAGE THE CONCRETE TO BE LEFT IN PLACE SHALL NOT BE USED.
   E. INTERNAL SUPPORT OF THE EXISTING RCB SHALL BE PROVIDED DURING THE REMOVAL AND RECONSTRUCTION OF THE TOP SLAB. A DETAILED PLAN WITH CALCULATIONS PREPARED BY A CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA SHOWING THE TEMPORARY SUPPORT SYSTEM SHALL BE SUBMITTED AND APPROVED BY THE AGENCY PRIOR TO THE START OF REMOVAL WORK.
4. WHEN THE MANHOLE OPENING IS 24" (610 mm), THE BREAKOUT LIMIT DIMENSIONS MAY BE REDUCED FROM 5'-0" x 7'-0" (1.5 m x 2.1 m) TO 4'-0" x 6'-0" (1.2 m x 1.8 m).

5. STEPS SHALL CONFORM TO SPPWC 635. UNLESS OTHERWISE SHOWN, STEPS SHALL BE SPACED 14" (350 mm) TO 15" (375 mm) OC. THE LOWEST STEP SHALL NOT BE MORE THAN 24" (600 mm) ABOVE THE INVERT.

6. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:

323 MANHOLE - CONCRETE BOX STORM DRAIN
630 24" (610 mm) MANHOLE FRAME AND COVER
635 STEEL STEP
PLAN

MANHOLE OR STORM DRAIN CONDUIT

MANHOLE FRAME AND COVER PRESSURE TYPE PER SPPWC 211

SURFACE ELEVATION

D = 37 3/4" (952 mm)

D = 40 3/8" (1013 mm)

D = 43" (1074 mm)

6-#4 (#13M) @ 60° SPACING

OPTIMAL #4 (#13M) 15" (375 mm) DOWEL

D = 45 1/2" (1135 mm)

PROVIDE CONSTRUCTION JOINT WITH CONTINUOUS WATERSTOP WHEN MANHOLE SHAFT IS NOT POURED MONOLITHIC WITH MANHOLE OR STORM DRAIN CONDUIT

SECTION A-A

ELECTRICALLY BUTT WELD ENDS OR LAP ENDS OF BAR 18" (450 mm)

#4 (#13M) HOOP BARS
NOTES

1. IF H IS LESS THAN 18" (450 mm), W = 27" (675 mm).
   IF H IS BETWEEN 18" (450 mm) AND 2'–6" (750 mm), W = 2'–6" (750 mm).
   IF H IS 2'–6" (750 mm) OR MORE, W = 3'–0" (900 mm).
   IF H IS MORE THAN 4'–0 1/2" (1215 mm), BRING WALL VERTICALLY TO
5'–0 1/2" (1215 mm) BELOW SURFACE AND TAPER FROM 3'–0" (900 mm)
TO 27" (675 mm) AS SHOWN.

2. THIS STRUCTURE SHALL BE USED WITH MANHOLE FRAME AND COVER
PRESSURE TYPE, SPPWC 211. IT MAY BE USED FOR HYDROSTATIC
HEADS UP TO 25' (7.5 m) ABOVE THE STEEL PLATE.

3. THE VERTICAL SIDE OF THE MANHOLE SHAFT AND THE ECCENTRIC
REDUCER SHALL BE LOCATED ABOVE AND IN LINE WITH THE SIDE
OF THE STORM DRAIN CONDUIT.

4. REINFORCEMENT SHALL CONFORM TO ASTM A 615, GRADE 40 (ASTM
   A 615M, GRADE 300), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF
   CONCRETE SURFACES UNLESS OTHERWISE SHOWN.

5. STEPS SHALL CONFORM TO SPPWC 635 OR 636. THE TOP
   STEP SHALL BE PLACED DIRECTLY BENEATH THE MANHOLE FRAME.
   UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED
   14" (350 mm) TO 15" (375 mm) OC.

6. SEE CONTRACT SPECIFICATIONS FOR PHYSICAL REQUIREMENTS OF
   WATERSTOP.

7. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
   211 MANHOLE FRAME AND COVER PRESSURE TYPE
   635 STEEL STEP
   636 POLYPROPYLENE PLASTIC STEP
**MANHOLE FRAME AND COVER**

**COLLAR, CLASS C MORTAR**

**SURFACE ELEVATION**

- Variable:
  - 5 1/2" x 100 mm
  - 3" x 75 mm

- 2 1/2" x 65 mm

- 8" x 200 mm

- 3 1/2" x 89 mm

**STEPS**

- 6 - #4 (1/3M) @ 60° spacing

- 2 1/2" x 65 mm

- 5" (125 mm) (TYP)

- 6 - #4 (1/3M) @ 60° spacing

- 2" (50 mm)

- 12" x 500 mm

**COLLAR, CLASS C MORTAR**

**MANHOLE OR STORM DRAIN CONDUIT**

**PROVISE CONSTRUCTION JOINT WITH CONTINUOUS WATERSTOP WHEN MANHOLE SHAFT IS NOT POURED MONOLITHIC WITH MANHOLE OR STORM DRAIN CONDUIT**

**SECTION A-A**

**PRESSURE MANHOLE SHAFT**

**PLAN**

- Pressure Plate

- Pressure Plate Ring

**DETAIL**

- 8 - 1/2" x 1.1/2" (13 mm x 38 mm) Stainless Steel Hex Head Bolts

- Gasket (see Note 6)

- PL 1/2" (13 mm) With 8 bolt holes

- Drill and Tap 1/2" (13 mm) - NC thread

- 2" (50 mm)

- 8 - #4 (1/3M) anchors or 1/2" x 8" (13 mm x 600 mm) (length after weld) electrically welded studs, Nelson Hall or Equal

- Drill and Tap 1/2° (13 mm) Bar handle

- 1/4" (6 mm) (6 mm)

- 35 1/2" (902 mm)

**STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION**

**PRESSURE MANHOLE SHAFT AND PRESSURE PLATE DETAIL 36" (914 mm) WITHOUT REDUCER**

**STANDARD PLAN**

**329-2**

**USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION**

**Sheet 1 of 2**

____

**PRESSURE MANHOLE SHAFT AND PRESSURE PLATE DETAIL 36" (914 mm) WITHOUT REDUCER**

**STANDARD PLAN**

**329-2**

**USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION**

**Sheet 1 of 2**
NOTES

1. THIS STRUCTURE MAY BE USED FOR HYDROSTATIC HEADS UP TO 25' (7.5 m) ABOVE THE PRESSURE PLATE.

2. 36" (914 mm) MANHOLE FRAME AND COVER PER SPPWC 633 SHALL BE USED.

3. REINFORCEMENT SHALL BE PER ASTM A 615, GRADE 40 AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN. HOOPS MAY BE ELECTRICALLY BUTT WELDED OR THE ENDS LAPPED 18" (450 mm).

4. THE MANHOLE SHAFT SHALL BE LOCATED ABOVE AND IN LINE WITH THE SIDE OF THE CONDUIT BELOW.

5. STEPS SHALL CONFORM TO SPPWC 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC.

6. GASKET MATERIAL SHALL BE NEOPRENE (OR EQUAL) 1/16" (2 mm) THICK BY 1 1/4" (32 mm) WIDE.

7. BOLTS SHALL BE STAINLESS STEEL CONFIRMING TO ASTM A 320 (ASTM A 320M), GRADE B8.

8. PRESSURE PLATE AND PRESSURE PLATE RING SHALL BE STEEL CONFORMING TO ASTM A 36 (ASTM A 36M) AND SHALL BE GALVANIZED. PLATES SHALL BE MARKED IN SETS AND A CHISELED ARROW STAMPED ON BOTH PLATES, AFTER DRILLING AND TAPPING, TO FACILITATE FIELD ASSEMBLY.

9. SEE CONTRACT SPECIFICATIONS FOR PHYSICAL REQUIREMENTS OF WATERSTOP.

10. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:

   633  36" (914 mm) MANHOLE FRAME AND COVER
   635  STEEL STEP
   636  POLYPROPYLENE PLASTIC STEP
STEPS - SEE NOTE 3

PIPE RAIL
SEE NOTE 6

DETAIL "A"

STEPS ARE
CONTINUOUS
THROUGH SHAFT

VERTICAL SECTION

1 1/2" (40 mm) GROUT HOLE

ROUGHEN SURFACE SLOPE 1.0%

JOINT DETAILS
PER NOTE 7

SECTION A-A

DETAIL "A"

ROTATED 90°

SECTION B-B

REINFORCEMENT DETAILS
FOR FLOOR AND ROOF SLABS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MANHOLE SHAFT SAFETY LEDGE

330-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

REV. 1996, 2009

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1982

MANHOLE SHAFT SAFETY LEDGE

STANDARD PLAN

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2

TYP 3/16" (5 mm)
NOTES

1. MANHOLE SHAFT SAFETY LEDGE WILL BE NOTED ON THE PLANS WHEN REQUIRED. IT IS TO BE CONSTRUCTED WHEN DEPTH OF MANHOLE TO INVERT IS GREATER THAN 20' (6 m) AND MANHOLE SHAFT IS GREATER THAN 10' (3 m).

2. A SAFETY LEDGE SHALL NOT BE USED IF A PRESSURE MANHOLE IS REQUIRED.

3. STEPS SHALL CONFORM TO SPPWC 635 OR 636 AND SHALL BE ANCHORED 4" (100 mm) IN THE WALL OF THE STRUCTURE. STEPS SHALL BE PLACED TO MATCH THE SPACING OF THE MANHOLE SHAFT.

4. REINFORCEMENT SHALL BE PER ASTM A 615, GRADE 40 (ASTM A 615M, GRADE 300) AND SHALL TERMINATE 2" (50 mm) CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

5. GROUT HOLES, PIPE AND FITTINGS SHALL BE PROVIDED IN THE FLOOR SLAB. PRESSURE GROUTING SHALL BE USED TO FILL VOIDS AND TO SECURE UNIFORM BEARING. THE GROUT SHALL BE NEAT CEMENT GROUT AND GROUTING PRESSURES SHALL BE AS DETERMINED IN THE FIELD BY THE ENGINEER.

6. PIPE RAIL SHALL BE FABRICATED OF 1 1/4" (32 mm) STANDARD GALVANIZED PIPE COMPOSED OF TWO SECTIONS 7'–6" (2.25 m) & 18" (450 mm) IN LENGTH JOINED BY A GALVANIZED COUPLING. THE COUPLING SHALL BE THREADED A MINIMUM OF 2" (50 mm) ON EACH PIPE LENGTH.

7. ROOF AND FLOOR SLABS SHALL BE PRECAST AND KEYED FOR REINFORCED CONCRETE PIPE SECTIONS AS SHOWN. ALL JOINTS SHALL BE FILLED WITH CLASS C MORTAR AND NEATLY POINTED OR WIPED ON THE INSIDE.

8. 72" (1800 mm) RCP SHALL BE PROVIDED WITH TWO CIRCULAR CAGES OF REINFORCEMENT.

9. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
   - 324 MANHOLE SHAFT – WITH ECCENTRIC REDUCER
   - 326 MANHOLE SHAFT – 36" (900 mm) WITHOUT REDUCER
   - 635 STEEL STEP
   - 636 POLYPROPYLENE PLASTIC STEP
NOTES

1. THIS JUNCTION STRUCTURE SHALL BE USED WHEN THE OUTSIDE DIAMETER OF THE LATERAL IS GREATER THAN 1/2 THE INSIDE DIAMETER D OF THE MAIN LINE; OR WHEN THE INSIDE DIAMETER B OF THE LATERAL IS GREATER THAN 24" (600 mm). B SHALL NOT EXCEED 0.75 D OR 39" (975 mm).

2. IF THE MAIN LINE IS A REINFORCED MONOLITHIC ARCH STORM DRAIN, D SHALL REFER TO THE CLEAR SPAN OF THE ARCH. REINFORCING STEEL SHALL BE CUT AND BENT INTO THE JUNCTION STRUCTURE IN THE SAME MANNER AS FOR A PIPE. A CONCRETE CRADLE IS NOT REQUIRED FOR A REINFORCED MONOLITHIC ARCH.


5. a. ELEVATIONS R AND S NEED NOT BE SHOWN ON THE PLANS IF THE INLET PIPE IS TO ENTER THE MAIN LINE RADIALY.
   b. ELEVATION R SHALL BE SHOWN ON THE PLANS ONLY IF A STUB IS TO BE PROVIDED IN THE MAIN LINE FOR FUTURE CONNECTION OF AN INLET PIPE.
   c. ELEVATION S SHALL BE SHOWN ON THE PLANS IF AN INLET PIPE IS TO ENTER THE MAIN LINE OTHER THAN RADIALY. INLET PIPE SHALL BE LAID ON A STRAIGHT GRADE FROM ELEVATION S TO THE CATCH BASIN OR GRADE BREAK IN LINE.

6. THE INLET PIPE SHALL ENTER THE MAIN LINE RADIALY UNLESS OTHERWISE INDICATED. THE INLET PIPE MAY ENTER THE MAIN LINE OTHER THAN RADIALY IF ANGLE A IS GREATER THAN 45°; B IS LESS THAN OR EQUAL TO 24" (600 mm) AND THE OUTSIDE DIAMETER OF THE INLET PIPE IS LESS THAN 0.5 D; OTHERWISE, SPPWC 340 SHALL BE USED.

7. NO MORE THAN ONE OPENING SHALL BE MADE IN ANY ONE SECTION OF PIPE.


9. THE MAIN LINE SHALL BE REINFORCED WITH A CONCRETE CRADLE AND ENCASEMENT (AS APPLICABLE). A CONCRETE ENCASEMENT IS REQUIRED IF A JOINT IN THE MAIN LINE FALLS WITHIN THE LIMITS OF THE CRADLE. THE CONCRETE ENCASEMENT SHALL EXTEND 12" (300 mm) ABOVE THE TOP OF THE MAIN LINE AND TO THE LIMITS OF THE CRADLE. IF CONNECTING TO AN EXISTING STORM DRAIN, PORTION OF CRADLE OPPOSITE INLET MAY BE OMITTED.

10. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 40, (ASTM A 615M, GRADE 300), AND BE PLACED 1 1/2" (40 mm) CLEAR FROM CONCRETE SURFACES, UNLESS OTHERWISE SHOWN F BARS SHALL BE CARRIED TO A POINT NOT LESS THAN J DISTANCE FROM CENTER LINE WITH J=7D/12 + 6" (150 mm).

11. FLOOR OF THE SPUR SHALL BE STEEL—TROWELED TO THE SPRING LINE OF THE SPUR.
CASE 1

PLAN

CASE 1

SECTION B--B

CASE 2

(SEE NOTES 9 & 10)

CASE 3

SADDLE CONNECTION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

JUNCTION STRUCTURE – PIPE TO PIPE

ID ≤ 24" (600 mm)

332-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
CASE 1 AND CASE 2

1. IF ANGLE A IS LESS THAN 45° OR IF D IS LARGER THAN 24" (600 mm), THEN ANOTHER STANDARD STRUCTURE SHALL BE SPECIFIED.

2. THE OUTSIDE DIAMETER OF THE INLET PIPE SHALL NOT EXCEED 1/2 THE INSIDE DIAMETER OF THE MAIN LINE.

3. THE INLET PIPE SHALL ENTER THE MAIN LINE RADIALY. IF THE INLET PIPE CANNOT ENTER RADIALY, THEN ANOTHER STANDARD STRUCTURE SHALL BE SPECIFIED.

4. THE SIZE OF THE OPENING INTO THE MAIN LINE SHALL BE THE OUTSIDE DIAMETER OF THE INLET PIPE PLUS 1" (30 mm) MINIMUM TO 3" (75 mm) MAXIMUM.

5. ALL CONNECTOR PIPES FOR CASE 2 SHALL BE ENCASED IN CONCRETE IF LAID WITHIN THE MAIN LINE EXCAVATED TRENCH OR IF LAID ON FILL WHICH HAS NOT BEEN DENSIFIED.

6. BURN OR CHIP END OF CONNECTOR PIPE FLUSH WITH OUTER SURFACE OF MAIN LINE. ROUND EDGE OF CONCRETE PIPE OR RCP.

7. ALL CSP AND FITTINGS SHALL BE GALVANIZED.


9. CASE 2 SHALL NOT BE USED TO CONNECT TO THE FLOOR OF A GRATING CATCH BASIN WHERE THE GRATE WILL BE SUBJECT TO VEHICLE TRAFFIC.

10. FOR CASE 2, NOT MORE THAN 12' (3.5 m) OF INLET PIPE SHALL BE LOCATED WITHIN THE MAIN LINE EXCAVATED TRENCH.

CASE 3

11. CONNECTIONS TO PIPES 21" (525 mm) OR LESS IN DIAMETER WITHOUT JUNCTION STRUCTURES OR PRECAST Y BRANCHES SHALL BE MADE WITH SADDLES.

12. THE OUTSIDE DIAMETER OF THE INLET PIPE SHALL NOT EXCEED ONE-HALF THE INSIDE DIAMETER OF THE MAIN LINE.

13. TRIM OR CUT SADDLE TO FIT SNUGLY OVER THE OUTSIDE OF THE MAIN LINE SO ITS AXIS WILL BE ON THE LINE AND GRADE OF THE CONNECTOR PIPE.

14. THE OPENING INTO THE PIPE SHALL BE CUT AND TRIMMED TO FIT THE SADDLE SO THAT NO PART WILL PROJECT WITHIN THE BORE OF THE SADDLE PIPE.

15. THE CONNECTOR PIPE SHALL BE SUPPORTED AS SHOWN IN CASES 1 AND 2.
SECTION G-G

ROUND EDGES TO APPROXIMATE R.
OF ID OF LATERAL
WITH A MAXIMUM
OF 3'-6" (1.0 m)

D & E BARS
D, E, H & G BARS

CONSTRUCTION JOINT

NEW OR EXISTING RCB, SEE NOTE 6

W BARS
D BARS
F BARS

SECTION Z-Z

UNDISTURBED EARTH

BACKFILL WITH 450-C-2000
(265-C-14) MIX CONCRETE, OR
COMPACT SOIL TO RELATIVE DENSITY
REQUIRED BY SPECIFICATIONS. BACKFILL
MAY BE OMITTED IF STRUCTURE IS LAID
ON UNDISTURBED EARTH TO STORM
DRAIN WALL.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

JUNCTION STRUCTURE - PIPE TO RCB

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREDNBOOK COMMITTEE
1984
REV. 1986, 2009

STANDARD PLAN
333-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
NOTES

1. VALUES FOR A, B AND C SHALL BE SHOWN ON THE PLANS.
   ELEVATION R AND ELEVATION S SHALL BE SHOWN WHEN REQUIRED PER NOTE 8.

2. STATIONS SPECIFIED ON THE PLANS APPLY AT THE INTERSECTION OF CENTERLINES OF MAIN LINE AND LATERALS, EXCEPT THAT STATIONS FOR CATCH BASIN CONNECTOR PIPES APPLY AT INSIDE WALL OF STRUCTURE.

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 40, (ASTM A 615M, GRADE 300), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.
   a. W BARS ARE OF SIZE AND SPACING SPECIFIED FOR WALL STEEL ON PLANS, AND SHALL BE CUT IN CENTER OF OPENING AND BENT INTO TOP AND BOTTOM OF JUNCTION STRUCTURE.
   b. OMIT H BARS WHEN SOFFIT OF SPUR IS 12" (300 mm) OR LESS BELOW SOFFIT OF MAIN LINE, AND OMIT G BARS WHEN INVERT OF SPUR IS 12" (300 mm) OR LESS ABOVE FLOOR OF MAIN LINE.

4. JUNCTION STRUCTURE SHALL BE POURED MONOLITHICALLY WITH MAIN LINE, MANHOLE OR TRANSITION STRUCTURE.

5. FLOOR OF STRUCTURE SHALL BE STEEL—TROWeLED TO THE SPRING LINE.

6. WHEN CONNECTING TO EXISTING RCB, BREAKOUT LIMITS AND DETAILS SHALL BE SHOWN ON THE PLANS.

7. EMBEDMENT, P, SHALL BE 5" (130 mm) FOR B = 96" (2400 mm) OR LESS 8" (200 mm) FOR B OVER 96" (2400 mm).

8. IF ELEVATION R AND ELEVATION S ARE NOT SHOWN ON THE PLANS THEN THE INLET OPENING SHALL FALL 6" (150 mm) BELOW THE SOFFIT OF THE MAIN LINE WITH THE INLET PIPE LAID ON A STRAIGHT GRADE FROM MAIN LINE TO CATCH BASIN OR TO GRADE BREAK IN INLET LINE. ELEVATION S SHALL BE SHOWN ON THE PLANS IF THE INLET OPENING FALLS MORE THAN 6" (150 mm) BELOW THE SOFFIT OF THE MAIN LINE WITH THE INLET PIPE LAID ON A STRAIGHT GRADE AS STATED ABOVE.
   ELEVATION R SHALL BE SHOWN ON THE PLANS ONLY WHEN A STUB IS TO BE PROVIDED FOR A FUTURE CONNECTION.

9. LATERALS OR CONNECTOR PIPES 24" (600 mm) OR LESS IN DIAMETER SHALL BE NO MORE THAN 5" (1.5 m) ABOVE THE INVERT. LATERALS OR CONNECTOR PIPES 27" (675 mm) OR LARGER IN DIAMETER SHALL BE NO MORE THAN 18" (450 mm) ABOVE THE INVERT, WITH THE EXCEPTION THAT CATCH BASIN CONNECTOR PIPES LESS THAN 50' (15 m) IN LENGTH SHALL NOT BE MORE THAN 5" (1.5 m) ABOVE THE INVERT.

10. THE NEED FOR AN EDGE BEAM AND/OR ADDITIONAL REINFORCEMENT SHALL BE INVESTIGATED BY THE ENGINEER FOR ANY ONE OF THE FOLLOWING CONDITIONS:
    a. ANGLE A IS LESS THAN 30°
    b. TOP OF INLET PIPE IS LESS THAN 6" (150 mm) BELOW THE SOFFIT
    c. FLOW LINE OF INLET PIPE IS LESS THAN 7" (180 mm) ABOVE THE FLOOR OF THE RCB AT THE INSIDE FACE
UNDISTURBED EARTH
UNCOMPACTED BACKFILL 1.0 m

CASE 1
BEAM SUPPORT
D = 30" (750 mm) MAX

SECTION C-C

SECTION A-A CASE 2
COLUMN SUPPORT
D = 30" (750 mm) MAX

CASE 1
BEAM SUPPORT
D = 30" (750 mm) MAX

SECTION C-C

SECTION A-A CASE 2
COLUMN SUPPORT
D = 30" (750 mm) MAX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

JUNCTION STRUCTURE - PIPE TO PIPE INLET ID<30" (750 mm)

STANDARD PLAN 334-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC.

SECTION B-B
B BARS - #6 @ 4" (#19M @ 100 mm) OC,
LENGTH = D+3'-0" (1.0 m)
PLACED UNDER CUT BARS AND
ON TOP OF UNGUT BARS. OMIT
BARS THAT FALL OVER SIDEWALLS.

FOR OUTLET SEE
STANDARD CATCH
BASIN PLANS

CATCH BASIN FLOOR

CONC PIPE OR RCP

6" (150 mm)

4" (100 mm)

450-C-2000
(265-C-14) CONCRETE EN-
CASEMENT WHEN MORE
THAN ONE SECTION OF
PIPE IS USED

NOTE:
WHEN CATCH BASIN FALLS
ON TOP OF BOX, THE
OPENING MAY BE FORMED
THROUGH FLOOR OF CATCH
BASIN AND TOP SLAB OF BOX.

CASE 3
TOP SLAB ENTRANCE
D = 30" (750 mm) MAX

NOTE:
WHEN CATCH BASIN FALLS
ON TOP OF BOX, THE
OPENING MAY BE FORMED
THROUGH FLOOR OF CATCH
BASIN AND TOP SLAB OF BOX.

SECTION D-D
NOTES

1. USE JUNCTION STRUCTURE PER SPPWC 333 INSTEAD OF THIS JUNCTION STRUCTURE UNDER ANY ONE OF THE FOLLOWING CONDITIONS:
   a. DIAMETER OF INLET PIPE EXCEEDS 30" (750 mm).
   b. TOP OF PIPE IS LESS THAN 12" (300 mm) BELOW SOFFIT OF BOX.
   c. FLOW LINE OF PIPE IS LESS THAN 13" (225 mm) ABOVE FLOOR OF THE BOX AT INSIDE FACE.
   d. ANGLE A IS LESS THAN 45°.

2. ALL CSP AND FITTINGS SHALL BE GALVANIZED.

3. ELEVATION S SHALL BE SPECIFIED ON PLANS ONLY IF THE TOP OF PIPE IS MORE THAN 12" (300 mm) BELOW SOFFIT OF BOX.

4. LATERALS OR CONNECTOR PIPES 24" (600 mm) OR LESS IN DIAMETER SHALL BE NOT MORE THAN 5' (1.5 m) ABOVE THE INVERT. LATERALS OR CONNECTOR PIPES 27" (675 mm) OR LARGER IN DIAMETER SHALL BE NOT MORE THAN 18" (450 mm) ABOVE THE INVERT, WITH THE EXCEPTION THAT CATCH BASIN CONNECTOR PIPES LESS THAN 50" (15 m) IN LENGTH SHALL BE NOT MORE THAN 5' (1.5 m) ABOVE THE INVERT.
EXISTING RCP STORM DRAIN

PLAN

CHIP PIPE TO SURFACE OF CONCRETE AND ROUND EDGES

SUPPORT PIPE ACROSS TRENCH WITH 450-C-2000 (265-C-14) CONCRETE BACKFILL. SEE NOTE 3

MINIMUM BEARING SURFACE = OD/2

SECTION B-B

CASE 1
PLAIN CONCRETE PIPE
\[ D = 24" (600 \text{ mm}) \text{ MAX} \]

VARIIES TO SUIT CONDITIONS

SADDLE PLAN

SECTION C-C

CASE 2
SADDLE CONNECTION

PIPE CONNECTIONS TO EXISTING STORM DRAINS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

335-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHET 1 OF 3
EXISTING RCP STORM DRAIN

PLAN

SECTION E–E

BURN OR CUT PIPE TO SURFACE OF CONCRETE AND ROUND EDGES OF RCP

CASE 3
RCP OR CSP
D = 24" (600 mm) MAX

SECTION F–F

MINIMUM BEARING SURFACE = OD/2

OPTIONAL RECTANGULAR COLLAR

D 15" (375 mm) - 21" (525 mm) 
24" (600 mm) 

DIAMETER OF CSP | MIN GAGE
-----------------|--------
15" (375 mm)     | 16
21" (525 mm)     | 16
24" (600 mm)     | 14

CLASS C MORTAR

CORRUGATED STEEL BAND CONNECTOR (CS BAND CONNECTOR NOT NEEDED FOR RCP)

SUPPORT PIPE ACROSS TRENCH WITH 450–C–2000 (265–C–14) CONCRETE BACKFILL. SEE NOTE 3

UNDISTURBED EARTH

PLAN

EXISTING RC BOX STORM DRAIN

MAIN LINE

EXISTING RCP STORM DRAIN

SUPPORT PIPE ACROSS TRENCH WITH 450–C–2000 (265–C–14) CONCRETE BACKFILL. SEE NOTE 3

UNDISTURBED EARTH

PLAN

MAIN LINE

EXISTING RC BOX STORM DRAIN

SUPPORT PIPE ACROSS TRENCH WITH 450–C–2000 (265–C–14) CONCRETE BACKFILL. SEE NOTE 3

UNDISTURBED EARTH

PLAN
NOTES

CASE 1 AND CASE 3

1. OUTSIDE DIAMETER OF THE CONNECTOR PIPE SHALL NOT BE GREATER THAN 1/2 THE INSIDE DIAMETER OF THE RCP MAIN LINE.

2. INSIDE DIAMETER D OF THE CONNECTOR PIPE SHALL NOT BE GREATER THAN 24" (600 mm).

3. THE MINIMUM OPENING INTO THE EXISTING STORM DRAIN SHALL BE THE OUTSIDE DIAMETER OF THE CONNECTING PIPE PLUS 1" (30 mm). THE CONCRETE BACKFILL SUPPORTING THE CONNECTING PIPE MAY BE OMITTED IF THE PIPE IS LAID ON UNDISTURBED EARTH TO STORM DRAIN WALL.

4. ALL CSP AND FITTINGS SHALL BE GALVANIZED. BAND CONNECTORS MAY BE 2 GAGES LIGHTER THAN THE PIPE, BUT WITH A MINIMUM GAGE OF 16. THEY SHALL BE CONNECTED AT THE ENDS BY ANGLES HAVING MINIMUM DIMENSIONS OF 2"x2"x3/16" (50 mm x 50 mm x 5 mm) AND 5 1/2" (140 mm) BOLTS.

5. WHEN JOINING A RCP CONNECTOR PIPE TO A CSP CONNECTOR PIPE, THE INSIDE DIAMETER D OF THE CSP SHALL BE AT LEAST EQUAL TO BUT NOT MORE THAN 3" (75 mm) GREATER THAN THAT OF THE RCP.

6. CONNECTOR PIPES SHALL BE NOT MORE THAN 5' (1.5 m) ABOVE THE INVERT.

7. CONNECTOR PIPES SHALL ENTER MAIN LINE RCP RADICALLY.

8. WHEN CONNECTING TO A RCB, SPPWC 333 SHALL BE USED IF THE TOP OF THE CONNECTOR PIPE IS LESS THAN 12" (300 mm) BELOW THE SOFFIT OF THE RCB OR THE FLOW LINE OF THE PIPE IS LESS THAN 13" (330 mm) ABOVE THE FLOOR OF THE RCB AT THE INSIDE FACE.

CASE 2

9. SADDLE CONNECTIONS SHALL BE USED WHEN CONNECTING TO PIPES 21" (525 mm) OR LESS IN DIAMETER WITHOUT THE USE OF JUNCTION STRUCTURES OR PRECAST Y BRANCHES.

10. TRIM OR CUT SADDLE TO FIT SNUGLY OVER THE OUTSIDE OF THE MAIN PIPE SO ITS AXIS WILL BE ON THE LINE AND GRADE OF THE CONNECTING PIPE.

11. THE OPENING INTO THE PIPE SHALL BE CUT AND TRIMMED TO FIT THE SADDLE SO THAT NO PART WILL PROJECT WITHIN THE BORE OF THE SADDLE PIPE.

12. THE CONNECTOR PIPE SHALL BE SUPPORTED AS SHOWN IN CASE 1 AND CASE 3.
TABLE

FOR DIMENSIONS
AND BAR SIZES

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<th>T (INCHES)</th>
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STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

TRANSITION STRUCTURE
PIPE TO PIPE

STANDARD PLAN
340-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
NOTES

1. THE HORIZONTAL ANGLE OF CONVERGENCE OR DIVERGENCE, $\theta$, SHALL NOT EXCEED 5° 45'.

2. VALUES FOR A, B, C, D1 AND D2 ARE SHOWN ON THE PLANS. ELEVATION R AND ELEVATION S ARE SHOWN WHEN REQUIRED BY NOTE 10.

3. FLOOR OF STRUCTURE SHALL BE STEEL TROWELED TO SPRING LINE.

4. REINFORCEMENT STEEL SHALL CONFORM TO ASTM A 615 (A 615 M), GRADE 300 (40), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN. LONGITUDINAL BARS SHALL BE #3 OR #4 @ 18" (#10M @ 450 mm) OC OR LESS.

5. ELEVATION S APPLIES AT INSIDE WALL OF STRUCTURE.

6. TRANSITION STRUCTURE SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT THE CONTRACTOR SHALL HAVE THE OPTION OF PLACING AT THE SPRING LINE A CONSTRUCTION JOINT LONGITUDINAL KEYWAY.

7. THE LENGTH OF THE STRUCTURE MAY BE INCREASED AT THE OPTION OF THE CONTRACTOR TO MEET RCP ENDS, USING D BARS, LONGITUDINAL AND BOTTOM REINFORCEMENT IN EXTENDED PORTION OF SAME DIAMETER AND SPACING AS SPECIFIED IN THE TABLE, BUT ANY CHANGE IN THE LOCATION OF SPUR MUST BE APPROVED BY THE ENGINEER.

8. EMBEDMENT P SHALL BE AS SPECIFIED IN THE TABLE, UNLESS OTHERWISE SHOWN ON THE PLANS.

9. WHEN THERE IS NO SPUR REQUIRED, A & B BARS SHALL BE OMITTED.

10. WHEN ELEVATION R AND ELEVATION S ARE NOT SHOWN ON PLANS, INLET PIPE SHALL ENTER MAIN LINE RADIALLY. WHEN INLET PIPE ENTERS MAIN LINE OTHER THAN RADIALLY, ELEVATION S SHALL BE SHOWN ON PLANS, AND INLET PIPE SHALL BE LAID ON A STRAIGHT GRADE FROM ELEVATION S TO CATCH BASIN OR GRADE BREAK IN INLET LINE. ELEVATION R SHALL BE SHOWN ON THE PLANS ONLY WHEN STUB IS TO BE PROVIDED IN MAIN LINE FOR FUTURE CONSTRUCTION OF INLET PIPE.

11. THE MAXIMUM COVER ABOVE THIS STRUCTURE SHALL BE 25' (7.5 m). IF THE COVER EXCEEDS 25' (7.5 m), A SPECIAL STRUCTURE SHALL BE DESIGNED FOR THE COVER AND DETAILED ON THE PLANS.
PLAN

SECTION A-A

SECTION B-B

OPTIONAL CONSTRUCTION JOINT

TOP L-BAR

TRANSVERSE BARS

BOTTOM L-BAR

STEEL PATTERN SHOWN IS PICTORIAL ONLY. SEE NOTES 2 AND 5

ELEVATION STATION

ELEVATION STATION

CONSTRUCTION JOINT

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

TRANSITION STRUCTURE
SINGLE RCB TO SINGLE RCB

STANDARD PLAN 341-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
NOTES

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, \( \theta \), SHALL NOT EXCEED 5° 45'.

2. THE REINFORCING STEEL BAR SIZE, SPACING AND COVER OVER THE STEEL OF STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS, OF L-BARS IN TOP AND BOTTOM CORNERS, OF STRAIGHT VERTICAL BARS IN SIDEWALLS AND/OR LONGITUDINAL DISTRIBUTION AND TIE BARS IN TOP OR BOTTOM SLABS OR SIDE WALLS SHALL BE THOSE OF WHICHEVER ADJOINING RCB SECTION PROVIDES THE GREATER STEEL AREA FOR EACH TYPE OF BAR AND GREATEST COVER. THE BAR LENGTHS SHALL VARY UNIFORMLY THROUGHOUT THE TRANSITION.


4. \( f' = 4000 \) PSI \((28 \) MPa\) AT 28 DAYS AND THE CONCRETE SHALL BE THE SAME MIX AS THE ADJACENT RCB.

5. ALL STEEL EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 \((400)\) BILLET STEEL CONFORMING TO ASTM A 615 \((A 615 M)\) AND SHALL TERMINATE 1 1/2" \((40 \) mm\) CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

6. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STRUCTURAL NOTES APPLICABLE TO RCB STRUCTURES SHOWN ON THE PLANS.

7. DETAILS OF CONSTRUCTION JOINTS AND KEYWAYS SHALL BE AS SHOWN ON THE PLANS FOR SINGLE RCB STRUCTURES.
* Arch may have a horseshoe-shaped, circular, elliptical or similar cross section.

Steel pattern shown is pictorial only, see Notes 2 and 7

Optional construction joint:
RCB or arch to RCP use const joint of RCB or arch.
RCB to arch, use const joint of RCB.
1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, $\theta$, SHALL NOT EXCEED 5° 45'.

2. REINFORCING STEEL BAR SIZES, SPACING, PATTERN AND COVER OVER THE STEEL SHALL BE AS FOLLOWS:
   - RCB TO RCP AND RCB TO ARCH — THAT OF RCB SECTION.
   - ARCH TO RCP — THAT OF ARCH SECTION.
   - ARCH TO ARCH — THAT OF ARCH SECTION HAVING THE THICKER WALLS. THE BAR LENGTHS SHALL VARY UNIFORMLY THROUGHOUT THE TRANSITION.

3. THE CONCRETE THICKNESS SHALL BE AS FOLLOWS:
   - RCB TO RCP AND ARCH TO RCP — THAT OF ARCH OR RCB SECTION UNLESS THE WALL THICKNESS OF THE RCP PLUS 100 mm (4") GREATER, IN WHICH CASE THE CONCRETE THICKNESS SHALL VARY UNIFORMLY FROM THAT OF THE ARCH OR RCB SECTION TO THAT OF THE RCP WALL PLUS 100 mm (4").
   - RCB TO ARCH AND ARCH TO ARCH — THAT OF THE ADJOINING RCB OR ARCH SECTION AT EACH END OF THE TRANSITION AND SHALL VARY UNIFORMLY BETWEEN THE TWO ENDS.

4. THE INTERIOR SURFACE SHALL BE SMOOTH AND VARY UNIFORMLY BETWEEN THE TWO ADJOINING SECTIONS.

5. AT RCP JUNCTURE, EMBEDMENT $P$ SHALL BE 130 mm (5") FOR PIPE SIZE OF 2400 mm (96") OR LESS, AND 200 mm (8") FOR PIPE SIZES OVER 2400 mm (96").

6. $f_{c} = 28$ MPa (4000 PSI) AT 28 DAYS AND THE CONCRETE SHALL BE THE SAME MIX AS THE ADJACENT RCB.

7. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 400 (60) BILLET STEEL CONFORMING TO ASTM A 615 M (A 615) AND SHALL TERMINATE 40 mm (1 1/2") CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

8. KEYED CONSTRUCTION JOINTS OF THE SAME DIMENSIONS AS THOSE OF THE RCB OR ARCH SECTION MAY BE CARRIED THROUGH THE TRANSITION STRUCTURE AT THE CONTRACTOR'S OPTION. SEE SECTION B-B.

9. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE THE STRUCTURAL NOTES APPLYING TO RCB OR ARCH STRUCTURES SHOWN ON THE PLANS.
STRUCTURAL ANALYSIS REQUIRED WHEN THIS
DIMENSION EXCEEDS 18" (450 mm)

PLAN

SECTION A--A

SECTION B--B

STEEL PATTERN SHOWN IS PICTORIAL ONLY. SEE NOTES 2 AND 6

OPTIONAL CONSTRUCTION JOINT

CONSTRUCTION JOINT

PHOTOCOPY PROHIBITED
NOTES

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, θ, SHALL NOT EXCEED 5° 45'.

2. REINFORCING STEEL BAR SIZE, SPACING AND OUTSIDE COVER SHALL BE THAT OF DOUBLE RCB SECTION. FOR CURVED TRANSITIONS, SPACE BARS ON CENTER LINE AND PLACE TRANSVERSE STEEL RADIA LLY. THE BAR LENGTHS AND DIMENSIONS SHALL VARY UNIFORMLY THROUGHOUT TRANSITION. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSITION STRUCTURE.

3. THE CONCRETE THICKNESS SHALL BE THAT OF THE DOUBLE RCB SECTION.

4. PLAN AS SHOWN IS FOR DOUBLE RCB SECTION DOWNSTREAM. WHEN DOUBLE RCB SECTION IS UPSTREAM TAPER THE LAST 24" (600 mm) OF CENTER WALL TO END IN 1 1/2" (40 mm) RADIUS.

5. f'c = 4000 PSI (28 MPa) AT 28 DAYS AND THE CONCRETE SHALL BE THE SAME MIX AS THE ADJACENT RCB.

6. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 (400) BILLET STEEL CONFORMING TO ASTM A 615 (A 615 M) AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.

7. TRANSVERSE JOINT KEYWAYS, AS DETAILED FOR LONGITUDINAL JOINT KEYWAYS AT BASE OF OUTER WALLS ON THE PLANS, SHALL BE PLACED IN BOTH SLABS AND WALLS AT THE END OF EACH POUR.

8. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STRUCTURAL NOTES APPLYING TO RCB STRUCTURES SHOWN ON THE PLANS.
PLAN

SECTION A-A

SECTION B-B

OPTIONAL CONSTRUCTION JOINT

STEEL PATTERN SHOWN IS PICTORIAL ONLY. SEE NOTES 2 AND 5
NOTES

1. HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, \( \theta \), SHALL NOT EXCEED 5° 45'.

2. REINFORCING STEEL BAR SIZE, SPACING, LENGTHS, AND OUTSIDE COVER SHALL BE THAT OF WHICHEREVER ADJOINING DOUBLE RCB SECTION PROVIDES THE GREATER STEEL AREA FOR EACH TYPE OF BAR. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSITION STRUCTURE.


4. \( f_c = 4,000 \text{ PSI (28 MPa)} \) AT 28 DAYS AND THE CONCRETE SHALL BE THE SAME MIX AS THE ADJACENT RCB.

5. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 (400) BILLET STEEL CONFORMING TO ASTM A 615 (A 615 M) AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

6. TRANSVERSE JOINT KEYWAYS, AS DETAILED FOR LONGITUDINAL JOINT KEYWAYS AT BASE OF OUTER WALLS ON THE PLANS, SHALL BE PLACED IN BOTH SLABS AND WALLS AT THE END OF EACH POUR.

7. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STRUCTURAL NOTES APPLYING TO DOUBLE RCB STRUCTURES SHOWN ON THE PLANS.
REINFORCING STEEL DETAILS SAME AS FOR DOUBLE RCB SECTION

REINFORCING STEEL DETAILS SAME AS FOR TRIPLE RCB SECTION

SECTIONAL PLAN

24" (600 mm)

VARIABLE

EQUAL

VALLEY

REINFORCING STEEL DETAILS SAME AS FOR DOUBLE RCB SECTION

STRUCTURAL ANALYSIS REQUIRED WHEN THIS DIMENSION EXCEEDS 24" (600 mm)

SECTION A–A

SECTION B–B

STEEL PATTERN SHOWN IS PICTORIAL ONLY. SEE NOTES 2 AND 6

OPTIONAL CONSTRUCTION JOINT

CONSTRUCTION JOINT

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

TRANSITION STRUCTURE

DOUBLE RCB TO TRIPLE RCB

STANDARD PLAN

345–2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
NOTES

1. HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, $\theta$, SHALL NOT EXCEED 5° 45'.

2. REINFORCING BAR STEEL SIZE, SPACING, AND OUTSIDE COVER SHALL BE THAT OF THE ADJOINING RCB SECTION WITHIN THE LIMITS INDICATED ON THE PLANS. FOR CURVED TRANSITIONS SPACE BARS ON CENTER LINE, AND PLACE TRANSVERSE STEEL RADIALY. BAR LENGTHS AND DIMENSIONS SHALL VARY UNIFORMLY THROUGHOUT TRANSITION. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSITION STRUCTURE.

3. CONCRETE THICKNESS SHALL BE THAT OF ADJOINING RCB SECTION WITHIN THE LIMITS INDICATED ON THE PLANS.

4. PLAN AS SHOWN IS FOR TRIPLE RCB SECTION DOWNSTREAM. WHEN TRIPLE RCB SECTION IS UPSTREAM REVERSE THE RADIUS AT ENDS OF DIVISION WALLS AS FOLLOWS:
   (A) TAPER THE LAST 24" (600 mm) OF TRIPLE RCB DIVISION WALLS TO END IN 1 1/2" (40 mm) RADIUS.
   (B) THE 24" (600 mm) EXTENSION OF CENTER WALL OF DOUBLE RCB SHALL BE OF UNIFORM THICKNESS, $T_4$, ENDING IN RADIUS = 1/2$T_4$.

5. $f'_c = 4000$ PSI (28 MPa) AT 28 DAYS AND CONCRETE SHALL BE THE SAME MIX AS THE ADJACENT RCB.

6. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 (400) BILLET STEEL CONFORMING TO ASTM A 615 (A 615 M) AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

7. TRANSVERSE JOINT KEYWAYS, AS DETAILED FOR LONGITUDINAL JOINT KEYWAYS AT BASE OF OUTER WALLS ON THE PLANS, SHALL BE PLACED IN BOTH SLABS AND WALLS AT THE END OF EACH POUR.

8. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STRUCTURAL NOTES APPLYING TO THE RCB STRUCTURES SHOWN ON THE PLANS.
NOTES

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, $\theta$, SHALL NOT EXCEED 5° 45'.

2. REINFORCING STEEL BAR SIZE, SPACING AND OUTSIDE COVER SHALL BE THAT OF THE LARGER SECTION. FOR CURVED TRANSITIONS, SPACE BARS ON CENTERLINE AND PLACE TRANSVERSE STEEL RADIALY. BAR LENGTHS AND DIMENSIONS SHALL VARY UNIFORMLY THROUGHOUT TRANSITION. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSITION STRUCTURE.

3. THE CONCRETE THICKNESS SHALL BE THAT OF THE LARGER RCB SECTION.

4. $f'_{c} = 4000$ PSI (28 MPa) AT 28 DAYS AND THE CONCRETE SHALL BE THE SAME MIX AS THE ADJACENT RCB.

5. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 (400) BILLET STEEL CONFORMING TO ASTM A 615 (A 615 M) AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

6. TRANSVERSE JOINT KEYWAYS, AS DETAILED FOR LONGITUDINAL JOINT KEYWAYS AT BASE OF OUTER WALLS ON THE PLANS, SHALL BE PLACED IN BOTH SLABS AND WALLS AT THE END OF EACH POUR.

7. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STRUCTURAL NOTES APPLYING TO RCB STRUCTURES SHOWN ON THE PLANS.
RCB OR RCP

PLAN

SECTION B – B

SECTION A – A

DETAIL OF L BOLT

DETAIL "A"

L BOLT GRATE LOCK SEE
DETAIL "A" (TOP OF BOLT
FLUSH WITH TOP OF GRATE)

SEE NOTE 2

9 1/2" (240 mm) x 18" (400 mm) UTILITY BOX WITH
CAST IRON GRATE SUCH AS "QUIKSET" SERIES
NO. WV-16, BROOKS PRODUCTS INC. NO. 3-TG,
OR AGENCY APPROVED EQUAL

SLOPE

3" (75 mm)(TYP)

1 1/2" (25 mm) MIN

#4 (2-#13) x 20" (500 mm) LONG

450-C-200D (265-C-14) CONCRETE COLLAR

SPPWC 334 FOR RCB CONNECTION, TYP. SEE NOTE 2
SPPWC 332 FOR RCP CONNECTION, TYP. SEE NOTE 2

1/4" (M6) STD. STAINLESS STEEL
HEX. HEAD NUTS

1/4" (6 mm) Ø HOLE
THRU C'BORE 3/4" (20 mm) Ø x 1/4" (6 mm) DEEP.
HOLES

1/4" (M6) Ø STAINLESS STEEL
L' BOLTS, SEE DETAIL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

YARD INLET

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1984
REV. 1996, 2009

350-2

SHEET 1 OF 2
1. CONNECTOR PIPE
   LOCATE PIPE AS INDICATED ON SHEET 1.

2. CONCRETE
   FLOOR OF BASIN SHALL SLOPE FROM ALL WALLS TO THE OUTLET AND SHALL BE GIVEN A STEEL TROWELED SURFACE FINISH.
   3" (75 mm) THICK CONCRETE ENCASEMENT SHALL BE USED IN LIEU OF 6" (150 mm) THICK CONCRETE ENCASEMENT WHEN REQUIRED BY SPPWC 332 OR 334.

3. GENERAL
   GRATING AND BASIN ARE NOT DESIGNED FOR VEHICULAR TRAFFIC AND SHALL NOT BE USED IN LOCATIONS WHERE SUCH TRAFFIC WILL OCCUR.
   EMBED UTILITY BOX 1/2" (15 mm) INTO CONCRETE COLLAR. SEAL PIPE SLOTS IN UTILITY BOX WALLS WITH CONCRETE.

4. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
   332 JUNCTION STRUCTURE PIPE TO PIPE (INLET I.D. ≤ 24" (600 mm))
   334 JUNCTION STRUCTURE PIPE TO BOX (INLET I.D. ≤ 30" (750 mm))
END SECTION FOR CSP

STATION POINT. ALL TIE DIMENSIONS SHOWN ON THE PLANS ARE TO THIS POINT

A (SHEET 1 & 2)

GALVANIZED PROTECTION BARS

PLAN

CORRUGATED STEEL BAND CONNECTOR.
SEE NOTE 6

CONSTRUCT BERM TO HEIGHT OF TOP OF INLET
SEE NOTE 9

END SECTION FOR CSP
FLOW LINE
12" (300 mm)
POINT B
SLOPE = 4%

SECTION A-A
CASE 1

CORRUGATED STEEL 2-PIECE 90° ELBOW
ALTERNATE GROUND LINE

CORRUGATED STEEL BAND CONNECTOR

CORRUGATED STEEL 3-PIECE
2 WELD 90° ELBOW

CONCRETE COLLAR
450-C-2000
(265-C-14)

NOTE:

FOR CASE 2 & 3, SEE SHEET 2.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CSP FLARED INLET

STANDARD PLAN

351-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHET 1 OF 3
SECTION A–A (SHEET 1)
CASE 2
CORRUGATED STEEL BAND CONNECTOR.
SEE NOTE 6
CONSTRUCT BERM TO HEIGHT OF TOP OF INLET
SEE NOTE 9
END SECTION FOR CSP
FLOW LINE
12" (300 mm)
POINT B
SLOPE = 4%
TOP OF RCP OR TOP SLAB OF RCB

SECTION A–A (SHEET 1)
CASE 3
CORRUGATED STEEL 2–PIECE 90° ELBOW
ALTERNATE GROUND LINE
VARIABLE RISER CSP
BURN OR CUT PIPE TO SURFACE OF CONCRETE. SEE NOTE 7

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
CSP FLARED INLET

STANDARD PLAN
351–2
SHEET 2 OF 3
NOTES

1. ANGLE A MAY BE ANY ANGLE AS REQUIRED.

2. ELEVATION OF POINT A SHOWN ON PLANS.

3. POINT B SHALL BE PLACED 12" (300 mm) BELOW THE FLOW LINE OF EXISTING DITCH UNLESS OTHERWISE SPECIFIED ON PLANS. SLOPE SHALL BE SET IN FIELD BY THE ENGINEER.

4. THE HEIGHT OF THE RISER FOR CASE 1 & 3 SHALL VARY AS DETERMINED BY THE ELEVATION OF POINTS A & B, OR BY THE TOP OF STORM DRAIN CONDUIT AND ELEVATION OF POINT B.

5. CORRUGATED STEEL BAND CONNECTOR IS NOT REQUIRED FOR INLET SIZES 24" (600 mm) DIAMETER OR LESS.

6. IN ALL CASES, CONNECTION TO THE STORM DRAIN CONDUIT SHALL BE IN ACCORDANCE WITH THE APPLICABLE JUNCTION STRUCTURE, TRANSITION STRUCTURE, OR MANHOLE.

7. ALL CSP AND FITTINGS SHALL BE GALVANIZED.

8. PUNCH HOLES IN CSP AND WELD 3/4" (20 mm) GALVANIZED BARS HORIZONTALLY IN PLACE ACROSS OPENING.

9. COAT WELDED, CUT AND ABRaded SURFACES AS SPECIFIED IN SSPWC 210-3.5.

10. INLET SHALL NOT BE USED IN WATER COURSES SUBJECT TO DEBRIS FLOWS. A STRUCTURE HAVING A PROTECTION BARRIER SHOULD BE USED.

11. END SECTION MAY BE ARMCO STANDARD END SECTION, BETHLEHEM STEEL CO. FLARED END SECTION FOR CSP, OR AN AGENCY-APPROVED EQUAL.
THREE-HINGED INLET/OUTLET BARRIER
FOR RCB

TWO-HINGED INLET/OUTLET BARRIER
FOR RCB

SECTION A-A

SLOPED PROTECTION BARRIER

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

360-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SLOPED PROTECTION BARRIER

STANDARD PLAN

360-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

360-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
TRAPEZOIDAL OUTLET BARRIER
FOR RCP

FOR TRAPEZOIDAL OUTLET BARRIERS, USE WH TO DETERMINE NUMBER AND SIZE OF HINGES AND USE WF TO DETERMINE REQUIRED FRAME MEMBER SIZES.

#5 (#16M) BARS
20" (500 mm) LONG
4 EA HINGE

OUTLET STRUCTURE

REINFORCED CONCRETE PIPE

FLOW

BEARING PLATE

25'

6" MAX
(150 mm)

BOTTOM
MEMBER

4" MIN
(100 mm)

H

SECTION B–B

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

SLOPED PROTECTION BARRIER

360–2

SHEET 2 OF 8
### TABLE 1 - STANDARD INLET / OUTLET

<table>
<thead>
<tr>
<th>Box Size, W x H</th>
<th>Vertical Bars, (mm)</th>
<th>Top Member</th>
<th>Side Members</th>
<th>Bottom Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'x4' (1.2 x 1.2 m)</td>
<td>2 1/2 &quot;x 1 1/2&quot;</td>
<td>76 x 38.1</td>
<td>51 x 19.7</td>
<td>76 x 38.1</td>
</tr>
<tr>
<td>4'x6' (1.2 x 1.8 m)</td>
<td>2 1/2 &quot;x 1 1/2&quot;</td>
<td>76 x 38.1</td>
<td>51 x 19.7</td>
<td>76 x 38.1</td>
</tr>
<tr>
<td>4'x8' (1.2 x 2.4 m)</td>
<td>2 1/2 &quot;x 1 1/2&quot;</td>
<td>76 x 38.1</td>
<td>51 x 19.7</td>
<td>76 x 38.1</td>
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</table>

### TABLE 2 - OCEAN OUTLET

<table>
<thead>
<tr>
<th>Box Size, W x H</th>
<th>Vertical Bars, (mm)</th>
<th>Top Member</th>
<th>Side Members</th>
<th>Bottom Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'x4' (1.2 x 1.2 m)</td>
<td>2 1/2 &quot;x 1 1/2&quot;</td>
<td>76 x 38.1</td>
<td>51 x 19.7</td>
<td>76 x 38.1</td>
</tr>
<tr>
<td>4'x6' (1.2 x 1.8 m)</td>
<td>2 1/2 &quot;x 1 1/2&quot;</td>
<td>76 x 38.1</td>
<td>51 x 19.7</td>
<td>76 x 38.1</td>
</tr>
<tr>
<td>4'x8' (1.2 x 2.4 m)</td>
<td>2 1/2 &quot;x 1 1/2&quot;</td>
<td>76 x 38.1</td>
<td>51 x 19.7</td>
<td>76 x 38.1</td>
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</table>
### TABLE 3 - HINGES

<table>
<thead>
<tr>
<th>BOX SIZE, W x H</th>
<th>NO. OF HINGES</th>
<th>HINGE SIZE</th>
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<tr>
<td>4'x4' (1.2 x 1.2 m)</td>
<td>2</td>
<td>12&quot; (300)</td>
</tr>
<tr>
<td>4'x6' (1.2 x 1.8)</td>
<td>2</td>
<td>12&quot; (300)</td>
</tr>
<tr>
<td>4'x8' (1.2 x 2.4)</td>
<td>2</td>
<td>18&quot; (450)</td>
</tr>
<tr>
<td>6'x4' (1.8 x 1.2)</td>
<td>2</td>
<td>12&quot; (300)</td>
</tr>
<tr>
<td>6'x6' (1.8 x 1.8)</td>
<td>2</td>
<td>18&quot; (450)</td>
</tr>
<tr>
<td>6'x8' (1.8 x 2.4)</td>
<td>2</td>
<td>18&quot; (450)</td>
</tr>
<tr>
<td>6'x10' (1.8 x 3.0)</td>
<td>2</td>
<td>18&quot; (450)</td>
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<tr>
<td>8'x4' (2.4 x 1.2)</td>
<td>3</td>
<td>12&quot; (300)</td>
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<tr>
<td>8'x6' (2.4 x 1.8)</td>
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<td>12&quot; (300)</td>
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<tr>
<td>8'x8' (2.4 x 2.4)</td>
<td>3</td>
<td>12&quot; (300)</td>
</tr>
<tr>
<td>8'x10' (2.4 x 3.0)</td>
<td>3</td>
<td>18&quot; (450)</td>
</tr>
<tr>
<td>10'x6' (3.0 x 1.8)</td>
<td>3</td>
<td>18&quot; (450)</td>
</tr>
<tr>
<td>10'x8' (3.0 x 2.4)</td>
<td>3</td>
<td>18&quot; (450)</td>
</tr>
<tr>
<td>10'x10' (3.0 x 3.0)</td>
<td>3</td>
<td>24&quot; (600)</td>
</tr>
<tr>
<td>12'x8' (3.6 x 2.4)</td>
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<td>24&quot; (600)</td>
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<td>12'x10' (3.6 x 3.0)</td>
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<td>24&quot; (600)</td>
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<td>14'x8' (4.2 x 2.4)</td>
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<td>24&quot; (600)</td>
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<tr>
<td>14'x10' (4.2 x 3.0)</td>
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<td>24&quot; (600)</td>
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### TABLE 4 - HINGE CLEARANCES (mm)

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<th>Y</th>
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<td>(50)</td>
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<tr>
<td>6&quot;</td>
<td>(152)</td>
<td>3 1/2&quot; (90)</td>
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<td>7&quot;</td>
<td>(178)</td>
<td>3 1/2&quot; (90)</td>
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<tr>
<td>8&quot;</td>
<td>(203)</td>
<td>4 1/2&quot; (115)</td>
</tr>
<tr>
<td>9&quot;</td>
<td>(229)</td>
<td>4 1/2&quot; (115)</td>
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</tbody>
</table>

---

**SECTION C-C**

- **SAND PLATE**
  - 3/8" (10 mm)
  - VERTICAL BARS (TABLE 1 & 2)
- **MID MEMBER**
  - 3"x3"x3/8" (76 x 76 x 10 mm)

**SECTION D-D**

- **NOTE A:**
  - WELDS 1" (25 mm) FOR H = 4' & 6' (1.2 & 1.8 m)
  - WELDS 1 1/2" (40 mm) FOR H = 8' & 10' (2.4 & 3.0 m)

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**SECTION E-E**

**NOTE A:**

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**STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION**

**SLOPED PROTECTION BARRIER**

**STANDARD PLAN**

**360-2**

**SHEET 4 OF 8**
SLOPED PROTECTION BARRIER

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 360-2

SHEET 5 OF 8
5 (#16M) BARS 20" (500 mm) LONG BOTH WAYS 1" (25 mm) BOLT

SEE DETAIL D

SECTION W–W

5/16" (8 mm) PL 3/4" (19 mm) DOUBLE EXTRA STRONG PIPE

DETAIL X

SECTION Y–Y

1/2" (13 mm) PLATE AA 7/8" (22 mm) THICK 2 EACH HINGE

DETAIL Z

SEE DETAIL DD

TOP MEMBER 24" (600 mm) HINGE

SEE DETAIL D

PLATE AA

HINGE PIN 1 1/2" (38 mm)

PL 1/4"x2"x2" (6 x 50 x 50 mm)

DETAIL DD

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

SLOPED PROTECTION BARRIER

STANDARD PLAN 360–2

SHEET 7 OF 8
NOTES:

1. SUBMIT FABRICATION ("SHOP") DRAWINGS FOR APPROVAL PER SSPWC 2-5.3.3.
2. WHENEVER THE REINFORCED CONCRETE BOX SIZE FALLS BETWEEN SIZES SHOWN IN THE TABLES, USE THE HINGE AND MEMBER SIZING FOR THE LARGER BOX SIZE SHOWN.
3. FRAME MEMBERS SHALL BE ASTM A 36 STEEL OR BETTER.
4. HINGE ASSEMBLIES AND BEARING PADS SHALL BE STAINLESS STEEL.
5. MAKE NECESSARY MODIFICATIONS TO ALLOW THE SIMPLE REMOVAL OR INSERTION OF HINGE PINS FOR INSTALLATION OR REMOVAL OF THE PROTECTION BARRIER. THREAD THE END OF HINGE PINS SO THAT NUTS AND LOCK WASHERS ARE FLUSH WITH THE HINGE SLEEVE PIPE. DAMAGE THE THREADS BEYOND THE NUT FACE TO PREVENT LOOSENING. SEE ALSO ALTERNATE DETAIL BELOW.
6. GALVANIZE FRAME MEMBERS AFTER FABRICATION.
7. MINIMIZE OR ELIMINATE WELDING AFTER GALVANIZING. REPAIR POST–FABRICATION WELDS IN ACCORDANCE WITH SSPWC 210–3.5.
8. INSTALL A MID SUPPORT FOR BARRIERS WITH THREE HINGES.
9. INSTALL SAND PLATES AT OCEAN OUTLETS.
10. DESIGN LOADS:
   A. INLET/OUTLET BARRIER: BULKED EQUIVALENT FLUID DENSITY = 85 PCF
   B. OCEAN OUTLET:
      1. 1,800 PSF (86 kPa) OVER SAND PLATE AREA
      2. 600 PSF (29 kPa) OVER LOWER OPEN AREA

Hinge Sleeve

1/4" (6 mm) Pin in Drilled Hole

Hinge Pin

Spot Weld Ends to Prevent Removal

Alternate Hinge Pin Attachment

Use Only Where Approved
STIFFENER BAR
3" x 3/8" (76 x 10 mm) WELDED ON BOTTOM OF RACK WHEN LR IS 72" (1.8 m) OR MORE

HEADWALL AND WINGWALL

OUTLET CONDUIT

BOLTS PER NOTE 5

CASE A

RACK PLAN

CASE B

SEE SECT C-C, SHEET 2

STIFFENER (WHEN REQ'D)
BARS 3"x3/8" (76 x 10 mm) TYP

HEADWALL

SEE SECT D-D, SHEET 2

PCC SUPPORT

RACK SECTION

HEADWALL & WINGWALL

SLOPE

HEADWALL

4" (100 mm) TYP

PCC SUPPORT

DETAIL E

SHEET 2

PCC SUPPORT

DETAIL F

SHEET 2

RACK FRONT

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

TRASH RACK (INCLINED)

STANDARD PLAN

361-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PUBLIC WORKS STANDARDS ING

1993

REV. 2005, 2009
NOTES

1. MAXIMUM SIZE OF OUTLET FOR THIS RACK IS 48" (1200 mm) PIPE OR 48" (1.2 m) WIDE RCB.
   MAXIMUM LENGTH OF RACK L_R IS 10'-0" (3 m).

2. ADJUST L_R SO THAT THE SLOPE OF THE RACK IS APPROXIMATELY 2 HORIZONTAL TO 1 VERTICAL.

3. THE PCC SUPPORT IS NOT NEEDED IF THE INLET STRUCTURE HAS A SUITABLE CUTOFF WALL.
   THE PCC SUPPORT SHALL NOT REPLACE THE CUTOFF WALL.

4. GALVANIZE RACK AFTER FABRICATION.

5. BOLTS SHALL BE 1/2"x7" (13 x 175 mm). BOLTS FOR REMOVABLE PORTION SHALL BE
   STAINLESS STEEL. PROVIDE WASHERS AT EACH BOLT.

6. SUBMIT SHOP DRAWINGS PER SSPWC 2-5.3.3. FOR RETROFIT WORK, INCLUDE DETAILS FOR
   ATTACHMENT TO EXISTING STRUCTURE.
NEW OR EXIST PIPE FLOW

6" MIN. (150 mm)

CUT NO. 2 LINE

CUT NO. 2

3.14 (D₂ - D₁)

DETAIL "A" (SEE NOTE 10)
SONOTUBE, OR EQUAL, INTERIOR FORM

CUT NO. 1: SAW THE TUBE AT AN ANGLE OF A/2 WITH THE TRANSVERSE PLANE. REVERSE ONE SECTION AND TAPE BOTH SECTIONS TOGETHER FORMING THE DEFLECTION ANGLE A.


DETAIL "B"
TYPICAL JOINT FOR REINFORCED CONCRETE PIPE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CONCRETE COLLAR FOR RCB
12" (300 mm) THROUGH 72" (1800 mm)

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

380-4

STANDARD PLAN

SHEET 1 OF 2
NOTES

1. A CONCRETE COLLAR IS REQUIRED WHERE THE CHANGE IN GRADE EXCEEDS 10%.

2. FOR CURVE JOINTS (SEE DETAIL B, SHEET 1)
   IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE
   THAT IS GREATER THAN 1" (25 mm), BUT IS LESS THAN 3" (75 mm)
   A CONCRETE COVER IS REQUIRED IN ACCORDANCE WITH
   SSPWC 306-1.2.4.
   IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE
   THAT IS EQUAL TO OR GREATER THAN 3" (75 mm), BUT LESS THAN
   6" (150 mm), A CONCRETE COLLAR IS REQUIRED. IF THE CLEAR
   SPACE IS 6" (150 mm) OR GREATER, A TRANSITION STRUCTURE
   IS REQUIRED.

3. CONCRETE COLLAR SHALL NOT BE USED FOR A SIZE CHANGE ON
   THE MAIN LINE.

4. CONNECTOR PIPES
   A. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A
      CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER
      PIPE. \( D = D_1 \) OR \( D_2 \), WHICHEVER IS GREATER.
   B. WHEN \( D_1 \) IS EQUAL TO OR LESS THAN \( D_2 \), JOIN INVERTS AND
      WHEN \( D_1 \) IS GREATER THAN \( D_2 \), JOIN SOFFITS.

5. FOR PIPE LARGER THAN 72" (1800 mm) SPECIAL COLLAR DETAILS
   ARE REQUIRED.

6. FOR PIPE SIZE NOT LISTED USE NEXT SIZE LARGER.

7. REINFORCEMENT SHALL CONFORM TO ASTM A 615 (A 615 M) GRADE
   40 (300).

8. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR
   TIES SHALL BE \( D + (2 \times \text{WALL THICKNESS}) + T \).

9. REINFORCING SHALL BE USED WHERE THE PIPE DIAMETER IS
   GREATER THAN 21" (525 mm) AND ON ALL PIPES WHERE THE SPACES
   BETWEEN THE EXTREME OUTER ENDS IS 3" (75 mm) OR LARGER.

<table>
<thead>
<tr>
<th>CIRCULAR TIES:</th>
<th>NO. OF CIRCULAR TIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>21&quot; (525 mm) OR LESS</td>
<td>3</td>
</tr>
<tr>
<td>24&quot; (600 mm) TO 30&quot; (750 mm)</td>
<td>3</td>
</tr>
<tr>
<td>33&quot; (825 mm) TO 57&quot; (1425 mm)</td>
<td>4</td>
</tr>
<tr>
<td>60&quot; (1500 mm) TO 72&quot; (1800 mm)</td>
<td>5</td>
</tr>
</tbody>
</table>

WHERE THE SPACE BETWEEN PIPE ENDS EXCEEDS 3" (75 mm), THE
NUMBER OF CIRCULAR TIES SHALL BE INCREASED TO MAINTAIN AN
APPROXIMATE SPACING OF 6" (150 mm) O.C.

10. WHERE THE PIPE IS 21" (525 mm) OR LESS IN DIAMETER AN INTERIOR
    FORM OF UNSEALED SONÖ-TUBE OR EQUAL SHALL BE USED TO
    PROVIDE A SMOOTH INTERIOR JOINT. THE PAPER FORM MAY BE
    LEFT IN PLACE (SEE DETAIL A). WHEN THE PIPE IS 24" (600 mm)
    OR LARGER A REMOVABLE INTERIOR FORM SHALL BE USED OR THE
    INTERIOR JOINT SHALL BE COMPLETELY FILLED WITH MORTAR AND
    NEATLY POINTED.
NOTES

1. THIS STRUCTURE MAY BE USED WHERE:
   a. DEPTH OF COVER DOES NOT EXCEED 10' (3.0 m).
   b. CLEAR SPAN OF ONE BARREL DOES NOT EXCEED 12' (3.6 m).
      WHEN THESE LIMITS ARE EXCEEDED, WINDOW OPENING DETAILS
      SHALL BE AS SHOWN ON PLANS.

2. LONGITUDINAL BARS SHALL BE CUT IN THE FIELD 2" (50 mm) FROM OPENING.

3. ROUND ALL EDGES TO 2" (50 mm) RADIUS.

4. NO TRANSVERSE CONSTRUCTION JOINT SHALL BE PLACED WITHIN 5'-0"
   (1.5 m) OF WINDOW.
NOTCH GE
DETAIL "A2"

NOTE:
PLATE AND ANCHOR BOLTS NOT SHOWN.

PRECAST RCP SECTION
LOOKING UPSTREAM

NOTE:
PLATE AND ANCHOR BOLTS NOT SHOWN.

 DETAIL "A3"

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

VELOCITY CONTROL RING
PRECAST RCP SECTION

STANDARD PLAN
383-2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
NOTES

1. DRAINAGE NOTCH OF VELOCITY CONTROL PRECAST SECTIONS SHALL BE PLACED ON THE RCP INVERT AND CENTERED ON THE RCP CENTERLINE.

2. THE LOCATION AND SPACING OF THE VELOCITY CONTROL RINGS ARE SHOWN ON THE PLANS. THE SPACING BETWEEN THE RINGS UPSTREAM TO DOWNSTREAM SHALL BE A MULTIPLE OF 4'-0" (1.2 m).

3. PRECAST RCP VELOCITY CONTROL RINGS SHALL BE MANUFACTURED PER SSPWC 207–2. REINFORCING STEEL CAGES SHALL BE THE SAME AS THAT OF THE ADJACENT RCP EXCEPT THAT AN ADDITIONAL CAGE MAY BE ADDED. THE RING NEED NOT BE D–LOAD TESTED.

4. VALUES D AND H ARE SHOWN ON THE PLANS. THE VALUE H SHALL BE A MULTIPLE OF 1 1/2" (37.5 mm).

5. THE MINIMUM INSIDE DIAMETER (D–2H) SHALL BE 36" (900 mm).

6. #3 (#10M) REINFORCING STEEL BARS 12" (300 mm) LONG WELDED TO THE REINFORCING CAGES MAY BE USED IN PLACE OF THE J BOLTS OR STUD ANCHORS.

7. CONCRETE STRENGTH FOR VELOCITY RINGS SHALL BE 5,000 PSI (35 MPa) AT 28 DAYS.
GREATER OF 20 BAR DIAMETERS OR T2 (SHEET 3)

SEE NOTE 1, SHEET 10

DETAIL E

FLOW

PIPE OR BOX PER PLANS

T2

5" (1.5 m) HIGH
CHAIN LINK FENCE
PER SPPWC 600

PLAN

RIPRAP, BACKFILL,
RETAINING WALL OR
WING WALL PER PLANS

RCP

RCB

DETAIL E

DETAIL F (SHEET 3)
PIPE OR BOX PER PLANS. MAX INLET PIPE SLOPE = 0.10. SEE PLANS REGARDING NEED FOR THRUST BLOCK &/OR FOC COLLAR.

4" OR 6" FILLET (100 OR 150 mm), TYP

SECTION A-A

SYMMETRICAL ABOUT EC

B-1 & B-2 BARS, BOTH SIDES

A-3 & A-4 BARS TOP & BOTTOM

NOTE: ARMOR PLATE NOT SHOWN.

SECTION G-G

SECTION D-D

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

ENERGY DISSIPATOR - IMPACT BASIN
WITH VERTICAL BAFFLE WALL

STANDARD PLAN

384-3

SHEET 2 OF 10
SECTION B-B (SHEET 1)

SECTION H-H (SHEET 1)

SECTION C-C (SHEET 2)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

ENERGY DISSIPATOR – IMPACT BASIN
WITH VERTICAL BAFFLE WALL

SHEET 3 OF 10
<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>WIDTH</th>
<th>4'-0&quot;</th>
<th>6'-0&quot;</th>
<th>8'-0&quot;</th>
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<tbody>
<tr>
<td>m</td>
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<td>(1370)</td>
<td>(1830)</td>
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<td>L</td>
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**WORKING STRESS DESIGN**

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<td>#4 @ 12&quot;</td>
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<td>#4 @ 12&quot;</td>
</tr>
<tr>
<td>D-2</td>
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<td>#4 @ 12&quot;</td>
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**DESIGN LOAD, IMPACT**

- 225 PSF (10.8 kPa)
- 300 PSF (14.4 kPa)
- 375 PSF (18.0 kPa)
<table>
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<tr>
<th>WIDTH</th>
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**DIMENSIONS**

**WORKING STRESS DESIGN**

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**STRENGTH DESIGN**

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**DESIGN LOAD, IMPACT**

- 450 PSF (21.5 kPa)
- 525 PSF (25.1 kPa)
- 600 PSF (28.7 kPa)
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### Design Load, Impact

- 675 PSF (32.3 kPa)
- 750 PSF (35.9 kPa)
- 825 PSF (39.5 kPa)
### Dimensions

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### Working Stress Design

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**DIMENSIONS**

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**WORKING STRESS DESIGN**

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**STRENGTH DESIGN**

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<td>#7 @ 12&quot; (#22M @ 300)</td>
<td>#4 @ 4&quot; (#13M @ 100)</td>
<td>#4 @ 10&quot; (#13M @ 250)</td>
</tr>
<tr>
<td>D1</td>
<td>#7 @ 12&quot; (#22M @ 300)</td>
<td>#8 @ 4&quot; (#25M @ 100)</td>
<td>#8 @ 10&quot; (#25M @ 250)</td>
</tr>
<tr>
<td>D2</td>
<td>#7 @ 12&quot; (#22M @ 300)</td>
<td>#8 @ 13&quot; (#25M @ 330)</td>
<td>#8 @ 10&quot; (#25M @ 250)</td>
</tr>
</tbody>
</table>

**DESIGN LOAD, IMPACT**

- 1100 PSF (52.7 kPa)
- 1200 PSF (57.5 kPa)
- 1300 PSF (62.2 kPa)
ANCHOR STUDS OR HOOKED ANCHORS WELDED TO STEEL PLATE

1/4" (6 mm) STEEL PLATE, A36

NOTE:
ARMOR PLATE ASS'Y w/ WELDED STUD ANCHORS SHALL BE EMBEDDED INTO WET CONCRETE.

ARMOR PLATE DETAIL (SHT 2)

SECTION J–J

SECTION K–K

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

ENERGY DISSIPATOR – IMPACT BASIN
WITH VERTICAL BAFFLE WALL

STANDARD PLAN

384–3

SHEET 9 OF 10
## ARMOR PLATE ANCHORS

<table>
<thead>
<tr>
<th>WIDTH, (mm)</th>
<th>TOTAL BENT PLATE ANCHORS</th>
<th>FLAT PLATE ANCHORS</th>
<th>X L (mm)</th>
<th>Y L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-0&quot; (1220)</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>6'-0&quot; (1830)</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>8'-0&quot; (2440)</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>10'-0&quot; (3050)</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>12'-0&quot; (3660)</td>
<td>6</td>
<td>12</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>14'-0&quot; (4270)</td>
<td>6</td>
<td>14</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>16'-0&quot; (4880)</td>
<td>9</td>
<td>15</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>18'-0&quot; (5490)</td>
<td>9</td>
<td>18</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>20'-0&quot; (6100)</td>
<td>9</td>
<td>20</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>22'-0&quot; (6710)</td>
<td>9</td>
<td>23</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>24'-0&quot; (7320)</td>
<td>9</td>
<td>25</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>26'-0&quot; (7920)</td>
<td>9</td>
<td>26</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>28'-0&quot; (8530)</td>
<td>12</td>
<td>29</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>30'-0&quot; (9140)</td>
<td>12</td>
<td>31</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>32'-0&quot; (9750)</td>
<td>12</td>
<td>32</td>
<td>17</td>
<td>2</td>
</tr>
</tbody>
</table>

### NOTES:

1. PCC COVER FOR RE-BAR SHALL BE 2" (50 mm), EXCEPT AS OTHERWISE NOTED. WHEN PCC WILL BE POURED AGAINST BARE EARTH, HOWEVER, INCREASE WALL THICKNESS SHOWN IN TABLES BY 1" (25 mm) AND INCREASE PCC COVER TO 3" (75 mm).

2. PCC COVER FOR RE-BAR WITHIN IMPACT CHAMBER SHALL BE 2-1/2" (65 mm).

3. TABULATED METRIC REINFORCING BAR SPACING IS IN MILLIMETERS.
SECTION A-A
TOP AND INVERT SLAB JOINT REINFORCEMENT

DETAIl 1
INNER REINFORCEMENT

DETAIl 2
OPTION

NOTE:
JOINT SHALL CONFORM
WITH ASTM C990 OR
AASHTO M-198
DETAIL 3
REINFORCEMENT ARRANGEMENT

DETAIL 4
OPTION
OUTSIDE CAGE* WIRES
1/4 SPAN

WIRES THAT ARE WELDED SHALL
BE AT 18" (450 mm) MIN SPACING

INSIDE CAGE* MID 1/3 SPAN
WELDING OR LAP
NOT ALLOWED

CRITICAL ZONES OF HIGH STRESS
WHERE WELDING IS RESTRICTED

*INDICATES NO—SPLICE ZONES

MINIMUM LENGTH EQUAL TO
SPACING OF LONGITUDINAL
WIRES PLUS 2" (50 mm) (TYP)

DETAIL 5
OPTION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX
"W" WIDTH VARIES—SEE TABLE

<table>
<thead>
<tr>
<th>SPAN, S</th>
<th>&quot;W&quot; EXTERNAL SEALING BAND WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT (mm)</td>
<td>INCHES (mm)</td>
</tr>
<tr>
<td>4-6</td>
<td>1200-1800 9 225</td>
</tr>
<tr>
<td>7-8</td>
<td>2100-2400 11 275</td>
</tr>
<tr>
<td>10-12</td>
<td>3000-3600 14 350</td>
</tr>
</tbody>
</table>

NOTES:
1. THE INSIDE SURFACE OF THE Precast Soffit SHALL BE MARKED "TOP".
2. "W" MINIMUM SHALL EQUAL THE WALL THICKNESS. "W" MAXIMUM SHALL BE 8" (200 mm) FOR SPANS THROUGH 8' (2400 mm) AND 14" (350 mm) FOR SPANS OVER 8' (2500 mm).
3. FOR EXTERNAL SEALING BAND APPLICATIONS SEE BELOW.

EXTERNAL SEALING BAND SCHEMATIC

SINGLE BOX

MULTIPLE BOXES

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN 390-1

SHEET 5 OF 42
LIFTING HOLES, SIZE & LOCATION TO BE DETERMINED BY FABRICATOR

AT MULTIPLE CELL INSTALLATIONS, FILL GAP BETWEEN SECTIONS WITH EITHER FLOWABLE FILL GROUT OR SAND WITH AT LEAST THE TOP TWO FEET (600 mm) FILLED WITH FLOWABLE FILL GROUT

4" ± 1/2" (100 mm ± 13 mm)

2" x 4" (50 x 100 mm) WOOD SPACER

6" (150 mm) MIN GRANULAR FOUNDATION FILL MATERIAL

TYPICAL SECTION
SHOWS INSTALLATION OF MULTI-CELL LOCATIONS.
SINGLE CELL INSTALLATION IS SIMILAR.

SOFFIT

FLOW

INVERT

RUBBER BASED PRE-FORMED FLEXIBLE JOINT SEALANT (ASTM C990 OR AASHTO M-198) OR CEMENT MORTAR

TYPICAL JOINT DETAIL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX
TYPICAL NOTES:
1. SLOPE OR SHORE EXCAVATION SIDES AS DETERMINED BY THE ENGINEER
2. DIMENSIONS SHOWN ARE MINIMUM.
3. CONSTRUCTION OF ROADWAY STRUCTURAL SECTION SHALL NOT DISTURB THE SEALING BAND INSTALLATION.

OG = ORIGINAL GROUND  GP = GROUND PROFILE

EXCAVATION AND BACKFILL DETAILS 1

PRECAST REINFORCED CONCRETE BOX
FILL HEIGHT GREATER THAN 24" (600 mm)

EXCAVATION AND BACKFILL DETAILS 2

NOTE: SEE LEGEND AND TYPICAL NOTES ON SHEET 7
12° (300 mm) WHERE METHOD 1 or 2 BACKFILL IS USED.
24" (600 mm) WHERE METHOD 3 BACKFILL IS USED.

EXCAVATION

METHOD 1
METHOD 2
METHOD 3

BACKFILL

FILL HEIGHT 24" (600 mm) OR LESS
EXCAVATION AND BACKFILL DETAILS 3

NOTE: SEE LEGEND AND TYPICAL NOTES ON SHEET 7
EXCAVATION

METHOD 1

BACKFILL

METHOD 2

FILL HEIGHT 24" (600 mm) OR LESS

EXCAVATION AND BACKFILL DETAILS 4

NOTE: SEE LEGEND AND TYPICAL NOTES ON SHEET 7
PRECAST REINFORCED CONCRETE BOX BEVELS

<table>
<thead>
<tr>
<th>SPAN(S)</th>
<th>MAX BEVEL ANGLE (θ)</th>
<th>DROP</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEET</td>
<td>mm</td>
<td>INCHES</td>
</tr>
<tr>
<td>3</td>
<td>900</td>
<td>3.85</td>
</tr>
<tr>
<td>4</td>
<td>1200</td>
<td>5.07</td>
</tr>
<tr>
<td>5</td>
<td>1500</td>
<td>6.30</td>
</tr>
<tr>
<td>6</td>
<td>1800</td>
<td>7.52</td>
</tr>
<tr>
<td>7</td>
<td>2100</td>
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<td>8</td>
<td>2400</td>
<td>5.87</td>
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<td>2700</td>
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<td>8.07</td>
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<tr>
<td>12</td>
<td>3600</td>
<td>8.80</td>
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<table>
<thead>
<tr>
<th>SPAN(S)</th>
<th>BOX LENGTH</th>
<th>MIN RADIUS</th>
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</thead>
<tbody>
<tr>
<td>FEET</td>
<td>mm</td>
<td>FEET</td>
</tr>
<tr>
<td>3</td>
<td>900</td>
<td>4</td>
</tr>
<tr>
<td>THROUGH 6</td>
<td>1200</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>2100</td>
<td>4</td>
</tr>
<tr>
<td>THROUGH 12</td>
<td>2400</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>3600</td>
<td>8</td>
</tr>
</tbody>
</table>
CLASS C MORTAR

INTERIOR SURFACE OF BOX

DETAIL "A"

CLASS C MORTAR OR
560-C-3250 (330-C-23)

PRECAST REINFORCED CONCRETE BOX PULLED
NOTES:
1. STEEL COVER SHALL BE FROM THE FACE OF THE BAR OR WIRE TO THE FACE OF THE CONCRETE.
2. STEEL COVER FROM THE TOP OF INVERT SLAB SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

<table>
<thead>
<tr>
<th>VELOCITY</th>
<th>STEEL COVER</th>
<th>MINIMUM 28-DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPS (m/s)</td>
<td>INCHES (mm)</td>
<td>CONCRETE STRENGTH</td>
</tr>
<tr>
<td>&lt; 5 (&lt; 1.5)</td>
<td>1.5 (38)</td>
<td>5,000 PSI (35 MPa)</td>
</tr>
<tr>
<td>5 TO 20 (1.5 TO 6)</td>
<td>2.0 (50)</td>
<td>5,000 PSI (35 MPa)</td>
</tr>
<tr>
<td>&gt; 20 TO 40 (&gt; 6 TO 12)</td>
<td>2.5 (63)</td>
<td>5,000 PSI (35 MPa)</td>
</tr>
<tr>
<td>&gt; 40 (&gt; 12)</td>
<td>NOT ALLOWED</td>
<td>NOT ALLOWED</td>
</tr>
</tbody>
</table>

FPS: FEET PER SECOND
m/s: METERS PER SECOND

3. STEEL COVER FROM THE TOP OF INVERT SLAB MAY BE INCREASED FOR PRCB SUBJECT TO THE ACTION OF SEAWATER, HARMFUL GROUNDWATER, OR APPRECIABLE DEBRIS FLOWS.
4. STEEL COVER GREATER THAN 2.5 INCHES (63 mm) MAY RESULT IN DELAMINATION OF CONCRETE. SEE THE PLANS FOR SACRIFICAL STEEL TO PREVENT SLABBING WHEN THE STEEL COVER EXCEEDS 2.5 INCHES (63 mm).
5. PRCB SHALL NOT BE PERMITTED WHEN THE MAXIMUM GROUND WATER TABLE IS LOCATED 1 FEET (300 mm) BELOW THE BOTTOM OF INVERT OR HIGHER, OR THE HYDRAULIC GRADE LINE IS MORE THAN 4 FEET (1200 mm) ABOVE THE SOFFIT.
6. PRCB WITH RISE LARGER THAN 12 FEET (3600 mm) AND SPAN GREATER THAN 12 FEET (3600 mm) SPAN TO 24 FEET (7200 mm), MUST HAVE A SPECIAL DESIGN SUBMITTED FOR REVIEW AND ARE SUBJECT TO APPROVAL BY THE ENGINEER.
7. THE DESIGN TABLES IN THIS STANDARD PLAN DO NOT ACCOUNT FOR TEMPERATURE VARIATIONS, UNBALANCED LATERAL LOADS, RAILROAD LOADING OR LOADING DUE TO OTHER TEMPORARY OR PERMANENT STRUCTURES. SPECIAL DESIGN FOR THESE LOADS, IF APPLICABLE, MUST BE SUBMITTED FOR REVIEW AND ARE SUBJECT TO APPROVAL BY THE ENGINEER.
8. DESIGN CRITERIA: AASHTO SPECIFICATIONS FOR HIGHWAY BRIDGES, CURRENT LFD EDITION, EXCEPT THE LOAD FACTOR FOR DEAD LOAD ($\beta_D$) AND EARTH PRESSURE ($\beta_E$) = 1.4
9. THE JOINTS OF THE SECTIONS SHALL BE OF SUCH DESIGN THAT THEY WILL WITHSTAND THE FORCES CAUSED BY THE COMPRESSION OF THE SEALANT WHEN JOINED, WITHOUT CRACKING OR FRACTURING WHEN TESTED.
10. IF STEEL BARS GRADE 60 (GRADE 420) ARE USED IN LIEU OF WELDED WIRE REINFORCEMENT, THE STEEL AREAS PRESENTED SHALL BE INCREASED TO ACCOUNT FOR THE DIFFERENCES IN STEEL YIELD STRENGTH, STEEL SPACING, CONCRETE COVER, AND CRACK CONTROL.
11. WHEN USING WELDED WIRE REINFORCEMENT, THE INDIVIDUAL LONGITUDINAL WIRE SHALL HAVE AN AREA OF AT LEAST 40 PERCENT OF THE INDIVIDUAL TRANSVERSE WIRE AND 8" (200 mm) MAXIMUM SPACING.
13. THE CLEAR DISTANCE OF THE END TRANVERSE WIRES SHALL BE NOT LESS THAN 1/2 INCH (12 mm) NOR MORE THAN 2 INCHES (50 mm) FROM THE ENDS OF THE PRCB SECTION.
14. REINFORCEMENT MAY BE ASSEMBLED USING ANY COMBINATION OF SINGLE OR MULTIPLE LAYERS OF WELDED-WIRE REINFORCEMENT.
15. A COMMON REINFORCEMENT UNIT MAY BE USED FOR BOTH $A_{S2}$ (OR $A_{S3}$) AND $A_{S4}$, AND ALSO FOR BOTH $A_{S7}$ (OR $A_{S8}$) AND $A_{S1}$, WITH THE LARGEST AREA REQUIREMENT GOVERNING, BENDING THE REINFORCEMENT 90 DEGREES AT THE CORNERS AND WAIVING THE EXTENSION REQUIREMENTS SHOWN IN DETAILS 1 THROUGH 4.
16. WHEN A SINGLE CAGE OF MULTIPLE TRANSVERSE STEEL IS USED FOR $A_{S2}$ (OR $A_{S3}$) AND $A_{S4}$ REINFORCEMENT, THE SLAB OR WALL REQUIRING THE LARGER STEEL AREA SHALL HAVE THIS ADDITIONAL TRANSVERSE STEEL EXTENDING THE FULL LENGTH OF THE SLAB OR WALL.
17. WELDED WIRE REINFORCEMENT SHALL BE COMPOSED OF TRANSVERSE AND LONGITUDINAL WIRES WITH SUFFICIENT LONGITUDINAL WIRES EXTENDING THROUGH THE PRCB SECTION TO MAINTAIN THE SHAPE AND POSITION OF REINFORCEMENT.

18. THE ENDS OF THE LONGITUDINAL DISTRIBUTION REINFORCEMENT SHALL NOT BE MORE THAN 2 INCHES (50 mm) FROM THE ENDS OF THE PRCEB SECTION.

19. THE ENDS OF THE LONGITUDINALS, STIRRUPS, AND SPACERS USED TO POSITION THE REINFORCEMENT MAY BE EXPOSED TO CONTACT WITH FORMS.

20. THE OVERLAP MEASURED BETWEEN THE OUTERMOST LONGITUDINAL WIRES OF EACH WELDED WIRE REINFORCEMENT SHEET SHALL NOT BE LESS THAN THE SPACING OF THE LONGITUDINAL WIRES PLUS 2 INCHES (50 mm) NOR LESS THAN 10 INCHES (250 mm).

21. IF $A_{S1}$ IS EXTENDED TO THE MIDDLE OF EITHER SLAB AND CONNECTED, WELDED SPLICES ARE ALLOWED IN THE CONNECTION.

22. WHEN USED, $A_{S7}$ AND $A_{S8}$ SHALL BE LAPPED WITH $A_{S1}$ AS SHOWN ON DETAILS 3 AND 4.

23. SPLICES IN THE TRANSVERSE REINFORCEMENT SHALL BE MADE BY LAPPPING. IF WELDS ARE MADE TO TRANSVERSE REINFORCEMENT, THEY SHALL BE MADE ONLY TO SELECTED TRANSVERSE WIRES THAT ARE NOT LESS THAN 18 INCHES (460 mm) APART ALONG THE LONGITUDINAL AXIS OF THE PRCEB SECTION. ALSO, WHEN SPACERS ARE WELDED TO TRANSVERSE WIRES, THEY SHALL BE WELDED ONLY TO THE SELECTED TRANSVERSE WIRES.

24. THERE SHALL BE NO WELDING TO OTHER TRANSVERSE WIRES, EXCEPT $A_{S4}$ MAY BE LAPPED AND WELDED AT ANY LOCATION OR CONNECTED BY WELDING AT THE CORNERS TO $A_{S2}$ AND $A_{S3}$.

25. NO WELDS OR LAPS SHALL BE MADE TO $A_{S2}$ OR $A_{S3}$ TRANSVERSE WIRES IN THE MIDDLE THIRD OF THE SPAN.

26. WHEN DISTRIBUTION REINFORCEMENT IS TO BE FASTENED TO A CAGE BY WELDING, IT SHALL BE WELDED ONLY TO LONGITUDINAL WIRES AND ONLY NEAR THE ENDS OF THE PRCEB SECTION.

27. THE SPACING CENTER TO CENTER OF THE TRANSVERSE WIRES SHALL BE NOT LESS THAN 2 INCHES (50 mm) NOR MORE THAN 4 INCHES (100 mm).

28. THE SPACING CENTER TO CENTER OF THE LONGITUDINAL WIRES SHALL BE NOT MORE THAN 8 INCHES (200 mm).

29. OUTER CAGE TRANSVERSE REINFORCEMENT AS SHOWN SHALL BE PLACED IN THE TOP AND BOTTOM SLABS AT THE GROOVE PORTION OF THE JOINT WHEN $A_{S1}$ IS NOT CONTINUOUS OVER THE SPAN.

30. IF STEEL BARS (GRADE 60) ARE USED IN LIEU OF WELDED WIRE REINFORCEMENT, THE STEEL AREAS SHALL BE INCREASED TO ACCOUNT FOR THE DIFFERENCE IN STEEL YIELD STRENGTH, STEEL SPACING, CONCRETE COVER, AND CRACK CONTROL BETWEEN THE WELDED WIRE REINFORCEMENT AND STEEL BARS.

31. IN LIEU OF PERFORMING A SPECIAL DESIGN FOR THE SPECIFIC CASE WHERE THE ACTUAL HAUNCH DIMENSIONS ARE LARGER THAN THE STANDARD DIMENSIONS AND VERTICAL AND HORIZONTAL HAUNCH DIMENSIONS ARE EQUAL, THE $A_{S1}$ STEEL AREA SHALL BE INCREASED 1 PERCENT FOR EVERY 5 PERCENT INCREASE IN THE HAUNCH DIMENSION OVER THAT SPECIFIED, AND $A_{S2}$ AND $A_{S3}$ SHALL BE REDUCED BY AN EQUAL PERCENTAGE.

NOTE:
SHEETS 16 TO 24 HAVE 1.5 INCHES (38 mm) OF STEEL COVER AT THE TOP OF INVERT SLAB.
SHEETS 25 TO 33 HAVE 2.0 INCHES (50 mm) OF STEEL COVER AT THE TOP OF INVERT SLAB.
SHEETS 34 TO 42 HAVE 2.5 INCHES (63 mm) OF STEEL COVER AT THE TOP OF INVERT SLAB.
### Specific Criteria Used for Tables

**Material Properties:**
- **Welded Wire Reinforcement:** 65,000 PSI (450 MPa)
- **Deformed Bars:** 60,000 PSI (420 MPa)
- **Concrete:** 5,000 PSI (35 MPa)

**Soil Data:**
- **Unit Weight:** 120 lb/ft$^3$ (20 kN/m$^3$)
- **Ratio of Lateral to Vertical Pressure from Weight to Earth:** 0.50 max to 0.25 min
- **Additional Lateral Pressure from Approaching Truck Wheels:**
  - $700 \text{ lbf/ft}^2 \, (10/\text{H}_e \, \text{kN/m}^2)$ OR
  - $800 \text{ lbf/ft}^2 \, (39 \text{ kN/m}^2)$
  - WHEN $H_e < 1$ FEET (300 mm), WHERE $H_e = \text{Earth Cover, Feet (mm)}$
- **External Water Table:** Below Box Section Invert
- **Soil Structure Interaction Factor:** 1.15

**Capacity Reduction Factors (From AASHTO Bridge Specifications):**
- **Shear:** 0.90
- **Axial Compression Combined with Bending:** 0.95

**Loading Data:**
- **Load Factor:** $\delta (\beta_D + \beta_L)$
  - $\delta = 1.3$
  - $\beta_D = 1.40$ FOR DEAD LOADS
  - $\beta_L = 1.67$ FOR LIVE LOADS
- **Truck Axle Load:**
  - HS20 (MS18)
  - 32,000 lbf (142 kN)

**Impact (Variable With Depth):**
- 0 to 30%

**Structural Arrangement:**
- **Concrete Cover Over Steel:**
  - Top Slab 1.0 INCH (25 mm)
  - FOR FILL HEIGHTS 2 FEET (600 mm) AND GREATER, 2.0 INCHES (50 mm)
  - FOR FILL HEIGHTS UNDER 2 FEET (600 mm)
- **Slab Thickness:**
  - FOR FILL HEIGHTS GREATER THAN 2 FEET (600 mm), 1/12 TIMES INSIDE SPAN PLUS 1.0 INCH (25 mm) UP TO 7-FOOT (2100 mm) SPAN,
  - 1/12 INSIDE SPAN ABOVE 7-FOOT SPAN
- **Side Wall Thickness:**
  - 1/12 TIMES INSIDE SPAN PLUS 1.0 INCH (25 mm) UP TO 7-FOOT (2100 mm) SPAN,
  - 1/12 INSIDE SPAN ABOVE 7-FOOT SPAN (2100 mm)
- **Minimum Haunch Dimensions:**
  - Vertical and horizontal dimensions both equal to wall thickness
- **Transverse Wire Spacing:**
  - 4.0 INCHES (100 mm) MAX
- **Minimum Reinforcing Inside Face Slabs and Side Walls, Outside Face Side Walls and Corners of Slabs:**
  - 0.002 x gross area
<table>
<thead>
<tr>
<th>FEET (mm)</th>
<th>TOP SHEAR WIDE</th>
<th>7 (2100)</th>
<th>8 (2400)</th>
<th>9 (2700)</th>
<th>10 (3000)</th>
<th>11 (3300)</th>
<th>12 (3600)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 (900)</td>
<td>5 (1500)</td>
<td>0.29 (614)</td>
<td>0.30 (660)</td>
<td>0.28 (635)</td>
<td>0.27 (609)</td>
<td>0.26 (583)</td>
<td>0.25 (557)</td>
</tr>
<tr>
<td>3 (900)</td>
<td>6 (1800)</td>
<td>0.23 (466)</td>
<td>0.24 (492)</td>
<td>0.23 (508)</td>
<td>0.22 (484)</td>
<td>0.21 (460)</td>
<td>0.20 (436)</td>
</tr>
<tr>
<td>4 (1200)</td>
<td>5 (1500)</td>
<td>0.48 (1037)</td>
<td>0.49 (1053)</td>
<td>0.48 (1063)</td>
<td>0.47 (1079)</td>
<td>0.46 (1095)</td>
<td>0.45 (1110)</td>
</tr>
<tr>
<td>5 (1500)</td>
<td>6 (1800)</td>
<td>0.46 (996)</td>
<td>0.47 (1012)</td>
<td>0.46 (1028)</td>
<td>0.45 (1044)</td>
<td>0.44 (1060)</td>
<td>0.43 (1076)</td>
</tr>
<tr>
<td>6 (1800)</td>
<td>7 (2100)</td>
<td>0.32 (702)</td>
<td>0.33 (718)</td>
<td>0.32 (734)</td>
<td>0.31 (750)</td>
<td>0.30 (766)</td>
<td>0.29 (782)</td>
</tr>
<tr>
<td>7 (2100)</td>
<td>8 (2400)</td>
<td>0.26 (593)</td>
<td>0.27 (609)</td>
<td>0.26 (624)</td>
<td>0.25 (640)</td>
<td>0.24 (656)</td>
<td>0.23 (672)</td>
</tr>
<tr>
<td>8 (2400)</td>
<td>9 (2700)</td>
<td>0.21 (492)</td>
<td>0.22 (508)</td>
<td>0.21 (524)</td>
<td>0.20 (540)</td>
<td>0.19 (556)</td>
<td>0.19 (572)</td>
</tr>
<tr>
<td>9 (2700)</td>
<td>10 (3000)</td>
<td>0.16 (370)</td>
<td>0.17 (386)</td>
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SHALLOW COVER BOXES – COVER 0’ TO 2’ (0 TO 600 mm)
STEEL COVER 1.5 INCHES (38 mm) AT TOP OF INVERT SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

390-1

SHEET 16 OF 42
<table>
<thead>
<tr>
<th>SPAN (ft)</th>
<th>Rise, R (in.)</th>
<th>Transverse Reinforcement Area, in²/ft (mm²/m)</th>
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<td>9 (2700)</td>
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SHALLOW COVER BOXES - COVER 0' TO 2' (0 TO 610 mm)
STEEL COVER 1.5 INCHES (38 mm) AT TOP OF INVERT SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX
**EARTH COVER MORE THAN 2' (610 mm) DIMENSIONS SHOWN ARE SPAN x RISE x **

WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

STEEL COVER 1.5 INCHES (38 mm) AT TOP OF INVERT SLAB

<table>
<thead>
<tr>
<th>H_e</th>
<th>EARTH COVER AREA, IN 2/ FT (mm²/ m)</th>
<th>TRANSVERSE REINFORCEMENT</th>
<th>M INCHES (mm)</th>
<th>H_e</th>
<th>EARTH COVER AREA, IN 2/ FT (mm²/ m)</th>
<th>TRANSVERSE REINFORCEMENT</th>
<th>M INCHES (mm)</th>
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<td>A_s2</td>
<td>A_s3</td>
<td>A_s4</td>
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<td>31 (775)</td>
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<td>(1525)</td>
<td>0.10 (217)</td>
<td>0.11 (233)</td>
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<td>(3000)</td>
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<td>0.14 (296)</td>
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<td>(6000)</td>
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<th>4' x 3' x 5' (1200 x 900 x 125 mm)</th>
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<table>
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<table>
<thead>
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<th>5' x 3' x 6' (1500 x 900 x 150 mm)</th>
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### Standard Plans for Public Works Construction

#### Precast Reinforced Concrete Box

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<th>Steel Cover More Than 2' (610 mm)</th>
<th>Invert Slab Haunch</th>
<th>Top Slab Shear Reinforcement</th>
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<td>Area, in ft (mm)</td>
<td>Top Slab Thickness</td>
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<td>ft x ft x ft (mm x mm x mm)</td>
<td>Top Slab Shear.</td>
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<td>3 (915)</td>
<td>3 (915)</td>
</tr>
<tr>
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<td>0.14 (364)</td>
<td>0.22 (462)</td>
</tr>
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<td>0.19 (492)</td>
<td>0.33 (699)</td>
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**Note:** Dimensions shown are span x rise x depth. Where noted, submit details for steel cover. More than 2' (610 mm) at top of invert slab.
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<th>M INCHES</th>
<th>TRANSVERSE REINFORCEMENT</th>
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<td>A S2</td>
<td>A S3</td>
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<td>Transverse Reinforcement, in²/FT (mm²/m)</td>
<td>M Inches (mm)</td>
</tr>
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<td>8' x 6' x 8' (2400 x 1800 x 200 mm)</td>
<td>9' x 5' x 9' (2700 x 1500 x 225 mm)</td>
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### Earth Cover More Than 2' (610 mm)

Steel cover 1.5 inches (38 mm) at top of invert slab.

Dimensions shown are span x rise x *where noted, submit details for haunch, wall and slab thickness.

Top slab shear reinforcement.

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<th>Hc</th>
<th>Earth Cover FT</th>
<th>Transverse Reinforcement Area, IN² FT (mm²/m)</th>
<th>M Inches (mm)</th>
<th>Hc</th>
<th>Earth Cover FT</th>
<th>Transverse Reinforcement Area, IN² FT (mm²/m)</th>
<th>M Inches (mm)</th>
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<td>Aₗ₁ 0.25 (529) 0.53 (1122) 0.60 (1270) 0.22 (466) 72 (1800) 3</td>
<td>(915) 0.32 (677) 0.51 (1080) 0.56 (1185) 0.24 (508) 64 (1600)</td>
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<td>(1525) 0.32 (677) 0.51 (1080) 0.56 (1185) 0.24 (508) 64 (1600)</td>
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<td>H (in)</td>
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<td>TRANSVERSE REINFORCEMENT AREA, IN $\text{ft}^2$ (mm$^2$)</td>
<td>$H_e$ MAXIMUM</td>
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SHALLOW COVER BOXES - COVER 0" TO 2" (0 TO 600 mm)
STEEL COVER 2.0 INCHES (50 mm) AT TOP OF INVERT SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

390-1

SHEET 25 OF 42
<table>
<thead>
<tr>
<th>SPAN, S FEET (mm)</th>
<th>RISE, R FEET (mm)</th>
<th>T1 TOP TOP INCHES (mm)</th>
<th>T1 BOTTOM INCHES (mm)</th>
<th>T1 SIDE INCHES (mm)</th>
<th>H HAUNCH INCHES (mm)</th>
<th>TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)</th>
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<td>0.59 (1249)</td>
<td>0.89 (1884)</td>
<td>0.19 (402)</td>
<td>45 (1125)</td>
<td>15 (4500)</td>
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<tr>
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<td>0.77 (1630)</td>
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<td>0.97 (2053)</td>
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<tr>
<td>Dimensions</td>
<td>Transverse Reinforcement Area, in^2/ft (mm^2/m)</td>
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<td>TRANVERSE REINFORCEMENT AREA, IN^2/FT (mm^2/ m)</td>
<td>M INCHES (mm)</td>
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<td></td>
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</tr>
<tr>
<td>9' x 8' x 9&quot; (2700 x 2400 x 225 mm)</td>
<td>A&lt;sub&gt;S1&lt;/sub&gt;</td>
<td>A&lt;sub&gt;S2&lt;/sub&gt;</td>
<td>A&lt;sub&gt;S3&lt;/sub&gt;</td>
<td>A&lt;sub&gt;S4&lt;/sub&gt;</td>
<td>A&lt;sub&gt;S1&lt;/sub&gt;</td>
<td>A&lt;sub&gt;S2&lt;/sub&gt;</td>
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<td>1.09 (2307)</td>
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<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Transverse Reinforcement Area, in^2/ft (mm^2/ m)</th>
<th>EARTH COVER MORE THAN 2' (610 mm)</th>
<th>TRANVERSE REINFORCEMENT AREA, IN^2/FT (mm^2/ m)</th>
<th>M INCHES (mm)</th>
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<td>A&lt;sub&gt;S3&lt;/sub&gt;</td>
<td>A&lt;sub&gt;S4&lt;/sub&gt;</td>
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<td>0.71 (1503)</td>
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<table>
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<th>EARTH COVER MORE THAN 2' (610 mm)</th>
<th>TRANVERSE REINFORCEMENT AREA, IN^2/FT (mm^2/ m)</th>
<th>M INCHES (mm)</th>
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<td>A&lt;sub&gt;S2&lt;/sub&gt;</td>
<td>A&lt;sub&gt;S3&lt;/sub&gt;</td>
<td>A&lt;sub&gt;S4&lt;/sub&gt;</td>
</tr>
<tr>
<td>3 (915)</td>
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<td>0.46 (974)</td>
<td>0.57 (1207)</td>
<td>0.24 (508)</td>
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<td>0.32 (677)</td>
<td>0.38 (804)</td>
<td>0.52 (1101)</td>
<td>0.24 (508)</td>
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<td>0.39 (826)</td>
<td>0.45 (953)</td>
<td>0.66 (1397)</td>
<td>0.24 (508)</td>
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<td>0.63 (1334)</td>
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<td>0.24 (508)</td>
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<td>0.91 (1926)</td>
<td>1.03 (2180)</td>
<td>1.42 (3006)</td>
<td>0.24 (508)</td>
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</table>
## Earth Cover More Than 2' (610 mm)

Dimensions shown are span x rise x where noted, submit details for steel cover 2.0 inches (50 mm) at top of invert slab haunch, wall and slab thickness.

### Transverse Reinforcement

<table>
<thead>
<tr>
<th>H_e Earth Cover FT (mm) Maximum</th>
<th>Transverse Reinforcement AREA, IN 2/ FT (mm²/ m)</th>
<th>M Inches (mm)</th>
<th>H_e Earth Cover Area, IN 2/ FT (mm²/ m)</th>
<th>Transverse Reinforcement AREA, IN 2/ FT (mm²/ m)</th>
<th>M Inches (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10' x 9' x 10' (3000 x 2700 x 250 mm)</td>
<td></td>
<td></td>
<td>12' x 5' x 12' (3600 x 1500 x 300 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (915)</td>
<td>0.28 (593)</td>
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<td>0.76 (1609)</td>
<td>0.24 (508)</td>
<td>79 (1975)</td>
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<td>5 (1525)</td>
<td>0.24 (508)</td>
<td>0.47 (995)</td>
<td>0.68 (1439)</td>
<td>0.24 (508)</td>
<td>64 (1600)</td>
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<td>10 (3000)</td>
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<td>0.81 (1715)</td>
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<td>58 (1450)</td>
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<td>0.39 (826)</td>
<td>0.73 (1545)</td>
<td>1.08 (2286)</td>
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<td>47 (1175)</td>
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<tr>
<td>20 (6000)</td>
<td>* 0.51 (1080)</td>
<td>0.95 (2011)</td>
<td>1.36 (2879)</td>
<td>0.24 (508)</td>
<td>47 (1175)</td>
</tr>
<tr>
<td>25 (7500)</td>
<td>* 0.64 (1355)</td>
<td>1.18 (2498)</td>
<td>1.64 (3471)</td>
<td>0.24 (508)</td>
<td>47 (1175)</td>
</tr>
</tbody>
</table>

| 10' x 10' x 10' (3000 x 3000 x 250 mm) | | | 12' x 6' x 12' (3600 x 1800 x 300 mm) | | |
| 3 (915) | 0.26 (550) | 0.57 (1207) | 0.80 (1693) | 0.24 (508) | 79 (1975) | 3 (915) | 0.44 (931) | 0.52 (1101) | 0.66 (1397) | 0.29 (614) | 66 (1650) |
| 5 (1525) | 0.24 (508) | 0.50 (1058) | 0.72 (1524) | 0.24 (508) | 70 (1750) | 5 (1525) | 0.39 (826) | 0.45 (953) | 0.62 (1312) | 0.29 (614) | 59 (1475) |
| 10 (3000) | 0.28 (593) | 0.54 (1143) | 0.83 (1757) | 0.24 (508) | 64 (1600) | 10 (3000) | 0.47 (995) | 0.54 (1143) | 0.79 (1672) | 0.29 (614) | 59 (1475) |
| 15 (4500) | 0.38 (804) | 0.74 (1567) | 1.19 (2519) | 0.24 (508) | 52 (1300) | 15 (4500) | 0.66 (1397) | 0.75 (1588) | 1.08 (2286) | 0.29 (614) | 53 (1325) |
| 20 (6000) | * 0.49 (1037) | 0.95 (2011) | 1.38 (2921) | 0.24 (508) | 52 (1300) | 20 (6000) | * 0.86 (1820) | 0.98 (2074) | 1.38 (2921) | 0.29 (614) | 53 (1325) |
| 25 (7500) | * 0.61 (1355) | 1.19 (2519) | 1.65 (3493) | 0.24 (508) | 47 (1175) | 25 (7500) | * 1.09 (2307) | 1.22 (2582) | 1.68 (3556) | 0.29 (614) | 53 (1325) |

| 12' x 4' x 12" (3600 x 1200 x 300 mm) | | | 12' x 7' x 12" (3600 x 2100 x 300 mm) | | |
| 3 (915) | 0.31 (656) | 0.69 (1461) | 0.95 (2011) | 0.29 (614) | 73 (1825) | 3 (915) | 0.41 (868) | 0.55 (1164) | 0.77 (1630) | 0.29 (614) | 66 (1650) |
| 5 (1525) | 0.46 (974) | 0.53 (1122) | 0.80 (1693) | 0.29 (614) | 66 (1650) | 5 (1525) | 0.37 (783) | 0.49 (1037) | 0.67 (1418) | 0.29 (614) | 59 (1475) |
| 10 (3000) | 0.56 (1185) | 0.46 (974) | 0.67 (1418) | 0.29 (614) | 59 (1475) | 10 (3000) | 0.44 (931) | 0.57 (1207) | 0.84 (1778) | 0.29 (614) | 59 (1475) |
| 15 (4500) | 0.80 (1693) | 0.64 (1355) | 0.92 (1947) | 0.29 (614) | 59 (1475) | 15 (4500) | 0.60 (1270) | 0.79 (1672) | 1.15 (2434) | 0.29 (614) | 53 (1325) |
| 20 (6000) | 1.06 (2244) | 0.83 (1757) | 1.18 (2498) | 0.29 (614) | 59 (1475) | 20 (6000) | * 0.79 (1672) | 1.03 (2180) | 1.46 (3090) | 0.29 (614) | 53 (1325) |
| 25 (7500) | * 1.35 (2858) | 1.03 (2180) | 1.44 (2434) | 0.29 (614) | 59 (1475) | 25 (7500) | * 0.99 (2096) | 1.28 (2731) | 1.77 (3747) | 0.29 (614) | 53 (1325) |
### Earth Cover More Than 2' (610 mm)

Dimensions shown are span x rise x * Where noted, submit details for steel cover 1.5 inches (50 mm) at top of invert slab haunch, wall and slab thickness top slab shear reinforcement.

<table>
<thead>
<tr>
<th>H_e (FT)</th>
<th>Transverse Reinforcement Area, in 2/FT (mm²/m)</th>
<th>M (INCHES (mm))</th>
<th>H_e (FT)</th>
<th>Transverse Reinforcement Area, in 2/FT (mm²/m)</th>
<th>M (INCHES (mm))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>12' x 8' x 12&quot; (3600 x 2400 x 300 mm)</td>
<td></td>
<td></td>
<td>12' x 11' x 12&quot; (3600 x 3300 x 300 mm)</td>
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<tr>
<td>3</td>
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<td>0.58 (1228)</td>
<td>0.76 (1609)</td>
<td>0.29 (614)</td>
<td>66 (1650)</td>
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<tr>
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<td>59 (1475)</td>
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<td>12' x 12' x 12&quot; (3600 x 3600 x 300 mm)</td>
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<td>12' x 10' x 12&quot; (3600 x 3000 x 300 mm)</td>
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<td>RISE, FEET (mm)</td>
<td>TOP INCHES (mm)</td>
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SHALLOW COVER BOXES - COVER 0' TO 2' (0 TO 600 mm)
STEEL COVER 2.5 INCHES (63 mm) AT TOP OF INVERT SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

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SHEET 34 OF 42
<table>
<thead>
<tr>
<th>SPAN, S (mm)</th>
<th>RISE, R (mm)</th>
<th>T1 TOP INCHES (mm)</th>
<th>T2 BOTTOM INCHES (mm)</th>
<th>T3 SIDE INCHES (mm)</th>
<th>H0 HAUNCH INCHES (mm)</th>
<th>TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)</th>
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</thead>
<tbody>
<tr>
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<td>8 (2400)</td>
<td>9 (225)</td>
<td>9 (225)</td>
<td>9 (225)</td>
<td>9 (225)</td>
<td>0.23 (487) 0.60 (1270) 0.54 (1143) 0.22 (466) 0.28 (593) 0.22 (466) 0.22 (466)</td>
</tr>
<tr>
<td>9 (2700)</td>
<td>9 (2700)</td>
<td>9 (225)</td>
<td>9 (225)</td>
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<td>6' x 3' x 7' (1800 x 900 x 175 mm)</td>
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<td>0.18 (381) 0.33 (669) 0.39 (826) 0.14 (296) 45 (1125)</td>
<td>3 (915) 0.22 (466) 0.33 (669) 0.36 (762) 0.17 (360) 43 (1075)</td>
<td>0.16 (339) 0.35 (741) 0.43 (910) 0.14 (296) 45 (1125)</td>
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<td>0.24 (508) 0.30 (635) 0.32 (677) 0.17 (360) 43 (1075)</td>
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**Notes:**
- *Where noted, submit details for steel cover 25 inches (63 mm) at top of invert slab.
- Haunch, wall, and slab thickness.
- Top slab shear reinforcement.
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<th>( \text{TRANSVERSE REINFORCEMENT} )</th>
<th>( M )</th>
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Note: All dimensions are shown in ft x ft x in (mm x mm x mm).
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<th>H_e (m)</th>
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SECTION 4

Street Lighting and Traffic Signals
POWER POLE

3" (75 mm) SCHEDULE 40 GALVANIZED STEEL ELECTRICAL CONDUIT

6'-0" (1800 mm) MIN
10'-0" (3000 mm) MAX

OF PULL BOX

No. 5 CONCRETE PULL BOX WITH "120V ELECTRIC" CAST IN COVER

24" (600 mm) EXPANSION LOOP, EA WIRE

POWER FEED (WIRE BY OTHERS)

COPPER BONDING STRAP

CRUSHED ROCK SUMP PER SPPWC 405

SWEEP ELLS

SCHEDULE 40 GALVANIZED STEEL ELECTRICAL CONDUIT TO SERVICE CABINET PER SPPWC 403.

NOTES:

1. AREA AROUND BOX MAY BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.

2. TOP OF BOX:
   - AT GRADE FOR HARD SURFACE
   - 1/2" (12 mm) ABOVE GRADE FOR LAWN
   - 1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS

3. CRUSHED ROCK SHALL COVER ELECTRICAL BOX SIDE OPENINGS TO PREVENT SOIL ENTRY.

4. WATERPROOF CONNECTORS SHALL BE SUBJECT TO ENGINEER'S APPROVAL.

5. IF PLASTIC CONDUIT IS ALLOWED FROM PULL BOX TO SERVICE CABINET, INSTALL 5/8" x 9' (16 x 2700 mm) COPPER GROUND ROD IN PULL BOX.

UNDERGROUND SERVICE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

ELECTRICAL SERVICE

STANDARD PLAN

REV. 2009
COVER (NOT SHOWN) SHALL BE CAPTIVE DROP HINGED TO HOLD COVER IN EITHER CLOSED OR OPEN (90°) POSITION.

CIRCUIT BREAKERS

GROUND BUS

SERVICE CABINET DETAIL

METER CABINET
4 1/2"x10"x20"
(115 x 254 x 508 mm)

1 1/2" (38 mm)
CONDUIT w/ RAIN TIGHT FITTINGS

SERVICE CABINET
4 1/2"x10"x18" MIN
(115 x 255 x 455 mm) MIN
TOP HINGED COVER

TOP
1/8"x1"
(3.2 x 25 mm)
GALV STRAP

1/4"x1"
(6 x 25 mm)
LAG BOLTS

SIDE

OVERHEAD SERVICE CABINET MOUNTING

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

ELECTRICAL SERVICE

STANDARD PLAN
401-1

SHEET 2 OF 2
NOTES (ALL TYPES)

1. CABINET SHALL BE FABRICATED FROM 1/8" (3.2 mm) ALUMINUM SHEET, FACTORY WIRED, COMPLYING WITH NEMA 3R AND 12, RAIN AND DUST TIGHT, ELECTRICALLY WELDED AND REINFORCED.
2. NUTS, BOLTS, SCREWS AND HINGES SHALL BE STAINLESS STEEL.
3. NUTS, BOLTS AND SCREWS SHALL NOT BE Visible FROM OUTSIDE ENCLOSURE.
4. PROVIDE PHENOLIC NAMEPLATE AS REQUIRED.
5. MARK CONTROL WIRING AT BOTH ENDS WITH PERMANENT WIRE MARKERS.
6. ATTACH PLASTIC-COVERED WIRING DIAGRAM TO INSIDE FRONT DOOR.
7. COATING SYSTEM PREPARATION PROCESS SHALL BE 5 STEP USING DIP TANK:
   A. ALKALINE CLEANER, 70°C
   B. CLEAR WATER RINSE
   C. IRON PHOSPHATE APPLICATION, 65°C.
   D. CLEAR WATER RINSE
   E. INHIBITIVE RINSE TO SEAL PHOSPHATED SURFACES, 50°C.
8. FINISH WITH ELECTROSTATICALLY APPLIED DRY POLYESTER POWDER COATING. CURE AT 195°C. COLOR SHALL BE MINT GREEN.

TYPE 1

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

SERVICE CABINET

STANDARD PLAN

403-1

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 6
SERVICES CABINET

- 6"x6" (150 x 150 mm) LEXAN VIEWING WINDOW
- HANDLE
- CIRCUIT BREAKERS INSIDE
- TRANSFER SWITCH INSIDE
- TEST SWITCH INSIDE
- GENERATOR INLET
- PCC FOUNDATION
- SERVICE CONDUIT
- LOAD CONDUIT
- CU GROUND ROD 5/8" x 8' (16x2400 mm)
- METER SOCKET #14 STRANDED CU
- #2 THHN STRANDED CU
- LANDING LUGS
- SERVICE 120/240V 1 PHASE, 3 WIRE
- GROUND
- AUTO TEST
- LIGHTING #1 C1 I.S.N.S.
- (SPARE)
- (SPARE)
- (SPARE)
- (SPARE)
- TRAFFIC SIGNAL
- OFF TRANSFER SWITCH, 55A
- EXTERNAL PHOTOCELL MOUNT ON SAFETY LIGHT OR FIRST FIXTURE

SECTION A-A

HASP OR LOCK AS REQUIRED

OTHERS

CUSTOMER DISTRIBUTION SECTION

DOOR

CIRCUIT BREAKERS

HANDLE

REMovable PANEL

LANDING LUGS

METER PERCH (METER BY OTHERS)

Hinged COVER

TRANSFER SWITCH INSIDE BREAKERS REQUIRED TEST SWITCH INSIDE REMOVABLE CUSTOMER PANEL DISTRIBUTION INLET SECTION

PCC FOUNDATION

FRONT

SERVICE CONDUIT LOAD CONDUIT

CIRCUIT DISCONNECT

GROUND

GENERATOR INLET, NEMA LS-30R

OFF

TRANSER SWITCH, 55A

SERVICE 120/240V 1 PHASE, 3 WIRE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

SERVICE CABINET

403-1

SHEET 3 OF 6
6"x6" (150 x 150 mm) LEXAN VIEWING WINDOW
HANDLE

CIRCUIT BREAKERS INSIDE
TEST SWITCH INSIDE

PCC FOUNDATION
SERVICE CONDUIT
LOAD CONDUIT
CU GROUND ROD
5/8"x8' (16x2400 mm)

HASP OR LOCK AS REQUIRED

METER PERCH (METER BY OTHERS)
LANDING LUGS

HANDLE
REMOVABLE PANEL
CUSTOMER DISTRIBUTION SECTION

SECTION A-A

EXTERNAL PHOTOCCELL MOUNT ON SAFETY LIGHT OR FIRST FIXTURE

#2 THHN STRANDED CU
#1 STRANDED CU

LANDING LUGS

SERVICE 120/240V 3 PHASE, 4 WIRE

30A/3 POLE SERVICE DISCONNECT

GROUND

TYPE 5
SEE TYPE 1 FOR NOTES AND DIMENSIONS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

SERVICE CABINET

STANDARD PLAN

403-1

SHEET 5 OF 6
LIFT SLOT IDENTIFICATION:

- "TRAFFIC SIGNAL" - TRAFFIC SIGNAL CIRCUITS, INCLUDING THOSE WITH STREET OR SIGN LIGHTING.
- "STREET LIGHTING" - CIRCUITS LESS THAN 600V.
- "STREET LIGHTING - HIGH VOLTAGE" - 600V OR MORE.
- "SPRINKLER CONTROL" - CIRCUITS LESS THAN 50V.

NOTE: STREET LIGHTING BALLASTS ARE REQUIRED.

BOXES SHALL BE PCC AND COVERS SHALL BE NON-BOLTDOWN TYPE UNLESS OTHERWISE NOTED.

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<th>COVER (mm)</th>
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<td>A</td>
<td>B</td>
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<td>6</td>
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<td>31 1/2&quot;</td>
<td>18 5/8&quot;</td>
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PCC APRON, 3" (75 mm) THICK AROUND PULL BOX. OMIT IF PULL BOX CONSTRUCTED WITHIN SIDEWALK.

STREET LIGHT PULL BOX INSTALLATION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PULL BOXES

STANDARD PLAN

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE REV 2009

405-1 SHEET 1 OF 2
TRAFFIC SIGNAL PULL BOX INSTALLATION

CRUSHED ROCK PER STREET LIGHT PULL BOX INSTALLATION

GROUTED BOTTOM w/ DRAIN HOLE

COVER ENTRIES w/ CRUSHED ROCK

CONDUIT

MACHINE SCREWS

SLOT 7/8" x 2 1/2" (22 x 60 mm)

ATTACH STL PLATE TO PCC COVER WITH 2 BRASS MACHINE SCREWS, 1/4" (6 mm) 20 NC-2 FLAT HEAD, IN 1 1/4" (32 mm) HOLES w/ EXPANSION SHIELDS

STEEL COVER INSTALLATION

CRUSHED ROCK PER STREET LIGHT PULL BOX INSTALLATION

NEW CONDUIT

CRUSHED ROCK PER STREET LIGHT PULL BOX INSTALLATION

90° PVC OR RIGID STEEL EXISTING CONDUIT

SIZE OF COUPLER AND NEW CONDUIT SHALL BE SAME AS EXISTING CONDUIT

STREET LIGHT CONDUIT INTERCEPT

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PULL BOXES

STANDARD PLAN 405-1
STREET LIGHTING WINDOW SPLICE CONNECTORS

NOTES:
1. WATERPROOF COATING SHALL BE SUBJECT TO ENGINEER'S APPROVAL.
2. WIRE NUTS SHALL NOT BE USED FOR STREET LIGHTING SPLICES.

FUSE SIZE FOR HIGH PRESSURE SODIUM LAMPS SHALL BE 15 A.
TRAFFIC SIGNAL CONDUCTOR SPLICE

CONDUCTORS - 5 TWISTS, MIN
SOLDER
WIRE NUT
VINYL CHLORIDE ELECTRICAL INSULATING TAPE
WATERPROOF COATING

TRAFFIC SIGNAL CONDUCTOR SPLICE

CONDUIT

STRUCTURAL EXPANSION JOINT

PACKING

REAM

PCC STRUCTURE

STRAP LOOP PLACE AGAINST CONCRETE FIRST POURED

NO. 8 GAGE CU BONDING STRAP

TYPE A

1/4" (6 mm) SPONGE RUBBER

4" (100 mm)

6" (150 mm)

4"

REUMER

STRAP LOOP PLACE AGAINST CONCRETE FIRST POURED

PCC STRUCTURE

TYPE B

CONDUIT EXPANSION ASSEMBLY

NOMINAL SIZES

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot; (25 mm)</td>
<td>2&quot; (50 mm)</td>
</tr>
<tr>
<td>1 1/2&quot; (40 mm)</td>
<td>2 1/2&quot; (65 mm)</td>
</tr>
<tr>
<td>2 1/2&quot; (65 mm)</td>
<td>3 1/2&quot; (90 mm)</td>
</tr>
</tbody>
</table>

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

WIRING SERVICE DETAILS

STANDARD PLAN

408-1

SHEET 2 OF 2
SECOND ARM WHEN SPECIFIED

- 2.375" (60 mm) PIPE (O.D.)
- 11 GA (3.04 mm) GALV STEEL

SIMPLEX ATTACHMENT w/ 1/2"x3/4" (13x19 mm) BOLT

SECTION THRU SHAFT

- 11 1/2" (242 mm) SQUARE
- 9.5" TO 11.5" (241 TO 292 mm) BOLT CIRCLE
- R=11/16" (17 mm)
- R=1.5" (38 mm)
- 1" (25 mm) THICK STL PLATE

- HANDHOLE 4"x6 1/2" (100 x 165 mm) MIN
- SEE NOTE 3

- 3/16" (5 mm)
- 1/8" (3 mm)
- 3/16" (5 mm)
- 8" (200 mm)

- BOLT COVER
- 4" (100 mm) GROUT CAP

- 2" (50 mm) DRAIN HOLE
- GALV STL ANCHOR BOLTS 36" x 4" x 1" DIA (915 x 100 x 25 mm DIA)

- 36" (915 mm)
- 32" (815 mm) SQUARE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STEEL LIGHTING STANDARD
TYPE 10

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
2005
REV. 2009

STANDARD PLAN
429-1

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
<table>
<thead>
<tr>
<th>TYPE</th>
<th>H</th>
<th>SHAFT SIZE</th>
<th>4' (1220 mm) ARM(S)</th>
<th>8' (2440 mm) ARM(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10−A</td>
<td>26′−0&quot;</td>
<td>3.8&quot;x 7.5&quot;</td>
<td>27′−0&quot; (8200 mm)</td>
<td>28′6&quot; (8690 mm)</td>
</tr>
<tr>
<td></td>
<td>(7920 mm)</td>
<td>(97 x 191 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10−B</td>
<td>28′−0&quot;</td>
<td>3.8&quot;x7.8&quot;</td>
<td>29′−0&quot; (8800 mm)</td>
<td>30′-6&quot; (9300 mm)</td>
</tr>
<tr>
<td></td>
<td>(8530 mm)</td>
<td>(97 x 198 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10−C</td>
<td>30′-0&quot;</td>
<td>3.8&quot;x8.0&quot;</td>
<td>31′-0&quot; (9400 mm)</td>
<td>32′-6&quot; (9910 mm)</td>
</tr>
<tr>
<td></td>
<td>(9140 mm)</td>
<td>(97 x 203 mm)</td>
<td></td>
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</tr>
</tbody>
</table>

**MAST ARM RADIUS RISE**

<table>
<thead>
<tr>
<th>MAST ARM</th>
<th>RADIUS</th>
<th>RISE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4' (1220 mm)</td>
<td>4′8&quot; (1420 mm)</td>
<td>18&quot; (460 mm)</td>
</tr>
<tr>
<td>8' (2440 mm)</td>
<td>10′6&quot; (3200 mm)</td>
<td>36&quot; (915 mm)</td>
</tr>
</tbody>
</table>

**NOTES:**

1. FOR STANDARDS WITH TWO ARMS OR WITH 8' (2440 mm) ARMS, FOUNDATION SHALL BE 4′ (1220 mm) DEEP WITH 1 1/8"x 40"x 4" (29 x 1020 x 102 mm) GALVANIZED STEEL ANCHOR BOLTS.

2. BOND ANCHOR BOLTS TO STEEL CONDUIT OR GROUND WIRE AS REQUIRED.

3. FURNISH HANDHOLE WITH ALUMINUM TAMPER-RESISTANT DOOR. INSTALL STANDARD SO THAT DOOR FACES AWAY FROM ONCOMING TRAFFIC.

4. POLE SHAFT SHALL BE CONSTRUCTED TO WITHSTAND LOADING AS SPECIFIED IN THE LATEST EDITION OF AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS. LOADING FROM LUMINAIRE ARM AND LUMINAIRE SHALL BE INCLUDED.
POLE SHAFT SHALL BE CONSTRUCTED TO WITHSTAND LOADING SPECIFIED IN THE LATEST EDITION OF AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRE, AND TRAFFIC SIGNALS. LOADING FROM LUMINAIRE ARM AND LUMINAIRE SHALL BE INCLUDED.
TOP ANCHOR BOLTS EQUALLY SPACED
3 3/4" (95 mm) DIA BOLT CIRCLE
(4 TOTAL)

SECTION THRU SHAFT

1 1/2" (40 mm) DIA NOMINAL

18" (460 mm) DIA

1" (25 mm) THICK ANCHOR LUG OR STL PLATE
w/ 1 1/4" (30 mm) DIA BOLT HOLE

14 7/8" (378 mm) SQUARE

2 1/2" (65 mm) TYP

21" (535 mm) DIA BOLT CIRCLE

CORED HOLE
4 1/2" x 6 1/4" x 14 1/2"
(114 DIA x 160 DIA x 370 mm)

HANDHOLE 3" x 6 3/4"
(75 x 170 mm) MIN
w/ ALUMINUM TAMPER-
RESISTANT DOOR. DOOR
SHALL FACE AWAY FROM
ONCOMING TRAFFIC.

2" (50 mm) DRAIN HOLE

4" (100 mm) GROUT CAP

GALV STL ANCHOR BOLTS
36" x 4" x 1" DIA C-2
(915 x 100 x 25 mm DIA)
48" x 6" x 1" DIA C-2-T
(1220 x 150 x 25 mm DIA)
(4 TOTAL)

POLE SHAFT SHALL BE CONSTRUCTED TO WITHSTAND LOADING AS SPECIFIED IN
THE LATEST EDITION OF AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL
SUPPORTS FOR HIGHWAY SIGNS, LUMINAires, AND TRAFFIC SIGNALS. LOADING
FROM LUMINAIRE ARM AND LUMINAIRE SHALL BE INCLUDED.

TYPE C-2-T IS THE SAME AS TYPE C-2, EXCEPT EQUIPPED WITH
TRAFFIC SIGNAL MAST ARM AND SIGNAL.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CONCRETE LIGHTING STANDARD
TYPE C-2

STANDARD PLAN
431-1

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
TOP ANCHOR BOLTS EQUALLY SPACED
3 1/8" (80 mm) DIA
BOLT CIRCLE
(4 TOTAL)

SECTION THRU SHAFT

1 1/2" (40 mm) DIA NOMINAL

11 1/2 DIA ±1/4"
(290 DIA ±5 mm)

1" (25 mm) THICK
ANCHOR LUG OR STL PLATE
w/ 1 1/4" (30 mm) DIA
BOLT HOLE

14" (356 mm) DIA
BOLT CIRCLE

9 7/8" (250 mm)
SQUARE

2 1/2" (65 mm)
TYP.

16 1/2" ±1 1/2"
(420 ±40 mm)

2" (50 mm) DRAIN HOLE

GALV STL ANCHOR BOLTS
36" x 4" x 1" DIA
(915 x 100 x 25 mm)
(4 TOTAL)

4" (100 mm)
GROUT CAP

1 1/2" (40 mm) DIA
BOLT HOLE

4 1/2" x 6 1/4" DIA x 14 1/2"
(114 DIA x 160 DIA x 370 mm)

CORED HOLE

HANDHOLE 3" x 6 3/4"
(75 x 170 mm) MIN
w/ ALUMINUM TAMPER-
RESISTANT DOOR. DOOR
SHALL FACE AWAY FROM
ONCOMING TRAFFIC.

9 7/8" (250 mm)
SQUARE

2 1/2" (65 mm)
TYP.

36" (915 mm)
SQUARE OR ROUND

POLE HEIGHT

SHAFT SIZE (ROUND)

POLE SHAFT SHALL BE CONSTRUCTED TO WITHSTAND
LOADING SPECIFIED IN THE LATEST EDITION OF AASHTO
STANDARD SPECIFICATION FOR STRUCTURAL SUPPORTS
FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS.
LOADING FROM LUMINAIRE ARM AND LUMINAIRE SHALL
BE INCLUDED.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SHAFT SIZE</th>
<th>POLE HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-4-A</td>
<td>8 1/4&quot; x 5&quot; x 23'-1&quot;</td>
<td>24'-7&quot; (7,490 mm)</td>
</tr>
<tr>
<td></td>
<td>(210 x 125 x 7,030 mm)</td>
<td></td>
</tr>
<tr>
<td>C-4-B</td>
<td>8 1/2&quot; x 5&quot; x 25'-1&quot;</td>
<td>26'-7&quot; (8,100 mm)</td>
</tr>
<tr>
<td></td>
<td>(220 x 125 x 7,640 mm)</td>
<td></td>
</tr>
</tbody>
</table>

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CONCRETE LIGHTING STANDARD
TYPE C-4

STANDARD PLAN

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
2005
REV. 2009

432-1

SHEET 1 OF 1

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
POLE SHAFT SHALL BE CONSTRUCTED TO WITHSTAND LOADING SPECIFIED IN THE LATEST EDITION OF AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS. LOADING RESULTING FROM LUMINAIRE ARM AND LUMINAIRE SHALL BE INCLUDED.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SHAFT SIZE</th>
<th>POLE HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-6-A</td>
<td>6 1/2&quot; x 5 1/4&quot; x 8'-10 1/2&quot;</td>
<td>10'-2 1/2&quot;</td>
</tr>
<tr>
<td></td>
<td>(165 x 135 x 2,710 mm)</td>
<td>(3,110 mm)</td>
</tr>
<tr>
<td>C-6-B</td>
<td>6 1/2&quot; x 5&quot; x 10'-10 1/2&quot;</td>
<td>12'-2 1/2&quot;</td>
</tr>
<tr>
<td></td>
<td>(165 x 125 x 3,320 mm)</td>
<td>(3,720 mm)</td>
</tr>
<tr>
<td>C-6-C</td>
<td>6 1/2&quot; x 4 5/8&quot; x 13'-1 1/2&quot;</td>
<td>14'-5 1/2&quot;</td>
</tr>
<tr>
<td></td>
<td>(165 x 120 x 4,000 mm)</td>
<td>(4,410 mm)</td>
</tr>
<tr>
<td>C-6-D</td>
<td>6 1/2&quot; x 5&quot; x 14'-1 3/8&quot;</td>
<td>15'-7 7/8&quot;</td>
</tr>
<tr>
<td></td>
<td>(165 x 125 x 4,300 mm)</td>
<td>(4,770 mm)</td>
</tr>
<tr>
<td>MAST ARM TYPE</td>
<td>LIGHT STANDARD</td>
<td>POLE MOUNTING HEIGHT</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>ALUMINUM POLE TOP</td>
<td>TYPE A</td>
<td>26'-3&quot; (8,000 mm)</td>
</tr>
<tr>
<td></td>
<td>TYPE B, C &amp; D</td>
<td>31'-3&quot; (9,525 mm)</td>
</tr>
<tr>
<td>ALUMINUM POLE CAP</td>
<td>TYPE A</td>
<td>26'-3&quot; (8,000 mm)</td>
</tr>
<tr>
<td></td>
<td>TYPE B, C &amp; D</td>
<td>31'-3&quot; (9,525 mm)</td>
</tr>
<tr>
<td>ALUMINUM POLE CAP</td>
<td>TYPE F</td>
<td>24'-7&quot; (7,500 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TYPE C &amp; D</td>
<td>31'-3&quot; (9,525 mm)</td>
</tr>
</tbody>
</table>

### Detail A

- **Arm Length**: 4' (1220 mm), 6' (1830 mm), 8' (2440 mm)
- **Rise**: 24" (610 mm), 32" (815 mm), 42" (1070 mm)
- **Dimensions**:
  - Arm Length: 5" (125 mm) O.D.
  - Rise: 5 1/4" ± 1/4" (133 ± 6 mm)

### Detail B

- **Pole Diameter, D**: 5" (125 mm), 6" (150 mm)
- **Y**: 4 1/4" ± 1/4" (108 ± 6 mm), 6" ± 1/4" (152 ± 6 mm)
Controller Cabinet Type 170

(A) Power Supply
(B) Controller Unit
(C) Input File #1
(D) Input File #J
(E) Power Distr Ass'y
(F) Output File
(G) Fan Area
(H) Fan Exhaust Vent
(I) Vent Louvers
(J) Hinges

See cabinet notes, Sheet 2

Section A-A

Front Door Removed

Section B-B

See detail D, Sheet 2

Section C-C

0.0625" (2 mm) Max Clearance

Standard Plans for Public Works Construction

Promulgated by the Public Works Standards Inc.
Greenbook Committee
2006 Rev. 2009

Use with Standard Specifications for Public Works Construction

Controller Cabinet Type 170

452-1

Sheet 1 of 2
CABINET NOTES:

1. FAN EXHAUST VENT: SCREENED, VANDAL RESISTANT, 36 SQ IN (0.023 m²) MIN OPENING.
2. VENTILATION LOUVERS SHALL HAVE METAL AIR FILTERS AND 36 SQ IN (0.023 m²) MIN OPENING.
3. HINGES SHALL BE STAINLESS STEEL BUTT-TYPE OR SHALL BE CONTINUOUS.
4. SECTION (A), POWER SUPPLY, MAY BE COMBINED WITH SECTION (E), POWER DISTRIBUTION ASSEMBLY.

FOUNDATION DETAILS
For Model 332 and 334 cabinets
(Type 1 housing)
TAPERED STEEL POST
0.1196" (3.04 mm)
WALL THICKNESS,
5" (127 mm) ID AT BASE

SEE DETAIL J

1/2" (12 mm)
BASE PLATE

ANCHOR BOLTS
3/4"x18"x2" (19 x 460 x 50 mm)
4 TOTAL

TYPE 1-A

SEE SPPWC 101

3" x5" (76 x 127 mm)
HANDHOLE AND COVER

4 NPS GALV STEEL
PIPE OR CONDUIT,
THREADED BOTH ENDS

SEE SPPWC 101

1/2" (12 mm)
BASE PLATE

ANCHOR BOLTS
5/8"x18"x2" (16 x 460 x 50 mm)
4 TOTAL

TYPE 1-B

SEE DETAIL J

1 1/4" (31.8 mm)
OD AT BASE

3" x5" (76 x 127 mm)
HANDHOLE AND COVER

1/2" (12 mm)
BASE PLATE

ANCHOR BOLTS
1"x18"x3" (25 x 460 x 75 mm)
9 1/2" (240 mm) BOLT CIRCLE
4 TOTAL

TYPE 1-D

SEE DETAIL J

4 1/2" (114 mm)

4 NPS STD PIPE
SEE DETAIL J

TAPERED STEEL POST
.01196" (3.04 mm)
WALL THICKNESS,
5 1/4" (133 mm) OD AT BASE

3" x5" (76 x 127 mm)
HANDHOLE AND COVER

SEE SPPWC 101

1/2" (12 mm)
BASE PLATE

ANCHOR BOLTS
1 1/2" (38 mm)
(100 mm)
4 TOTAL

TYPE 1-C

SEE DETAIL J

4 1/2" (114 mm)

4 NPS STD PIPE
SEE DETAIL J

TAPERED STEEL POST
.01196" (3.04 mm)
WALL THICKNESS,
5 1/4" (133 mm) OD AT BASE

3" x5" (76 x 127 mm)
HANDHOLE AND COVER

SEE SPPWC 101

1/2" (12 mm)
BASE PLATE

ANCHOR BOLTS
1"x18"x3" (25 x 460 x 75 mm)
9 1/2" (240 mm) BOLT CIRCLE
4 TOTAL

TYPE 1-D

SEE DETAIL J

4 1/2" (114 mm)
TACK 4 PLACES AT 90°

BEVEL TUBE AND WELD

STANDARD PIPE

1/4" (5 mm)

DETAIL J

TUBE MAY BE INSERTED INTO PIPE OR BUTTED AS APPROVED

HANDHOLE REINFORCED WITH RING WELDED TO OUTSIDE OF POLE & 1/8" (3 mm) COVER PLATE

PLACE MORTAR AFTER PLUMBING STANDARD. SLOPE 45° TO 90°.

2" TO 3" (50 TO 75 mm)

ASTM A307 GALVANIZED ANCHOR BOLTS, 4 TOTAL SIZE OF ANCHOR BOLTS SHOWN AS "a x b x c"

HANDHOLE AND ANCHORAGE

HANDHOLE REINFORCEMENT RING

ALLEN SOCKET FLAT HEAD CAP SCREW, 5/16" (8 mm) DIA, INSET WITH COVER. ALLEN WRENCH SIZE 3/16" (4.8 mm).

TAPPED HOLE

STEEL STRAP

SCREWS ARE STAINLESS STEEL.

ALTERNATE DETAIL

TAMPER RESISTANT HANDHOLE COVER

NOTES:

1. TYPE 1 STANDARDS SHALL BE 10' (3.05 m) LONG FOR VEHICLE SIGNALS AND 7' (2.13 m) LONG FOR PEDESTRIAN SIGNALS. LENGTHS ARE ± 2" (0.05 m).

2. TOP OF TYPE 1 STANDARDS SHALL BE 4 1/2" (114 mm) OD.

3. CONDUITS SHALL EXTEND 2" (50 mm) MAXIMUM ABOVE FINISHED SURFACE OF FOUNDATION AND FOR TYPES 1-A AND 1-D SHALL BE SLOPED TOWARD MANHOLE.

4. ANCHOR BOLTS SHALL BE BONDED TO CONDUIT OR GROUNDING CONDUCTOR.

5. CONDUIT BETWEEN STANDARD AND ADJACENT PULL BOX SHALL BE 2" (50 mm) MINIMUM.
**ELEVATION**


SEE SHEET 3 FOR OTHER DIMENSIONS

<table>
<thead>
<tr>
<th>SIGNAL ARM:</th>
<th>DESIGN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>18' (4.9 m)</td>
</tr>
<tr>
<td>THICK</td>
<td>0.180&quot; (4.55 mm)</td>
</tr>
<tr>
<td>I BOLT CIRCLE</td>
<td>12&quot; (305 mm)</td>
</tr>
<tr>
<td>HS CAP SCREWS</td>
<td>32-7NC-76</td>
</tr>
<tr>
<td>J PLATE SIZE</td>
<td>12&quot; (305 mm)</td>
</tr>
<tr>
<td>K ARM PLATE THICK</td>
<td>1.25&quot; (32 mm)</td>
</tr>
<tr>
<td>L POLE PLATE THICK</td>
<td>1.50&quot; (38 mm)</td>
</tr>
<tr>
<td>θ</td>
<td>23°</td>
</tr>
<tr>
<td>X MAX</td>
<td>10'-6&quot; (3.2 m)</td>
</tr>
<tr>
<td>LUMINAIRE ARM:</td>
<td>THICKNESS 3.04 mm (0.1196&quot;)</td>
</tr>
</tbody>
</table>
LUMINAIRE ARM CONNECTION

DETAIL W

SECTION A-A

ELEVATION

SIGNAL ARM CONNECTION DETAILS

BASE PLATE

16-11NC-45 HS CAP SCREW, 3 TOTAL TAP POLE PLATE.

CHASED EDGES FOR ELECTRICAL CONDUCTORS

1/4" (7 mm) GUSSET PLATES TOP, BOTTOM AND SIDES

1" (25 mm) POLE PLATE

3/4" (19 mm) ARM PLATE

HS HEX HEAD CAP SCREWS, 4 TOTAL TAP POLE PLATE

2 1/4" (60 mm) DIA HOLE w/ CHASED EDGES FOR ELECTRICAL CONDUCTORS

DETAIL F, SHEET 7

TYP 1/4" (7 mm)

BOLT HOLE = BOLT DIA + 1/4" (6 mm)

AXIS OF ARM

GALVANIZED DRAIN HOLES, 2 BOTH SIDES

2 NPS PIPE

1/4" (7 mm) PLATE - TOP, BOTTOM & SIDES

CHASED EDGES

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

SIGNAL STANDARDS

STANDARD PLAN

453-1

SHEET 5 OF 8
ELEVATION B

USE THIS DETAIL FOR 2-PLY POLES

TABLE A

<table>
<thead>
<tr>
<th>WALL THICKNESS</th>
<th>WELD SIZE</th>
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<tbody>
<tr>
<td>0.1196&quot; (3.04)</td>
<td>1/8&quot; (4)</td>
</tr>
<tr>
<td>0.1793&quot; (4.55)</td>
<td>5/16&quot; (8)</td>
</tr>
<tr>
<td>0.2391&quot; (6.07)</td>
<td>7/32&quot; (10)</td>
</tr>
<tr>
<td>0.3125&quot; (7.94)</td>
<td>7/16&quot; (11)</td>
</tr>
</tbody>
</table>

TABLE B

<table>
<thead>
<tr>
<th>WALL THICKNESS</th>
<th>WELD SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1196&quot; (3.04)</td>
<td>1/8&quot; (4)</td>
</tr>
<tr>
<td>0.1793&quot; (4.55)</td>
<td>3/16&quot; (5)</td>
</tr>
<tr>
<td>0.2391&quot; (6.07)</td>
<td>1/4&quot; (7)</td>
</tr>
<tr>
<td>0.3125&quot; (7.94)</td>
<td>5/16&quot; (7)</td>
</tr>
</tbody>
</table>

PLAN

DETAIL B

ALTERNATIVE BASE PLATE DETAILS

CAST-IN-DRILLED HOLE PILE FOUNDATION

REINFORCED PILE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

SIGNAL STANDARDS

STANDARD PLAN

453-1

SHEET 6 OF 8
STEEL SLEEVE AT EACH WELDED JOINT

FOR UNIFORM TUBE THICKNESS

POLE SPLICES

2 NPS PIPE, CHASED FOR WIRE PROTECTION
SEE NOTE 2, SHEET 8

DETAIL TS - TIP TENON

2 NPS PIPE, CHASED FOR WIRE PROTECTION

DETAIL TL - TIP TENON

THIS DETAIL SUPERSEDES DETAIL S WHEN SO DESIGNATED

DETAIL S - SIDE TENON

PIPE TENONS

GALV BOLT

SIGNAL ARM

RATIENT CAP

SECTION A - A

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

SIGNAL STANDARDS

STANDARD PLAN

453-1

SHEET 7 OF 8
IDENTIFICATION NUMBER

ATTACH A STAMPED METAL TAG WITH EACH POLE'S IDENTIFICATION NUMBER TO SHAFT ABOVE HANDHOLE. NUMBER SHALL BE MINIMUM 1/4" (7 mm) HIGH. ATTACH SIMILAR TAG TO THE TOP OF THE SIGNAL MAST ARM NEAR THE POLE PLATE.

SAMPLE IDENTIFICATION NUMBER:

<table>
<thead>
<tr>
<th>TYPE</th>
<th>LOAD CASE</th>
<th>WIND VELOCITY</th>
<th>SIGNAL ARM LENGTH</th>
<th>CALTRANS STD PLAN YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>19A</td>
<td>3</td>
<td>129</td>
<td>91</td>
<td>99 - F</td>
</tr>
</tbody>
</table>

USE SL FOR SPECIAL LOAD CASE

SPECIFICATIONS


WIND LOADING: 129 km/h AASHTO

UNIT STRESSES, STRUCTURAL STEEL:

\[ f_y = 48 \text{ ksi (331 MPa)}, \text{TAPERED SHEET STEEL} \]

\[ f_y = 36 \text{ ksi (248 MPa)} \text{ UNLESS OTHERWISE NOTED} \]

CONSTRUCTION: STANDARD SPECIFICATIONS AND THE SPECIAL PROVISIONS

HIGH STRENGTH CAP SCREWS:

<table>
<thead>
<tr>
<th>SIZE, mm</th>
<th>THREADS PER INCH</th>
<th>LENGTH, mm</th>
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</thead>
<tbody>
<tr>
<td>16</td>
<td>11NC</td>
<td>45</td>
</tr>
</tbody>
</table>

NOTES

1. PROVIDE FOUR ASTM A-307 ANCHOR BOLTS FOR EACH POLE. PROVIDE A HEX NUT, LEVELLING NUT AND TWO WASHERS FOR EACH BOLT.

2. LUMINAIRE ARMS SHALL BE ROUND, TAPERED STEEL TUBES, TAPER OF 0.137° TO 0.140" PER FT (11.45 TO 11.66 mm/m) WITH AN END SECTION 2 3/8" (60 mm) OD FOR MOUNTING HARDWARE. EXTENSIONS OF 2 NPS PIPE 7" (178 mm) LONG MAY BE USED AT THE OPTION OF THE MANUFACTURER. WHEN LOW PRESSURE SODIUM LUMINAIRES ARE REQUIRED, THE EXTENSION SHALL BE 15" (381 mm).

3. SIGNAL ARMS SHALL BE ROUND, TAPERED STEEL TUBES, MAXIMUM TAPER 0.140" PER FT (11.66 mm/m).

4. HANDHOLE REINFORCEMENT RING SHALL BE 1/4"x2" (6 x 51 mm) FOR 0.1196" TO 0.2391" THICK POLES (3.04 TO 6.07 mm); 3/8"x2" (10 x 51 mm) FOR 0.3125" (7.94 mm) THICK POLES.

5. USE DETAIL F, SHEET 7, FATIGUE RESISTANT WELD, AT SIGNAL ARM PLATE AND POLE BASE PLATE.

6. IN LIEU OF THE TORQUE REQUIREMENTS FOR HS BOLTS, CAP SCREWS SHALL BE TIGHTENED BY THE TURN-OF-NUT METHOD 1/3 TURN FROM A SNUG, TIGHT CONDITION. NO WASHER IS REQUIRED.

7. DURING POLE ERECTION, RAKE THE POST AS NECESSARY WITH THE USE OF LEVELLING NUTS TO PRODUCE A PLUMB POLE AXIS.
SIDE SIGNAL MOUNTINGS

TOP SIGNAL MOUNTINGS

TYPICAL SIGNAL INSTALLATIONS

ABBREVIATIONS

TV TOP MOUNTED VEHICLE SIGNALS
SV SIDE MOUNTED VEHICLE SIGNALS
T TERMINAL COMPARTMENT
1,2 NUMBER OF SIGNAL FACES

NOTES

1. MOUNTINGS SHALL BE ORIENTED TO PROVIDE MAXIMUM HORIZONTAL CLEARANCE TO ADJACENT ROADWAY.
2. BRACKET ARMS SHALL BE LONG ENOUGH TO PERMIT PROPER ALIGNMENT OF SIGNALS AND BACKPLATE INSTALLATION.
3. SEE SPPWC 455 FOR ATTACHMENT FITTING DETAILS.
4. ALL ARROW INDICATIONS SHALL BE 12" (300 mm).
5. ALL PROGRAMMED VISIBILITY SIGNAL HEADS SHALL BE PROVIDED WITH BACKPLATES.
MAST SIGNAL MOUNTINGS

8" ± 1/2" (200 ± 13 mm) FOR 8" (200 mm) SECTIONS
5 1/2" ± 1/2" (140 ± 13 mm) FOR 12" (300 mm) SECTIONS

DRILL SIGNAL FACE AND ATTACH BACKPLATE WITH SIX 10-24 OR 10-32 SELF-TAPPING AND LOCKING STAINLESS STEEL MACHINE SCREWS AND FLAT WASHERS

2" ± 1/2" R (50 ± 12 mm)

8" (200 mm) AND 12" (300 mm) SECTIONS

BACKPLATE
1/16" (1.5 mm) MIN THICKNESS
3001-14 ALUMINUM, OR PLASTIC WHEN SPECIFIED
SIDE MOUNTINGS

TOP MOUNTINGS

PEDESTRIAN SIGNALS AND MOUNTINGS

NOTE: "CLAM SHELL" MOUNTINGS ARE ALSO ACCEPTABLE.

PEDESTRIAN SIGNAL FACE

SYMBOL TYPE
2 3/4" 1/2" (13 mm) STANDARD
70 mm GALV STL BOLT
3 4"
~20 mm 1/2° (13 mm) ~ ~ 5 16"~~2 LOCK WASHER
8 mm(12 mm
~ ~ 4~~ i FLAT WASHER
(32 mm) WASHERS— 1 1/2" (38 mm) NPS
~ SEE DETAIL C PIPE THREAD
A ~~ A' 1/2° (13 mm) NUT
SIGNAL STANDARD
BRONZE WASHER CURVED 'oo E N E
TO FIT STANDARD
WASHER DETAIL C
5° SERRATIONS
3/16° (5 mm) PIN
BRASS RING TO MATCH FLANGE ON
SIGNAL HOUSING OR FITTING
LOCK RING
USE WHERE LOCKING RING IS NOT INTEGRAL
WITH SIGNAL HOUSING OR FITTING.
SPECIAL 90° ELBOW
ONE FOR EACH FACE, EXCEPT THOSE
WITH SPECIAL SLIP FITTER MOUNTING

POLE PLATE
FOR SIDE MOUNTINGS

CURVED TO
FIT STANDARD

SECTION A-A

SECTION B-B

HOLE SHALL BE
OFFSET WHEN
BACKPLATE IS
REQUIRED

ONE-WAY MOUNTING
MULTIPLE MOUNTINGS

TOP MOUNTINGS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
2005
REV. 2006

SIGNAL FITTINGS

STANDARD PLAN
455-1

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
**TOP MOUNTING**

- **SLIP FITTER**: 4 1/2" (115 mm)
- **TWO ROWS OF 3 SET SCREWS**

**SIDE MOUNTING**

- **SLIP FITTER**: 3 1/2" (90 mm)
- **CABLE GUIDE**

**TERMINAL COMPARTMENTS**

- **5" SERRATIONS**
- **3 CADMIUM PLATED STEEL SET SCREWS**
- **3/8" (10 mm) BOLT THROUGH MAST ARM**. SEE NOTE 1.
- **CABLE GUIDE**
- **STOP**
- **SEAL OPENING WITH MASTIC**. SEE NOTE 1(A).
- **MAST ARM OR PIPE TENON**
- **LOCK RING. SEAL WITH GASKET OR SEALING COMPOUND**.
- **SHAKE-PROOF LOCK WASHER**
- **RUBBER WASHER**

**MAST ARM MOUNTING — TYPE "MAT"**

For 2" (50 mm) NPS pipe, see Note 1.

**NOTES**

1. AFTER MAST ARM SIGNAL HAS BEEN PLUMBED AND SECURED, DRILL 7/16" (11 mm) HOLE THROUGH MAST ARM TENON IN LINE WITH SLIP FITTER HOLE. PLACE A 3/8" (10 mm) GALVANIZED BOLT WITH WASHER UNDER BOLT HEAD THROUGH HOLE AND SECURE WITH WASHER, NUT, AND LOCKNUT.

(A) SEAL OPENINGS BETWEEN MAS, MAT OR MAS—5 MOUNTINGS AND MAST ARM.

2. (A) THREADED TOP—MOUNTED SLIP FITTER OPENINGS SHALL BE 1 1/2" (38 mm) NPS.

(B) SERRATIONS IN FITTINGS SHALL MATCH THOSE ON BOTTOM OF SIGNAL HEADS OR IN LOCK RING.

(C) TOP OPENING SHALL BE OFFSET WHEN BACKPLATE IS USED.

3. WIREWAY SHALL HAVE A CROSS SECTION AREA OF 0.95 SQ. IN. (600 mm²) MIN, AND MIN WIDTH OF 13 mm (1/2").
EXTEND CONDUIT 2" (50 mm) MAX ABOVE FINISHED SURFACE OF FOUNDATION. BOND ANCHOR BOLTS TO CONDUIT OR GROUNDING CONDUCTOR.

COMBINED STREET SIGN AND PEDESTRIAN PUSH BUTTON POST

BASE PLATE
5/8" x 1 3/4" (16 x 44 mm) SQUARE OR HEX HEAD GALV STL BOLTS
TACK WELD TWO OPPOSITE FLATS OF EACH BOLT

1/2" (13 mm) RAD 3"
4 1/2" (114 mm)
7 1/2" (190 mm)
1 1/2" (38 mm)

ADAPTER BASE PLATE

INSTALL WHERE SPECIFIED. CONSTRUCT FOUNDATION AND ANCHORAGE FOR TYPE 1 SIGNAL STANDARD PER SPPWC 431.

PCC FOUNDATION

PEDESTRIAN PUSH BUTTON POST

ADAPTER PLATE

2" (50 mm) CONDUIT
ALTERNATIVE SYMBOL AND ARROW DIRECTIONS:
LEFT, RIGHT OR BOTH

LEFT  RIGHT  BOTH

FOR BICYCLE LANES
(USE ONLY WHEN SPECIFIED)
BLACK LEGEND ON WHITE BACKGROUND

FOR 3-LIGHT SIGNALS
(USE ONLY WHEN SPECIFIED)
BLACK LEGEND ON WHITE BACKGROUND

SIGN DIMENSIONS, INCHES (mm)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
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<tr>
<td>5&quot;</td>
<td>130 mm</td>
<td>7 1/2&quot;</td>
<td>9/16&quot;</td>
<td>3/4&quot;</td>
<td>3/8&quot;</td>
<td>7/16&quot;</td>
<td>2 1/8&quot;</td>
<td>3/8&quot;</td>
<td>1/4&quot;</td>
<td>11/16&quot;</td>
</tr>
</tbody>
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PEDESTRIAN PUSH BUTTON SIGNS

NOTES
1. BACK CASTING SHAPE SHALL FIT CURVATURE OF POST.
2. PROVIDE COVER FITTING FOR TOP OF POST, WHEN PPB IS MOUNTED ON PEDESTRIAN PUSH BUTTON POST.
3. INSTALL PUSH BUTTON ON CROSSWALK SIDE OF STANDARD.
4. ACTUATOR SHALL BE 2" (50 mm) MIN DIAMETER.
TO CROSS
PUSH BUTTON

START CROSSING
Watch For Vehicles
GREEN

DON'T START
Finish Crossing
If In Crosswalk
PORTLAND ORANGE

DON'T CROSS
Wait On Curb
PORTLAND ORANGE

EDUCATIONAL COVER PLATE
(USE ONLY WHEN SPECIFIED)
NOTES:
1. LOOPS MAY BE OCTAGONAL AS SHOWN, OR CIRCULAR.
2. CONSTRUCT OCTAGONAL LOOPS WITH 12° (300 mm) CORNER CUTOFFS.
3. INSTALL WEDGES EACH 6' (1.8 m) TO MAINTAIN MINIMUM EPOXY COVER.
4. INSTALL LOOPS ALTERNATING CLOCKWISE AND COUNTERCLOCKWISE.
5. IN PAVEMENT RESURFACING AREAS, INSTALL LOOPS IN UNDERLYING PAVEMENT BEFORE RESURFACING.

TYPICAL INSTALLATION

CHIP OUT TO AT LEAST SAWCUT DEPTH. COVER CABLE WITH SAND.
FILL WITH AT LEAST 1" (25 mm) THICK EPOXY TO FINISHED SURFACE.

LOOP DETECTORS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 457-1

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
NOTES:

1. FOR TYPE 16M STANDARD, MAST ARM LENGTH SHALL NOT EXCEED 15' (4.5 m). CLEARANCE FROM ROADWAY TO BOTTOM OF BACK PLATE SHALL BE AT LEAST 17' (5.1 m). MAX NUMBER OF HEADS IS THREE: ONE ON MAST AND TWO ON POLE.

2. MORTAR LEVELING BED NOT REQUIRED ON CRUSHED BASE, DIRT, OR WHEN SLOPE IS LESS THAN 2%. POLE SHALL NEVERTHELESS BE SET PLUMB.

3. DRILL HOLES IN STEEL PLATE TO MATCH BASE PLATE BOLT CIRCLE.
SECTION 5

Landscaping and Irrigation Systems
SWING JOINT ASSEMBLY - SINGLE

SWING JOINT ASSEMBLY - DOUBLE

SHRUB HEAD*
1/4 CIRCLE
1/2 CIRCLE

LAWN HEAD*
1/4 CIRCLE
1/2 CIRCLE
FULL

BUBBLER HEAD

ELECTRICAL METER CABINET

AUTOMATIC CONTROLLER & CABINET

ELECTRICAL CONDUIT

CONTROL WIRES - DIRECT BURIAL

CONTROL WIRES - IN CONDUIT

PULL BOX

*SEE PLANS FOR SYMBOLS USED FOR MULTIPLE TYPES AND SIZES
POWER POLE

1" (25 mm) SCHEDULE 40 GALVANIZED STEEL ELECTRICAL CONDUIT

6'-0" (1800 mm) MIN
10'-0" (3000 mm) MAX

OF PULL BOX

10 1/2"x17 1/4"x12" (270x440x300 mm)
CONCRETE PULL BOX W/ "120V ELECTRIC" CAST IN COVER

APPROVED WATERPROOF IN-LINE FUSE HOLDER WITH 5 AMP FUSE ON LINE-WIRE

WATERPROOF CONNECTOR

24" (600 mm) EXPANSION LOOP, EA WIRE

HARD SURFACE

POWER FEED
(WIRES BY OTHERS)

COPPER BONDING STRAP

3" (75 mm)

1" (25 mm) CRUSHED ROCK SUMP

FINISHED GRADE

BUSHING AND APPROVED SEALANT

SWEEP ELLS

SCHEDULE 40 GALVANIZED STEEL ELECTRICAL CONDUIT

NOTES:
1. AREA AROUND BOX MAY BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.
2. TOP OF BOX:
   AT GRADE FOR HARD SURFACE
   1/2" (12 mm) ABOVE GRADE FOR LAWN
   1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS
3. CRUSHED ROCK SHALL COVER ELECTRICAL BOX SIDE OPENINGS TO PREVENT SOIL ENTRY.
4. WATERPROOF CONNECTORS SHALL BE SUBJECT TO ENGINEER'S APPROVAL.
NOTES:

1. AREA AROUND BOX MAY BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.

2. TOP OF BOX:
   AT GRADE FOR HARD SURFACE
   1/2" (12 mm) ABOVE GRADE FOR LAWN
   1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS

3. CRUSHED ROCK SHALL COVER ELECTRICAL BOX SIDE OPENINGS TO PREVENT SOIL ENTRY.

4. WATERPROOF CONNECTORS SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

5. GROUND WIRE SHALL BE CONTINUOUS No. 10 COPPER, WRAPPED AROUND AND BONDED TO GROUNDING ROD WITH AN APPROVED CLAMP.

6. GROUNDING ROD SHALL BE COPPER-CLAD STEEL.
NOTES:

1. AREA AROUND BOX MAY BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.

2. TOP OF CONCRETE BASE:
   AT GRADE FOR HARD SURFACE
   1/2" (12 mm) ABOVE GRADE FOR LAWN
   1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS

3. CONCRETE BASE SHALL BE CLASS 450-C-2000 (265-C-14)

4. CONTRACTOR SHALL FILL PAD MOUNT WITH 1" (25 mm) CRUSHED ROCK 12"
   (300 mm) DEEP.

5. MATERIAL (UNLESS OTHERWISE NOTED):
   BODY – 12 GAGE (2.75 mm) GALVANIZED STEEL. DEAD FRONT AND COVERS –
   16 GAGE (1.61 mm) GALVANIZED STEEL. FINISH – IRON PHOSPHATE DIP,
   ZINC CHROMATE PRIME, GREEN BAKED ENAMEL SURFACE.

6. CABINET SHALL INCLUDE 2 POLE MAIN CIRCUIT BREAKER, 100 A.
NOTES:

1. AREA AROUND BOX MAY BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.

2. TOP OF BOX:
   - AT GRADE FOR HARD SURFACE
   - 1/2" (12 mm) ABOVE GRADE FOR LAWN
   - 1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS

3. CLOSE NIPPLES SHALL NOT BE USED.

4. CRUSHED ROCK SHALL COVER VALVE BOX PIPE OPENINGS TO PREVENT SOIL ENTRY.
NOTES:

1. AREA AROUND BOX MAY BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.

2. TOP OF BOX:
   AT GRADE FOR HARD SURFACE
   1/2" (12 mm) ABOVE GRADE FOR LAWN
   1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS

3. CLOSE NIPPLES SHALL NOT BE USED.

4. CRUSHED ROCK SHALL COVER VALVE BOX PIPE OPENINGS TO PREVENT SOIL ENTRY.
NOTES:
1. PIPE AND FITTINGS SHALL BE SCHEDULE 40 GALVANIZED STEEL.
2. PIPE SIZE FROM MAIN LINE SHALL MATCH QUICK COUPLER INLET DIAMETER.
3. DISSIMILAR METALS SHALL BE SEPARATED BY AN APPROVED DIELECTRIC COUPLING.
4. CLAMPS SHALL BE STEEL (COMMERCIAL QUALITY, GALVANIZED OR CADMIUM PLATED) OR STAINLESS STEEL.
5. PLASTIC PIPE SHALL NOT BE USED ABOVE FINISHED GRADE.

ABOVE-GRADE PIPING INSTALLATION
NOTES:

1. GALVANIZED STEEL PIPE AND FITTINGS SHALL BE SCHEDULE 40. PVC PIPE AND FITTINGS SHALL BE SCHEDULE 80.

2. VALVE IN LAWN AREAS SHALL BE SET AT GRADE. IN SHRUB AREAS, VALVE SHALL BE SET 4" (100 mm) ABOVE FINISHED GRADE.

2. PIPE SIZE FROM MAIN LINE SHALL MATCH QUICK COUPLER INLET DIAMETER.

3. DISSIMILAR METALS SHALL BE SEPARATED BY AN APPROVED DIELECTRIC COUPLING.

4. CLAMPS SHALL BE STEEL (COMMERCIAL QUALITY, GALVANIZED OR CADMIUM PLATED) OR STAINLESS STEEL.

5. PLASTIC PIPE SHALL NOT BE USED ABOVE FINISHED GRADE.

BELOW-GRADE PIPING INSTALLATION

SYMBOL ON PLAN
NOTES:
1. PIPE AND FITTINGS SHALL BE SCHEDULE 40 GALVANIZED STEEL.
2. PIPE SIZE FROM MAIN LINE SHALL MATCH QUICK COUPLER INLET DIAMETER.
3. DISSIMILAR METALS SHALL BE SEPARATED BY AN APPROVED DIELECTRIC COUPLING.
4. CLAMPS SHALL BE STEEL (COMMERCIAL QUALITY, GALVANIZED OR CADMIUM PLATED) OR STAINLESS STEEL.
5. PLASTIC PIPE SHALL NOT BE USED ABOVE FINISHED GRADE.

ABOVE-GRACDE PIPING INSTALLATION
1. GALVANIZED STEEL PIPE AND FITTINGS SHALL BE SCHEDULE 40. PVC PIPE AND FITTINGS SHALL BE SCHEDULE 80.

2. VALVE IN LAWN AREAS SHALL BE SET AT GRADE. IN SHRUB AREAS, VALVE SHALL BE SET 4" (100 mm) ABOVE FINISHED GRADE.

3. PIPE SIZE FROM MAIN LINE SHALL MATCH QUICK COUPLER INLET DIAMETER.

3. DISSIMILAR METALS SHALL BE SEPARATED BY AN APPROVED DIELECTRIC COUPLING.

4. CLAMPS SHALL BE STEEL (COMMERCIAL QUALITY, GALVANIZED OR CADMIUM PLATED) OR STAINLESS STEEL.

5. PLASTIC PIPE SHALL NOT BE USED ABOVE FINISHED GRADE.
NOTES:

1. AREA AROUND BOX MAY EITHER BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.
2. TOP OF BOX:
   - AT GRADE FOR HARD SURFACE
   - 1 1/2" (12 mm) ABOVE GRADE FOR LAWN
   - 1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS
3. CLOSE NIPPLES SHALL NOT BE USED.
4. CRUSHED ROCK SHALL COVER VALVE BOX PIPE OPENINGS TO PREVENT SOIL ENTRY.
5. PIPE AND FITTINGS SHALL BE SCHEDULE 80 PVC.
6. WATERPROOF CONNECTORS SHALL BE SUBJECT TO ENGINEER'S APPROVAL.
7. VALVE BOX SHALL BE AS SPECIFIED, EITHER:
   - CASE 1 - CONCRETE BOX w/ CONCRETE COVER
   - CASE 2 - CONCRETE BOX w/ LOCKING CAST IRON COVER
   - CASE 3 - PLASTIC BOX w/ LOCKING PLASTIC COVER
8. PROVIDE 24" (600 mm) EXPANSION LOOP FOR EACH CONTROL WIRE IN BOX.
NOTES:
1. AREA AROUND BOX MAY EITHER BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.
2. TOP OF BOX:
   - AT GRADE FOR HARD SURFACE
   - 1/2" (12 mm) ABOVE GRADE FOR LAWN
   - 1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS
3. CLOSE NIPPLES SHALL NOT BE USED.
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7. VALVE BOX SHALL BE AS SPECIFIED, EITHER:
   - CASE 1—CONCRETE BOX w/ CONCRETE COVER
   - CASE 2—CONCRETE BOX w/ LOCKING CAST IRON COVER
   - CASE 3—PLASTIC BOX w/ LOCKING PLASTIC COVER
8. PROVIDE 24" (600 mm) EXPANSION LOOP FOR EACH CONTROL WIRE IN BOX.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
REMOTE CONTROL VALVE WITH QUICK COUPLER
STANDARD PLAN 507-3
USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE 1984

SYMBOL ON PLAN
NOTES:
1. THRUST BLOCKS SHALL BE USED FOR PLASTIC PIPE 3" (75 mm) DIAMETER OR LARGER.
3. ANCHOR RODS SHALL BE GALVANIZED STEEL, 1/2" (12 mm) DIAMETER, WRAPPED AROUND PIPE.
4. SIZE OF THRUST BLOCKS SHALL BE AS SHOWN ON PLANS.
5. ALL VIEWS ARE PLAN VIEW UNLESS OTHERWISE SHOWN.
**SHRUB SPRINKLER**

- Bubbler or shrub sprinkler head
- Pop-up head (see note 3)
- Flexible riser male connection, 6" (150 mm) long, or swing joint. See note 2
- Ell and lateral line

**LAWN SPRINKLER**

- Sprinkler head (see note 1)
- Lawn pop-up head (see note 3)
- Flexible riser male connection, 6" (150 mm) long, or swing joint. See note 2
- Ell and lateral line

**NOTES:**

1. Pipe and fittings shall be schedule 80 PVC.
2. Flexible risers shall be subject to approval by the engineer. Contractor may use swing joints per detail, sheet 3, instead of flexible risers.
3. Install lawn heads 3" (75 mm) above grade. Before first mowing, adjust non-pop-up lawn heads to finished grade.
4. Install pop-up bodies 1/4" (10 mm) above finished grade.
5. Eells and risers shall be made of the same material.
NOTES:
1. PIPE AND FITTINGS SHALL BE SCHEDULE 40 GALVANIZED STEEL.

2. FLEXIBLE RISERS SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER. CONTRACTOR MAY USE SWING JOINTS PER DETAIL, SHEET 3, INSTEAD OF FLEXIBLE RISERS.

3. DISSIMILAR METALS SHALL BE SEPARATED BY AN APPROVED DIELECTRIC COUPLING.

4. CLAMPS SHALL BE STEEL (COMMERCIAL QUALITY, GALVANIZED OR CADMIUM PLATED) OR STAINLESS STEEL.

5. PLASTIC PIPE SHALL NOT BE USED ABOVE FINISHED GRADE.

IMPACT SPRINKLER
PIVC TEE OR ELL
MAIN OR LATERAL LINE

12" (300 mm)

GALVANIZED STEEL

NOTES:
PIPE AND FITTINGS SHALL BE SCHEDULE 80 PVC UNLESS SHOWN OTHERWISE. GALVANIZED STEEL PIPE AND FITTINGS SHALL BE SCHEDULE 40.

SWING JOINT DETAIL
NOTES:

1. PIPE AND FITTINGS SHALL BE SCHEDULE 40 GALVANIZED STEEL UNLESS OTHERWISE NOTED.

2. ATMOSPHERIC TYPE VACUUM BREAKER SHALL BE INSTALLED DOWNSTREAM OF CONTROL VALVE AND AT LEAST 6" (150 mm) ABOVE THE HIGHEST OUTLET OR THE FLOOD LINE, WHICHEVER IS HIGHER.

3. DEVICES AND INSTALLATIONS SHALL COMPLY WITH LOCAL HEALTH AND WATER AGENCY REQUIREMENTS.

4. CLOSE NIPPLES SHALL NOT BE USED.

5. USE APPROVED PLASTIC TAPE 1/2" (12 mm) WIDE AT ALL THREADED CONNECTIONS. COAT EXPOSED THREADS WITH APPROVED RUST-INHIBITING SEALANT.
PRESSURE TYPE, 2" (50 mm) AND SMALLER

NOTES:

1. PIPE AND FITTINGS SHALL BE SCHEDULE 40 GALVANIZED STEEL UNLESS OTHERWISE NOTED.
2. PRESSURE TYPE VACUUM BREAKER SHALL BE INSTALLED AT LEAST 12" (300 mm) ABOVE THE HIGHEST OUTLET OR THE FLOOD LINE, WHICHER EVER IS HIGHER. PRESSURE TYPE VACUUM BREAKERS SHALL NOT BE SUBJECTED TO BACK PRESSURE OR DRAINAGE.
3. DEVICES AND INSTALLATIONS SHALL COMPLY WITH LOCAL HEALTH AND WATER AGENCY REQUIREMENTS.
4. CLOSE NIPPLES SHALL NOT BE USED.
5. USE APPROVED PLASTIC TAPE 1/2" (12 mm) WIDE AT ALL THREADED CONNECTIONS. COAT EXPOSED THREADS WITH APPROVED RUST-INHIBITING SEALANT.
6. DISSIMILAR METALS SHALL BE SEPARATED BY AN APPROVED DIELECTRIC COUPLING.
7. PLASTIC PIPE SHALL NOT BE USED ABOVE FINISHED GRADE.
NOTES:
1. PIPE AND FITTINGS SHALL BE SCHEDULE 40 GALVANIZED STEEL UNLESS OTHERWISE NOTED.
2. DEVICES AND INSTALLATIONS SHALL COMPLY WITH LOCAL HEALTH AND WATER AGENCY REQUIREMENTS.
3. VALVE ASSEMBLIES MAY HAVE SCREWED OR FLANGED FITTINGS.
4. USE APPROVED PLASTIC TAPE 1/2" (12 mm) WIDE AT ALL THREADED CONNECTIONS. COAT EXPOSED THREADS WITH APPROVED RUST-INHIBITING SEALANT.
5. DISSIMILAR METALS SHALL BE SEPARATED BY AN APPROVED DIELECTRIC COUPLING.
6. PLASTIC PIPE SHALL NOT BE USED ABOVE FINISHED GRADE.
GATE VALVE
NIPPLE 3" (75 mm) LONG

REDUCED PRESSURE
BACKFLOW PREVENTER

FLOW

FINISHED GRADE

12" (300 mm) ABOVE
FLOOD LINE
OR GRADE LINE
WHICHEVER HIGHER

GATE VALVE
NIPPLE 3" (75 mm) LONG

REDUCED PRESSURE
BACKFLOW PREVENTER

FLOW

FINISHED GRADE

8" MIN

6" (150 mm)
MIN CLEAR
BOTH SIDES

PVC COUPLING, SCH 80
2"

6", TYP
(150 mm) MIN

PCC, 450-C-2000 (265-C-14)

6" (150 mm)
MIN CLEAR
BOTH SIDES

NOTES:

1. PIPE AND FITTINGS SHALL BE SCHEDULE 40 GALVANIZED STEEL UNLESS OTHERWISE NOTED.
2. DEVICES AND INSTALLATIONS SHALL COMPLY WITH LOCAL HEALTH AND WATER AGENCY REQUIREMENTS.
3. VALVE ASSEMBLIES MAY HAVE SCREWED OR FLANGED FITTINGS.
4. USE APPROVED PLASTIC TAPE 1/2" (12 mm) WIDE AT ALL THREADED CONNECTIONS. COAT EXPOSED THREADS WITH APPROVED RUST-INHIBITING SEALANT.
5. DISSIMILAR METALS SHALL BE SEPARATED BY AN APPROVED DIELECTRIC COUPLING.
6. PLASTIC PIPE SHALL NOT BE USED ABOVE FINISHED GRADE.
CASE 1

10 1/2" x 17 1/4" x 12" (270 x 440 x 300 mm)
LOOKING CONCRETE PULL BOX W/ "120V ELECTRIC" CAST IN COVER
WATERPROOF CONNECTOR

CASE 2

CRUSHED ROCK SHALL COVER ELECTRICAL BOX SIDE OPENINGS TO PREVENT SOIL ENTRY.
WATERPROOF CONNECTORS SHALL BE SUBJECT TO ENGINEER'S APPROVAL.
PVC CONDUIT MAY BE USED FOR CASE 2 IF APPROPRIATE GROUND WIRES ARE INSTALLED.

HIGH VOLTAGE INSTALLATION

NOTES:

1. AREA AROUND BOX MAY BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.
2. TOP OF BOX:
   AT GRADE FOR HARD SURFACE
   1/2" (12 mm) ABOVE GRADE FOR LAWN
   1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS
3. CRUSHED ROCK SHALL COVER ELECTRICAL BOX SIDE OPENINGS TO PREVENT SOIL ENTRY.
4. WATERPROOF CONNECTORS SHALL BE SUBJECT TO ENGINEER'S APPROVAL.
5. PVC CONDUIT MAY BE USED FOR CASE 2 IF APPROPRIATE GROUND WIRES ARE INSTALLED.
1. AREA AROUND BOX MAY BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.

2. TOP OF BOX:
   AT GRADE FOR HARD SURFACE
   1/2” (12 mm) ABOVE GRADE FOR LAWN
   1” (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS

3. CRUSHED ROCK SHALL COVER ELECTRICAL BOX SIDE OPENINGS TO PREVENT SOIL ENTRY.

4. LOW VOLTAGE WIRES UNDER ROADWAY SHALL BE WITHIN CONTINUOUS CONDUIT WITH
   90° SWEEP ELLS TERMINATING WITHIN PULL BOXES. SEE PLANS FOR SIZE AND TYPE OF BOXES.

LOW VOLTAGE INSTALLATION

SYMBOL ON PLAN — PB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
ELECTRICAL PULL BOX

STANDARD PLAN
513-3
SHEET 2 OF 2
NOTES:

1. AREA AROUND BOX MAY BE PLANTED, HARD SURFACE, OR A COMBINATION OF BOTH.

2. TOP OF BASE:
   AT GRADE FOR HARD SURFACE
   1/2" (15 mm) ABOVE GRADE FOR LAWN
   1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS
1/2" (12 mm) HOLE FOR LOCK

CONDUIT

ANCHOR BOLT, 3/8"x4" (9x100 mm) w/ NUT & WASHER - 6 REQ'D

ELASTOMERIC MASTIC

FINISHED GRADE

PLAN OF CONCRETE BASE

PEDESTAL MOUNT – TYPE B

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

IRRIGATION CONTROLLER ENCLOSURE

SYMBOL ON PLAN

A

STANDARD PLAN

514-3

SHEET 2 OF 4
AUTOMATIC CONTROLLER IN LOCKABLE CABINET MOUNTED SECURELY TO WALL

LOCK NUT

SINGLE POLE SWITCH IN LOCKABLE BOX

HASP-PADLOCK BY OTHERS

GALV STEEL CONDUIT, SCH 40, 2" (50 mm) DIA

HARD SURFACE

FINISHED GRADE

UF DIRECT BURIAL WIRES TO VALVES

16" MIN (400 mm)

24" (600 mm)

120V WIRES IN CONDUIT TO POWER SOURCE

WALL MOUNT – TYPE C

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

IRRIGATION CONTROLLER ENCLOSURE

STANDARD PLAN 514-3

SHEET 3 OF 4
NOTES:

1. CONCRETE SHALL BE CLASS 450-C-2000 (265-C-14).
2. UNLESS OTHERWISE NOTED, ENCLOSURE SHALL BE 12 GAGE (2.75 mm) STEEL. PAINT ENCLOSURE WITH TWO COATS OF RUST INHIBITING PAINT (COLOR WILL BE SELECTED BY ENGINEER).
NOTES:
1. PINS SHALL BE #4 (#13mm) REINFORCING BARS.
2. PINS SHALL BE PLACED 10' (3 m) APART FOR MAIN LINE.
3. PINS SHALL BE PLACED NO MORE THAN 15' (4.5 m) APART FOR LATERAL LINE.
4. ON SLOPES, THE 12" (300 mm) LEG OF THE PIN SHALL BE PLACED ON THE DOWNHILL SIDE.
SWING JOINT PLAN DETAIL

ELEVATION

NOTES:
1. PIPE AND FITTINGS SHALL BE SCHEDULE 40 GALVANIZED STEEL UNLESS OTHERWISE NOTED.
2. SWING JOINTS SHALL BE INSTALLED AT EACH CHANGE OF GRADE.
3. PIPE SHALL BE PINNED PER STANDARD PLAN 515.

SINGLE SWING JOINT ASSEMBLY
NOTES:

1. PIPE AND FITTINGS SHALL BE SCHEDULE 40 GALVANIZED STEEL UNLESS OTHERWISE NOTED.

2. DOUBLE SWING JOINTS SHALL BE INSTALLED WHERE CHANGES OF GRADE AND ALIGNMENT OCCUR SIMULTANEOUSLY.

3. DOUBLE SWING JOINTS SHALL ALSO BE INSTALLED AS EXPANSION JOINTS ON LONG RUNS OF GALVANIZED PIPE, EACH 300' (90 m) MAXIMUM.

3. PIPE SHALL BE PINNED PER STANDARD PLAN 515.

**DOUBLE SWING JOINT**
SINGLE STAKING

NOTES:

1. Stake shall be either 2" (50 mm) diameter lodge pole pine, treated with copper napthenate or pressure treated with chromated copper arsenate, or galvanized steel pipe, per SSPWC 308-4.6.1 (Method A).

2. Height of stake shall be 10’ (3 m); however, it shall not be higher than the top of the tree.

3. Tree supports shall be per SSPWC 308-4.6.1.
TREE SUPPORTS, SEE NOTE 5

STAKES

A~ ~A

TREE

CURB AND GUTTER

PLAN

SECTION A–A

<table>
<thead>
<tr>
<th>TREE SIZE</th>
<th>LENGTH</th>
</tr>
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<tbody>
<tr>
<td>15 GAL (55 L)</td>
<td>10’ (3 m)*</td>
</tr>
<tr>
<td>24” (600 mm) BOX</td>
<td>12’ (3.6 m)</td>
</tr>
<tr>
<td>30” (750 mm) BOX</td>
<td>12’ (3.6 m)</td>
</tr>
<tr>
<td>36” (900 mm) – 48” (1200 mm) BOX</td>
<td>SEE NOTE 4</td>
</tr>
</tbody>
</table>

*USE 12’ (3.6 m) WITH CASE 2. SEE SPPWC 520.

DOUBLE STAKING

NOTES:

1. STAKE SHALL BE EITHER 2” (50 mm) DIAMETER LODGE POLE PINE, TREATED WITH COPPER NAPHTHANATE OR PRESSURE TREATED WITH CHROMATED COPPER ARSENATE, OR GALVANIZED STEEL PIPE, PER SPPWC 308–4.6.1 (METHOD A).

2. PLACE STAKES 18” (450 mm) APART FOR 15GAL (55 L) TREE. PLACE STAKES AT OUTER EDGE OF ROOT BALL FOR LARGER SIZE (BOX) TREES.

3. HEIGHT OF STAKES SHALL NOT BE HIGHER THAN THE TOP OF THE TREE.

4. FOR 36” (900 mm) OR LARGER BOX TREES—STAKE OR GUY AT THE DIRECTION OF THE ENGINEER.

5. TREE SUPPORTS SHALL BE PER SPPWC 308–4.6.1.
GUY WIRE SIZES

24" - 48" BOX
(600 - 1200 mm)
2 STRAND #12 BWG
(2.7 mm) ZINC COATED

OVER 48"
(1200 mm) BOX
3 STRAND #12 BWG
(2.7 mm) ZINC COATED

MULTIPLE STRANDS SHALL
BE TWISTED TOGETHER

WIRE AND HOSE TIES

TRUNK, TYP

LOOP HOSES
1" (25 mm) GREATER
THAN TRUNK DIA

2-Ply
1/2"
(15 mm) ID RUBBER HOSE

TYING PLAN
INSTALL WIRE TIES
BETWEEN INDIVIDUAL
GUYS PRIOR TO
TENSIONING GUYS

WIRE AND HOSE TIES

THREE 5" (125 mm)
GALVANIZED TURNBUCKLES

1/2" (15 mm) DIA
WHITE SCH 40 PVC
5' (1.5 m) LONG

FINISHED GRADE

ELEVATION

4" x 4" x 2' - 6"
(100 x 100 x 750 mm)
REDWOOD DEADMAN, TYP

COMPACTED
BACKFILL, TYP

TREE GUying

DEADMAN

TWIST WIRE

TRENCH

EXCAVATION LINE

PLAN
DEADMAN

DEADMAN

WIRE

120'

PLAN
DEADMAN PLACEMENT
NOTE:
SEE SHEETS 3 AND 7 FOR NOTES PERTAINING TO THIS SHEET.

TYPE 1

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

TREE WELL

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

519-3

SHEET 1 OF 7
CASE 1

MANHOLE BRICK
2 1/2" x 7/8" x 8 1/4"
(64 mm x 96 mm x 209 mm)
LAID TIGHT WITHOUT MORTAR

CASE 2

MANHOLE BRICK
2 1/2" x 7/8" x 8 1/4"
(64 mm x 96 mm x 209 mm)
LAID TIGHT WITHOUT MORTAR

Case 3

HOLLOW CONCRETE BLOCK
5 5/8" x 3 5/8" x 7 5/8"
(140 mm x 90 mm x 195 mm) AND
3 5/8" x 7 5/8" x 7 5/8"
(90 mm x 195 mm x 195 mm)
LAID TIGHT WITHOUT MORTAR

NOTE:
SEE SHEETS 3 AND 7 FOR NOTES PERTAINING TO THIS SHEET.
NOTES FOR TYPE 1 TREE WELL

1. The cover shall be made of permeable concrete with a minimum compressive strength of 1200 psi (8.5 MPa) and shall be cast-in-place or precast "AGRIPERM" or equivalent. Cast-in-place concrete shall consist of one part cement to four parts 3/8" (10 mm) gravel and approximate 4 gallons (15 liters) of water per 94 lb (42.5 kg) of cement. The gravel shall be clean with fines removed. The concrete mixture shall be deposited as near as possible to its final location. The excess concrete shall be rodded off in a sawing motion. A surplus of concrete should be maintained against the front surface of the screed in order that low areas will be filled as the screed passes over. Rodding shall be held to a minimum. After the surface is flat no other finishing will be required. Curing compound to which waterproofing materials have been added will not be permitted.

2. Existing sidewalks shall be carefully sawcut preparatory to installation of tree well covers. Sawcut over-runs shall be cleaned and filled with epoxy approved by the engineer and finished to sidewalk grade.

3. The pipe may be CIP, ACP, VCP, ABS, PVC, GALV STL or asphalt impregnated fiber duct and it may be bell or plain end.

4. After all other work pertinent to planting has been completed, each tree shall be watered immediately with a minimum of 20 gallons (75 liters) of water, and repeated 2 times in the next 3 days. After the tree has been watered and the soil is sufficiently dry, the soil shall be graded and tamped. The 3" (75 mm) layer of aggregate shall be placed and graded to accept the tree well cover firmly, without rocking, and flush with the top surface of the sidewalk. The premolded joint filler shall be carefully placed to insure a tight fit with the top of the joint filler flush with the adjacent sidewalk.

5. If cast-in-place, there shall be a 3 mil (0.075 mm) plastic liner between walk and aggregate.

NOTES FOR TYPE 2 TREE WELL

1. Existing sidewalk shall be carefully sawcut preparatory to laying of concrete blocks or brick. Sawcut over-runs shall be cleaned and filled with epoxy approved by the engineer and finished to sidewalk grade.

2. The pipe may be CIP, ACP, VCP, ABS, PVC, GALV STL or asphalt impregnated fiber duct, and it may be bell or plain end.

3. Nails shall be galvanized steel box.

4. After all other work pertinent to planting has been completed, each tree shall be watered immediately with a minimum of 20 gallons (75 liters) of water and repeated 2 times in the next 3 days. After the water has settled and the soil is sufficiently dry, the soil shall be graded and tamped. A 3" (75 mm) layer of aggregate shall be placed and graded to accept bricks flush with the top surface of the sidewalk. The premolded joint filler and headers shall be carefully placed to insure a tight fit with the top of the joint filler flush with the adjacent sidewalk.
R/W

1 COVER REQUIRED
CASE 1: 3' x 18" (900 mm x 450 mm) TREE WELL
CASE 2: 4' x 24" (1200 mm x 600 mm) TREE WELL

2 COVERS REQUIRED
CASE 3: 3' x 3' (900 mm x 900 mm) TREE WELL
CASE 4: 4' x 4' (1200 mm x 1200 mm) TREE WELL

**TREE WELLS**

<table>
<thead>
<tr>
<th>CASE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>R</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>3°-0°</td>
<td>18°</td>
<td>2°-11'</td>
<td>17 1/2&quot;</td>
<td>5°-0°</td>
<td>9°</td>
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<tr>
<td></td>
<td>(900 mm)</td>
<td>(450 mm)</td>
<td>(975 mm)</td>
<td>(450 mm)</td>
<td>(1500 mm) MIN</td>
<td>(225 mm)</td>
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<tr>
<td>2</td>
<td>4°-0°</td>
<td>23 1/2&quot;</td>
<td>5°-6&quot;</td>
<td>15°</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(1200 mm)</td>
<td>(600 mm)</td>
<td>(600 mm)</td>
<td>(1650 mm) MIN</td>
<td>(375 mm)</td>
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</tr>
<tr>
<td>3</td>
<td>5°-0°</td>
<td>2°-11&quot;</td>
<td>6°-6&quot;</td>
<td>9°</td>
<td></td>
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<tr>
<td></td>
<td>(900 mm)</td>
<td>(900 mm)</td>
<td>(975 mm)</td>
<td>(450 mm)</td>
<td>(1950 mm) MIN</td>
<td>(225 mm)</td>
</tr>
<tr>
<td>4</td>
<td>4°-0°</td>
<td>23 1/2°</td>
<td>7°-6&quot;</td>
<td>15°</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(1200 mm)</td>
<td>(1200 mm)</td>
<td>(1175 mm)</td>
<td>(600 mm)</td>
<td>(2250 mm) MIN</td>
<td>(375 mm)</td>
</tr>
</tbody>
</table>

**POROUS TREE WELL COVER (SEE NOTE 2)**

1. SEE SHEET 7 FOR NOTES PERTAINING TO THE SHEET.
2. PERMEABLE (POROUS) CONCRETE TREE WELL COVER:
   THE COVER SHALL BE MADE OF PERMEABLE CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 1200 PSI (8.5 MPa) AND SHALL BE PRECAST & REINFORCED WITH 2 1/4" X 2 1/4" (60 mm x 60 mm) 16 GAUGE WIRE MESH. CONCRETE SHALL CONSIST OF ONE PART CEMENT TO FOUR PARTS 3/8" (10 mm) GRAVEL AND APPROXIMATELY FOUR GALLONS (15 LITERS) OF WATER PER SACK OF CEMENT. THE GRAVEL SHALL BE CLEAN WITH FINES REMOVED. CURING COMPOUND TO WHICH WATER-PROOFING MATERIALS HAVE BEEN ADDED WILL NOT BE PERMITTED.

**TYPE 3**

**STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION**

**TREE WELL**

**STANDARD PLAN 519-3**

**SHEET 4 OF 7**
NOTES FOR TYPE 4 TREE WELL

1. GRATE MATERIAL TO BE CAST IRON.
2. GRATE PATTERN AS SPECIFIED ON PLANS OR IN SPECIFICATIONS.
3. EXISTING SIDEWALK SHALL BE CAREFULLY SAWCUT PREPARATORY TO LAYING OF FRAME. SAWCUT OVER-RUNS SHALL BE CLEANED AND FILLED WITH EPOXY APPROVED BY THE ENGINEER AND FINISHED TO SIDEWALK GRADE.
4. THE PIPE MAY BE CIP, ACP, VCP, ABS, PVC, GALV STL OR ASPHALT IMPREGNATED FIBER DUCT, AND IT MAY BE BELL OR PLAIN END.
5. AFTER ALL OTHER WORK PERTINENT TO PLANTING HAS BEEN COMPLETED, EACH TREE SHALL BE WATERED IMMEDIATELY WITH A MINIMUM OF 75 LITERS (20 GALLONS) OF WATER AND REPEATED 2 TIMES IN THE NEXT 3 DAYS. AFTER THE WATER HAS SETTLED AND THE SOIL IS SUFFICIENTLY DRY, THE SOIL SHALL BE GRADED AND TAMPED AND 3” (75 mm) CONCRETE AGGREGATE SHALL BE PLACED AND GRADED.
NOTES FOR TYPE 4 TREE WELL

1. SECTION A AND B REQUIRED ONLY WHEN TREE GUARD IS REQUIRED.
2. ALL METAL PARTS AND FRAME SHALL CONFORM TO THE SSPWC AND SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
3. SEE SHEET 7 FOR NOTES PERTAINING TO THIS SHEET.

TYPE 4
GENERAL NOTES FOR ALL FOUR TYPES OF TREE WELL

1. TREE WELLS SHOULD BE SPACED APPROXIMATELY 50' (15 m) APART, BUT NOT LESS THAN ONE PER RESIDENTIAL LOT.

2. LOCATION OF TREE WELLS SUBJECT TO THE FOLLOWING MINIMUM CLEARANCES:
   A. 50' (15 m) FROM BCR ON THE APPROACH TO AN INTERSECTION AND 15' (4.5 m) FROM THE ECR ON THE EXIT SIDE.
   B. 20' (6 m) FROM LIGHT STANDARDS.
   C. 10' (3 m) FROM FIRE HYDRANTS AND DRIVEWAYS.
   D. 5' (1.5 m) FROM HOUSE WALKS AND UTILITY METERS.

3. COVERS SHALL BE COLORED BUFF USING AN ACCEPTABLE COLORING AGENT.

4. TREE WELL SHALL BE BACKFILLED WITH CLEAN DIRT FLUSH WITH ADJACENT WALK UNTIL TREE IS PLANTED.

5. DO NOT USE CASE 1 OR CASE 2 TREE WELL WHERE THERE IS AN EXISTING FENCE OR WALL AT THE R/W LINE.

6. TOP OF TREE WELL COVER SHALL BE FLUSH WITH ADJACENT SIDEWALK.

7. LOCATION OF TREE SUBJECT TO CHANGE AT THE DIRECTION OF THE ENGINEER.
PLAN VIEW

UNPAVED PARKWAY
15 GAL (60 LITER) OR 24" (600 mm) BOX
SIDEWALK TREE WELL
15 GAL (60 LITER) OR 24" (600 mm) BOX

CURB OR PAVEMENT
ROOT BARRIER
12' (4.0 m) x 18"
(450 mm)
NATIVE SOIL OR
CLASS C TOPSOIL
BACKFILL WITH AMENDMENTS
PERFORATED PIPE

TREE STAKE
TIE
TREE CROWN
TREE TRUNK
ROOT BALL
PLANTING PIT

PLAN VIEW

CURB OR PAVEMENT
PERFORATED PIPE

TREE STAKE—NOTE 8
TIE
No. 2 GRAVEL,
3" (75 mm) THICK
TREE WELL COVER

DEPTH OF
ROOT BALL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
STANDARD PLAN
520-4
TREE PLANTING
SHEET 2 OF 4
SECTION

ROOT BARRIER 16' (4800 mm) x 36" (900 mm)

WATER BASIN
BERM
FINISH GRADE

BACKFILL WITH AMENDMENTS
ROOT BALL
PERFORATED PIPE 6" (150 mm) x 48" (1200 mm)

PLAN VIEW

ROOT BARRIER
TREE CROWN
PLANTING PIT
TREE STAKE
TREE TRUNK
ROOT BALL

30" (750 mm) TO 48" (1200 mm) BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

TREE PLANTING
1. SET TOP OF ROOT BALL 1” (25 mm) ABOVE FINISH GRADE.

2. FOR 24” (600 mm) BOX TREES OR SMALLER, INSTALL ROOT BARRIERS IF TRUNK IS WITHIN 5’ (1.5 m) OF CURB OR WALK.
   FOR 30” TO 48” (750 mm TO 1200 mm) BOX TREES, INSTALL ROOT BARRIERS IF TRUNK IS WITHIN 10’ (3.0 m) OF CURB OR WALK.

3. AMEND BACKFILL MIX PER SPECIFICATIONS. LEAVE TRUNK AND ROOT FLARE VISIBLE.

4. SET PERFORATED PIPE FLUSH WITH TOP OF BACKFILL. FILL PIPE WITH NO. 2 GRAVEL PER SSPWC TABLE 200-1.4.(B) AND COVER WITH FILTER FABRIC. WRAP FABRIC 6” (150 mm) DOWN SIDES OF PIPE.

5. FORM 3 1/2” (90 mm) HIGH BERM AROUND BACKFILL AS A WATER BASIN.

6. TOP WATER BASIN WITH 3 1/2” (90 mm) OF NO. 2 GRAVEL OR TYPE 1 MULCH PER THE SPECIAL PROVISIONS. KEEP GRAVEL OR MULCH 3 1/2”(90 mm) CLEAR OF TRUNK. LEAVE TRUNK AND ROOT FLARE VISIBLE.

7. REMOVE ALL NURSERY STAKES.

8. INSTALL NEW TREE STAKES PER SPPWC 518.

9. FASTEN TREE TO STAKES PER 308-4.6, TWO TIES PER STAKE.

10. AFTER PLANTING, PRUNE THE TREE AS APPROVED BY THE ENGINEER.

11. ROOT BARRIER, WHERE SHOWN, SHALL BE 80 MIL (2.0 mm) THICK.
NOTES:

1. PRESSURE REGULATOR AND Y STRAINER SHALL BE BRASS OR BRONZE.

2. PRESSURE RATING SHALL BE AS SPECIFIED.

3. Y STRAINER SHALL BE FITTED WITH A 30 MESH SCREEN OF STAINLESS STEEL OR MONEL AND A BLOW-OFF COCK.

4. VALVE BOX SHALL BE SIZED TO CONTAIN ENTIRE Y STRAINER AND PRESSURE REGULATOR ASSEMBLY.

5. ASSEMBLY SHALL BE INSTALLED HORIZONTAL. BLOW-OFF COCK, ADJUSTMENT NUT, AND MAIN CAP ON REGULATOR SHALL BE ACCESSIBLE.

6. UNLESS OTHERWISE NOTED, FITTINGS SHALL BE THREADED SCHEDULE 80 PVC.

7. AREA AROUND VALVE BOX MAY BE PLANTED OR HARD SURFACE OR A COMBINATION OF BOTH.
   TOP OF VALVE BOX:
   AT GRADE FOR HARD SURFACE
   1/2" (12 mm) ABOVE GRADE FOR LAWN
   1" (25 mm) ABOVE GRADE FOR GROUND COVER OR SHRUBS

8. CRUSHED ROCK SHALL COVER BOX SIDE OPENINGS TO PREVENT SOIL ENTRY.

9. CLOSE NIPPLES ARE PROHIBITED.
NOTES:

1. WHERE EXISTING PARKWAY TREES HAVE BEEN ROOT PRUNED, INSTALL CONTINUOUS, LINEAL ROOT BARRIER ADJACENT TO THE CURB AND/OR SIDEWALK.

2. LENGTH AND LOCATION OF ROOT BARRIER SHALL BE DETERMINED BY ENGINEER.

3. ROOT SEALER SHALL BE APPROVED BY THE ENGINEER AT LEAST 48 HOURS IN ADVANCE OF THE PRUNING OPERATION. IT SHALL BE APPLIED TO ALL CUT ROOT AREAS WHICH ARE LARGER THAN 2" (50 mm) IN DIAMETER. THE SEALER SHALL BE APPLIED AS SOON AS PRACTICAL AFTER THE CUTS HAVE BEEN MADE.

4. ROOT BARRIERS SHALL BE FABRICATED FROM A HIGH DENSITY, HIGH IMPACT PLASTIC AND BE EXPRESSLY DESIGNED FOR THE PURPOSE OF ROOT DEFLECTION.
WEAKENED-PLANE JOINTS

CASE 3: A = 3' (900 mm) B = 3' (900 mm) C = 6'-6" (1950 mm) MIN
CASE 4: A = 4' (1200 mm) B = 4' (1200 mm) C = 7'-6" (2250 mm) MIN

PORTLAND CEMENT CONCRETE

2" (50 mm) x 4" (100 mm) REDWOOD HEADERS

SECTION X-X

SECTION Y-Y
NOTES

1. TREE WELLS SHALL BE SPACED APPROXIMATELY 50' (15 m) APART, BUT NOT LESS THAN ONE PER RESIDENTIAL LOT.

2. LOCATION OF TREE WELLS SUBJECT TO THE FOLLOWING MINIMUM CLEARANCES:
   A. 50' (15 m) FROM THE BCR ON THE APPROACH TO AN INTERSECTION AND 15' (4.5 m) FROM THE ECR ON THE EXIT SIDE.
   B. 20' (6 m) FROM LIGHT STANDARDS.
   C. 10' (3 m) FROM FIRE HYDRANTS AND DRIVEWAYS.
   D. 5' (1.5 m) FROM HOUSE WALKS AND UTILITY METERS.

3. TEMPORARY TREE WELL COVER SHALL BE TAPERED TO A 2" (50 mm) THICKNESS AT THE CENTER FOR EASE OF BREAKING AND REMOVAL.

4. TEMPORARY TREE WELL COVER SHALL BE POURED IN PLACE. FINISH TO BE IDENTICAL WITH ADJACENT PCC WALK.

5. TEMPORARY TREE WELL COVER SHALL BE CASE 3 UNLESS OTHERWISE SPECIFIED.

6. LOCATION OF TREE WELL SUBJECT TO CHANGE AT THE DIRECTION OF THE ENGINEER.
General Facilities
**TYPICAL FENCE**

**INTERMEDIATE / SLOPE POST**

For wall thickness less than 8" (200 mm), install fence outside wall.

**CHANNEL WALL AND WINGWALL AT HEADWALL**

**STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION**

**CHAIN LINK FENCE AND GATES**

Use with standard specifications for public works construction.
BARBED WIRE – NOTE 4

END POST

GATE FABRIC
SAME AS FENCE FABRIC

TENSION ROD & TIGHTENER

PIECE STIFFENER
8' (2.4 m)
MAX O.C.

18' (5.4 m)
MAX SINGLE LEAF

END POST

GUSSET

GATE FABRIC
SAME AS FENCE FABRIC

TENSION ROD & TIGHTENER

PLUNGER CUP IN
1 CF (0.03 m³) PCC

POST OD + 8" (200 mm)

WALK GATE

DRIVE GATE

PIPE POST

NON-SHRINK GROUT

12" (300 mm) FOR LINE POSTS,
ELSE 18" (450 mm)

4" (100 mm)

4" (100 mm)

3/8" (10 mm) PLATE

1/8" (3 mm)

1" (25 mm) GREATER THAN PIPE OD

2" (50 mm)

2" (50 mm)

#5 x 12" RE-BAR
(#16 x 300 mm)

1/8" (3 mm)

TENSION BAR

5" x 5" (125 x
125 mm)

TIE WIRE

1" (25 mm) GREATER THAN PIPE OD

2" (50 mm)

2" (50 mm)

#5 x 12" RE-BAR
(#16 x 300 mm)

1/8" (3 mm)

STL PLATE

CHAIN AND LOCK
CUT-OUT

PLUNGER CUP
ISOMETRIC

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CHAIN LINK FENCE AND GATES

STANDARD PLAN

600-3

SHEET 2 OF 3
NOTES:

1. SECURE DRIVE-FIT GALVANIZED CAP TO POST WITH 1/4" (6 mm) ROUND-HEAD RIVET.

2. H DENOTES FABRIC WIDTH AND NOMINAL FENCE HEIGHT. H = 5' (1.5 m) UNLESS OTHERWISE NOTED.

3. IF FENCE WITH TOP RAIL IS SPECIFIED, DELETE STEEL TENSION WIRE AT TOP, AND PIPE RAILS AT INTERMEDIATE, SLOPE, END AND CORNER POSTS. EXTEND TENSION ROD TO TOP RAIL.

4. BARBED WIRE SHALL BE USED ONLY WHEN SPECIFIED.

5. POST SPACING IS MAXIMUM 10' (3.0 m).

6. FILL CLEAR OPENINGS GREATER THAN 3" (75 mm) WITH FABRIC. FOR OPENINGS LESS THAN 18" (450 mm), TIE FABRIC TO POSTS.

7. USE ONE POST FOR COMBINED SLOPE AND CORNER POST IF TOP OF CHANNEL WALL IS CONSTRUCTED AS SHOWN FOR "ALTERNATE".

8. STEEL BANDS AT TENSION BARS SHALL BE 1/8" x 1" (3 x 25 mm), MINIMUM, SPACED AT MAXIMUM 16" (400 mm).

9. SECURE TENSION WIRES TO EACH LINE POST WITH TIE WIRES.
MORTAR CAP - 
#5 (#16M) CONT. AT EACH BOND BEAM TYP. SEE NOTE 14

TYPE 1

#4 @ 18" (#13M @ 450) CONT.
LEVEL OR SLOPE 2:1 MAX

SLOPE CONTROL POINT

TYPE 2

#5 (#16M) CONT. AT EACH BOND BEAM TYP. SEE NOTE 14

SLOPE CONTROL POINT

LEVEL OR SLOPE 2:1 MAX

TYPE 3

#4 @ 18" (#13M @ 450) CONTINUOUS

DETAILS FOR DOUBLE REINFORCEMENT
SEE REINFORCING SCHEDULES FOR REQ'D USE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

REINFORCED CONCRETE BLOCK WALL

601-4

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 6
DETAILS FOR SINGLE REINFORCEMENT
SEE REINFORCING SCHEDULES FOR ALLOWED USE
SEE SHEET 1 FOR OTHER DIMENSIONS AND DETAILS

TYPE 1

A (L-BAR)
@ CENTER

#4 @ 18" (13M @ 450)
CONTINUOUS

3" CLEAR
TYPICAL

TYPE 2

A (L-BAR)
@ CENTER

#4 @ 18" (13M @ 450)
CONTINUOUS

3" CLEAR
TYPICAL

TYPE 3

#4 @ 18" (13M @ 450)
CONTINUOUS

3" CLEAR
TYPICAL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

REINFORCED CONCRETE BLOCK WALL

STANDARD PLAN

601-4

SHEET 2 OF 8
4' - 0" (1200 mm) MIN BOND BEAM AND REINFORCEMENT EXTENSION AT STEP
1/2" (15 mm) EXPANSION JOINTS @ 50' (15 m) MAX
PLACE FULL HEIGHT REINFORCEMENT TO MATCH VERTICAL WALL REINFORCEMENT AT EACH SIDE OF EXPANSION JOINT, CHANGE IN HEIGHT, OR END OF WALL

TOP OF FOOTING ELEVATION

ALL CELLS WITH VERTICAL REINFORCEMENT AND BOND BEAMS SHALL BE GROUTED SOLID

WALL ELEVATION

PREMOLDED EXPANSION JOINT FILLER

FULL HEIGHT VERTICAL BAR EACH SIDE OF JOINT TO MATCH VERTICAL WALL REINFORCEMENT

STOP JOINT REINFORCEMENT EACH SIDE OF EXPANSION JOINT. SEE NOTE 13

CAULKING SEALANT CONT. EACH SIDE

NOTE:
SINGLE VERTICAL REINFORCING BARS SHALL BE CENTERED IN CELLS. DOUBLE ROWS OF VERTICAL REINFORCING BARS SHALL HAVE THE REINFORCEMENT PLACED IN EACH FACE (EF).

CORNER DETAIL

SPREAD FOOTING TYPE 1 AND 2

FOOTING STEP DETAILS

4 COURSES MAX

#4 @ 12" (#13 @ 300) (600 mm x 300 mm)

TRENCH FOOTING TYPE 3

1:1 OPTIONAL CORNER SHAPE

4 COURSES MAX

#4 @ 18" (#13 @ 450) (600 mm x 300 mm)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

REINFORCED CONCRETE BLOCK WALL

STANDARD PLAN

601-4

SHEET 3 OF 6
### LATERAL LOAD = 15 PSF (720 Pa)

<table>
<thead>
<tr>
<th>STEM</th>
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<th>REINFORCING BARS</th>
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<tr>
<td></td>
<td></td>
<td>CUTOFF</td>
</tr>
<tr>
<td>H t T W1 (TYPE 1) W2 (TYPE 2) F (TYPE 3) h A B C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6'-0&quot; (1.8 m) 6&quot; (150 mm) 12&quot; (300 mm) 2'-3&quot; (675 mm) 2'-3&quot; (675 mm) 2'-9&quot; (825 mm) 30&quot; (750 mm) #4 Ø 48&quot; (16MØ800EF) #4 Ø 48&quot; (16MØ800EF) #4 Ø 48&quot; (16MØ800EF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8'-0&quot; (2.4 m) 8&quot; (200 mm) 12&quot; (300 mm) 2'-9&quot; (825 mm) 2'-6&quot; (750 mm) 3'-3&quot; (975 mm) 30&quot; (750 mm) #4 Ø 32&quot; (13MØ600EF) #4 Ø 32&quot; (13MØ600EF) #4 Ø 32&quot; (13MØ600EF)</td>
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<tr>
<td>10'-0&quot; (3.0 m) 8&quot; (200 mm) 12&quot; (300 mm) 3'-0&quot; (900 mm) 3'-0&quot; (900 mm) 3'-9&quot; (1050 mm) 4'-3&quot; (1275 mm) #5 Ø 32&quot; (13MØ800EF) #4 Ø 32&quot; (16MØ800EF) #5 Ø 32&quot; (13MØ800EF)</td>
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### LATERAL LOAD = 20 PSF (960 Pa)

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<tr>
<td>H t T W1 (TYPE 1) W2 (TYPE 2) F (TYPE 3) h A B C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6'-0&quot; (1.8 m) 6&quot; (150 mm) 12&quot; (300 mm) 2'-9&quot; (825 mm) 2'-6&quot; (750 mm) 3'-3&quot; (975 mm) 30&quot; (750 mm) #5 Ø 32&quot; (13MØ800EF) #6 Ø 32&quot; (16MØ800EF) #4 Ø 32&quot; (13MØ800EF)</td>
<td></td>
<td></td>
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<tr>
<td>8'-0&quot; (2.4 m) 8&quot; (200 mm) 12&quot; (300 mm) 3'-3&quot; (975 mm) 3'-0&quot; (900 mm) 3'-9&quot; (1050 mm) 3'-9&quot; (1050 mm) #5 Ø 32&quot; (13MØ800EF) #6 Ø 32&quot; (16MØ800EF) #5 Ø 32&quot; (13MØ800EF)</td>
<td></td>
<td></td>
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<tr>
<td>10'-0&quot; (3.0 m) 8&quot; (200 mm) 12&quot; (300 mm) 4'-3&quot; (1275 mm) 3'-6&quot; (1050 mm) 4'-3&quot; (1275 mm) 50&quot; (1250 mm) #5 Ø 16&quot; (16MØ400EF) #4 Ø 32&quot; (16MØ400EF) #5 Ø 32&quot; (16MØ400EF)</td>
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### LATERAL LOAD = 25 PSF (1200 Pa)

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<td>CUTOFF</td>
</tr>
<tr>
<td>H t T W1 (TYPE 1) W2 (TYPE 2) F (TYPE 3) h A B C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6'-0&quot; (1.8 m) 6&quot; (150 mm) 12&quot; (300 mm) 3'-0&quot; (900 mm) 2'-9&quot; (825 mm) 3'-6&quot; (1050 mm) 30&quot; (750 mm) #5 Ø 16&quot; (16MØ400EF) #4 Ø 32&quot; (13MØ800EF) #4 Ø 32&quot; (13MØ800EF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8'-0&quot; (2.4 m) 8&quot; (200 mm) 12&quot; (300 mm) 3'-9&quot; (1125 mm) 3'-3&quot; (975 mm) 4'-0&quot; (1200 mm) 30&quot; (750 mm) #4 Ø 16&quot; (13MØ400EF) #4 Ø 32&quot; (13MØ800EF) #4 Ø 32&quot; (13MØ800EF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10'-0&quot; (3.0 m) 8&quot; (200 mm) 12&quot; (300 mm) 4'-9&quot; (1425 mm) 4'-0&quot; (1200 mm) 4'-9&quot; (1425 mm) 50&quot; (1250 mm) #5 Ø 16&quot; (16MØ400EF) #4 Ø 32&quot; (16MØ800EF) #5 Ø 32&quot; (16MØ800EF)</td>
<td></td>
<td></td>
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</tbody>
</table>

**NOTE**

Single Vertical Reinforcing Bars shall be centered in cell.
* For single A-Bars in Foundation, see Sheet 2.
Double rows of vertical reinforcing where indicated shall be placed at each face (EF).
DESIGN CRITERIA:

MATERIALS DESIGN DATA:

REINFORCING STEEL .......................................................... fy = 60 KSI (400 MPa)

CONCRETE 28TH-DAY STRENGTH:
FOOTING ......................................................................... f’c = 2,500 PSI (17 MPa)

CONCRETE MASONRY:
PARTIALLY GROUTED .......................................................... f’m = 1,500 PSI (10 MPa)

DESIGN CODE: ....................................................................... GOVERNING BUILDING CODE

DESIGN METHOD:

CONCRETE ........................................................................ ULTIMATE STRENGTH METHOD
CONCRETE MASONRY ........................................................ WORKING STRESS METHOD

FOUNDATION:

ALLOWABLE SOIL BEARING PRESSURE ......................... 1,000 PSF (48 kPa)
ALLOWABLE LATERAL SOIL BEARING PRESSURE .......... 100 PSF / FT OF DEPTH
(157 kPa / m OF DEPTH)
LATERAL SLIDING RESISTANCE AT CONTACT AREA ........... 130 PSF (6.2 kPa)
BUT NOT TO EXCEED 0.40 X DL
SOIL DENSITY ............................................................... 110 PCF (1760 k9/m³)

FACTORs OF SAFETY FOR SPREAD FOOTING (BASED ON SERVICE LOAD CONDITIONS):

OVERTURNING ................................................................. 1.75 MINIMUM
SLIDING ........................................................................... 1.5 MINIMUM

ONE THIRD INCREASE IS ALLOWED FOR SHORT TERM LOADS.
GENERAL NOTES:

1. CONSULT WITH LOCAL GOVERNING AGENCY FOR DETERMINATION OF LATERAL LOAD AND WALL TYPE LISTED IN TABLES, FOR PROJECT-SPECIFIC USE.

2. DISTANCE OF THE FOOTING FROM DESCENDING SLOPE SHALL BE PER LATEST GOVERNING BUILDING CODE OR PER AGENCY REQUIREMENTS.

3. SPECIAL INSPECTION IS NOT REQUIRED FOR WALLS.

4. GROUND LINE TO BE AT THE SAME ELEVATION ON BOTH SIDES OF THE WALL. WALL SHALL NOT BE USED TO RETAIN EARTH.

5. USE TABULAR INFORMATION FOR THE NEXT HIGHER H FOR INTERMEDIATE WALL HEIGHTS THAT ARE BETWEEN THE H'S GIVEN.

6. CONCRETE SHALL BE 500-C-2500 (295-C-17) PER SSPWC 201-1.1.2.

7. REINFORCING SHALL BE LAPPED A MINIMUM 48 BAR Dia. GRADE 60 UNLESS NOTED OTHERWISE PER SSPWC SECTION 201-2, 303-4.1.3, JOINT REINFORCING WIRE: ASTM A82.

8. ALL REINFORCED CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH SSPWC 303.

9. FOR TYPE OF BLOCKS, BOND PATTERN AND JOINT FINISH, SEE PROJECT PLANS.

10. ALL MASONRY CONSTRUCTION TO BE IN ACCORDANCE WITH SSPWC 303-4.

11. HOLLOW MASONRY UNITS...ASTM C-90. TYPE I, NORMAL WEIGHT UNITS.

   MORTAR ......1:1/2:3, PORTLAND CEMENT — LIME — SAND RATIO, 1800 PSI (13 MPa) PER SSPWC 202-2.2.1.

   GROUT ......1:3:2 PORTLAND CEMENT — SAND — PEA GRAVEL RATIO, 2,000 PSI (14 MPa) PER SSPWC 202-2.2.2.

12. PROVIDE FULL MORTAR BED AT THE BOTTOM OF THE FIRST COURSE AND OMIT MORTAR BETWEEN VERTICAL JOINTS OF LOWEST EXPOSED COURSE.

13. WHEN BLOCKS ARE LAID IN STACKED BOND, CONTINUOUS HORIZONTAL JOINT REINFORCEMENT SPACED AT 4'-0" (1200 mm) OC SHALL BE PROVIDED IN ADDITION TO THE BOND BEAM REINFORCEMENT PER SSPWC 303-4.1.2. LOCATE REINFORCEMENT IN JOINTS THAT ARE APPROXIMATE MIDPOINT BETWEEN BOND BEAMS.

14. BOND BEAMS SHALL BE PLACED AT TOP OF WALL AND SUBSEQUENTLY SPACED NOT TO EXCEED 4'-0" (1200 mm) O.C. BELOW.

15. ONLY CELLS WITH REINFORCING BARS SHALL BE GROUTED PER SSPWC 303-4.1.3.

16. HORIZONTAL JOINTS SHALL BE TOOLED CONCAVE OR WEATHERED. VERTICAL JOINTS SHALL BE TOOLED CONCAVE OR RAKED. WEATHERED AND RAKED JOINTS ARE NOT PERMITTED FOR SLUMPED BLOCKS.
FOR NARROWER ROADS, SEE NOTE 1

TOTAL WIDTH 18' TO 32'
(5.5 TO 9.8 m)

Hinge

DETAIL A

DETAIL B

DETAIL C

ROAD SURFACE

GALV PIPE

PCC, 1 CF
(0.03 m³)

3-1/2' ø x 8'-0'
(89 mm ø x 2.44 m)
GALV PIPE

TYPE K REFLECTOR

1/4" (6 mm)
"U" BOLT EA END

3/8" ø x 3/4"
(10 mm ø x 20 mm)
HOLD-OPEN STUD

BENT PLATE

ROD SLEEVE, GALV STL
1/8" (3 mm)

PLUNGER CUP

1" (25 mm)

DETAIL B

GATE CATCH
L 3-1/2"x3-1/2"x1/4"
(89x89x6 mm)

CHAIN HOLD
"U" BAR
1/4"x2"
(6x50 mm)

MARKER

1/4" (6 mm)
"U" BOLT EA END

SIDE VIEW

DETAIL C

SECTION E-E

ELEVATION

FRONT VIEW

DETAIL A

SIDE VIEW

DETAIL A

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PIPE GATE
FOR ACCESS ROADS

STANDARD PLAN
602-3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1995

SHEET 1 OF 2
NOTES:

1. FOR ROADWAYS 16'-0" (4.8 m) WIDE OR LESS, USE A SINGLE GATE. PLACE THE ANGLE CATCH ON A PERMANENT END POST.

2. PIPE SHALL BE STANDARD WEIGHT, PER AISC STANDARDS.

3. CUT THE PIPE TO PROVIDE A CLOSE FIT-UP OF THE JOINTS.

4. USE 100% PENETRATION WELDS FOR PIPE CONNECTIONS.

5. PAINT GATE WITH ONE COAT OF ALUMINUM PAINT AFTER FABRICATION.

6. GATE Hinges SHALL BE HEAVY DUTY, MALLEABLE IRON OR STEEL, INDUSTRIAL SERVICE TYPE, WITH 270° SWING.

7. TYPE K AND TYPE L MARKERS SHALL CONFORM TO STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION ("CALTRANS") STANDARDS. THE REFLECTORS SHALL BE FILM-TYPE.

8. SECURE NUTS AT U BOLT ENDS FROM REMOVAL BY WELDING OR PEENING AFTER INSTALLING MARKERS.

DETAIL D

CENTER POST
2-1/2" (64 mm) Ø

STOPPER
3-1/2" (89 mm) Ø
(89 mm Ø)

SLEEVE
3-1/2" Ø
(89 mm Ø)

PCC

12ø
(300 mm Ø)

2" (50 mm)

4" (100 mm)

2" R
(50 mm)

1/8" (3 mm)

#5 x 12" RE-BAR
(#15M x 300 mm)

1/8" (3 mm)

STL PLATE

PLUNGER CUP
ISOMETRIC

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PIPE GATE
FOR ACCESS ROADS

STANDARD PLAN

602-3

SHEET 2 OF 2
2" (51 mm) STD STL PIPE, RAILS AND POSTS

CAP DETAIL

NOTE 5

NON-SHRINK GROUT

TOP OF WALL

END OF WALL

6" (150 mm)

18" (460 mm)

10" MIN (250 mm)

3" MIN ø (75 mm)

9" MIN (230 mm)

18" (460 mm)

SECTION A-A

SECTION B-B

SECTION C-C

ELEVATION

SEE CALIFORNIA BUILDING CODE FOR HANDRAIL AND OTHER REQUIREMENTS FOR HANDICAPPED ACCESSIBLE RAMPS OTHER THAN CURB RAMPS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

METAL HAND RAILINGS

STANDARD PLAN


USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

Sheet 1 of 3
SEE SHEET 1 FOR BOTTOM RAIL, POSTS, PICKETS, AND POST EMBEDMENT

TOP RAIL DETAILS
SHEET 3

18" (460 mm)
18" (460 mm)

< 4" CLEAR (< 100 mm)

WELD ALL AROUND—SEE NOTE 5

T, TREAD WIDTH

12" (305 mm)

BACK OF SIDEWALK

2" MAX
(60 mm)

18°
(460 mm)

STAIR CURB

SEE SHEET 1 FOR BOTTOM RAIL, POSTS, PICKETS, AND POST EMBEDMENT

TYPE A

HANDRAIL INSTALLATION ON STAIRWAYS

TYPE C

SLIP JOINT DETAIL

CAP DETAIL FOR RAIL END

NOTES:

1. USE TYPE C WHERE ADJACENT GRADE IS MORE THAN 2'-6" (760 mm) BELOW LANDING OR SIDEWALK FINISHED SURFACE.

2. RAILS, POSTS, AND PICKETS SHALL BE GALVANIZED STEEL PIPE.
TOP RAIL TYPE 1

SECTION D-D

POSTS PER SHEET 1

TOP RAIL TYPE 2

SECTION E-E

SECTION F-F

WALL-MOUNTED HANDRAIL

BRACKETS EACH 8'-0" (2.44 m)
OR AS SHOWN ON PLANS.
MOUNT TOP BRACKET ABOVE
TOP STAIR NOSE.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
METAL HAND RAILINGS

STANDARD PLAN

606-4

SHEET 3 OF 3
LOL ~ 5 ~ 32° LOAD CASE I OR II

GUTTER EL OR TOE OF SLOPE INTERSECTION

EXPOSED FACE

VERTICAL

12° (300 mm)

2° (50 mm)

CLEAR

2° (50 mm) CLEAR

CONSTRUCTION JOINT

STOP

H = 8' to 12'
(2400 to 3600 mm)

16" (400 mm)

3" (75 mm) CLEAR

OPTIONAL KEY

SECTION

NUMBER ABOVE SHORT BARS IS DISTANCE, INCHES (mm), FROM TOP OF FOOTING TO END OF SHORT BARS

BARS ALONG EXPOSED FACE NOT SHOWN

FOR AND SHORT BARS

H = 6' (1800 mm) OR LESS:
NO SPLICES WITHIN 20" (500 mm) FROM TOP OF FOOTING

H MORE THAN 6' (1800 mm):
NO SPLICES WITHIN H/4 FROM TOP OF FOOTING

ELEVATION

SIMILAR TO CALTRANS TYPE 1A

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

REINFORCED CONCRETE RETAINING WALL TYPE 1

STANDARD PLAN

610-3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
### TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

<table>
<thead>
<tr>
<th>DESIGN H</th>
<th>4' (1200 mm)</th>
<th>6' (1800 mm)</th>
<th>8' (2400 mm)</th>
<th>10' (3000 mm)</th>
<th>12' (3600 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>3'-2&quot; (1000)</td>
<td>4'-2&quot; (1300)</td>
<td>5'-2&quot; (1600)</td>
<td>6'-2&quot; (1900)</td>
<td>7'-2&quot; (2200)</td>
</tr>
<tr>
<td>C</td>
<td>1'-0&quot; (300)</td>
<td>1'-4&quot; (400)</td>
<td>1'-8&quot; (500)</td>
<td>2'-0&quot; (600)</td>
<td>2'-4&quot; (700)</td>
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<tr>
<td>B</td>
<td>2'-2&quot; (700)</td>
<td>2'-10&quot; (900)</td>
<td>3'-6&quot; (1100)</td>
<td>4'-2&quot; (1300)</td>
<td>4'-10&quot; (1500)</td>
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<tr>
<td>🌃BARS</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 8&quot; (#16M @ 200)</td>
<td>#6 @ 8&quot; (#19M @ 200)</td>
<td>#6 @ 8&quot; (#25M @ 200)</td>
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<td>#5 @ 16&quot; (#16M @ 400)</td>
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<td>#5 @ 8&quot; (#16M @ 200)</td>
<td>#5 @ 8&quot; (#19M @ 200)</td>
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<tr>
<td>CASE I TOE PRESSURE, psf (kPa)</td>
<td>1590 (75)</td>
<td>1930 (95)</td>
<td>2240 (110)</td>
<td>2550 (125)</td>
<td>2840 (135)</td>
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<tr>
<td>CASE II TOE PRESSURE, psf (kPa)</td>
<td>1060 (50)</td>
<td>1460 (70)</td>
<td>1860 (90)</td>
<td>2280 (110)</td>
<td>2700 (130)</td>
</tr>
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</table>

**NOTES:**

1. SEE SPPWC 617 FOR STANDARD WALL DETAILS.
2. METRIC REINFORCING BAR SPACING IS IN MILLIMETERS.
LOADING CASE I, II, OR III
PER SPPWC 617

![Diagram of a retaining wall with various dimensions and symbols indicating load cases and construction details.]

**NOTE:**
SEE SPPWC 617 FOR STANDARD WALL DETAILS.

SIMILAR TO CALTRANS TYPE 1

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
REINFORCED CONCRETE
RETAINING WALL TYPE 2

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1993

STANDARD PLAN
611-3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 3
<table>
<thead>
<tr>
<th>DESIGN H</th>
<th>4' (1200 mm)</th>
<th>6' (1800)</th>
<th>8' (2400)</th>
<th>10' (3000)</th>
<th>12' (3600)</th>
<th>14' (4200)</th>
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<td>7'-2&quot; (2200)</td>
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<td>C</td>
<td>1'-0&quot; (300)</td>
<td>1'-4&quot; (400)</td>
<td>1'-8&quot; (500)</td>
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<td>2'-8&quot; (800)</td>
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<td>2'-10&quot; (900)</td>
<td>3'-6&quot; (1100)</td>
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<td>1'-4&quot; (400)</td>
<td>1'-4&quot; (400)</td>
<td>1'-4&quot; (400)</td>
<td>1'-6&quot; (450)</td>
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<td>BATTER</td>
<td>100:4</td>
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<tr>
<th>LOAD PRESSURE</th>
<th>CASE I</th>
<th>CASE II</th>
<th>CASE III</th>
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<tr>
<td><strong>LOAD</strong></td>
<td><strong>(80 kPa)</strong></td>
<td><strong>(80 kPa)</strong></td>
<td><strong>(80 kPa)</strong></td>
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<tr>
<td><strong>LOAD</strong></td>
<td><strong>1600 psf</strong></td>
<td><strong>1900 (90)</strong></td>
<td><strong>2200 (105)</strong></td>
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<tr>
<td><strong>LOAD</strong></td>
<td><strong>1100 (55)</strong></td>
<td><strong>1500 (70)</strong></td>
<td><strong>2000 (95)</strong></td>
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<tr>
<td><strong>LOAD</strong></td>
<td><strong>1300 (65)</strong></td>
<td><strong>1700 (80)</strong></td>
<td><strong>2100 (100)</strong></td>
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<th>16' (4800)</th>
<th>18' (5500)</th>
<th>20' (6100)</th>
<th>22' (6700)</th>
<th>24' (7300)</th>
<th>26' (7900)</th>
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<tbody>
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<td>9'-0&quot; (2750)</td>
<td>10'-0&quot; (3050)</td>
<td>11'-0&quot; (3350)</td>
<td>12'-0&quot; (3700)</td>
<td>13'-3&quot; (4050)</td>
<td>14'-3&quot; (4350)</td>
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<tr>
<td>C</td>
<td>3'-0&quot; (900)</td>
<td>3'-4&quot; (1000)</td>
<td>3'-8&quot; (1100)</td>
<td>4'-0&quot; (1200)</td>
<td>4'-5&quot; (1350)</td>
<td>4'-9&quot; (1450)</td>
</tr>
<tr>
<td>B</td>
<td>6'-0&quot; (1850)</td>
<td>6'-8&quot; (2050)</td>
<td>7'-4&quot; (2250)</td>
<td>8'-0&quot; (2500)</td>
<td>8'-10&quot; (2700)</td>
<td>9'-6&quot; (2900)</td>
</tr>
<tr>
<td>F</td>
<td>1'-6&quot; (450)</td>
<td>1'-6&quot; (450)</td>
<td>1'-6&quot; (450)</td>
<td>1'-8&quot; (500)</td>
<td>1'-10&quot; (550)</td>
<td>2'-2&quot; (650)</td>
</tr>
<tr>
<td>BATTER</td>
<td>100:4</td>
<td>100:4</td>
<td>100:4</td>
<td>100:4</td>
<td>100:5</td>
<td>100:6</td>
</tr>
</tbody>
</table>

| **LOAD** | **(80 kPa)** | **(80 kPa)** | **(80 kPa)** |
| **LOAD** | **(80 kPa)** | **(80 kPa)** | **(80 kPa)** |
| **LOAD** | **3500 psf** | **4000 (450)** | **4300 (450)** |
| **LOAD** | **3600 (175)** | **4200 (200)** | **4700 (225)** |
| **LOAD** | **3800 (180)** | **4300 (205)** | **4800 (230)** |

**METRIC REINFORCING BAR SPACING IS IN MILLIMETERS**

**STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION**

**STANDARD PLAN**

**REINFORCED CONCRETE RETAINING WALL TYPE 2**
LOL LOADING CASE IV
PER SPPWC 617
GUTTER ELEVATION OR
TOE OF SLOPE INTERSECTION

#5 @ 32" (#16M @ 800)
2" (50 mm) CLEAR
SHORT (c)

#5 @ 16" (#16M @ 400)
VERTICAL EXPOSED
FACE
2" (50 mm) CLEAR
SHORT (b)

CONSTRUCTION
JOINT
2" (50 mm) CLEAR

R = 9" (230 mm)

NOTE:
SEE SPPWC 617 FOR STANDARD WALL DETAILS.

SIMILAR TO CALTRANS TYPE 2

REINFORCED CONCRETE
RETAINING WALL TYPE 3

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE

612-3

STANDARD PLAN
SHEET 1 OF 3
NUMBER ABOVE BARS SHOW DISTANCE, INCHES (mm), FROM TOP OF FOOTING TO UPPER END OF BARS.

ATT AND SHORT BARS: FOR H More THAN 6 ft (1800 mm) OR LESS NO SPLICES WITHIN 20 in (500 mm) FROM TOP OF FOOTING.

BARS ALONG EXPOSED FACE NOT SHOWN.
<table>
<thead>
<tr>
<th>DESIGN H</th>
<th>6' (1800 mm)</th>
<th>8' (2400)</th>
<th>10' (3000)</th>
<th>12' (3600)</th>
<th>14' (4200)</th>
<th>16' (4800)</th>
<th>18' (5500)</th>
<th>20' (6100)</th>
<th>22' (6700)</th>
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</thead>
<tbody>
<tr>
<td>W</td>
<td>3'-10&quot; (1200)</td>
<td>5'-3&quot; (1600)</td>
<td>6'-7&quot; (2000)</td>
<td>8'-1&quot; (2500)</td>
<td>9'-10&quot; (3000)</td>
<td>11'-4&quot; (3500)</td>
<td>13'-0&quot; (4000)</td>
<td>14'-10&quot; (4600)</td>
<td>17'-6&quot; (5400)</td>
</tr>
<tr>
<td>C</td>
<td>1'-4&quot; (400)</td>
<td>1'-7&quot; (500)</td>
<td>1'-10&quot; (550)</td>
<td>2'-1&quot; (650)</td>
<td>2'-6&quot; (750)</td>
<td>2'-10&quot; (850)</td>
<td>3'-1&quot; (950)</td>
<td>3'-8&quot; (1150)</td>
<td>4'-4&quot; (1350)</td>
</tr>
<tr>
<td>B</td>
<td>2'-6&quot; (800)</td>
<td>3'-8&quot; (1100)</td>
<td>4'-9&quot; (1450)</td>
<td>6'-0&quot; (1850)</td>
<td>7'-4&quot; (2250)</td>
<td>8'-6&quot; (2650)</td>
<td>9'-11&quot; (3050)</td>
<td>11'-2&quot; (3450)</td>
<td>13'-2&quot; (3850)</td>
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<td>F</td>
<td>1'-4&quot; (400)</td>
<td>1'-4&quot; (400)</td>
<td>1'-4&quot; (400)</td>
<td>1'-4&quot; (400)</td>
<td>1'-6&quot; (550)</td>
<td>1'-10&quot; (650)</td>
<td>2'-2&quot; (650)</td>
<td>2'-6&quot; (750)</td>
<td>2'-10&quot; (850)</td>
</tr>
<tr>
<td>G</td>
<td>12&quot; (300)</td>
<td>12&quot; (300)</td>
<td>12&quot; (300)</td>
<td>18&quot; (450)</td>
<td>18&quot; (450)</td>
<td>18&quot; (450)</td>
<td>18&quot; (450)</td>
<td>18&quot; (450)</td>
<td>18&quot; (450)</td>
</tr>
<tr>
<td>S1</td>
<td>14&quot; (350)</td>
<td>16&quot; (400)</td>
<td>16&quot; (400)</td>
<td>16&quot; (400)</td>
<td>16&quot; (400)</td>
<td>16&quot; (400)</td>
<td>16&quot; (400)</td>
<td>16&quot; (400)</td>
<td>16&quot; (400)</td>
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<tr>
<td>S2</td>
<td>35 BAR DIA</td>
<td>35 BAR DIA</td>
<td>35 BAR DIA</td>
<td>35 BAR DIA</td>
<td>45 BAR DIA</td>
<td>45 BAR DIA</td>
<td>45 BAR DIA</td>
<td>45 BAR DIA</td>
<td>45 BAR DIA</td>
</tr>
<tr>
<td>BATTERY</td>
<td>100:4</td>
<td>100:4</td>
<td>100:4</td>
<td>100:4</td>
<td>100:4</td>
<td>100:4</td>
<td>100:4</td>
<td>100:5</td>
<td>100:6</td>
</tr>
<tr>
<td>(a) BARS</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#6 @ 16&quot; (#19M @ 200)</td>
<td>#8 @ 16&quot; (#25M @ 200)</td>
<td>#8 @ 16&quot; (#25M @ 200)</td>
<td>#8 @ 16&quot; (#25M @ 300)</td>
</tr>
<tr>
<td>(b) BARS</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 8&quot; (#16M @ 200)</td>
<td>#6 @ 8&quot; (#19M @ 200)</td>
<td>#8 @ 8&quot; (#25M @ 200)</td>
<td>#9 @ 8&quot; (#29M @ 200)</td>
<td>#11 @ 8&quot; (#36M @ 200)</td>
<td>#11 @ 8&quot; (#36M @ 200)</td>
<td>#11 @ 8&quot; (#36M @ 175)</td>
<td>#11 @ 6&quot; (#36M @ 150)</td>
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<tr>
<td>(c) BARS</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#6 @ 16&quot; (#19M @ 400)</td>
<td>#6 @ 8&quot; (#19M @ 200)</td>
<td>#8 @ 8&quot; (#25M @ 200)</td>
<td>#8 @ 8&quot; (#25M @ 200)</td>
<td>#8 @ 8&quot; (#25M @ 200)</td>
<td>#8 @ 8&quot; (#25M @ 175)</td>
<td>#8 @ 6&quot; (#25M @ 150)</td>
</tr>
<tr>
<td>TOE PRESS.</td>
<td>2540 psf (125 kPa)</td>
<td>3170 (155)</td>
<td>3880 (185)</td>
<td>4470 (215)</td>
<td>4950 (240)</td>
<td>5720 (275)</td>
<td>6540 (315)</td>
<td>(6970)</td>
<td>6990 (335)</td>
</tr>
</tbody>
</table>

Metric reinforcing bar spacing is in millimeters.
LOL LOADING CASE I, II OR IV PER STANDARD PLAN 617

GUTTER ELEVATION OR TOE OF SLOPE INTERSECTION

#5 @ 32" (#16M @ 800)

2" (50 mm) CLEAR

#4 (#13M) PER SHEET 2

#5 @ 16" (#16M @ 400)

VERTICAL EXPOSED FACE

2" (50 mm) CLEAR

CONSTRUCTION JOINT

STOP

SEE FORESLOPE DETAIL, SHEET 2

12" (300 mm) ^

15° (300 mm) W

3" (75 mm) CLEAR

OPTIONAL KEY

G

R = 9" (230 mm)

W/2

W

SEE SSPWC 617 FOR STANDARD WALL DETAILS.

NOTES:

FOR H LT 8' (2400 mm) S1 = C-2" (S1 = C-50 mm)

FOR H GE 8' (2400 mm) S1 = W/3

NO SIMILAR CALTRANS TYPE
FILL PER STD PLAN 617

MAX 1:1.5 SLOPE

FORESLOPE

5' (1500 mm) MIN FOR H=6' (1800 mm) OR LESS
8' (2400 mm) MIN FOR H MORE THAN 6' (1800 mm)

NUMBER ABOVE BAR SHOWS DISTANCE, INCHES (mm), FROM TOP OF FOOTING TO END OF BAR.

H=12' (3600 mm)
H=10' (3000 mm)
H=8' (2400 mm)
H=6' (1800 mm)
H=4' (1200 mm)

BARS ALONG EXPOSED FACE NOT SHOWN

LAP #4 (#13M) BARS BY 18" (450 mm) WITH 18" BARS

LOAD
CASE I
18" (450 mm)
15" (380 mm)
7 1/2" (190 mm)
6 3/4" (170 mm)
5 3/4" (145 mm)

CASE II
18" (450 mm)
14 1/2" (370 mm)
8" (200 mm)
6" (150 mm)
5" (125 mm)

ELEVATION
### LOAD CASE I OR II

<table>
<thead>
<tr>
<th>H</th>
<th>4' (1200 mm)</th>
<th>6' (1800)</th>
<th>8' (2400)</th>
<th>10' (3000)</th>
<th>12' (3600)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>3'-8&quot; (1120)</td>
<td>5'-3&quot; (1600)</td>
<td>7'-1&quot; (2160)</td>
<td>9'-4&quot; (2840)</td>
<td>11'-9&quot; (3580)</td>
</tr>
<tr>
<td>F</td>
<td>0'-10&quot; (250)</td>
<td>0'-10&quot; (250)</td>
<td>0'-10&quot; (250)</td>
<td>0'-11&quot; (280)</td>
<td>1'-1&quot; (330)</td>
</tr>
<tr>
<td>C</td>
<td>2'-4&quot; (710)</td>
<td>3'-11&quot; (1190)</td>
<td>5'-9&quot; (1750)</td>
<td>8'-0&quot; (2440)</td>
<td>10'-5&quot; (3180)</td>
</tr>
<tr>
<td>G</td>
<td>8&quot; (200)</td>
<td>8&quot; (200)</td>
<td>8&quot; (200)</td>
<td>12&quot; (300)</td>
<td>12&quot; (300)</td>
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<tr>
<td>BATTER</td>
<td>NONE</td>
<td>NONE</td>
<td>NONE</td>
<td>NONE</td>
<td>100:1</td>
</tr>
</tbody>
</table>

**殉BARS**
- #4 @ 18" (#13M @ 450)
- #5 @ 15" (#16M @ 380)
- #4 @ 15" (#13M @ 380)
- #5 @ 13 1/2" (#16M @ 340)
- #6 @ 11 1/2" (#19M @ 290)

**殉BARS**
- #6 @ 15" (#19M @ 380)
- #7 @ 13 1/2" (#22M @ 340)
- #7 @ 11 1/2" (#22M @ 290)

**殉BARS**
- #4 @ 18" (#13M @ 450)
- #4 @ 15" (#13M @ 380)
- #4 @ 15" (#13M @ 380)
- #4 @ 13 1/2" (#13M @ 340)
- #4 @ 11 1/2" (#13M @ 290)

**TOE SOIL PRESSURE**
- 630 psf (30 kPa)
- 650 (30)
- 660 (30)
- 660 (30)
- 700 (35)

### LOAD CASE IV

<table>
<thead>
<tr>
<th>H</th>
<th>4' (1200 mm)</th>
<th>6' (1800)</th>
<th>8' (2400)</th>
<th>10' (3000)</th>
<th>12' (3600)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>3'-8&quot; (1120)</td>
<td>5'-3&quot; (1600)</td>
<td>7'-1&quot; (2160)</td>
<td>9'-4&quot; (2840)</td>
<td>11'-10&quot; (3600)</td>
</tr>
<tr>
<td>F</td>
<td>0'-10&quot; (250)</td>
<td>0'-10&quot; (250)</td>
<td>0'-10&quot; (250)</td>
<td>1'-0&quot; (300)</td>
<td>1'-3&quot; (380)</td>
</tr>
<tr>
<td>C</td>
<td>2'-4&quot; (710)</td>
<td>3'-11&quot; (1190)</td>
<td>5'-9&quot; (1750)</td>
<td>8'-0&quot; (2440)</td>
<td>10'-5&quot; (3180)</td>
</tr>
<tr>
<td>G</td>
<td>8&quot; (200)</td>
<td>8&quot; (200)</td>
<td>8&quot; (200)</td>
<td>12&quot; (300)</td>
<td>12&quot; (300)</td>
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<tr>
<td>BATTER</td>
<td>NONE</td>
<td>NONE</td>
<td>NONE</td>
<td>NONE</td>
<td>100:1</td>
</tr>
</tbody>
</table>

**殉BARS**
- #4 @ 18" (#13M @ 450)
- #5 @ 14 1/2" (#16M @ 370)
- #4 @ 16" (#13M @ 400)
- #5 @ 12" (#16M @ 300)
- #6 @ 10" (#19M @ 250)

**殉BARS**
- #7 @ 16" (#22M @ 400)
- #7 @ 12" (#22M @ 300)
- #7 @ 10" (#22M @ 250)

**殉BARS**
- #4 @ 18" (#13M @ 450)
- #4 @ 14 1/2" (#13M @ 370)
- #4 @ 16" (#13M @ 400)
- #4 @ 12" (#13M @ 300)
- #4 @ 10" (#13M @ 250)

**TOE SOIL PRESSURE**
- 490 psf (25 kPa)
- 560 (25)
- 610 (30)
- 680 (35)
- 750 (35)
NOTE:
SEE SPPWC 617 FOR STANDARD WALL DETAILS.
FILL PER STD PLAN 617

MAX 1:1.5 SLOPE

5' (1500 mm) MIN FOR H = 6' (1800 mm) OR LESS

8' (2400 mm) MIN FOR H MORE THAN 6' (1800 mm)

FORESLOPE

NUMBER ABOVE BAR IS DISTANCE, INCHES (mm), FROM TOP OF FOOTING TO TOP OF BAR

BARS ALONG EXPOSED FACE NOT SHOWN

LOAD

CASE I OR II

18" (450 mm)

12" (300 mm)

9" (225 mm)

7" (180 mm)

7 1/4" (185 mm)

LOAD

CASE IV

18" (450 mm)

12" (300 mm)

5 1/4" (135 mm)

6 1/4" (180 mm)

6 1/2" (185 mm)

ELEVATION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

REINFORCED CONCRETE RETAINING WALL TYPE 5

SHEET 2 OF 3
### LOAD CASE I OR II

<table>
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<th>H</th>
<th>4'</th>
<th>6'</th>
<th>8'</th>
<th>10'</th>
<th>12'</th>
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<tbody>
<tr>
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<td>(1200 mm)</td>
<td>(1800)</td>
<td>(2400)</td>
<td>(3000)</td>
<td>(3600)</td>
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<td>3'-9&quot;</td>
<td>4'-10&quot;</td>
<td>6'-0&quot;</td>
<td>7'-2&quot;</td>
<td>8'-4&quot;</td>
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<tr>
<td></td>
<td>(1120)</td>
<td>(1470)</td>
<td>(1830)</td>
<td>(2180)</td>
<td>(2540)</td>
</tr>
<tr>
<td>F</td>
<td>0'-10&quot;</td>
<td>0'-10&quot;</td>
<td>0'-10&quot;</td>
<td>0'-10&quot;</td>
<td>1'-0&quot;</td>
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<td>(250)</td>
<td>(250)</td>
<td>(250)</td>
<td>(250)</td>
<td>(300)</td>
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<tr>
<td>C</td>
<td>2'-4&quot;</td>
<td>3'-6&quot;</td>
<td>4'-8&quot;</td>
<td>5'-10&quot;</td>
<td>6'-10&quot;</td>
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<tr>
<td></td>
<td>(710)</td>
<td>(1070)</td>
<td>(1420)</td>
<td>(1780)</td>
<td>(2080)</td>
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<tr>
<td>G</td>
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<td>8&quot;</td>
<td>8&quot;</td>
<td>12&quot;</td>
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<td>(200)</td>
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<td>(200)</td>
<td>(200)</td>
<td>(300)</td>
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<td>BATTER</td>
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<td>NONE</td>
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<td>NONE</td>
<td>100:1.5</td>
</tr>
</tbody>
</table>

**BARS**
- **G** BARS: 4 @ 18" (#13M @ 460)
- **B** BARS: #5 @ 18" (#16M @ 460)
- **C** BARS: 8 @ 18" (#25M @ 460)

**TOE SOIL PRESSURE**
- 1110 psf (55 kPa)
- 1580 (75)
- 2040 (100)
- 2500 (120)
- 3050 (145)

### LOAD CASE IV

<table>
<thead>
<tr>
<th>H</th>
<th>4'</th>
<th>6'</th>
<th>8'</th>
<th>10'</th>
<th>12'</th>
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<tbody>
<tr>
<td></td>
<td>(1200 mm)</td>
<td>(1800)</td>
<td>(2400)</td>
<td>(3000)</td>
<td>(3600)</td>
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<td>W</td>
<td>3'-8&quot;</td>
<td>5'-8&quot;</td>
<td>7'-11&quot;</td>
<td>10'-3&quot;</td>
<td>12'-8&quot;</td>
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<tr>
<td></td>
<td>(1120)</td>
<td>(1730)</td>
<td>(2410)</td>
<td>(3120)</td>
<td>(3860)</td>
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<tr>
<td>F</td>
<td>0'-10&quot;</td>
<td>0'-10&quot;</td>
<td>0'-11&quot;</td>
<td>1'-0&quot;</td>
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</tr>
<tr>
<td></td>
<td>(250)</td>
<td>(250)</td>
<td>(275)</td>
<td>(300)</td>
<td>(350)</td>
</tr>
<tr>
<td>C</td>
<td>2'-4&quot;</td>
<td>4'-4&quot;</td>
<td>6'-7&quot;</td>
<td>8'-10&quot;</td>
<td>11'-1&quot;</td>
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<td>(1320)</td>
<td>(2010)</td>
<td>(2690)</td>
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<td>8&quot;</td>
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<td>12&quot;</td>
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<td>(200)</td>
<td>(200)</td>
<td>(200)</td>
<td>(200)</td>
<td>(300)</td>
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<td>NONE</td>
<td>NONE</td>
<td>100:1</td>
<td>100:2</td>
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</table>

**BARS**
- **G** BARS: 4 @ 18" (#13M @ 450)
- **B** BARS: 4 @ 12" (#13M @ 305)
- **C** BARS: 5 @ 10 1/2" (#16M @ 265)

**TOE SOIL PRESSURE**
- 1480 psf (70 kPa)
- 2220 (105)
- 3120 (150)
- 4120 (195)
- 5170 (250)
LOL LOADING CASE I, II, III OR IV
PER SPPWC 617

GUTTER EL OR TOE OF SLOPE INTERSECTION

2" (50 mm) CLEAR
#5 @ 32" (#16M @ 800)

BATTER BACKFACE

EXPOSED FACE

SHORT Bars

#5 @ 16" (#16M @ 400)

CONSTRUCTION JOINT

3" (75 mm) CLEAR

8" (200 mm) FOR H=10' (3000 mm)
OR LESS
12" (300 mm) FOR H=12' (3600 mm)

OPTIONAL KEY

SECTION

NUMBER ABOVE SHORT Bars IS DISTANCE, INCHES (mm), FROM TOP OF FOOTING TO END OF BARS

BARS ALONG EXPOSED FACE NOT SHOWN

H=12' (3600 mm)
H=10' (3000 mm)
H=8' (2400 mm)
H=6' (1800 mm)
H=4' (1200 mm)

3'-6" (1000)
3'-3" (750)
1'-6" (450)
6" (150)
5" (125)

16" (400)
8" (200)
6" (150)
5" (125)

ELEVATION

SIMILAR TO CALTRANS TYPE 5

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

REINFORCED CONCRETE
RETAINING WALL TYPE 6

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN
615-4

SHEET 1 OF 2
## TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

<table>
<thead>
<tr>
<th>DESIGN H</th>
<th>4' (1200 mm)</th>
<th>6' (1800)</th>
<th>8' (2400)</th>
<th>10' (3000)</th>
<th>12' (3600)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>4'-0&quot; (1250)</td>
<td>5'-0&quot; (1550)</td>
<td>6'-6&quot; (2000)</td>
<td>8'-0&quot; (2450)</td>
<td>9'-6&quot; (2900)</td>
</tr>
<tr>
<td>F</td>
<td>16&quot; (400)</td>
<td>16&quot; (400)</td>
<td>18&quot; (450)</td>
<td>18&quot; (450)</td>
<td>22&quot; (550)</td>
</tr>
<tr>
<td>BATTER</td>
<td>NONE</td>
<td>NONE</td>
<td>NONE</td>
<td>100:3</td>
<td>100:6</td>
</tr>
<tr>
<td>a BARS</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 12&quot; (#16M @ 300)</td>
<td>#5 @ 10&quot; (#16M @ 250)</td>
</tr>
<tr>
<td>SHORT a BARS</td>
<td></td>
<td></td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 12&quot; (#16M @ 300)</td>
<td>#5 @ 10&quot; (#16M @ 250)</td>
</tr>
<tr>
<td>b BARS</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 16&quot; (#16M @ 400)</td>
<td>#5 @ 8&quot; (#16M @ 200)</td>
<td>#5 @ 6&quot; (#16M @ 150)</td>
<td>#5 @ 5&quot; (#16M @ 125)</td>
</tr>
</tbody>
</table>

### CASE I
- psf: 1600 (80), 2200 (105), 2500 (120), 3000 (145), 3500 (170) (kPa)

### CASE II
- psf: 1500 (75), 2100 (100), 2700 (130), 3400 (165), 4100 (195) (kPa)

### CASE III
- psf: 1600 (80), 2300 (110), 2900 (140), 3800 (185), 4400 (210) (kPa)

### CASE IV
- psf: 2000 (95), 3200 (155), 4200 (200), 5300 (255), 6500 (310) (kPa)

### NOTES:
1. SEE SPPWC 617 FOR STANDARD WALL DETAILS.
2. METRIC REINFORCING BAR SPACING IS IN MILLIMETERS.
DESIGN LOADING
CASE I OR II PER
SPPWC 617

PCC STEM

#5 @ 16" (#16M @ 400)
7 5/8" (194 mm)

#5 @ 16" (#16M @ 400)

6" (150 mm)

2" MIN (50 mm)

H = 6' - 0" MAX
(1830 mm)

8" (200 mm)

W/2

W

TOTAL 5

TYPE 7A

TYPE 7B

AT(4) BARS, NO SPLICES WITHIN
20" (500 mm) FROM TOP OF FOOTING

NOTES:
1. SEE SPPWC 617 FOR STANDARD WALL DETAILS.
2. METRIC REINFORCING BAR SPACING IS IN MILLIMETERS.

SIMILAR TO CALTRANS TYPE 6

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

REINFORCED CONCRETE RETAINING WALL TYPE 7

STANDARD PLAN 616–3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2
### TYPE 7A WALL

<table>
<thead>
<tr>
<th>DESIGN H</th>
<th>3'-4&quot; (1020 mm)</th>
<th>4'-0&quot; (1220)</th>
<th>4'-8&quot; (1420)</th>
<th>5'-4&quot; (1630)</th>
<th>6'-0&quot; (1830)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>3'-2&quot; (1000)</td>
<td>3'-6&quot; (1100)</td>
<td>3'-10&quot; (1200)</td>
<td>4'-2&quot; (1300)</td>
<td>4'-6&quot; (1400)</td>
</tr>
<tr>
<td>(d) BARS</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 300)</td>
<td>#5 @ 12&quot; (#16M @ 300)</td>
</tr>
</tbody>
</table>

### TYPE 7B WALL

<table>
<thead>
<tr>
<th>DESIGN H</th>
<th>3'-4&quot; (1020 mm)</th>
<th>4'-0&quot; (1220)</th>
<th>4'-8&quot; (1420)</th>
<th>5'-4&quot; (1630)</th>
<th>6'-0&quot; (1830)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>2'-8&quot; (850)</td>
<td>3'-0&quot; (950)</td>
<td>3'-4&quot; (1050)</td>
<td>3'-8&quot; (1150)</td>
<td>4'-0&quot; (1250)</td>
</tr>
<tr>
<td>(d) BARS</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 300)</td>
<td>#5 @ 12&quot; (#16M @ 300)</td>
</tr>
<tr>
<td>(e) BARS</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 300)</td>
<td>#5 @ 12&quot; (#16M @ 300)</td>
</tr>
</tbody>
</table>
PARABOLIC

VERTICAL CURVE AT TOP OF WALL SLOPE CHANGE
USE WHERE SHOWN ON THE PLANS

12" MIN
(300 mm)
6"
(150 mm)

WATERSTOP
WHEN REQUIRED

18" MIN
(450 mm)
3" (75 mm)

WEEP HOLE & BACKFILL PER DETAIL, SHEET 3

FOOTING STEP

VERTICAL LOL

OFFSET = H
200

APPROXIMATE WALL OFFSET VALUES
VALUES FOR OFFSETTING FORMS WILL BE DETERMINED BY THE ENGINEER

TYPICAL FOOTING LAYOUT

SIMILAR TO CALTRANS STD PLANS B0-3, B3-8 AND B3-9
DESIGN LOADING CASES

DESIGN CONDITIONS:

DESIGN H MAY BE EXCEEDED BY 6" (150 mm) BEFORE USING VALUES SHOWN FOR NEXT GREATER H.

SPECIAL FOOTING DESIGN IS REQUIRED WHERE FOUNDATION MATERIAL IS INCAPABLE OF SUPPORTING TOE PRESSURES SHOWN ON WALL STANDARD PLANS.

RETURN WALL NOT REQUIRED IF NOT SHOWN ON PLANS.

DESIGN DATA:

\[ f_c = 1,300 \text{ psi (10 MPa)} \quad f'_c = 3,250 \text{ psi (25 MPa)} \quad f_s = 24 \text{ ksi (168 MPa)} \]

\[ n = 10 \quad \text{SOIL WEIGHT} = 120 \text{ pcf (19 kN/m}^3) \]

240 psf (11.5 kPa) SURCHARGE:

EQUIVALENT FLUID PRESSURE =

- 36 psf/ft (5.6 kPa/m) MAXIMUM FOR DETERMINATION OF TOE PRESSURE.
- 27 psf/ft (4.2 kPa/m) MINIMUM FOR DETERMINATION OF HEEL PRESSURE.

EARTH PRESSURES FOR 1:2 UNLIMITED SLOPE, 1:1.5 SLOPE, AND 1:1.5 UNLIMITED SLOPE DETERMINED FROM RANKINE'S FORMULA WITH \( \phi = 33°42' \).

CUT OR BUTT EVERY OTHER FRONT FACE HORIZONTAL BAR AT WEAKENED PLANE JOINT

JOINT MAY BE FORMED WITH 1/8" (3 mm) HARDBOARD AND CUT BACK TO THE ROOT OF THE CHAMFER ON THE EXPOSED FACE.

SEE DETAIL A

SECTION DETAILS

WEAKENED PLANE JOINT
WALL EXPANSION JOINTS AND WEAKENED PLANES

RETAINING WALL UTILITY OPENING
MAX SIZE OF OPENING A = 48" (1200 mm)

NOTES:
1. STANDARD VERTICAL REINFORCEMENT PLUS ADDITIONAL VERTICAL BARS MATCHING SIZE AND NUMBER OF BARS CUT BY THE OPENING. PLACE HALF ON EACH SIDE. EXTEND THE ADDITIONAL BARS INTO THE FOOTING THE SAME AS THE OTHER VERTICAL WALL REINFORCEMENT AND TO A MINIMUM OF 60 BAR DIAMETERS ABOVE THE TOP OF UTILITY OPENING IF WALL HEIGHT PERMITS. BUNDLE BARS AS REQUIRED.

2. HORIZONTAL REINFORCEMENT IS STANDARD EXCEPT AS SHOWN.

3. ALL REINFORCEMENT SHALL CLEAR OPENING BY 2" (50 mm) MIN.

4. ADJUST EXPANSION JOINT LOCATIONS TO FALL OUTSIDE THE LIMITS OF SPECIAL REINFORCING.
NOTES

A. 4" (100 mm) DIA DRAINS EACH 25' (7.6 m) MAX. FOR WALLS ADJACENT TO SIDEWALKS OR CURBS, PROVIDE CURB DRAINS PER SPPWC 150 OR 151. PLACE EXPOSED WALL DRAINS AT LEAST 3" (75 mm) ABOVE FINISHED GRADE.

B. ALUMINUM OR GALV STEEL WIRE MESH HARDWARE CLOTH, WIRES 0.03" (0.64 mm) DIA. EACH 1/4" (6 mm). ANCHOR FIRMLY TO BACKFACE.

C. 1 CF (0.03 m³) PERVERSIOUS BACKFILL MATERIAL IN NONWOVEN FILTER FABRIC, SECURELY TIED.

D. PERVERSIOUS BACKFILL MATERIAL CONTINUOUS BEHIND RETAINING WALL.

WATERSTOP NOTES:

1. HOLES PERMITTED IN THE OUTER 1/2" (13 mm) OF THE WEB FOR WIRE, RINGS, ETC. TIE WEB TO #3 (#10M) REBARS EACH 16" (400 mm) MAX TO SUPPORT THE WATERSTOP IN POSITION DURING PCC PLACEMENT OR SUBMIT ALTERNATIVE TO ENGINEER FOR APPROVAL.

2. WATERSTOP SHALL HAVE 5 OR MORE PAIRS OF RAISED RIBS TO PROVIDE 0.1 SQ IN (65 mm²) MINIMUM RIB CROSS-SECTION AREA ON EACH HALF OF THE WATERSTOP.
WALL DRAINAGE
WHERE GUTTER NOT REQUIRED

PLAN - OFFSET WALL
PLAN - CONTINUOUS WALL
DRAIN THROUGH RETURN WALL

RETURN WALL
LOL
10" (250 mm)

RETURN WALL
LOL
10" (250 mm)

TOP OF WALL
RETURN WALL

1% MIN
TOP OF WALL

WALL GUTTER OUTLET
TO FACE OF WALL

WALL GUTTER OUTLET TO CURB

CURB DRAIN PER SPPWC 150 OR 151

MIN 4" (100 mm) PLASTIC PIPE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
REINFORCED CONCRETE
RETAINING WALL DETAILS

STANDARD PLAN
617-3
SHEET 5 OF 8
24" x 12" (75 x 300 mm) OVERFLOW SCUPPER WHERE SHOWN ON PLANS

SLOPE AS SPECIFIED

GUTTER ELEVATION

TYPICAL GUTTER DETAIL

6" x 14" (150 x 350 mm) STD PIPE
6-3/4" x 10" (20 x 250 mm)
SLOTS IN PIPE, EQUALLY SPACED

#5 x 7" REINF
(#16M x 175 mm)
TACK WELD TO TOP OF PIPE;
END FLUSH WITH PIPE

3" (75 mm) RECESS FOR PIPE

1" MIN (25 mm)

1:1

WALL DRAIN DETAIL

12" MIN (300 mm)

PLASTIC PIPE

WALL DRAIN WITH PIPE DOME

1" MIN (25 mm)

PLASTIC PIPE

GRATE DETAIL

SIZE TO FIT STANDARD HUBS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

REINFORCED CONCRETE

RETAINING WALL DETAILS

STANDARD PLAN

617-3

SHEET 6 OF 8
**PLAN**

RETURN WALL TYPE "D"

**PLAN**

RETURN WALL TYPE "A"

**ELEVATION**

RETURN WALL TYPE "D"
USE WHERE H = 6' (1800 mm) OR LESS

METRIC REINFORCING BAR
SPACING IS IN MILLIMETERS

RETURN WALL TYPE "A"
USE WHERE H = 8' (2400 mm) OR LESS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

REINFORCED CONCRETE
RETAINING WALL DETAILS

STANDARD PLAN

617-3
SHEET 7 OF 8
PLAN
RETURN WALL TYPE "B"

PLAN
RETURN WALL TYPE "C"

ELEVATION
RETURN WALL TYPE "B"
USE AT OFFSET WALLS WHERE
H=10' (3000 mm) OR MORE

ELEVATION
RETURN WALL TYPE "C"
USE AT STRAIGHT WALLS WHERE
H=10' (3000 mm) OR MORE

METRIC REINFORCING BAR
SPACING IS IN MILLIMETERS
MASSONRY RETAINING WALL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1993

MASONRY RETAINING WALL

SIMILAR TO CALTRANS TYPE 6

LOADING CASE I OR II
PER SPPWC 617

2” (50 mm) CEMENT
MORTAR CAP

MASONRY
STEM

2” CLEAR
(50 mm)

2” CLEAR
(50 mm)

BUNDLED

H=6’-0” MAX
(1830 mm)

2-8” MIN
(615 mm)

7-1/2”
(194 mm)

H=4’-8” MAX
(1422 mm)

8”
(200 mm)

1-1/2”
(40 mm)

12” MIN
(300 mm)

12” MIN
(300 mm)

12” MIN
(300 mm)

2-#5 (#16M)
BUNDLED

#5 (#16M)
7-1/2”
(194 mm)

#5 (#16M)
11-5/8”
(295 mm)

6”
(150 mm)

W/2

OPTIONAL KEY

FINISHED GRADE

LEAK

BUNDLED

#5 ~ 16”
(400)

#5 ~ 16”
(400)

2-#5 (#16M)

8”
(200 mm)

W

GUARDRAIL
WHERE REQUIRED

NO SPLICES ALLOWED
IN (A), (B), OR (C) BARS

TYPE A

W

W

3” CLEAR
(75 mm)

3” CLEAR
(75 mm)

2” CLEAR
(50 mm)

#5 @ 16”
(#16M @ 400)

#5 @ 16”
(#16M @ 400)

2” (50 mm)

#5 (#16M)
TOTAL 5

#5 (#16M)
TOTAL 5

#5 (#16M)

8”
(200 mm)

W

W

2” (50 mm)

2” (50 mm)

4’ MIN
(1200 mm)

4’ MIN
(1200 mm)

6”
(150 mm)

6”
(150 mm)

W

W

TYPE B

STANDARD PLAN

618-3

SHEET 1 OF 3
FINISHED GRADE, FRONT FACE

OMIT MORTAR FROM VERTICAL JOINT IN FIRST COURSE ABOVE FINISHED GRADE AT 2'-8" (813 mm) CENTERS FOR WEEP HOLES. FILL ALL CELLS WITH GROUT.

ELEVATION

SECTION A-A

FOOTING STEP DETAILS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MASONRY RETAINING WALL

STANDARD PLAN

618-3

SHEET 2 OF 3
### TYPE A WALL

<table>
<thead>
<tr>
<th>DESIGN H</th>
<th>3'-4&quot; (1020)</th>
<th>4'-0&quot; (1220)</th>
<th>4'-8&quot; (1420)</th>
<th>5'-4&quot; (1630)</th>
<th>6'-0&quot; (1830)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>W</strong></td>
<td>3'-2&quot; (1000 mm)</td>
<td>3'-6&quot; (1100)</td>
<td>3'-10&quot; (1200)</td>
<td>4'-2&quot; (1300)</td>
<td>4'-6&quot; (1400)</td>
</tr>
<tr>
<td><strong>BARS</strong></td>
<td>#5 @ 16&quot; (#16M @ 406)</td>
<td>#5 @ 16&quot; (#16M @ 406)</td>
<td>#5 @ 16&quot; (#16M @ 406)</td>
<td>#5 @ 16&quot; (#16M @ 406)</td>
<td>#5 @ 16&quot; (#16M @ 406)</td>
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</table>

### TYPE B WALL

<table>
<thead>
<tr>
<th>DESIGN H</th>
<th>3'-4&quot; (1020 mm)</th>
<th>4'-0&quot; (1220)</th>
<th>4'-8&quot; (1420)</th>
<th>5'-4&quot; (1630)</th>
<th>6'-0&quot; (1830)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>W</strong></td>
<td>2'-8&quot; (850)</td>
<td>3'-0&quot; (950)</td>
<td>3'-4&quot; (1050)</td>
<td>3'-8&quot; (1150)</td>
<td>4'-0&quot; (1250)</td>
</tr>
<tr>
<td><strong>BARS</strong></td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
<td>#5 @ 15&quot; (#16M @ 375)</td>
</tr>
</tbody>
</table>

DESIGN DATA (SEE SPPWC 617 FOR PCC, STEEL, AND OTHER SOIL DATA)

\[ f_m = 500 \text{ psi} \ (3.5 \text{ MPa}) \quad f'_{m} = 1500 \text{ psi} \ (10.5 \text{ MPa}) \]

REQUIRED SOIL BEARING CAPACITY 2000 psf (95 kPa)

NOTES:

1. SEE SPPWC 617 FOR STANDARD WALL DETAILS.
2. METRIC REINFORCING BAR SPACING IS IN MILLIMETERS.
DETAIL OF STRETCHER

1/2" (13 mm) GAP TO BE MAINTAINED UNTIL BACKFILL IS COMPLETED

DETAIL OF HEADER

TYPE A
WALLS 9'-8" (2.95 m) OR LESS IN HEIGHT

TYPE B
WALLS BETWEEN 10'-7" (3.23 m) AND 15'-2" (4.62 m) IN HEIGHT
WALL LAYOUT DETAILS

TYPE C
WALLS BETWEEN 16'-1" (4.90 m) AND 20'-8" (6.30 m) IN HEIGHT

TYPE D
WALLS BETWEEN 21'-7" (6.58 m) AND 29'-10" (9.09 m) IN HEIGHT

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
REINFORCED CONCRETE CRIB WALL

STANDARD PLAN 619-2
SHEET 2 OF 6
<table>
<thead>
<tr>
<th>HEIGHT OF WALL</th>
<th>FRONT Crib</th>
<th>1st Anchor Crib</th>
<th>2nd Anchor Crib</th>
<th>One Complete Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HEADERS</td>
<td>STRETCHERS</td>
<td>BLOCKS</td>
<td>HEADERS</td>
</tr>
<tr>
<td>3'-3&quot; (0.99 m)</td>
<td>3</td>
<td>9</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>4'-2&quot; (1.27 m)</td>
<td>4</td>
<td>11</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5'-1&quot; (1.55 m)</td>
<td>4</td>
<td>1</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>6'-0&quot; (1.83 m)</td>
<td>4</td>
<td>2</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>6'-11&quot; (2.11 m)</td>
<td>4</td>
<td>3</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>7'-10&quot; (2.39 m)</td>
<td>4</td>
<td>4</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>8'-9&quot; (2.67 m)</td>
<td>4</td>
<td>5</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>9'-8&quot; (2.95 m)</td>
<td>4</td>
<td>6</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>10'-7&quot; (3.23 m)</td>
<td>4</td>
<td>7</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>11'-6&quot; (3.51 m)</td>
<td>4</td>
<td>8</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>12'-5&quot; (3.78 m)</td>
<td>4</td>
<td>9</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>13'-4&quot; (4.06 m)</td>
<td>4</td>
<td>10</td>
<td>17</td>
<td>15</td>
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<tr>
<td>14'-3&quot; (4.34 m)</td>
<td>4</td>
<td>11</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>15'-2&quot; (4.62 m)</td>
<td>4</td>
<td>12</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>16'-1&quot; (4.90 m)</td>
<td>4</td>
<td>13</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>17'-0&quot; (5.18 m)</td>
<td>4</td>
<td>14</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>18'-9&quot; (5.56 m)</td>
<td>4</td>
<td>15</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>19'-8&quot; (5.94 m)</td>
<td>4</td>
<td>16</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>20'-7&quot; (6.30 m)</td>
<td>4</td>
<td>17</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>21'-6&quot; (6.66 m)</td>
<td>4</td>
<td>18</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>22'-5&quot; (6.92 m)</td>
<td>4</td>
<td>20</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>23'-4&quot; (7.18 m)</td>
<td>4</td>
<td>21</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>24'-3&quot; (7.44 m)</td>
<td>4</td>
<td>22</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>25'-2&quot; (7.70 m)</td>
<td>4</td>
<td>23</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>26'-1&quot; (7.96 m)</td>
<td>4</td>
<td>24</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>27'-0&quot; (8.22 m)</td>
<td>4</td>
<td>25</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>28'-9&quot; (8.53 m)</td>
<td>4</td>
<td>26</td>
<td>17</td>
<td>11</td>
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<tr>
<td>29'-8&quot; (8.81 m)</td>
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<td>27</td>
<td>17</td>
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<tr>
<td>30'-7&quot; (9.09 m)</td>
<td>4</td>
<td>28</td>
<td>17</td>
<td>11</td>
</tr>
</tbody>
</table>

NOTE: USE 8"x6" (203 x 152 mm) STRETCHER WITH VERTICAL WALLS
MAXIMUM ALLOWABLE SOIL BEARING CAPACITY FOR WALLS FOUNDED ON EMBANKMENT OF 4 TSF (383 040 Pa).

DESIGN CRITERIA:

1. WALL BASE IN EMBANKMENT: A MINIMUM DEPTH OF 5' (1.52 m) OF EMBANKMENT AT 95% RELATIVE SOIL COMPACTION IS REQUIRED BELOW THE BASE OF ALL WALLS IN ORDER TO CONSTITUTE AN EMBANKMENT CONDITION. WHEN THE FOUNDATION PRESSURE IS BETWEEN 2.5 TSF (239 400 Pa) AND 4.0 TSF (383 040 Pa) EMBANKMENT BELOW THE WALL SHALL CONSIST OF "STRUCTURAL BACKFILL" MATERIAL RELATIVE COMPACTION SHALL BE 95%.

2. WALL BASE IN ORIGINAL GROUND: ALLOWABLE SOIL AT TOE OF WALL SHALL BE DETERMINED BY FOUNDATION SITE INVESTIGATION WALLS THAT ARE TO RETAIN CUT SLOPES SHALL BE DESIGNED FOR LATERAL AND TOE PRESSURES DETERMINED FROM SITE INVESTIGATION DATA. OVERALL STABILITY OF SLOPE WITH WALL IN PLACE MUST BE ANALYZED. IF ORIGINAL GROUND SLOPES AWAY FROM TOE OF WALL, REDUCTION IN ALLOWABLE BEARING CAPACITY DUE TO SLOPE MUST BE CONSIDERED. WALLS SHALL NOT BE FOUNDED IN ORIGINAL GROUND HAVING AN ALLOWABLE BEARING CAPACITY OF LESS THAN 1.5 TSF (143 640 Pa). CONSIDERATION SHOULD BE GIVEN TO REMOVAL AND REPLACEMENT OF UNSUITABLE MATERIAL WITH "STRUCTURAL BACKFILL" MATERIAL RELATIVE COMPACTION SHALL BE 95%.

3. DESIGN DATA: WEIGHT OF SOIL = 120 PCF (1920 kg/m³) FOR 2' (610 mm) LEVEL SURCHARGE WITH TRAFFIC LOADING, AN EQUIVALENT FLUID PRESSURE OF 36 PCF (1724 Pa) WAS USED. EARTH PRESSURE FOR 1:2 (2:1) SLOPE AND 1:1 1/2 (1 1/2:1) UNLIMITED SLOPES DETERMINED FROM RANKINE'S FORMULA WITH $\phi = 33° 42'$.
LEGEND FOR GRAPHS:
A, B, C, D = WALL TYPE
2S+T = 2' (610 mm) LEVEL SURCHARGE WITH TRAFFIC LOADING
1:2 (2:1) = 1:2 (2:1) SLOPE ABOVE WALL
1:2.5 (2.5:1) = 1:1.5 (1.5:1) SLOPE ABOVE WALL
115' (35.05 m) MAX. DIFFERENCE IN ELEVATION FROM TOE OF WALL TO TOP OF SLOPE.

SOLID LINES INDICATED NORMAL RANGE OF WALL USE.
UPPER END AT LINE INDICATES MAXIMUM WALL HEIGHT FOR A GIVEN WALL TYPE AND LOADING.

MAXIMUM ALLOWABLE SOIL BEARING CAPACITY FOR WALLS FOUND ON EMBANKMENT OF 4 TSF (383 040 Pa)

DESIGN SURCHARGES
DESIGN EXAMPLES:

EXAMPLE NO. 1

GIVEN: WALL HEIGHT 24' (7.32 m)
1:2 (2:1) EMBANKMENT SLOPE TO BE RETAINED. BASE FOUNDED IN EMBANKMENT.

SELECT: EITHER VERTICAL OR BATTERED "D" WALL. BOTH WALLS REQUIRE 5' (1.52 m)
DEPTH EMBANKMENT OF 95% COMPAC TION BELOW BASE. HOWEVER, FOR THE
VERTICAL WALL WITH A FOUNDATION PRESSURE OF 3.0 TSF (287 280 Pa)
EMBANKMENT MATERIAL MUST BE "STRUCTURAL BACKFILL"
(SEE DESIGN NOTE 1)

EXAMPLE NO. 2

GIVEN: WALL HEIGHT 20' (6.10 m)
1:2 (2:1) CUT SLOPE TO BE RETAINED. FOUNDATION SITE INVESTIGATION
INDICATES LATERAL PRESSURE FROM MATERIAL ABOVE WILL BE EQUIVALENT
TO 1:2 (2:1) EMBANKMENT SLOPE, AND THE ALLOWABLE SOIL BEARING
CAPACITY IS 2.5 TSF (239 400 Pa).

SELECT: BATTERED "C" WALL. ALSO A VERTICAL "D" WALL CAN BE USED. BY
INCREASING THE ALLOWABLE BEARING CAPACITY OF THE ORIGINAL GROUND
(SEE DESIGN NOTE 2), A VERTICAL "C" WALL CAN BE USED.

EXAMPLE NO. 3

GIVEN: WALL HEIGHT 9' (2.74 m)
2' (610 mm) LEVEL SURCHARGE WITH TRAFFIC LOADING TO BE RETAINED.
BASE FOUNDED IN EMBANKMENT.

SELECT: BATTERED "A" WALL OR VERTICAL "B" WALL. IF VERTICAL "B"
IS USED, THE ACTUAL HEIGHT OF THE WALL WILL BE 9'-8" (2.95 m).
THE FIRST STEP IN THE WALL WILL BE 7'-10" (2.39 m), WHICH IS THE
LIMITING HEIGHT OF THE "A" WALL FOR THE 25+T SURCHARGE. A
MINIMUM OF 2 COURSES OF 8" (2.44 m) HEADERS IS PROVIDED.

DESIGN CRITERIA:

1. WALLS 12'-5" (3.78 m) OR LESS IN HEIGHT MAY BE CONSTRUCTED WITH NO BATTER.

2. UNITS SHOWN IN TABLE ARE FOR INTERMEDIATE PANELS. IN COMPUTING A WALL
OF SAY 7 PANELS, IT IS NECESSARY TO REMEMBER THAT 7+1 OR 8 VERTICAL
ROWS OF HEADERS ARE REQUIRED. IN ADDITION, ANOTHER VERTICAL ROW OF
HEADERS MUST BE ADDED WHENEVER, IN CASE OF LONG WALLS, THE WALL IS
"BROKEN" AT PANEL POINTS OF APPROXIMATELY 96 FEET (29.26 m). TABLE OF
NUMBER OF UNITS REQUIRED APPLY TO BATTERED WALLS.

3. FOR BATTERED WALLS, STEPS IN WIDTH ARE TO BE MADE AT THE WALL HEIGHTS
SHOWN ON THIS SHEET WHEN THE NEXT LOWER LEVEL CONSISTS OF AT LEAST 2
COURSES OF HEADERS. FOR VERTICAL WALLS, STEPS IN WIDTH ARE TO BE MADE
AT THE LIMITING TOTAL HEIGHT FOR EACH WALL SHOWN ON THE GRAPHS ON THE
DESIGN DATA SHEET PROVIDING THE NEXT LOWER LEVEL CONSISTS OF AT LEAST
2 COURSES OF HEADERS.

4. $f_c = 3250$ PSI (22 392 kPa), $f_y = 40,000$ PSI (275 600 kPa).
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1993
REV. 1996, 2009

STEEL CRIB WALL

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

620-2

SHEET 1 OF 7
EXAMPLE NO. 1

GIVEN: WALL HEIGHT 24' (7.32 m), 1:2 (2:1) EMBANKMENT SLOPE TO BE RETAINED, 15' (4.57 m) MAXIMUM FROM TOE OF WALL TO TOP OF SLOPE, BASE IN EMBANKMENT (5' (1.52 m) DEPTH MIN.).

SELECT: 1:6 BATTERED WALL VERTICAL WALL NOT PERMITTED, "G" WALL SELECTED. MAXIMUM HEIGHT ON GRAPH IS 26.00' (7.92 m) AT 4 TFS (383 040 Pa). Since the foundation pressure is 3.2 TFS (306 432 Pa) at 24.00' (7.32 m), the wall must be founded on a 5 foot (1.52 m) thickness of "STRUCTURE BACKFILL" (SEE DESIGN NOTE 1). A DRAINAGE SYSTEM BEHIND THIS WALL WILL BE REQUIRED.

EXAMPLE NO. 2

GIVEN: WALL HEIGHT 29' (8.84 m), 2:1 (2:1) CUT SLOPE TO BE RETAINED, FOUNDATION SITE INVESTIGATION INDICATES LATERAL PRESSURE FROM MATERIAL ABOVE WILL BE EQUIVALENT TO 1:2 (2:1) EMBANKMENT SLOPE BASE IN EMBANKMENT DETERMINED TO ALLOWABLE SOIL BEARING CAPACITY AT 3 TFS (287 280 Pa).

SELECT: BATTERED "F" WALL MAXIMUM HEIGHT AT 4 TFS (383 040 Pa) IS 29' (8.84 m). THEREFORE THE REPLACEMENT OF 5 FOOT (1.52 m) EXCAVATION WITH "STRUCTURE BACKFILL" TO INCREASE THE ALLOWABLE SOIL BEARING CAPACITY TO 4 TFS (383 040 Pa) IS REQUIRED (SEE DESIGN NOTE 1). A DRAINAGE SYSTEM FOR THIS WALL SHOULD BE INVESTIGATED.

EXAMPLE NO. 3

GIVEN: WALL HEIGHT 15' (4.57 m), 1:1.5 (1.5:1) EMBANKMENT SLOPE 18' (5.49 m) ABOVE TOP OF WALL TO BE RETAINED BASE ON ORIGINAL GROUND FOUNDATION INVESTIGATION DETERMINES ALLOWABLE SOIL BEARING CAPACITY AT 2 TFS (191 520 Pa). BASE IN EMBANKMENT (6' (1.52 m) DEPTH MIN.).

SELECT: LOADING CONDITIONS INTERPOLATED AS BETWEEN 1:1.5 (1.5:1) AND 1:2 (2:1) EMBANKMENT SLOPE, USE A TYPE "B" BATTERED WALL OR A TYPE "C" VERTICAL WALL, HOWEVER, IF THE TYPE "C" WALL IS USED 5' (1.52 m) OF EXCAVATION MUST BE REPLACED TO INCREASE THE ALLOWABLE SOIL BEARING CAPACITY TO 4 TFS (383 040 Pa). (SEE DESIGN NOTE 1).
**DESIGN CRITERIA:**

1. **WALL BASE IN EMBANKMENT:** A minimum depth of 5' (1.52 m) of embankment at 95% relative soil compaction is required below the base of all walls in order to constitute an embankment condition. When the foundation pressure is between 2.5 Tons/S.F. (239.4 kPa) and 4.0 Tons/S.F. (383.0 kPa), embankment below the wall shall consist of "structure backfill" material as set forth in Section 300-3.5 of the standard specifications. The limits of relative compaction (95%) shall be as set forth in Section 300-3.5c of the standard specifications.

2. **WALL BASE IN ORIGINAL GROUND:** Allowable soil pressure at toe of wall shall be determined by foundation site investigation. Walls that are to retain cut slopes shall be designed for lateral and toe pressures determined from site investigation data. Overall stability of slope with wall in place must be analyzed. If original ground slopes away from toe of wall, reduction in allowable bearing capacity due to slope must be considered. Walls shall not be founded on original ground having an allowable bearing capacity of less than 1.5 Tons/S.F. (143.6 kPa). Consideration should be given to removal and replacement of unsuitable material with "structure backfill" material. Relative compaction shall be 95%.

3. **DRAINAGE:**
   
   A. **INTERNAL:** Section 300-3.5 of the standard specifications.
   
   B. **EXTERNAL:** If the combined height of wall and overfill (measured along face of wall and vertically from the toe of fill to top of fill) exceeds 25' (7.62 m), a system to drain water away from the back face of wall shall be provided. The type and extent of this system will depend on the type of backfill material expected to be used, the combined height of wall and backfill, and the location of the water table in the area.

4. **SLOPING SURCHARGE LIMITATIONS:** The maximum height of fill behind any wall of family of walls shall not exceed 115' (35.02 m) (measured vertically from the toe of the bottom wall to the top of fill behind the uppermost wall). For a family of walls, the slope of a line drawn from the top of the front face of bottom wall to the top of the front face of any intermediate or top wall, in no case exceed 1:1.5 (1.5:1).

5. **MATERIAL SPECIFICATIONS:**

   **STEEL SHEETS:**
   
   AASHTO M218
   
   45,000 ULTIMATE 33,000 YIELD
   
   20% ELONGATION
   
   **BOLTS:** ASTM A307 GRADE A.
CURVATURE CHART - 1 TO 6 BATTER

THIS DATA, OMITTING HEIGHT RESTRICTIONS, CAN BE USED FOR VERTICAL WALLS

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<td>1'55' to 2'05'</td>
<td>1'18' to 1'26'</td>
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RADIUS x 100
(30.5 m)

DEGREE
OF CURVE
25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50

EXAMPLE - To build a Type "D" wall 20.00' (6.1 m) high on a 1400' (425 m) radius curve, use Method 2 with one set of short stringers in each group of five panel sections.

METHOD 1

DEFLECTION ANGLE

USE NORMAL PLUMB IN BOLT HOLES OF STANDARD PARTS. MAXIMUM DEFLECTION SHOWN AT TOP OF TABLE CAN BE OBTAINED AT EACH COLUMN IN VERTICAL OR BATTERED WALLS. CHART SHOWS SMALLEST RADIUS WHICH CAN BE USED FOR EACH DESIGN OF WALL.

METHOD 2

SHORT STRINGER

USE SHORT PANEL SECTIONS 2' - 6' (2.9 m) FACE OR REAR) IN ADDITION TO PLAY IN BOLT HOLES CURVATURE CHART INDICATES NUMBER OF BINS IN EACH GROUP. INCLUDING A MODIFIED BIN, NECESSARY TO BUILD A CURVED WALL AT A REQUIRED HEIGHT AND RADIUS.

METHOD 3

USE STRINGERS FIELD CUT (WITH SABER SAW) AND DRILLED TO FIT WALL DIMENSIONS AS IT IS ASSEMBLED. ANY CURVE CAN BE FITTED ON ANY HEIGHT OF WALL, BATTERED OR VERTICAL, GENERALLY STANDARD PANELS ARE USED BETWEEN FIELD CUT PANELS. WITH VERY SHORT PANEL SECTIONS OR STRINGERS CAN BE CUT FROM EACH STRINGER. THIS METHOD IS APPLICABLE TO LARGE SINGLE DEFLECTIONS.

METHOD 4

SPECIAL CORNER

USE SPECIAL SHOP FABRICATED CORNER CONNECTION PIECES. BATTER, HEIGHT, ANGLE, TURN, AND BASE WIDTH DETERMINE THE DIRECTION OF DIMENSION LIMITATIONS APPLICABLE ON THIS METHOD. MANUFACTURER SHOULD BE CONTACTED BEFORE DETAILING DESIGN FOR A SPECIFIC TURN. STRINGERS ARE OMITTED AND IT MAY BE NECESSARY TO INCREASE THE BASE WIDTH OF ADJACENT BINS TO PROVIDE NECESSARY STABILITY. THIS METHOD IS AN ALTERNATIVE FOR METHOD 3.

RIGHT ANGLE TURNS IN VERTICAL WALLS CAN BE MADE BY STARTING A NEW WALL AT THE REAR OF THE FIRST WALL AND USING THE END TRANSVERSE SECTION FOR A FACE PANEL.

RIGHT ANGLE TURNS IN BATTERED WALLS CAN BE MADE BY ERECTING ONE COMPLETE BIN VERTICALLY IN THE CORNER.

NOTE - USE GRAPHS SHOWN ON STEEL CRIB WALL SHEET NO. 3 TO DETERMINE BASE WIDTH TO HEIGHT RATIO FOR THE VARIOUS SURCHARGES ON BOTH VERTICAL AND BATTER WALLS.
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<th>WALL HEIGHT</th>
<th>BEARING PLATE</th>
<th>FRONT COLUMN HEIGHT IN FEET</th>
<th>FRONT COLUMN TOTAL HEIGHT</th>
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**NOTE:** THIS TABLE APPLIES ONLY TO STANDARD PANEL SECTIONS AND INCLUDES UNITS FOR BOTH FRONT AND REAR OF A 10 ELEMENT OF WALL.
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<td>6</td>
<td>8</td>
</tr>
<tr>
<td>34.67 (10.57)</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>36.00 (10.97)</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

**Note:** This table applies only to short panel sections for curved walls and includes units for both front and rear of a 5.5 element of wall.
10'-0" (3.0 m) MAX SPACING FOR DISTANCE BETWEEN CROSS BRAACING. SEE NOTE

SPACING TYPICAL & PANEL REINFORCED SECTION

TOP OF EMBANKMENT

10'-0" (3.0 m) MAX SPACING TYPICAL INTERMEDIATE PANEL REINFORCED SECTION

END OR CORNER POST
2" (51 mm) STD BAR

MALLEABLE IRON BANDS
AT 14" (350 mm) MAX

3/16"x3/4" (5 x 19 mm)
TENSION BAR

GROUND LINE

2'-4" (75 mm) MIN

TOP OF WALL

FOOTING

STEEL TENSION WIRE

VERTICAL DRAIN PIPE

GROUND LINE

2'-4" (75 mm) MIN

TOP OF WALL

MALLEABLE IRON BANDS
AT 14" (350 mm) MAX

3/16"x3/4" (5 x 19 mm)
TENSION BAR

GOUND LINE

2'-4" (75 mm) MIN

TYPICAL ELEVATION

TOP OF EMBANKMENT

4'-0" (1.2 m)

2% (50 mm)

TOP OF WALL

12" (300 mm)

2'-3" (75 mm)

MIN

3" (75 mm)

CONCRETE

DRAINAGE SWALE DETAIL

WELDED WIRE MESH

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1983
REV. 1996, 2009

REINFORCED CONCRETE BLOCK WALL
AND CHAIN LINK FENCE COMBINATION

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

621-2

SHEET 1 OF 2
NOTES:

1. THE BLOCK WALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH SSPWC 303–4.1.
2. USE STANDARD 8" (200 mm) WIDE NORMAL WEIGHT CONCRETE BLOCK PER SSPWC 202–2.
3. USE CONCRETE BOND BEAM BLOCK WHERE HORIZONTAL STEEL IS CALLED FOR.
4. MORTAR, GROUT AND WATER SHALL BE IN ACCORDANCE WITH SSPWC 202–2.
5. REINFORCING STEEL SHALL BE GRADE 40 (GRADE 300) PER SSPWC 201–2.
6. ALL BLOCKS SHALL BE LAID UP IN MORTAR HEAD AND BED JOINTS FOR FULL THICKNESS OF FACE SHELLS. WEBS OF EACH COURSE SHALL CENTER ON WEBS OF COURSES BELOW. OMIT HEAD JOINT IN GRADE COURSE.
7. PLACE A MINIMUM 4" (100 mm) LAYER OF NO. 4 CONCRETE AGGREGATE BETWEEN THE SOIL BACKFILL AND THE OPEN HEAD JOINT.
8. ALL CELLS IN WHICH STEEL IS PLACED SHALL BE FILLED WITH GROUT.
10. POUR FOOTING AGAINST UNDISTURBED NATURAL SOIL OR SOIL THAT HAS BEEN COMPACTED TO 90% OPTIMUM DENSITY PER ASTM D1557–78.
12. PROVIDE OPEN HEAD JOINTS AT INTERVALS NO GREATER THAN 48" (1.2 m). WHERE WALL IS LOCATED ADJACENT TO A SIDEWALK, PROVIDE 2" Ø (50 mm Ø) WEEP HOLES UNDER SIDEWALK.
13. FOR PRIVATE PROPERTY, USE 1V:2H SLOPE. FOR PUBLIC PROPERTY, USE ENGINEER’S DESIGNATION.
14. WELDED WIRE MESH SHALL BE PER SSPWC 201–2.4.
NOTES:

1. MAX HEIGHT OF WALL IS 3 COURSES OF 8" (200 mm) HIGH BLOCK.

2. NO LIVE-LOAD SURCHARGE SHALL BE ALLOWED ON RETAINED SOIL.

3. POUR FOOTING AGAINST UNDISTURBED EARTH.

4. TOP OF FOOTING MAY BE PLACED AT SAME GRADE AS STREET IF STREET GRADE IS UNIFORM AND 5% MAX.

5. PLACE CONCRETE BLOCKS IMMEDIATELY AFTER POURING THE FOOTING. FILL ALL CELLS SOLID WITH GROUT AND ROD SO THAT GROUT IS MONOLITHIC WITH FOOTING.

6. IN FIRST COURSE ABOVE FINISHED GRADE, OMIT MORTAR FROM VERTICAL JOINTS EACH 32" (800 mm) TO SERVE AS WEEP HOLES.
NOTES

1. MAX HEIGHT OF WALL IS 3 COURSES OF 8" (200 mm) HIGH BLOCK.

2. NO LIVE-LOAD SURCHARGE SHALL BE ALLOWED ON RETAINED SOIL.

3. POUR FOOTING AGAINST UNDISTURBED EARTH.

4. TOP OF FOOTING MAY BE PLACED AT SAME GRADE AS STREET IF STREET GRADE IS UNIFORM AND 5% MAX.

5. PLACE CONCRETE BLOCKS IMMEDIATELY AFTER POURING THE FOOTING. FILL ALL CELLS SOLID WITH GROUT AND ROD SO THAT GROUT IS MONOLITHIC WITH FOOTING.

6. IN FIRST COURSE ABOVE FINISHED GRADE, OMIT MORTAR FROM VERTICAL JOINTS EACH 32" (800 mm) TO SERVE AS WEEP HOLES.
TOP OF COVER

BOTTOM OF COVER

SECTION A - A

FRAME DETAIL

SECTION THRU FRAME

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

24" (610 mm) MANHOLE FRAME AND COVER

STANDARD PLAN 630-4

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBROOK COMMITTEE 1984

SHEET 1 OF 2
NOTES:

1. THE CAST IRON USED SHALL CONFORM TO ASTM A-48 CLASS 35B.

2. COVERS SHALL BE CAST WITH THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS, AND THE AGENCY'S IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. THE LETTER "D" OR "S" SHALL BE APPROXIMATELY 2-1/2" (65 mm) HIGH WITH 1/2" (15 mm) LINE WIDTH, AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.

3. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.

4. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.

5. WEIGHT OF FRAME SHALL BE 260 LBS (118 kg). WEIGHT OF COVER SHALL BE 175 LBS (79 kg). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.

6. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.

7. COVERS FOR MANHOLES LOCATED IN EASEMENTS, ALLEYS, PARKWAYS AND ALL PLACES OTHER THAN PAVED STREETS SHALL BE PROVIDED WITH SOCKET-SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF 1" (25 mm) AT 90 DEGREES TO PICK HOLE AND INSTALL 3/4" x 3/4" (20 x 20 mm) STAINLESS STEEL SOCKET-SET SCREWS WITH 3/8" (10 mm) RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.
NOTES:

1. THE CAST IRON USED SHALL CONFORM TO ASTM A-48 CLASS 35B.

2. COVERS SHALL BE CAST WITH THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS, AND THE AGENCY'S IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. THE LETTER "D" OR "S" SHALL BE APPROXIMATELY 2-1/2" (65 mm) HIGH WITH 1/2" (15 mm) LINE WIDTH, AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.

3. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.

4. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.

5. WEIGHT OF FRAME SHALL BE 280 LBS (127 kg). WEIGHT OF COVER SHALL BE 230 LBS (104 kg). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.

6. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.

7. COVERS FOR MANHOLES LOCATED IN EASEMENTS, ALLEYS, PARKWAYS AND ALL PLACES OTHER THAN PAVED STREETS SHALL BE PROVIDED WITH SOCKET-SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF 1" (25 mm) AT 90 DEGREES TO PICK HOLE AND INSTALL 3/4" x 3/4" (20 x 20 mm) STAINLESS STEEL SOCKET-SET SCREWS WITH 3/8" (10 mm) RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.
NOTES:

1. THE CAST IRON USED SHALL CONFORM TO ASTM A-48 CLASS 35B.

2. COVERS SHALL BE CAST WITH THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS, AND THE AGENCY'S IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. THE LETTER "D" OR "S" SHALL BE APPROXIMATELY 2-1/2" (65 mm) HIGH WITH 1/2" (15 mm) LINE WIDTH, AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.

3. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.

4. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.

5. WEIGHT OF FRAME SHALL BE 320 LBS (145 kg), WEIGHT OF COVER SHALL BE 305 LBS (138 kg). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.

6. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.

7. COVERS FOR MANHOLES LOCATED IN EASEMENTS, ALLEYS, PARKWAYS AND ALL PLACES OTHER THAN PAVED STREETS SHALL BE PROVIDED WITH SOCKET-SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF 1" (25 mm) AT 90 DEGREES TO PICK HOLE AND INSTALL 3/4" x 3/4" (20 x 20 mm) STAINLESS STEEL SOCKET-SET SCREWS WITH 3/8" (10 mm) RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.
TOP OF COVER

BOTTOM OF COVER

SECTION A–A

SECTION THRU FRAME

FRAME DETAIL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

36" (914 mm) MANHOLE FRAME AND COVER

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
NOTES:

1. THE CAST IRON USED SHALL CONFORM TO ASTM A-48 CLASS 35B.

2. COVERS SHALL BE CAST WITH THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS, AND THE AGENCY'S IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. THE LETTER "D" OR "S" SHALL BE APPROXIMATELY 2-1/2" (65 mm) HIGH WITH 1/2" (15 mm) LINE WIDTH, AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.

3. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.

4. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.

5. WEIGHT OF FRAME SHALL BE 335 LBS (152 kg). WEIGHT OF COVER SHALL BE 340 LBS (154 kg). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.

6. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.

7. COVERS FOR MANHOLES LOCATED IN EASEMENTS, ALLEYS, PARKWAYS AND ALL PLACES OTHER THAN PAVED STREETS SHALL BE PROVIDED WITH SOCKET-SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF 1" (25 mm) AT 90 DEGREES TO PICK HOLE AND INSTALL 3/4" x 3/4" (20 x 20 mm) STAINLESS STEEL SOCKET-SET SCREWS WITH 3/8" (10 mm) RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.
D + E

SYM METRICAL
ABOUT θ

3/4"
(19 mm) DIA

END - TYPE
1, 2 OR 3

TOP

D = 7" (175 mm)
E = 6" (150 mm) OR T - 1" (25 mm), WHICHER IS LESS
MINIMUM E IS 3" (75 mm)
S = 12" (300 mm) MAX, EVENLY SPACED
W = 16" (400 mm) MIN

FOR MANHOLES AND UNDERGROUND VAULTS:
S = 16" (400 mm) MAX, EVENLY SPACED
W = 14" (350 mm) MIN

UNLESS OTHERWISE NOTED:
1. STEPS SHALL BE STEEL CONFORMING TO ASTM A307 AND SHALL BE GALVANIZED AFTER FABRICATION. UNLESS OTHERWISE NOTED, STEPS MAY ALSO BE POLYPROPYLENE STEPS, STEEL REINFORCED, CONFORMING TO SPPWC 636.

2. IF STAINLESS STEEL STEPS ARE REQUIRED, THE MATERIAL SHALL CONFORM TO ASTM A276, 300 SERIES.

3. STEP ENDS MAY BE TYPE 1, 2 OR 3, AS SHOWN.

4. BOTTOM STEP SHALL BE A MAXIMUM OF 2' (600 mm) ABOVE FLOOR OR SHELF.

5. STEPS WITH TYPE 1 OR 2 ENDS MAY BE CAST IN PLACE, OR PLACED IN THE CENTER OF 1-1/2" (40 mm) MIN DIA DRILLED OR FORMED HOLES AND SET WITH HIGH STRENGTH NON-SHRINK GROUT, 6000 PSI (40 MPa) MIN. STEPS WITH TYPE 3 ENDS SHALL BE CAST-IN-PLACE.
NOTES:

1. STEPS SHALL BE STEEL–REINFORCED COPOLYMER POLYPROPYLENE PLASTIC CONFORMING TO:
   
   (A) ASTM D478 AND C497, EXCEPT THAT THE MINIMUM HORIZONTAL PULLOUT LOAD SHALL BE 1,500 LBS (6.7 kN).
   (B) ASTM A615 GRADE 60 DEFORMED REINFORCING STEEL BAR.
   (C) CALIFORNIA CODE OF REGULATIONS TITLE 8, GENERAL INDUSTRY SAFETY ORDERS.

2. STEPS SHALL BE CAPABLE OF WITHSTANDING AN IMPACT LOAD OF 70 FT–LBS (95 N.m) AT 20°F (−7°C) WITHOUT CRACKING OR FRACTURING.


4. THE ENTIRE POLYPROPYLENE PLASTIC MATERIAL SURROUNDING THE REINFORCING STEEL BAR SHALL BE CAST MONOLITHICALLY. MINIMUM COVER SHALL BE 3/16" (5 mm).

5. A CERTIFICATION OF COMPLIANCE WITH THE REQUIREMENTS OF NOTES 1 THROUGH 4 PREPARED BY AN INDEPENDENT CERTIFIED LABORATORY SHALL BE SUBMITTED TO THE ENGINEER CONCURRENTLY WITH A REQUEST FOR APPROVAL.

6. E = 3–3/8" (86 mm). FOR VAULTS AND MANHOLES, D = 5–1/2" (140 mm). FOR OTHER INSTALLATIONS, D = 7–1/2" (190 mm). THESE DIMENSIONS MAY BE PLUS OR MINUS 1/4" (6 mm).

7. STEPS SHALL BE EVENLY SPACED. MAXIMUM VERTICAL SPACING OF STEPS SHALL BE 16" (400 mm). WITH THE BOTTOM STEP A MAXIMUM OF 2' (600 mm) ABOVE FLOOR OR SHELF.

8. IF TAPERED STEPS ARE INSTALLED INTO STRAIGHT DRILLED OR FORMED HOLES, APPROVED NON–SHRINK GROUT SHALL BE INJECTED INTO THE HOLE PRIOR TO INSTALLATION. HOLES SHALL BE STRAIGHT AND PARALLEL. EXCEPT AS OTHERWISE NOTED, STEPS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER’S RECOMMENDED PROCEDURES.

9. A DROP STEP WITH A MINIMUM DROP OF 3/4" (19 mm) MAY BE USED. THE DROP STEP SHALL MEET ALL OTHER CRITERIA OF THIS PLAN.
PLAN

EXPANSION JOINT

#4 @ 18" (#13M @ 460 mm)
#4 (@13M) UNDER EACH RISER

SECTION A—A

TYPICAL

SLOPE 2%

SECTION B—B

#4 (@13M) CONTINUOUS TYPICAL

SECTION C—C

#4 @ 12" EA WAY (#13M @ 300 mm)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

REINFORCED CONCRETE STAIRWAY

STANDARD PLAN

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

640-4

SHEET 1 OF 2

RECOMMENDED USE FOR PUBLIC WORKS CONSTRUCTION
NOTES:

1. SEE THE PLANS FOR THE FOLLOWING INFORMATION:
   TYPE OF STAIRWAY AND LOCATION
   W = WIDTH OF STAIRWAY
   L = LENGTH OF LANDINGS
   T = LENGTH OF TREAD, 11" (280 mm) MIN
   R = HEIGHT OF RISER, 4" TO 7" (100 TO 180 mm)
   C = WIDTH OF CURB
   S = LENGTH OF STAIRWAY FLIGHT

2. CONCRETE FINISH FOR EXPOSED SURFACES SHALL BE CLASS I, EXCEPT THAT TREADS AND
   LANDINGS SHALL BE TROWELLED SMOOTH AND GIVEN A FINE BROOM FINISH IN A DIRECTION
   PERPENDICULAR TO THE CENTERLINE OF THE STAIRWAY. THE BROOM FINISH SHALL BE BROUGHT
   TO THE NOSE OF THE TREADS AND LANDINGS.

3. ONE HANDRAIL ON EACH SIDE IS REQUIRED FOR STAIRWAYS 4' (1.22 m) WIDE OR LESS. THREE
   HANDRAILS ARE REQUIRED FOR WIDER STAIRWAYS.