SAN DIEGO AREA

REGIONAL STANDARD DRAWINGS

STANDARD DRAWINGS FOR AGENCIES IN THE SAN DIEGO REGION

Recommended by the Regional Standards Committee
Maintained and Published by the San Diego County Department of Transportation
July 1979
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These standard drawings have been adopted by the San Diego Regional Standards Committee for the benefit of all agencies in the San Diego area. The Regional Standards Committee membership is comprised of the County's fourteen cities, the County of San Diego, various representative districts and private industry organizations, the Pacific Telephone Company and the San Diego Gas and Electric Company as named above. The San Diego County Department of Transportation is currently providing coordination and staff support for the Regional Standards Committee.

REVISIONS

The Regional Standards Committee will continuously accept proposed revisions and/or proposed new standard drawings for review. They should be submitted to the Regional Standards staff at the County Department of Transportation. The staff will acknowledge receipt of all proposals in writing. Should the proposed revision be very minor in nature, i.e., a grammatical error, etc., the staff will make the necessary change without taking it to the Regional Standards Committee. Once enough proposals have been submitted to warrant a Regional Standards Committee meeting, the staff will prepare an agenda and schedule a meeting.

At the meeting the Committee will take one of three possible actions: approve the change, reject the change or recommend that a subcommittee further study the change and make recommendations to the Committee. The individual or organization who submitted the change will then be notified in writing of the Committee action. After approval of the proposed change by the Regional Standards Committee the staff will print and distribute the change to the governmental agencies within San Diego County.

It is intended that the standard drawing package will be reprinted and distributed periodically incorporating all the changes approved by the Regional Standards Committee since the last printing. The reprinting will take place when the Regional Standards Committee determines enough revisions have been approved to warrant issuance of an updated drawing package. It is further intended that the Regional Standards be accepted by all Agencies at the earliest date possible.

Elden C. Brazell
Chairman
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SPECIAL NOTE

Concrete consisting of portland cement, concrete aggregate, sand and water is designated in these Standard Drawings by a symbol consisting of a number, a letter and a number; for example, 564-C-3000. The first number is the weight of cement in pounds per cubic yard, the last number is the compressive strength at twenty-eight days and the letter indicates the grading of the aggregate. This designation is in the STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, published by the Building News, Incorporated.
NOTES
1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all block cells with grout.

### TYPICAL SECTION

- **H** = 8' - 0"
- **T** = 2' - 8"
- **W** = 1' - 0"

- **A** bars: # 4 total 2
- **B** bars: # 4 total 2
- **C** bars: # 4 @ 12"

### ELEVATION

- **H** = 8' - 0"
- **H** = 5' - 4"
- **H** = 3' - 8"

- **A** bars: # 4 total 2
- **B** bars: # 4 @ 12"
- **E** bars: # 4 @ 12"

- Horizontal reinforcing not shown

### TYPICAL SECTION

- **H** = 5' - 4"
- **T** = 2' - 0"
- **W** = 1' - 0"

- **A** bars: # 4 @ 32"
- **B** bars: # 4 @ 32"
- **C** bars: # 6 @ 16"
- **E** bars: # 4 total 4

### DIMENSIONS AND REINFORCING STEEL

<table>
<thead>
<tr>
<th></th>
<th>H (max)</th>
<th>T (min)</th>
<th>W (min)</th>
<th>A bars</th>
<th>B bars</th>
<th>C bars</th>
<th>E bars</th>
</tr>
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<td>Level 1</td>
<td>3' - 8&quot;</td>
<td>0' - 8&quot;</td>
<td>2' - 4&quot;</td>
<td># 4 @ 32&quot;</td>
<td># 4 @ 32&quot;</td>
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<td>---</td>
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<tr>
<td>Level 2</td>
<td>5' - 4&quot;</td>
<td>0' - 10&quot;</td>
<td>3' - 6&quot;</td>
<td># 4 @ 32&quot;</td>
<td># 4 @ 32&quot;</td>
<td>---</td>
<td># 6 @ 16&quot;</td>
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<tr>
<td>Level 3</td>
<td>8' - 0&quot;</td>
<td>1' - 0&quot;</td>
<td>5' - 4&quot;</td>
<td># 4 total 4</td>
<td># 4 total 5</td>
<td># 4 total 6</td>
<td>---</td>
</tr>
</tbody>
</table>

- **max soil press. (psf)**: 500, 600, 800
1. 1/2 : 1 sloping backfill or 250 psf, live load surcharge

mortar cap

A bars

# 4 total 2

H = 5' - 4''

H = 3' - 8''

# 4 total 2

8'' block

B bars

# 4 total 5

2''

T = Key

12'' x 12'' key

W/2

W

3'' dr.

1'' - 0''

1'' - 6''

12'' - 6''

# 4 @ 12''

# 4 total 3

3'' dr.

Horizontal reinf. not shown

TYPICAL SECTION

over 3' - 8''

ELEVATION

TYPICAL SECTION

over 3' - 8''

PAD

Edge of Footing

layout line

1 1/2 : 1 sloping backfill or 250 psf, live load surcharge

mortar cap

# 4 total 2

H = 5' - 4''

H = 3' - 8''

# 4 total 2

8'' block

B bars

# 4 total 5

2''

T = Key

12'' x 12'' key

W/2

W

3'' dr.

1'' - 0''

1'' - 6''

12'' - 6''

# 4 @ 12''

# 4 total 3

3'' dr.

Horizontal reinf. not shown

TYPICAL SECTION

over 3' - 8''

DIMENSIONS AND REINFORCING STEEL

<p>| | | |</p>
<table>
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<td>H (max)</td>
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<td>3' - 8''</td>
</tr>
<tr>
<td>T (min)</td>
<td>0' - 10''</td>
<td>0' - 10''</td>
</tr>
<tr>
<td>W (min)</td>
<td>5' - 0''</td>
<td>3' - 5''</td>
</tr>
<tr>
<td>A) bars</td>
<td># 4 @ 16''</td>
<td></td>
</tr>
<tr>
<td>B) bars</td>
<td># 6 @ 16''</td>
<td># 4 @ 16''</td>
</tr>
<tr>
<td>max. toe press. (psf)</td>
<td>700</td>
<td>550</td>
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NOTES
1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all block cells with grout.
TYPICAL SECTION
over 5' - 4"

ELEVATION

NOTES
1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all blockcells with grout.

<table>
<thead>
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</tr>
<tr>
<td><strong>A</strong> bars</td>
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</tr>
<tr>
<td><strong>E</strong> bars</td>
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<tr>
<td>max. soil press. (psf)</td>
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SAN DIEGO REGIONAL STANDARD DRAWING

MASTERY RETAINING WALL TYPE 3
LEVEL BACKFILL

DRAWING NUMBER C-3
1 1/2:1 sloping backfill or 250 psf live load surcharge

PLAN

Mortar cap

H = 5' - 4"

H = 3' - 8"

8" block

2' - 8" max.

2' - 8" min.

12" block

TYPICAL SECTION

3" clr.

1' - 6"

10"

W

Key

# 4 total 2

# 4 total 5

1' - 0"

T

K

# 4 @ 16"

# 4 @ 12"

# 4 total 2

# 4 total 5

edge of footing

layout line

1 1/2:1 sloping backfill or 250 psf live load surcharge

ELEVATION

Horizontal reinfl. not shown

TYPICAL SECTION

over 3' - 8"

NOTES
1. See Standard Drawings C-7 and C-8 for additional notes and details.
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</tr>
<tr>
<td>A bars</td>
</tr>
<tr>
<td>B bars</td>
</tr>
<tr>
<td>Surcharge sloping live load</td>
</tr>
<tr>
<td>C bars</td>
</tr>
<tr>
<td>K (min)</td>
</tr>
<tr>
<td>Toe press.</td>
</tr>
</tbody>
</table>
**NOTES**
1. See Standard Drawing C7 and C8 for additional notes and details.
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<tr>
<td><strong>H (max)</strong></td>
</tr>
<tr>
<td><strong>T (min)</strong></td>
</tr>
<tr>
<td><strong>W (min)</strong></td>
</tr>
</tbody>
</table>
| **R** | 0' - 9" | 1' - 2" | 1' - 5"
| **S** | 0' - 8 1/2" | 1' - 1/2" | 1' - 7 1/2"
| **K** | 0' - 8" | 0' - 8" | 0' - 12" |
| **(A) bars** | # 4 @ 32" | # 4 @ 32" | # 4 @ 32" |
| **(B) bars** | # 4 @ 32" | # 4 @ 32" | # 4 @ 32"
| **(C) bars** | # 7 @ 16" |
| **(D) bars** | # 4 @ 32" | # 4 @ 16" | # 4 @ 16" |
| **(E) bars** | # 4 total 5 | # 4 total 5 | # 4 total 6 |

| **Max Soil Press. (psf)** | 774 | 1030 | 1660 |

**SAN DIEGO REGIONAL STANDARD DRAWING**

**MASSONRY RETAINING WALL TYPE 5 (LEVEL BACKFILL)**

**DRAWING NUMBER** C-5
NOTES
1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all block cells with grout.

TYPICAL SECTION
over 3' - 8"

DIMENSIONS AND REINFORCING STEEL

<table>
<thead>
<tr>
<th></th>
<th>H (max)</th>
<th>T (min)</th>
<th>W (min)</th>
<th>A bars</th>
<th>B bars</th>
<th>Max. Toe Press. P.S.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5' - 4&quot;</td>
<td>0' - 10&quot;</td>
<td>3' - 8&quot;</td>
<td># 4 @ 16&quot;</td>
<td># 6 @ 16&quot;</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>3' - 8&quot;</td>
<td>0' - 8&quot;</td>
<td>2' - 9&quot;</td>
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<td>1400</td>
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</tbody>
</table>

SAN DIEGO REGIONAL STANDARD DRAWING
MASONRY RETAINING WALL TYPE 6
(LIVE LOAD SURCHARGE OR SLOPING BACKFILL)

DRAWING NUMBER C-6
DESIGN CONDITIONS

Walls are to be used for the loading conditions shown for each type wall.
Design H shall not be exceeded.
Footing key is required except as shown otherwise or when found unnecessary by the engineer.
Special footing design is required where foundation material is incapable of supporting toe pressure listed in table.

DESIGN DATA

Reinforced Concrete:
\[ F_c = 1200 \text{ psi} \quad F'_c = 3000 \text{ psi} \]
\[ F_s = 20,000 \text{ psi} \quad n = 10 \]

Reinforced Masonry:
\[ F'_m = 600 \text{ psi} \quad F_m = 200 \text{ psi} \]
\[ F_s = 20,000 \text{ psi} \quad n = 50 \]
Earth = 120 psf and equivalent fluid
Pressure = 36 psf per foot of height
Walls shown for 1 1/2\:1 unlimited sloping
surcharge are designed in accordance with Rankine's formula for unlimited sloping
surcharge with \( \theta = 33^\circ 42' \)

REINFORCEMENT

Intermediate grade, hard grade, or rail steel deformation shall conform to ASTM A615
A616, A617.
Bars shall lap 40 diameters, where spliced, unless otherwise shown on the plans.
Bends shall conform to the Manual of Standard practice, A.C.I.
Backings for hooks is four diameters.
All bar embedments are clear distances to outside of bar.
Spacing for parallel bars is center to center of bars.

CONCRETE

All concrete shall be 564 \cdot C \cdot 3000.

MASONRY

All reinforced masonry retaining walls shall be constructed of regular or light weight standard
grade "A" units conforming to ASTM
designation C-90 and manufactured in accordance
with requirements of the Concrete Masonry
Association Specifications. All masonry shall conform
to the regulations of the Uniform Building Code.

MASONRY MORTAR

The mortar shall consist of one (1) part portland cement to three and one-half (3 1/2) parts graded
mortar sand. Mortar shall be tempered with lime
putty in an amount not exceeding one-quarter to
one-half of the volume of the cement.
Mortar in horizontal joints shall fully cover all face
shell and web members. Vertical joints shall be
buttered to a depth greater than the thickness of
the face shells of the block. Furrowing of mortar
will not be permitted.

GROUT

The grout shall consist of one (1) part portland cement to three (3) parts clean sand for voids less
than four inches. If desired, grout to be used in
voids of 4" or greater dimensions, may be mixed of
one (1) part portland cement to two (2) parts clean
sand to two (2) parts pea gravel. Pea gravel shall be
graded such that 100% passes 3/8" sieve and not
more than 5% passes the No. 8 sieve. All cells shall
be poured solid with grout.

EXCAVATION AND BACKFILL

Compaction of backfill material by jetting or
ponding with water will not be permitted.
Each layer of backfill shall be moistened as directed
by the engineer and thoroughly tamped, rolled or
otherwise compacted until the relative compaction
is not less than 90%.
No backfill material shall be deposited against masonry
retaining walls until the grout has developed a
strength of 2,000 pounds per square inch in
compression as determined by test 2" cubes, or until
the masonry retaining wall has cured for a minimum
of 14 days.

OPTIONAL MORTAR KEY

Embedment of the first course of block in a poured
footing may be omitted by providing a mortar key.
The key is formed by embedding a flat 2" x 4" flush
with the top of the freshly poured footing. Remove the 2" x 4" after the concrete has started to harden.
No surcharge loads within this area for level backfill design.

Filter Material, 1" max. crushed aggregate, 4 cu. ft. per 4" dia. drain or 1 cu. ft. per ft. of open head joints.

4" dia. drain with 1/4" galv. wire mesh screen 8' - 0" on centers, or one row horizontally of open head joints.

Line of undisturbed natural soil

TYPICAL SECTION

Mortar or cast-in-place concrete

Finished ground line

Vertical reinf.

Grout filled block cells

Horizontal reinf. thru bond beam block

2" x 4" (nominal) key

Vertical reinf.

Top of footing

9" 12" block wall

5 1/4" 8" block wall

NOTE
All masonry retaining walls shall be constructed with cap, key and drainage details as shown hereon.
TYPE—A WALL
(Applicable for all types of backfill loadings)

TYPE—B WALL

TYPE—C WALL

There shall be no loadings extending above top of wall within a distance equal to height of the wall.

Expansion joint @ 30" 0" ± centers (max) and/or @ each step.

NOTE
See Standard Drawing C-10 for Section A–A, notes and details.
CONCRETE

Concrete shall be 564 - C - 3000.

DESIGN CONDITIONS

Walls are to be used for the loading conditions shown for each type wall. Design H may be exceeded by six inches before going to next size.

DESIGN DATA

F_c = 1200 psi \quad F_c' = 3000 psi
Earth = 120 pcf and equivalent fluid pressure = 36 psf per foot of height

Walls shown for 1 1/2:1 unlimited sloping surcharge are designed in accordance with Rankine's Formula for unlimited sloping surcharge with \( g = 33\, \text{fps}^2 \).

Note: Maximum toe pressure under wall footing = 1 1/2 tons. Special design required where footing material is incapable of supporting this pressure.

EXCAVATION AND BACKFILL

Compaction of backfill material by jetting or ponding with water will not be permitted.

Each layer of backfill shall be moistened as directed by the Engineer and thoroughly tamped, rolled or otherwise compacted until the relative compaction is not less than 90 percent.

No backfill material shall be deposited against concrete retaining walls until the concrete has developed a strength of 2,500 pounds per square inch in compression as determined by test cylinders, or until 28 days after wall has been placed.

TYPICAL DRAINAGE

WHEN H IS GREATER THAN 4'-0"

1/2" Expansion joint, fill with premolded expansion joint filler. Locate joints at 30'-0" centres or as directed by the Engineer.

1/2" chamfer

Water stop, use only when watertight joint is required, see water stop detail.

SECTION A-A

Embedment 2 3/8" min.

3/4" dia.

3/8"

SPLIT PERMITTED

RUBBER WATERSTOP

Use only when watertight joint is required.
SPREAD FOOTING SECTION

Place concrete in toe against undisturbed material, except as permitted by the Engineer.

Note:
Quantities apply to Design H portion and exclude the added portion above "Gutter Elevation."

TABLE OF REINFORCING STEEL DIMENSIONS AND DATA

<table>
<thead>
<tr>
<th>Design H</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
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<tr>
<td>W</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
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<tr>
<td>B</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>(1) bars</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>(2) bars</td>
<td>12</td>
<td>16</td>
<td>20</td>
<td>24</td>
<td>28</td>
<td>32</td>
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<tr>
<td>Total (3) bars</td>
<td>18</td>
<td>24</td>
<td>30</td>
<td>36</td>
<td>42</td>
<td>48</td>
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<tr>
<td>CASE 1: De Press psf</td>
<td>1550</td>
<td>1930</td>
<td>2240</td>
<td>2550</td>
<td>2880</td>
<td>3220</td>
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<td>CASE II: De Press psf</td>
<td>1650</td>
<td>1960</td>
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<td>3200</td>
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<tr>
<td>Steel bars/ft²</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
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<td>Conc CF/ft³</td>
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<td>15.3</td>
<td>18.8</td>
<td>22.2</td>
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</tbody>
</table>

Note:
Reinforcement detailed is to be placed in addition to that shown for spread footing. All piles not shown, see Elevation on plans.

For pile footing Design H-4 use same footing dimensions as Design H-6.

NOTES

Design Conditions
Design H may be exceeded by 6" before going to the next size footing key is required. Exception when found unnecessary by the Engineer. Special footing design is required where foundation material is incapable of supporting ice pressure loads listed in table.

Design Data
fc = 1500 psi; vs = 24,000 psi
n = 0; earth = 120 psi

Case I: Equivalent fluid pressure = 36 psi max for determination of toe pressure, 27 psi min for determination of base pressure.

Case II: Earth pressure determined using Rankine's formula with φ = 33°-42°.

45° PILE FOOTING SECTION

TYPICAL LAYOUT EXAMPLE

For piles required, see Details 3-3 and 3-4, drawing C-15

SANDIEGO REGIONAL STANDARD DRAWING
REINFORCED CONCRETE RETAINING WALL
TYPE 1A

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Ottis T. Stephenson

San Diego Regional Engineering Committee

DRAWING NUMBER C-12

Revision By Approved Date
RETAINING WALL
FACE OF WALL OUTLET

RETAINING WALL
GUTTER OUTLET

OUTLET DETAIL—SECTION B-B

PLAN
OFFSET WALL
CONTINUOUS WALL
DRAIN THROUGH RETURN WALL

SECTION A—A

WALL DRAIN DETAIL

TYPICAL GUTTER DETAIL

WALL DRAINAGE
WHERE GUTTER NOT REQUIRED

GRATE DETAIL
Size to fit Standard Hubs

SAN DIEGO REGIONAL STANDARD DRAWING
RECOMMENDED BY THE SAN DIEGO
REGIONAL STANDARDS COMMITTEE

REVIEWED BY:

SAN DIEGO REGIONAL STANDARDS DRAWING
RECOMMENDATIONS COMMITTEE

DRAWING NUMBER C-14

RECOMMENDATIONS COMMITTEE

RETAINING WALL DETAILS NO. 2

Revision By Approved Date
WEAKENED PLANES
DETAIL 3-2

WALL EXPANSION JOINTS AND WEAKENED PLANES
DETAIL 3-3

WATERSTOP
DETAIL 3-6

Notes:
A. 4" drains at 30" max center to center (8" c.c. for Type 3 and 9.3" c.c. for Type 4 Retaining Walls). For walls adjacent to sidewalks or curbs, provide 4" cast iron or asbestos cement pipe under the sidewalk to discharge thru curb face. Exposed wall drains shall be located 3" above finished grade.
B. 6" square aluminum or galvanized steel wire mesh hardware cloth (Min. wire diameter 0.03") Anchor firmly to backface.
C. One cubic yard pervious backfill material in a burlap sack, securely held.
D. Pervious backfill material continuous behind retaining wall.

WATERSTOP

Holes will be permitted in the outer 1/8" of the web for wire, rings, etc... Tie web to "3 reinforcing bars @ 12" max. intervals to support the waterstop in proper position during concrete placement. Alternative detail may be submitted for approval of the Engineer.
DRAINAGE SYSTEMS
NOTES:

2. Types are designated as follows: (no wing) A, (one wing) A-1, (two wings) A-2.
3. Exposed edges of concrete shall be rounded with a radius of 1/2".
5. Concrete gutter to match adjacent gutters.
6. An expansion joint shall be placed at the ends of the inlet where the curb is to adjoin.
7. Provide 1/4" tooted groove in top slab in line with back of adjacent curb.
8. Surface of top slab shall be sidewalk finished to drain toward street at a slope of 1/4" per foot.
9. Maintain 1 1/2" clear spacing between reinforcing and surface unless otherwise noted.
NOTES:
1. See Standard Drawings D-11 & D-12 or additional notes and details.
2. Types are designated as follows: (no wing) B, (one wing) B-1, (two wings) B-2.
3. Exposed edges of concrete shall be rounded with a radius of 1/2".
5. Concrete gutter to match adjacent gutters.
6. An expansion joint shall be placed at the ends of the inlet where the curb is to adjoin.
7. Provide 1/4" tooled groove in top slab in line with back of adjacent curb.
8. Surface of top slab shall be sidewalk finished to drain toward street at a slope of 1/4" per foot.
9. Maintain 1 1/2" clear spacing between reinforcing and surface unless otherwise noted.

LEGEND ON PLANS
15' Type B-1 inlet

15'
NOTES:
2. Types are designated as follows: (no wing) C, (one wing) C-1, (two wings) C-2.
3. Exposed edges of concrete shall be rounded with a radius of 1/2".
5. Concrete gutter to match adjacent gutters.
6. An expansion joint shall be placed at the ends of the inlet where the curb is to adjoin.
7. Provide 1/4" tooled groove in top slab in line with back of adjacent curb.
8. Surface of top slab shall be sidewalk finished to drain toward street at a slope of 1/4" per foot.
9. Maintain 1 1/2" clear spacing between reinforcing and surface unless otherwise noted.
10. Where inlet is to be constructed on grade and Standard Drawing D-20 concrete apron is required, lift down-grade end of grate as shown on D-20.
11. When G-1 & G-2 grates are used place 3"-5.7 lb. steel I-beam, 3.5' long.

LEGEND ON PLANS
15' Type C-1 Inlet
**DIMENSIONS**

T = 8" if V is less than 8'.
T = 10' if V is 8' or more.
V = 5' unless otherwise specified.
V = D + 32' minimum.
W' = 7' unless otherwise specified.
Y' = 5' unless otherwise specified.
Width of driveway, W, shall be 10' unless otherwise specified.
Elevation of point N shall be 13' below point H unless otherwise specified.

**NOTES**

1. Steel Plate should be of one continuous piece with curve portion a circular arc.
   Length = Width + 18" + circular arc.
2. # 4 rebar 30" long, 1" O.C. shall be installed in top of walls for ties to top and gutters.
3. The reinforcing steel in the top slab shall be # 3 bars 6" O.C. unless otherwise specified. Clearance shall be 1 1/2" from the bottom of the slab.
4. Concrete for the inlet too to be placed at the same time as the s/w curb and gutter.
5. Concrete shall be 564·C = 3000.
6. Exposed edges of concrete shall be rounded with a radius of 1/2".
7. Surface of top slab shall be sidewalk finished to drain toward street at a slope of 1/4" per foot.

---

**TABLE A**

<table>
<thead>
<tr>
<th>PT</th>
<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>K</th>
<th>M</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>F.C. 4%</td>
<td>5%</td>
<td>6%</td>
<td>7%</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>8%</td>
<td></td>
</tr>
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</table>

---

**SECTION A-A**

- Top of Curb
- Gutter Line

---

**SECTION D-D**

- 1" support bolt, see Detail A on drawing D-5.
- Top Slab
- Pt. H
- 9" Curb Face
- Pt. J (Normal Gutter Grade)

---

**SECTION C-C**

- Weakened Plane Joint
- Straight Grade
- 18"

---

**SECTION E-E**

- Weakened Plane Joint
- Straight Grade
- 18"

---

**TOP SLAB REINFORCING PLAN**

- # 3 @ 6"
- Expansion Joint
- Manhole Frame and Cover, see drawing M-1

---

**PLAN**

- Valley Str. Grade
- Warped Gutter Flow
- Std. Gutter
- 5' - 6"
NOTES
1. A plain, round steel protection bar 1" in dia. shall be installed. Bar shall be embedded 5" at each end.
2. Leave 8" hole blocked out in bottom placing of concrete for bolts placed at same time as gutter.
3. All exposed metal parts shall be galvanized.
4. All galvanizing damaged by welding shall receive two coats of aluminum paint.
5. Support bolts shall be spaced at not more than 5'-0" O.C.
6. Adjusting nuts to be tightened and secured in place when steel plate is in proper position.

SECTION B-B

SECTION A-A MODIFIED

Curb Inlet - Type D (Details)
NOTES
2. When V exceeds 4", steps shall be installed. See Standard Drawing D-11 for details.
3. Exposed edges of concrete shall be rounded with a radius of 1/2".
4. Maintain 1 1/2" clear spacing between reinforcing and surface.
5. Type E inlet to be used only with rolled curb. See Standard Drawing G-4.
6. Transition 10' to curb Section B-B at inlet, both sides.

LEGEND ON PLANS

SANDIEGO REGIONAL STANDARD DRAWING

CURB INLET - TYPE E
NOTES
2. When V exceeds 4° steps shall be installed. See Standard Drawing D-11 for details.
3. Exposed edges of concrete shall be rounded with a radius of 1/2".
4. Openings on both sides unless otherwise shown on plans.
5. Maintain 1 1/2" clear spacing between reinforcing and surface.

LEGEND ON PLANS

--- [Symbol] ---

PLAN

SECTION A-A

SECTION B-B

# 4 @ 6" both ways

Manhole frame and cover.
See drawing M-2.

Elev shown on plans
11" unless shown otherwise on plans

4 - # 4 around pipe

Slope floor 12:1 towards outlet

4 - # 4 around opening

2'

4'

3'-5 1/2''

2''

12:1
NOTES
2. When V exceeds 4', steps shall be installed. See Standard Drawing D-11 for details.
3. Maintain 1 1/2" clear spacing between reinforcing and surface.
4. Increase in allowable depth subject to approval by Agency.
5. Section A-A shows 3 sizes and shall not imply that an interior wall is to be built for the structures with double or triple frame and grate.
6. Exposed edges of concrete shall be rounded with a radius of 1/2".

For frame and grate details, see drawing D-13, D-14 & D-15.

LEGEND ON PLANS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

CATCH BASIN - TYPE G

DRAWING NUMBER D-8
NOTES
2. Concrete base shall be 564 - C - 3000.
3. All precast components shall be reinforced with 1/4" diameter steel, wound spirally on 4" centers.
4. All joints shall be set in Class C mortar.
5. Maintain 1 1/2" clear spacing between reinforcing and surface unless otherwise noted.
6. Exposed edges of concrete shall be rounded with a radius of 1/2".

LEGEND ON PLAN:

--- C ---

---
NOTES
2. All joints shall be set in Class C mortar.
3. All precast components shall be reinforced with 1/4" diameter steel wound spirally on 4" centers.
4. Maintain 1 1/2" clear spacing between reinforcing and surface.
5. Concrete base shall be 564 - C - 3000.
6. Exposed edges of concrete shall be rounded with a radius of 1/2".

LEGEND ON PLANS

---

# 4 @ 6" O.C.

# 4 bars placed diagonally

Bend Down 15" (Typ)

Manhole frame and cover see drawing M-1 or M-2

For step detail, see drawing D-11

Bend Down 15" (Typ)

Rounded pipe ends see drawing D-61

Elev. shown on plans.

SECTION A-A
**NOTES**

1. Concrete shall be 564 · C · 3000 unless otherwise noted.
2. Reinforcing steel shall comply with this drawing unless otherwise specified.
3. Reinforcing steel shall be intermediate grade deformed bars conforming to latest ASTM specifications.
4. Bends shall be in accordance with latest ACI code.
5. Minimum splice length for reinforcing shall be 30 diameters.
6. Floor shall have a wood trowel finish and, except where used as junction boxes, shall have a minimum slope of 1" per foot toward the outlet.
7. Depth V is measured from the top of the structure to the flowline of the box.
8. Wall thickness and reinforcing steel required may be decreased in accordance with table above.
9. Wall thickness shall be stepped on the outside of the box.
10. When the structure depth V exceeds 4', steps shall be cast into the wall at 15 inch intervals from 15" above floor to within 12 inches of top of structure. Where possible place steps in wall without pipe opening, otherwise over opening of smallest diameter.
11. Alternate step may be an approved steel reinforced polypropylene step.
NOTES:
1. Face angle shall be cast into structure continuous for the full length "L".
2. All exposed metal parts to be hot-dipped galvanized after fabrication.
3. When curb height (H) exceeds 10" install 1" # steel protection bar.
4. Install additional bars at 3 1/2" clear spacing above first bar when opening exceeds 13".
5. When curb inlet opening length exceeds 8' install 1" # steel support bolts, spaced at not more than 5' o.c.
NOTES:
1. Hot dip galvanize all parts after fabrication.
2. Dimensions to Centerline of bars unless otherwise noted.
3. Type G-1 and G-2 grates are not to be used in areas subject to bicycle traffic.
NOTES:
1. Hot dip galvanize all parts after fabrication.
2. Dimensions to Centerline of bars unless otherwise noted.
Punch 1" hole in CSP. Place pipe so bars of grate will be parallel with main surface flow.

SECTION A-A

**TYPE A**

3/4" x 1/2" bars

Calk Seal (See Note 2)

Continuous Weld

Inlet pipe

0.011" stub end

H = 2'-0" + dia., unless otherwise specified

Join to CSP

SECTION C-C

**TYPE B**

L 3/4" x 2 1/2" x 3/8" Rivet, Spot Weld or Tack Weld at 1/8 points or better to C.S.P.

SEE DETAIL "A"

SEE DETAIL "B"

(See Section A-A for bottom design)

SECTION F-F

**DETAIL "A"**

1 1/2" x 3"

1/2" x 3/4" x 2"

1/4" Checkered R.

1/8"

1/4" Checkered R.

1 3/16"

1/2" R

1/8"

3/8" Rivets, Spot Weld or Tack Weld at 1/8 points or better

NOTES

1. All components shall be galvanized.

2. Inlet and outlet pipes shall be set at factory and positioned as shown on plans.

3. Ladders and Steps: None required where "H" is 3'-6" or less. Where "H" is between 3'-6" and 4'-11" place one step +16" above the floor. If "H" is 5'-0" or more install a ladder placing the lowest rung 16" above the floor and the highest rung not more than 14" below top of inlet. Place single step or ladder in wall without wall opening.


5. Grate to be provided when specified.

6. Grate detail shall be as shown on drawing D-17 unless otherwise approved by Agency.

**SAN DIEGO REGIONAL STANDARD DRAWING**

**CORRUGATED STEEL PIPE INLETS**

**TYPES A AND B**

**DRAWING NUMBER**

D-16

**RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARD COMMITTEE**

*Adopted Standard Dec 1975

**COMMITTEE: R.E.C. 1967**

**DATE**: 1-7-74
GRATE DETAILS

ALTERNATIVE CAST NODULAR IRON GRATE OR CAST STEEL

GRATE BAR SPACING TABLE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>NO BARS</th>
<th>CLEAR BAR SPACING</th>
<th>X</th>
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<td>9/16</td>
<td>3 3/4&quot;</td>
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<tr>
<td>Cast</td>
<td>13</td>
<td>2</td>
<td>2 1/2</td>
<td>3 3/4&quot;</td>
</tr>
</tbody>
</table>

STEP DETAIL

H = 3' - 6" to 4' - 11"

LADDER DETAIL

H = 5' - 0" or GREATER

3/8" Cross bars may be fillet welded, resistance welded or electro forged to bearing bars.

CROSS BAR DETAIL

GRATE (WELDED STEEL)

CROSS BAR DETAIL

ALTERNATIVE CAST NODULAR IRON GRATE OR CAST STEEL GRATE
NOTES

1. Drain seams may be riveted or resistance spotwelded at equal centers, continuous helical lock seam or helical welded seam.

2. Each drain section shall be assembled with standard coupling bands.

3. Cross bar spacer of grate shall be pressure fusion or plug welded to bearing bars in such a manner as to develop the strength of the cross bar spacer.

4. Cross bar spacer (Section E–E) may differ from that shown provided section area is equal or greater.

5. Grate material shall be a weldable grade of steel complying to the requirements of ASTM A 36.

6. The maximum variance from a straight line from the extreme top corners of the bearing bar shall be 1/2” in 20 feet.

7. Installation lengths shall be 10 feet or multiples thereof.

8. Either field joint sealed with a pliable mixture of sand, portland cement and emulsified asphalt (Mixture of 1 part portland cement, 3 - 5 parts sand and 1 1/2 parts SSI emulsified asphalt), or continuous weld.
C.S.P. Slotted Drain
Square Wall, Concrete Plug, Metal Cap, or Band Plug.

SECTION A-A
CATCH BASIN
C.S.P. INLET

SECTION B-B
ALTERNATE SECTION B-B

INLETS

NOTES
1. Either field joint with a pliable mixture of sand, portland cement and emulsified asphalt (mixture of 1 part portland cement, 3 - 5 parts sand, and 1 1/2 parts SSI emulsified asphalt), or continuous weld.
2. See Standard Drawing D-18 for additional notes and details.

SAN DIEGO REGIONAL STANDARD DRAWING
SLOTTED DRAIN CONNECTIONS TO STANDARD INLETS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER D-19
NOTES:
1. Curb and apron to be placed monolithically.
2. Use of false header at valleys and slope break line is optional.
3. Extend vertical steel from inlet structure into concrete apron as required.
4. Screed Direction
5. Concrete shall be 517-C:2500.

LEGEND ON PLANS
NOTES
1. Fit curb to the face of inlet wall.
2. For use with Type C inlet only. See Standard Drawing D-3 for details.
**NOTES**

1. A.C. spillway may be used when fill is 10' or less, and where fill slope is 1 1/2:1 or flatter.
2. Use 10' min. length of gutter transition on each side of downdrain in sag condition.

**SECTION A-A**

**SECTION B-B**

**ALTERNATE SECTION B-B**

**LEGEND ON PLANS**

- sag cond.
NOTES
1. Downdrain flume may be used where fill slope is
   1 1/2 : 1 or flatter.
2. Use 10' min length of gutter transition on each side
   of downdrain in sag location.
3. All metal parts to be galvanized after fabrication.
Dimensions to be as tabulated below for Assembly.

<table>
<thead>
<tr>
<th>Dia</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot;</td>
<td>16&quot;</td>
<td>25</td>
<td>1/2&quot;</td>
<td>15&quot;</td>
<td>4</td>
<td>3/4&quot;</td>
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<td>6</td>
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<tr>
<td>12&quot;</td>
<td>18&quot;</td>
<td>25</td>
<td>1/2&quot;</td>
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<td>5</td>
<td>9</td>
</tr>
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<td>24&quot;</td>
<td>36</td>
<td>26&quot;</td>
<td>6&quot;</td>
<td>6&quot;</td>
<td>12&quot;</td>
<td>24&quot;</td>
<td>25&quot;</td>
</tr>
</tbody>
</table>

NOTES
1. All metal parts for anchor assemblies shall be galvanized after fabrication.
2. One anchor assembly required per length of pipe. When final length exceeds 10 ft., two anchors shall be required.

LEGEND ON PLANS
- Sag Cond.
NOTES
1. Not to be used in sidewalk areas.
2. Concrete shall be 517-C-2500.

LEGEND ON PLANS
- 10 ft

SAN DIEGO REGIONAL STANDARD DRAWING
CURB OUTLET - TYPE B

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER D-26
NOTES
1. Pipe shall be one continuous length from property line to curb line.
2. Multiple pipes to be set a minimum distance of D/2 apart.
3. Concrete shall be 517-C-2500.
4. Pipe shall be circular asbestos cement, cast iron or rigid plastic.

APPROVED DRAIN PIPE SIZES

<table>
<thead>
<tr>
<th>Size</th>
<th>Curb Face</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot;</td>
<td>6&quot; to 8&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>10&quot;</td>
</tr>
</tbody>
</table>

BLOCK CORNER

Drain shall not occupy the hatched area

2. Lip shall be used with any pipe over 18" I.D.

3. Surface of top slab shall be finished as specified for sidewalks in the Standard Specifications and shall drain towards streets at a slope of 1/4" per foot.

4. Exposed edges of concrete shall be rounded with a radius of 1/2".

5. Concrete gutter to match adjacent gutter.

6. Expansion joint material shall be placed at the ends of the inlet where the curb is to adjoin.

7. Provide 1/4" toed groove in top slab in line with back of adjacent curb.

8. Transition to normal curb height in 10' unless noted otherwise.

9. Construction joint (Standard Drawing D-12) may be eliminated if inlet and gutter are constructed concurrently.

LEGEND ON PLANS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

CURB INLET, SHALLOW - TYPE H

DRAWING NUMBER D-28
NOTES
2. When "V" exceeds 4', steps shall be installed.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING
CATCH BASIN - TYPE I

DRAWING NUMBER D-29
### ELEVATION DOUBLE HEADWALL

### ELEVATION SINGLE HEADWALL

**SECTION**

- Rounded pipe ends, see drawing D-61.

---

<table>
<thead>
<tr>
<th>D</th>
<th>H</th>
<th>L</th>
<th>Steel</th>
<th>Conc.</th>
<th>L</th>
<th>Steel</th>
<th>Conc.</th>
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<td>23' 0&quot;</td>
<td>240</td>
<td>4.30</td>
</tr>
</tbody>
</table>

### NOTES

1. Concrete shall be 564-C-3000.
2. All reinforcing steel # 4 bars. All vertical and horizontal tie bars 18" maximum spacing.

---

**RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARD COMMITTEE**

Coordinator: R.E.E. 1980

**SAN DIEGO REGIONAL STANDARD DRAWING**

**STRAIGHT HEADWALL - TYPE A**

(CIRCULAR PIPE)

**DRAWING NUMBER** D-30

**LEGEND ON PLANS**
ELEVATION DOUBLE HEADWALL

ELEVATION SINGLE HEADWALL

SECTION

NOTES
1. Concrete shall be 564-C-3000.
2. All reinforcing steel #4 bars. All vertical and horizontal tie bars 18” maximum spacing.

<table>
<thead>
<tr>
<th>C.S.P. ARCH SIZE</th>
<th>SINGLE</th>
<th>DOUBLE</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>18&quot; x 11&quot;</td>
<td>2'-7&quot;</td>
<td>5'-6&quot;</td>
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<tr>
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<td>3'-11&quot;</td>
<td>6'-6&quot;</td>
</tr>
<tr>
<td>24&quot; x 18&quot;</td>
<td>3'-2&quot;</td>
<td>7'-6&quot;</td>
</tr>
<tr>
<td>28&quot; x 20&quot;</td>
<td>3'-4&quot;</td>
<td>8'-6&quot;</td>
</tr>
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<td>35&quot; x 24&quot;</td>
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<td>10'-6&quot;</td>
</tr>
<tr>
<td>42&quot; x 29&quot;</td>
<td>4'-1&quot;</td>
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</tr>
<tr>
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<td>4'-5&quot;</td>
<td>14'-6&quot;</td>
</tr>
<tr>
<td>57&quot; x 38&quot;</td>
<td>4'-10&quot;</td>
<td>17'-0&quot;</td>
</tr>
<tr>
<td>64&quot; x 43&quot;</td>
<td>5'-3&quot;</td>
<td>19'-0&quot;</td>
</tr>
<tr>
<td>71&quot; x 47&quot;</td>
<td>5'-7&quot;</td>
<td>21'-0&quot;</td>
</tr>
</tbody>
</table>

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

STRAIGHT HEADWALL - TYPE A
(C.S.P.-ARCH)

DRAWING NUMBER: D-31
NOTES
1. Concrete shall be 564 - C - 3000.
2. Exposed corners to be chamfered 3/4".

LEGEND ON PLANS

---

SAN DIEGO REGIONAL STANDARD DRAWING

STRAIGHT HEADWALL - TYPE B
[CIRCULAR PIPE]
NOTES
1. Concrete shall be 564 - C - 3000.
2. Exposed corners to be chamfered 3/4".

LEGEND ON PLANS

<table>
<thead>
<tr>
<th>C.S.P. ARCH SIZE</th>
<th>A</th>
<th>B</th>
<th>H</th>
<th>SINGLE L</th>
<th>Conc C.Y.</th>
<th>DOUBLE L</th>
<th>Conc C.Y.</th>
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<td>0&quot;</td>
<td>1'</td>
<td>-  2'</td>
<td>3' - 11&quot;</td>
<td>6'</td>
<td>0.33</td>
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<td>2'</td>
<td>0&quot;</td>
<td>1'</td>
<td>-  4'</td>
<td>4' - 1&quot;</td>
<td>7'</td>
<td>1.08</td>
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<tr>
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<td>0&quot;</td>
<td>1'</td>
<td>-  6&quot;</td>
<td>4' - 4&quot;</td>
<td>8'</td>
<td>1.41</td>
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<td>-  8&quot;</td>
<td>5' - 0&quot;</td>
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<td>1.97</td>
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<tr>
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<td>6&quot;</td>
<td>2'</td>
<td>-  0&quot;</td>
<td>5' - 4&quot;</td>
<td>10'</td>
<td>2.56</td>
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</table>
### ELEVATION

#### SECTION B-B

## DIAMETER OF PIPE

<table>
<thead>
<tr>
<th>DIA OF PIPE</th>
<th>Dimensions</th>
<th>SINGLE PIPE</th>
<th>DOUBLE PIPE</th>
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<tr>
<td></td>
<td>L</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>18&quot;</td>
<td>2</td>
<td>3</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>3</td>
<td>3 1/8&quot;</td>
<td>1 1/8&quot;</td>
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<td>30&quot;</td>
<td>4</td>
<td>0 5/8&quot;</td>
<td>2 3/4&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>4 1/2&quot;</td>
<td>2 9/16&quot;</td>
<td>4 2/16&quot;</td>
</tr>
</tbody>
</table>

### NOTES:
1. Concrete shall be 564°C · 3000.
2. Exposed corners to be chamfered 3/4".
3. Multiple pipes to be set a distance of D/2, with a 1" minimum between outside diameters of pipes.
4. Top of headwall shall be placed approximately parallel to profile grade when the grade is 3% or more.
5. Skewed pipes: Dimension W to be increased in width or length due to skew or multiple pipes.
6. For pipe wall thickness greater than 3" use alternate Detail C.

### LEGEND ON PLANS

---

**SAN DIEGO REGIONAL STANDARD DRAWING**

**WING AND U TYPE HEADWALLS FOR 12" TO 36" PIPES**

**RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE**

**Drawing Number**: D-34

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**Recommended by the San Diego Regional Standards Committee**

**Drawing Number**: D-34

---

**On Plans**

---

**Construction**

---

**By**: [Name]

**Approved By**: [Name]

**Date**: [Date]
### NOTES

1. Skewed Pipes: Dimension W to be increased to take care of increased width or length due to skew of multiple pipes.
2. Tops of headwalls, on grade culverts, shall be placed parallel to profile grade when the grades are 3% or more.
3. Concrete shall be 564-C-3000.
4. Exposed corners shall be chamfered 3/4".
5. Multiple pipes shall be set a distance of D/2, with a 1' minimum, between outside diameters of pipes.
6. For pipe wall thickness greater than 3" use Alternate Detail C.

### TABLE

<table>
<thead>
<tr>
<th>Dia. of Pipe</th>
<th>Dimensions</th>
<th>Single Pipe</th>
<th>Double Pipe</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td>U Type</td>
<td>Wing Type</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Concrete</td>
<td>Concrete</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CY LBS</td>
<td>CY LBS</td>
</tr>
<tr>
<td>42&quot;</td>
<td>3' 7-1/4&quot;</td>
<td>2-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>4'-6&quot;</td>
<td>2'-6&quot;</td>
<td>3'-9&quot;</td>
</tr>
<tr>
<td>54&quot;</td>
<td>5'-4-7/8&quot;</td>
<td>3'-0&quot;</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>6'-3-3/4&quot;</td>
<td>3'-6&quot;</td>
<td>6'-3&quot;</td>
</tr>
<tr>
<td>66&quot;</td>
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<td>6'-0&quot;</td>
</tr>
<tr>
<td>72&quot;</td>
<td>8'-1-3/8&quot;</td>
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<td>6'-6&quot;</td>
</tr>
<tr>
<td>78&quot;</td>
<td>9'-0&quot;</td>
<td>5'-0&quot;</td>
<td>7'-6&quot;</td>
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<td>84&quot;</td>
<td>9'-10-3/4&quot;</td>
<td>5'-6&quot;</td>
<td>8'-3&quot;</td>
</tr>
</tbody>
</table>

Note: Dimensions E and L apply to wing type only.
NOTES
1. Concrete shall be 564 - C - 3000.
2. All reinforcing steel #4 bars. All vertical and horizontal tie bars 18" maximum spacing.
3. When multiple pipes are used, the distance between pipes shall be D/2 (1' min.). Dimension L/2 is from the center of the pipe nearest to the end of the headwall as shown.
### Diagram:

**Elevation**

- Dimensions:
  - L/2
  - W
  - 3/4" chamfer

**Section**

- Dimensions:
  - 7 1/2"
  - 2' 0"

**Corner Steel Detail**

### Table: Length of W

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<th>4' 10&quot;</th>
<th>5' 6&quot;</th>
<th>6' 4&quot;</th>
<th>7' 10&quot;</th>
<th>8' 4&quot;</th>
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<tr>
<td>18&quot; x 11&quot;</td>
<td>2' 7&quot;</td>
<td>2' 9&quot;</td>
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<td>75</td>
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<td>3.25</td>
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<td>3.56</td>
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</table>

### Notes:

1. Concrete shall be 564 - C - 3000.
2. All reinforcing steel # 4 bars. All vertical and horizontal tie bars 18" maximum spacing.
3. When multiple pipes are used, the distance between pipes shall be S/2 (1" min.). The dimension L/2 is from the center of the pipe nearest to the end of the headwall as shown.
FACE ELEVATION

SIDE ELEVATION

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
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</thead>
<tbody>
<tr>
<td>12&quot; to 24&quot;</td>
<td>1'-0&quot;</td>
<td>2'-0&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>21&quot; to 36&quot;</td>
<td>1'-6&quot;</td>
<td>2'-6&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>39&quot; to 48&quot;</td>
<td>2'-0&quot;</td>
<td>3'-0&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>51&quot; to 60&quot;</td>
<td>2'-6&quot;</td>
<td>3'-0&quot;</td>
<td>14&quot;</td>
</tr>
<tr>
<td>63&quot; &amp; Larger</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>14&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. A curtain wall shall be used in place of a headwall at culvert ends where extension of the culvert is considered imminent or no fill is retained.
2. Concrete shall be 564-C-3000.
3. Keep the pipe-end clear of obstructions to permit easy placing of culvert extension.

LEGEND ON PLANS

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SAN DIEGO REGIONAL STANDARD DRAWING

CURTAIN WALL

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER D-38
NOTES

1. When more than one pipe is used, the profile view shown shall hold for the distance across all pipe openings. Sections A-A and B-B shall be from the outermost pipe. The distance between pipes shall be D/2 for round and Span/3 for arch pipe. (12" minimum)

2. Culvert shall be cut off even with apron surface when required by the Agency.

3. Use Inlet Apron only where a flared end section can not be utilized.

4. Place weep holes when required by the Agency.
D = Pipe Diameter
W = Bottom Width of Channel
P = Wetted Perimeter of Channel

### SELECTION OF RIP RAP

<table>
<thead>
<tr>
<th>Design Velocity (ft/sec)</th>
<th>Rock Classification</th>
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<tr>
<td>6 - 10</td>
<td>No. 2 Backing</td>
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<tr>
<td>10 - 12</td>
<td>1/4 Ton</td>
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<tr>
<td>12 - 14</td>
<td>1/2 Ton</td>
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<tr>
<td>14 - 16</td>
<td>1 Ton</td>
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<tr>
<td>16 - 18</td>
<td>2 Ton</td>
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</tbody>
</table>

### NOTES

1. Type of Rip Rap
   a. Regular Quarry Stone
   b. Rounded Cobblestone
   c. Broken Concrete (only allowed upon approval of the Agency)

2. Placement
   a. Minimum depth = 1 1/2 times average stone size.
   b. Rocks shall be placed so as to provide a minimum of voids.
   c. Surface rocks or concrete shall protrude to at least 1/2 their vertical dimension.
   d. Rip Rap is to be placed over a natural bedding, or it may be grouted or placed over a gravel bedding when required by the Agency.
PLAN

Note: Riprap not shown.

SECTIOH A-A

SECTION B-B

Tb

Aggregate cutoff wall

Aggregate subbase bottom and sides
6" thick for facing class
9" thick for light class.

Channel invert

Min. thickness:
- Facing Class: 18"
- Light Class: 30"

Filter cloth

Top of slab min. of 6", above channel invert

Inlet box

2 x Pipe dia.

Tw

Top of 3" fillet

1.5%

3" fillet

2.0"

Top of slab min. of 6", above channel invert

NOTES

1. Design:
   - Equivalent Fluid Pressure = 60 p.s.f.
   - Maximum Outlet Velocity = 35 ft/s.

2. Concrete shall be 584 - C - 3000.
3. Reinforcing shall conform to ASTM designation A615 and may be grade 40 or 50. Reinforcing shall be placed with 2" clear concrete cover unless noted otherwise. Splices shall not be permitted except as indicated on the plans.
4. For pipe grades not exceeding 20%, inlet box may be omitted.
5. If inlet box is omitted, construct pipe collar as shown.
6. Unless noted otherwise, all reinforcing bar bends shall be fabricated with standard hooks.
7. Five foot high chain link fencing, embed post 18" deep in walls and encase with Class B mortar.
8. In Sandy and Silty soil:
   a) Riprap and aggregate base cutoff wall required at the end of rock apron.
   b) Filter cloth (Polyfilter X or equivalent) shall be installed on native soil and base, minimum of 1 ft. overlaps at joints.
9. Rip rap and subbase classification shall be as shown on plans.

<table>
<thead>
<tr>
<th>Pipe Dia (in)</th>
<th>18</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>54</th>
<th>60</th>
<th>72</th>
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SAN DIEGO REGIONAL STANDARD DRAWING

CONCRETE ENERGY DISSIPATOR

DRAWING NUMBER D-41
NOTE
1. Place reinforcing as noted at center wall (or slab).
2. Match location of reinforcing with that in headwall, end sill and foundation slab.
3. All reinforcing shall be placed with 2" concrete cover, unless noted otherwise.
**NOTES**

1. Match location of sidewall reinforcing.
2. Dowels having same size and spacing as wall reinforcing may be used in lieu of continuous bars at contractors option.
3. Match location of headwall or end sill reinforcing.

**SECTION A–A**

Add #4 @ 20" vertical spacing to reinforcing shown (ea. face)

**SECTION D–D**

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<thead>
<tr>
<th>Pipe dia. (in.)</th>
<th>36</th>
<th>42</th>
<th>48</th>
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<tbody>
<tr>
<td>A bar</td>
<td>#5 @ 12&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#7 @ 12&quot;</td>
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<tr>
<td>B bar</td>
<td>#5 @ 12&quot;</td>
<td>#6 @ 12&quot;</td>
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<tr>
<td>C bar</td>
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<td>#5 @ 12&quot;</td>
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<tr>
<td>D bar</td>
<td>#4 @ 12&quot;</td>
<td>#5 @ 12&quot;</td>
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<tr>
<td>E bar</td>
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<td>#5 @ 12&quot;</td>
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</tbody>
</table>
| F bar          | #4 @ 9"  | #5 @ 9"  | #6 @ 9"
| G bar          | #7      | #11     |
NOTES
1. For trenching on improved streets see Standard Drawing G - 24 or
   G - 25 for resurfacing details.
2. (*) indicates minimum relative compaction.

SECTION

1" max graded aggregate.

4" clearance (min)

8" min
12" max

invert elevation

Pipe O.D.

Trench Depth

Backfill

Upper Zone (3' 0"

90%)

Middle Zone

85% *

Bedding

Pipe Zone

60% *

Trench Width

Max limit of slope excavation allowed
NOTE
The rounded areas may be built up of cement mortar or poured in place with the drainage structure.

R = Thickness of pipe

R = Inside diameter of pipe

10
NOTES:
1. Pipe collar does not have to be finished if covered, but must have a minimum of 6" of concrete around joint.
2. Concrete shall be 564 - C - 3000

LEGEND ON PLANS

---
NOTES
1. The end of connecting pipe shall not project into the waterway of the larger pipe.
2. The larger pipe shall not be less than 24" I.D.
3. The smaller pipe shall not be more than 2/3 the size of the larger pipe.
4. Concrete shall be 470 - C - 2000.
NOTES
1. A.C. or clay pipe may be substituted for plastic pipe at weep holes.
2. Weakened plane joints shall be placed every 12' to 15'. Expansion joints shall be placed at all changes of section and at ends of curves.
3. Cutoff walls shall be constructed at each end of the channel along the full width of section. See Standard Drawing D-72.
4. Chainlink fence shall be as required by Agency.
5. For bottom widths greater than 8 feet see Standard Drawing D-71.
6. Reinforcement shown is minimum.

LEGEND ON PLANS

MINOR DRAINAGE CHANNEL

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

MINOR DRAINAGE CHANNEL

SAN DIEGO REGIONAL STANDARD DRAWING

DRAWING NUMBER D-70

Revision By Approved Date
NOTES
1. A.C. or clay pipe may be substituted for plastic pipe at weep holes.
2. Weakened plane joints shall be placed every 12' to 15'. Expansion joints shall be placed at all changes of section and at ends of curves.
3. Cutoff walls shall be constructed at each end of the channel along the full width of section. See Standard Drawing D-72.
4. Chainlink fence shall be as required by Agency.
5. Reinforcement shown is minimum.
NOTES
1. Thickness and wall depth shall be as shown on plan.
2. Reinforcing in cutoff wall shall be the same as that required in channel.
3. Concrete shall be S64-C-3000.
NOTES
1. Concrete shall be 564-C-3000.
2. Pipe shall connect to channel as high as possible.
3. The maximum angle of connection is 60° downstream.
   In no case shall a pipe angle upstream.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

PIPE TO CHANNEL CONNECTION

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Drawing Number D-73
NOTE
The following shall be as required by Agency:
  a) Low flow channel
  b) Filter blanket
  c) Cutoff wall
  d) Fence

LEGEND ON PLANS
NOTES
1. Longitudinal slope of lined ditch shall be 2% minimum.
2. Reinforcing, when required by Agency, shall be 1 1/2" x 1 1/2"
   17 gage stucco netting.
3. Over slope down ditches shall employ 6" thickened edge section
   at both sides of ditch.

LEGEND ON PLANS
### SPAN vs. HEIGHT Table

<table>
<thead>
<tr>
<th>SPAN</th>
<th>2'</th>
<th>3'</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
<th>7'</th>
<th>8'</th>
<th>9'</th>
<th>10'</th>
<th>12'</th>
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</thead>
<tbody>
<tr>
<td>HEIGHT</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>30</td>
</tr>
</tbody>
</table>

**Notes:**
- For boxes of height less than that shown in table, use greater table height sizes, with dimensions and reinforcing bars being necessary changes in bar lengths, number of spacers and quantities.

---

### Additional Information

- **FLAT INVERT**
- **V INVERT**
- **TRAPEZIODAL INVERT**

*When shown*

### Typical Sections

- **Typical Sections 2' thru 6' Spans**
- **Typical Section 7' thru 12' Spans**

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For reinforcement clearance, except of bottom, see "Miscellaneous Details."
For boxes of height less than that shown in table, use next greater table height slabs, wall dimensions and reinforcing steel, and make necessary changes in bar lengths, number of spacers and quantities. Number of "d" bars in table is slab total for both cells.

For exposed top, extend "c" bars full length, top slab only, provide additional "d" spacers @18" and adjust quantities.

Note:

Provide paving notch when top is exposed and where PCC pavement or approach slab is used.

"Flat Invert" Alternative

(When shown)

TYPICAL SECTION

(Showing reinforcement for interior walls 8" and over)
<table>
<thead>
<tr>
<th>SPAN</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
<th>7'</th>
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</thead>
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<tr>
<td>HEIGHT</td>
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<td>6'</td>
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<td>STRENGTH CLASSIFICATION</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
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Note: For boxes of height less than that shown in table, use next greater table height slabs, wall dimensions and reinforcing steel, and make necessary changes in bar lengths, number of spacers and quantities. Number of "a" bars in table is slab total for all three cells.

For reinforcement clearance, except at bottom, see "Miscellaneous Details."

For exposed top, extend "c" bars full length, provide additional "A" spacers @ 18" and adjust quantities.

Provide paving notch when top is exposed and where PCC pavement or approach slab is used.

"FLAT INVERT" ALTERNATIVE
(When shown)

Reinf. for interior walls under 8".

TYPICAL SECTION
**Design Notes**

**Specifications:**

- **Design:** A S 5-94. Dated 1973 with revisions and as supplemented by State of California Drainage Planning and Design Manual.
- **Section Design for Culverts:** Slab-on-Grade Foundation or Culvert Unprotected on Long Foundation. For Culverts on Roads or Rock Foundations, Special Design Will be Required.

**Loading:**

- **Live Load for Legal Maximum Load:** LC-50-LA or Alternative, with 30% Impact for All Cover Depths; No Impact on Invert.
- **Cover Less than 2'-6":** Wheel Load Distribution on the Top Slab is E0.5 + P3.5 + 3.5 Longitudinally and Concentrated along the Slab's length, Load Distribution is uniformed and uniformly over the breadth of the Culvert.
- **Cover 2'-6" or More:** Wheel Loads Distributed Uniformly Over a Square 1.5 x 1.5 Times the Depth of Cover but not Less than Half the Time of Cover on the Top Slab or 3.5 Load on the Invert Slab, when such areas from the wheel load concentration is taken into account. The Load shall be considered an impact uniformly distributed over the area of the wheel load, except for the individual wheel loads. The longitudinal dimension shall be considered. All dimensions shall be taken to the outside edges of the supporting slab adjacent to the live load on single span. When Cover is more than 2'-6" and Excess Span add Multiple Spans when Cover exceeds distance between exterior walls.
- **Dead Load:** Earth Load of 100pcf and an Equivalent Fluid Pressure of 12.5pcf Respectively for Clean Spans of 20'-0" or Less.

**Unit Stresses:**

- **Fv:** 30,000 psi, N = 0.7
- **Fv:** 1,200 psi

**Reinforcement:**

- **Clear Minimum 1.5 in. and 1.0 Increments, as noted.**
- **Distribution:** "B" expressed as a 5.0% main positive reinforcement.
- **Classification:** A. Top slab = 50%, Bottom Slab = 48.0% (Maximum Flexural or Longitudinal).
- **Classification:** B. Top and Bottom Slabs = 4.8%.

**General Notes:**

- **Quantities:** Quantities are for the specified invert slab and do not include offsets in longitudinaltion, foundation, or reinforcement for pipe harness or cutoff walls.
- **Special Covers:** Box standard plans are not to be used for Culverts in a contaminated or marginal environment or where there is a severe risk of corrosion for construction.
- **Designation:** Low on slabs as slab-on-grade - strength classification.
- **Alternatives:** invert = "A" (standard). alternate invert = "B" (full invert). "A" invert or "B" invert is included as designation end of Culvert shall be reamed in offset unless "A" invert end is designated.
- **Rental Placement:** Main reinforcement is placed transversely on pipe for exposed Culverts. Nominal Flange, Vertical Flange, Reinforcement spacers are placed along the edge.

**Construction Notes:**

- **Expansion Joints:** Bottom slab - no expansion joint shall be placed.
- **Top Slab Expansion:** When cover is less than 2'-6", Expansion joint shall be placed at 20'-0" intervals.
- **Ordinary Joint:** When cover is more than 2'-6", Expansion joint shall be placed at 20'-0" intervals.
- **Concrete:** Concrete shall be placed in alternating 3-1/2 foot courses. An expansion joint shall be placed at 20'-0" intervals.
- **Construction Loads:** Not permitted until concrete has reached a strength of 3,000 psi or age of 28 days, whichever occurs first, and until expansion joints have been set by the engineer.

**Use of Standard Drawing:**

- **Strength Classification:** Symbolized by the letters "A," "B," etc., at the top of the data table is merely a convenient designation for a particular structural section for a culvert of any given opening. It is dictated by the cover or depth of fill over the top slab.

**Use of Standard Drawing:**

- **Live Load and RCB Directional Terminology:**

**Box Culvert Miscellaneous Details**

**San Diego Regional Standards Drawing**

**Drawing Number:** D-81

**Recommended by the San Diego Regional Standards Committee**

**Date:** Oct. 1973

**Coordinator:** R.C.E. 1983
DIRECT BURIAL FOUNDATION

ANCHOR BASE FOUNDATION

564 - C - 3000 P.C.C. Anchor base square or round, add 1\' to each dimension for loose soil or soft clay conditions.

Anchor Bolts (4 req.) 1\'x 36\'x 4\' hook, galv. Use two leveling nuts with washers (all galv.) on each bolt.
**STEEL CONDUIT**

1. 3/4" x 8' copper covered steel ground rod.
2. Alternate Ground: 15' no. 4 bare stranded copper wire, coiled.
3. Approved non-metallic conduit.
4. Steel conduit.

**NON-METALLIC CONDUIT**

1. 
2. 
3. 
4. 

**DIRECT BURIAL FOUNDATION**

- #8 copper wire grounded to pole steel with lug

**ANCHOR BASE FOUNDATION**

 Attach ground wire under anchor nut

1/2" Rigid steel Conduit

**DETAIL A**

- Steel Conduit
- Anchor Rods
NOTES
1. See Standard Drawings E-16 and E-17 for details.
2. (*) indicates dimension shown on details.
NOTES
1. See Standard Drawings E-16 and E-17 for details.
2. (*) indicates dimension shown on details.

<table>
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<tr>
<th>Luminaire Arm Data</th>
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<tr>
<td>6' - 0&quot;</td>
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<tr>
<td>8' - 0&quot;</td>
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<td>15' - 0&quot;</td>
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<tr>
<td>18' - 0&quot;</td>
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<tr>
<th>Signal Arm Data</th>
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<td>F</td>
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<tr>
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<tr>
<td>18' - 0&quot;</td>
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<tr>
<td>20' - 0&quot;</td>
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<td>25' - 0&quot;</td>
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<td>4' - 0&quot; Thru 18' - 0&quot;</td>
<td>15' - 0&quot; Thru 25' - 0&quot;</td>
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</table>

SAN DIEGO REGIONAL STANDARD DRAWING
TRAFFIC SIGNAL AND STREET LIGHTING STANDARDS - TYPES 101 AND 102
DRAWING NUMBER E-9

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Drawing Number E-9

Revision: By: Approved: Date:
NOTES
1. See Standard Drawings E-16 and E-17 for details.
2. (*) indicates dimension shown on details.
NOTES
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2. (*) indicates dimension shown on details.

<table>
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<tr>
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<th>N</th>
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<tr>
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<td>1&quot; - 6&quot;</td>
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<tr>
<td>8' - 0&quot;</td>
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<td>2&quot; - 3&quot;</td>
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<tr>
<td>10' - 0&quot;</td>
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<tr>
<td>12' - 0&quot;</td>
<td>2.3/8&quot; X 4 5/16&quot; X 0.1345&quot;</td>
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<td></td>
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<tr>
<td>15' - 0&quot;</td>
<td>2.3/8&quot; X 4 5/16&quot; X 0.1345&quot;</td>
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<tr>
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<th>Top O.D. X Base O.D. X Thick</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Anchor Bolt</th>
<th>Luminaire Arm</th>
<th>Signal Arm</th>
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<tr>
<td>106</td>
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<td>16&quot;</td>
<td>15&quot;</td>
<td>1 1/4&quot;</td>
<td>1 1/2&quot; X 54&quot; X 6&quot;</td>
<td>4' Thru 18&quot;</td>
<td>25' - 0&quot;</td>
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<td>107</td>
<td>30' - 0&quot;</td>
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<td>1 1/2&quot; X 54&quot; X 6&quot;</td>
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<td>16&quot;</td>
<td>15&quot;</td>
<td>1 1/4&quot;</td>
<td>1 1/2&quot; X 54&quot; X 6&quot;</td>
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<td>35' - 0&quot;</td>
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<tr>
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<th>F</th>
<th>End O.D. X Base O.D. X Thick</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
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<tr>
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<td>16&quot;</td>
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<td>1&quot;</td>
<td>1 1/4&quot;</td>
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<tr>
<td>30' - 0&quot;</td>
<td>3 7/8&quot; X 8&quot; X 0.1793&quot;</td>
<td>16&quot;</td>
<td>23&quot;</td>
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<td>10 1/2&quot;</td>
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<td>1&quot;</td>
<td>1 1/4&quot;</td>
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<td>35' - 0&quot;</td>
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<td>0&quot;</td>
<td>10 1/2&quot;</td>
<td>12&quot;</td>
<td>1 1/4&quot;</td>
<td>1 1/2&quot;</td>
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</table>
Signal Arm Length F

10 sq. ft.
60 lbs.
Typ.

2" Sch. 40 Pipe
X 6" Long

2" Tenon
See Detail S

12' - 0' min

5.8 sq. ft.
15 lbs.

12' - 0' min

Pole A

Pole Data

<table>
<thead>
<tr>
<th>Pole Type</th>
<th>Top O.D. X Base O.D. X Thick</th>
<th>B*</th>
<th>C*</th>
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<th>Signal Arm F</th>
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<td>1 3/4&quot; X 66&quot; X 6&quot;</td>
<td>35' - 0&quot;</td>
</tr>
<tr>
<td>110</td>
<td>16&quot; X 12 1/8&quot; X 0.25&quot;</td>
<td>18&quot;</td>
<td>17&quot;</td>
<td>1 3/4&quot;</td>
<td>1 3/4&quot; X 66&quot; X 6&quot;</td>
<td>40' - 0&quot;</td>
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Signal Arm Data

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<tr>
<th>F</th>
<th>End O.D. X Base O.D. X Thick</th>
<th>G</th>
<th>H</th>
<th>I*</th>
<th>J*</th>
<th>K*</th>
<th>L*</th>
<th>M*</th>
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</thead>
<tbody>
<tr>
<td>35' - 0&quot;</td>
<td>3 7/8&quot; X 8 11/16&quot; X 0.25&quot;</td>
<td>15&quot;</td>
<td>23&quot;</td>
<td>0&quot;</td>
<td>12&quot;</td>
<td>1 1/4&quot; - 7NC X 3&quot;</td>
<td>1 1/4&quot;</td>
<td>1 1/2&quot;</td>
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<tr>
<td>40' - 0&quot;</td>
<td>3 7/8&quot; X 9 3/8&quot; X 0.25&quot;</td>
<td>15&quot;</td>
<td>23&quot;</td>
<td>0&quot;</td>
<td>12&quot;</td>
<td>1 1/4&quot; - 7NC X 3&quot;</td>
<td>1 1/4&quot;</td>
<td>1 1/2&quot;</td>
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</table>

NOTES
1. See Standard Drawings E-16 and E-17 for details.
2. (*) indicates dimension shown on details.
NOTES
1. See Standard Drawings E-16 and E-17 for details.
2. (*) indicates dimension shown on details.

### Luminaire Arm Data

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<th>Base O.D.</th>
<th>X Thick</th>
<th>N</th>
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<td>2 3/8&quot; X</td>
<td>3&quot;</td>
<td>X 0.1345&quot;</td>
<td>9&quot;</td>
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<tr>
<td>6' - 0&quot;</td>
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<td>X 0.1345&quot;</td>
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<td>8' - 0&quot;</td>
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<td>3 11/16&quot;</td>
<td>X 0.1345&quot;</td>
<td>2' - 3&quot;</td>
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<td>10' - 0&quot;</td>
<td>2 3/8&quot; X</td>
<td>3 7/8&quot;</td>
<td>X 0.1345&quot;</td>
<td>2' - 6&quot;</td>
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<tr>
<td>12' - 0&quot;</td>
<td>2 3/8&quot; X</td>
<td>4 5/16&quot;</td>
<td>X 0.1345&quot;</td>
<td>3' - 9&quot;</td>
</tr>
<tr>
<td>15' - 0&quot;</td>
<td>2 3/8&quot; X</td>
<td>4 3/4&quot;</td>
<td>X 0.1345&quot;</td>
<td>4' - 3&quot;</td>
</tr>
<tr>
<td>18' - 0&quot;</td>
<td>2 3/8&quot; X</td>
<td>4 3/4&quot;</td>
<td>X 0.1345&quot;</td>
<td>5' - 3&quot;</td>
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### Pole Data

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<tr>
<th>Pole Type</th>
<th>A</th>
<th>Top O.D.</th>
<th>Base O.D.</th>
<th>X Thick</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Anchor Bolt</th>
<th>Luminaire Arm</th>
<th>Signal Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>111 30' - 0&quot;</td>
<td>8' X 12 1/8&quot;</td>
<td>X 0.25&quot;</td>
<td>18&quot;</td>
<td>17&quot;</td>
<td>1 3/4&quot;</td>
<td>X 66&quot;</td>
<td>6&quot;</td>
<td>4'</td>
<td>Thru 18&quot;</td>
<td>35' - 0&quot;</td>
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<tr>
<td>112 30' - 0&quot;</td>
<td>8' X 12 1/8&quot;</td>
<td>X 0.25&quot;</td>
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<td>17&quot;</td>
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<td>X 66&quot;</td>
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<td>Thru 18&quot;</td>
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### Signal Arm Data

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<th>G</th>
<th>H</th>
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<th>J</th>
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<tr>
<td>40' - 0&quot;</td>
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<td>0&quot;</td>
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SAN DIEGO REGIONAL STANDARD DRAWING
TRAFFIC SIGNAL AND STREET LIGHTING STANDARDS - TYPES 111 AND 112

DRAWING NUMBER E-13
SIGNAL ARM CONNECTION

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<th>Pole Data</th>
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<td>B* C* D*</td>
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<td>18'' 17'' 3 1/4''</td>
<td>1 3/4'' X 60'' X 6'' 45' - 0''</td>
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<td>G</td>
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<td>7 3/8'' X 10 1/16'' X 0.25''</td>
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<td>H</td>
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<td>15 - 2''</td>
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<td>1 1/4''</td>
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<tr>
<td>1 1/2''</td>
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NOTES
1. See Standard Drawings E-16 and E-17 for details.
2. ( * ) indicates dimensions shown on details.
### Luminaire Arm Data

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<th>End O.D. X Base O.D. X Thick</th>
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<td>6' - 0&quot;</td>
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<td>8' - 0&quot;</td>
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<td>12' - 0&quot;</td>
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<tr>
<td>18' - 0&quot;</td>
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<td>5&quot; - 3&quot;</td>
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### Signal Arm Connection

**Signal Arm Data**

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<tr>
<th>Pole Type</th>
<th>Pole Data</th>
<th>Anchor Bolt</th>
<th>Luminaire Arm</th>
<th>Signal Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Top O.D. X Base O.D. X Thick</td>
<td>B*</td>
<td>C*</td>
<td>D*</td>
</tr>
<tr>
<td>114</td>
<td>30' - 0&quot;</td>
<td>8&quot; x 12 1/8&quot; x 0.25&quot;</td>
<td>18&quot;</td>
<td>17&quot;</td>
</tr>
<tr>
<td>115</td>
<td>35' - 0&quot;</td>
<td>7 1/8&quot; x 12 1/8&quot; x 0.25&quot;</td>
<td>18&quot;</td>
<td>17&quot;</td>
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**Notes**

1. See Standard Drawings E-16 and E-17 for details.
2. ( )* indicates dimension shown on details.
NOTES

1. Luminaire arms shall be round, tapered steel tubes, maximum taper 0.14 inches per foot. with an end section 2 3/8" O.D. for mounting hardware. Extensions of 2" standard pipe about 7" long may be used at the option of the manufacturer.

2. Signal arms shall be round, tapered steel tubes, maximum taper 0.14 inches per foot. Extensions of 2" standard pipe about 4" long may be added to accommodate signal mounting hardware.

3. Sheet and plate thickness shown is nominal thickness.

4. Handhole reinforcement ring to be 1/4" X 1 1/2" for 0.1345" to 0.2500" poles, 3/8" X 2" for 0.3125".

5. In lieu of the torque requirements for H.S. bolts, cap screws shall be tightened by the turn-of-nut method 1/8 turn from a snug tight condition. No washer will be required.

6. 4 anchor bolts are required for each pole. Provide a hex nut, leveling nut and 2 washers for each anchor bolt.
### Handhole and Anchorage Details

**Notes:**
1. Luminaire arms shall be round, tapered steel tubes, maximum taper 0.14 inches per foot, with an end section, 2 3/8” O.D., for mounting hardware. Extensions of 2” standard pipe about 7” long may be used at the option of the manufacturer.
2. Signal arms shall be round, tapered steel tubes, maximum taper 0.14 inches per foot. Extensions of 2” standard pipe about 4” long may be added to accommodate signal mounting hardware.
3. Sheet and plate thickness shown is nominal thickness.
4. Handhole reinforcement ring to be 1/4” X 1 1/2” for 0.1345” to 0.2500” poles, 3/8” X 2” for 0.3125”.
5. In lieu of the torque requirements for H.S. bolts, cap screws shall be tightened by the turn-of-nut method 1/6 turn from a snug tight condition. No washer will be required.
6. 4 anchor bolts are required for each pole. Provide a hex nut, leveling nut and 2 washers for each anchor bolt.

---

<table>
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<tr>
<th>Revision</th>
<th>By</th>
<th>Approved</th>
<th>Date</th>
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**San Diego Regional Standard Drawing**

**Traffic Signal and Street Lighting Details**

**Recommended by the San Diego Regional Standards Committee**

Coordinator R.E. 19007 Date
6" CURB
Area = 0.89 SQ. FT.

8" CURB
Area = 1.08 SQ. FT.

NOTES:
1. Concrete shall be 517 - C - 2500.
NOTES:
1. Concrete shall be 517 - C - 2500.
NOTES
1. Concrete shall be 517-C-2500.
3. Monolithic curb, gutter and sidewalk is to be used with Agency approval only.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING
MONOLITHIC CURB, GUTTER AND SIDEWALK

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER G-3
NOTES
1. Transition to type G curb at all curb returns, except where sidewalk ramps are provided, and at all cul-de-sacs with drainage structures.
2. See Standard Drawing D-6 for Rolled Curb Inlet.
3. Concrete shall be 517 - C - 2500.
TYPE A-SECTION

TYPE B-SECTION

TYPE C-SECTION

TYPE D-SECTION

Height 6", 8", or 9" as indicated on plans

2H + 6"

Slope end of dike 1:1 when not joining other improvements

APPROX. DIKE QUANTITIES

<table>
<thead>
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<th>TYPE</th>
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<tr>
<td>A</td>
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<tr>
<td>B</td>
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<tr>
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<tr>
<td>D</td>
<td>0.0062</td>
</tr>
</tbody>
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NOTES

1. Dike is to be placed on a minimum 2" of A.C. road surfacing, extending throughout the width of the dike.
2. AR-8000 grade asphalt to be used for all dikes
3. A.C. dikes may be shaped and compacted with an extrusion machine or other equipment capable of shaping and compacting the material to the required cross section.

LEGEND ON PLANS

Type A Dike

DIKES (BERMS) - ASPHALT CONCRETE

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Coordinator R.E. 1967
NOTES
1. Concrete shall be 517-C-2500.
3. Extruded type B-3 curb shall be anchored to existing pavement by placing steel dowels and reinforcing steel as shown or by using an approved adhesive.

LEGEND ON PLANS

Type B-2 Curb and Gutter

Type B-1, B-3, B-4 Curb
NOTES
1. Concrete shall be 517C - 2500.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING
SIDEWALK - TYPICAL SECTIONS

Revision By Approved Date
Thickness G-7 7/7 7/7
NOTES
1. Ramp shall be centered on or directly opposite the bisector of the curb return or as directed by the Agency.
2. In the ramp area, the slope shall not exceed 12:1 (8.33%). Any deviation must be approved by the Agency.
3. Texture to be heavy broom finish transverse to axis of ramp.
4. Concrete shall be 517-C-2500.
NOTES
1. Expansion Joints ——— at curb returns, and adjacent to structures.
   (See Standard Drawing G-10).
2. Weakened Plane Joints ——— at mid point of curb return, when required,
   and at 15' intervals from P.C.R.'s (See Standard Drawing G-10).
3. 1/4" grooves ——— with 1/4" radius edges at 5' intervals.
NOTE
When distance from, "Area to be removed", to existing joint, edge or score mark is less than minimum shown, "Area to be removed", shall be extended to that joint, edge or score mark.
Contact Joints per Standard Drawing G-10 when separate pours are made

SECTION A-A

NOTES
1. Concrete shall be 517 - C - 2500.
2. \( \frac{\Delta}{A} \) (typ.) = Weakened plane joints.
3. \( \rightarrow \) = Typical flowlines.
4. \( \circ \) = Elevations to be shown on plans.
5. Return segments to be 5/8" thick.
DRAINAGE SLOT DETAIL

NOTES
1. Cross gutter to be constructed where the drainage
   is carried across street.
2. Minimum allowable cross slope is 0.5%.
3. Concrete shall be 517 - C - 2500.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

MID-BLOCK CROSS GUTTER

RECOMMENDED BY THE SAN DIEGO
REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER G-13
NOTES
1. No concrete shall be placed until forms and subgrade are inspected by the Agency.
2. Concrete shall be 517-C-2500.
3. See standard drawings G-15 and G-16 for width and location requirements.
**REQUIREMENT 1**
No portion of any curb opening shall be permitted within 6' of the intersection of the prolonged property lines and the curb as shown by arc A.

**REQUIREMENT 2**
No portion of any curb opening shall be permitted in the curb return where the radius of curb is 25' or less, as shown by arc B.

**REQUIREMENT 3**
On all curb returns where the radius is 25' or more, curb openings may encroach upon each end of the return a distance equal to 12 1/2% or 1/8 of the total length of the arc on the curb return, thus leaving at least 75% of the length of arc on the return face free from driveway encroachment, provided Requirement 1 is met.

**REQUIREMENT 4**
No portion of any curb opening shall be permitted in the curb return where a separate turning movement is provided, as shown by arc C.
NOTES

1. Curb openings, except for joint-use driveways and drive ways on lots having 21-foot frontage or less, shall be located at least 3 feet from the side property line extended.

2. Not more than 40% of the property frontage on residential lots, nor 60% of the property frontage on commercial lots may be allocated for driveway curb openings, except that lots having frontage of 25 feet or less are entitled to one 12 foot driveway (18 foot curb opening).

3. All driveways and curb openings shall be a minimum of 3 feet from any obstruction, i.e., poles, hydrants, etc.

4. No portion of any driveway shall be allowed across a line extending normal to the roadway from the front corner of the property, except that joint-use driveways may be permitted in special instances where written approval of both property owners is filed with the Agency.
NOTES
1. Sidewalk Ramps shall be installed as required by Agency.
2. \( D \) = distance shown on plans.
3. \( R \) = radius shown on plans (3 ft. minimum).
4. \( O \) = elevations shown on plans (top of curb, and gutter elev.).

LEGEND ON PLANS

ALLEY APRON
NOTES
1. Concrete shall be 564-C-3000.
2. See Standard Drawing G-10 for Joint Details.
3. Adjust 15' interval between Transverse Joints to match adjacent existing improvements.
NOTES
1. Concrete shall be 564-C-3000.
3. Adjust 15' interval between Transverse Joints to match adjacent existing improvements.
TYPICAL SECTION

Contact Joints

1/2" R

16'

16'
Pavement Width = 69' or less, but more than 53'.

TYPICAL PLAN

Weakened Plane Joints

Transverse contact joints shall be constructed at end of pour.

Contact Joints

Expansion Joints shall be constructed at locations shown on plans.

NOTES
1. Concrete shall be 564 - C - 3000.
2. See Standard Drawing G-10 for Joint Details.
3. Adjust 15' interval between Transverse Joints to match adjacent existing improvements.
NOTES
1. Concrete shall be 564 - C - 3000.
3. Adjust 15' interval between Transverse Joints
to match adjacent existing improvements.
Curb and Gutter

Surface Course

Expansion Joint

Base Course

ELEVATION

SECTION A-A

517 - C - 2500 Concrete

8"

LEGEND ON PLANS
NOTES
1. Existing A.C. shall be cut and removed in such a manner so as not to tear, bulge or
displace adjacent pavement. Edges shall be clean and vertical. All cuts shall be parallel
or perpendicular to street centerline, when practical.
2. Base material to be replaced to depth of existing base. A.C. may be substituted for
base material.
3. A tack coat of asphaltic emulsion or paving asphalt shall be applied to existing A.C.
at all contact surfaces, prior to resurfacing.
4. Asphaltic Concrete Resurfacing:
   a) Minimum total thickness shall be one inch greater than existing A.C.
   b) A.C. shall be hot plant mix.
   c) Finish course for Type B resurfacing shall be laid down using a spreader box.
5. All A.C. resurfacing shall be seal coated with an emulsified asphalt and covered with
sand. Chip sealing shall be applied as required by Agency.
6. Type B not to be used on lateral crossings.
GENERAL NOTES
1. Existing A.C. shall be cut and removed in such a manner so as not to tear, bulge or displace adjacent pavement. Edges shall be clean and vertical. All cuts shall be parallel or perpendicular to street centerline, when practical.

NOTES TYPE-C
1. Concrete shall be colored black. Method to be specified by Agency.
2. Minimum concrete thickness:
   - Alleys and local residential streets .................. 5 inches
   - Major streets and highways ........................ 7 inches

NOTES TYPE-D
1. A.C. shall be hot plant mix.
2. A tack coat of asphaltic emulsion or paving asphalt shall be applied to the existing A.C.
   at all contact surfaces and to the portland concrete prior to placing the new A.C.
3. A.C. resurfacing shall be seal coated with an emulsified asphalt and covered with sand.
   Chip sealing shall be applied as required by Agency.
SPRINKLER IRRIGATION SYSTEMS
NOTES
1. Teflon tape, 3/4" wide, shall be used on all threaded connections.
2. Close nipples shall not be used.
NOTES
1. All fittings shall be P.V.C. Sch. 40.
2. Teflon tape, 3/4" wide, shall be used on all threaded connections.
3. Short nipples shall not be used.

LEGEND ON PLANS
Show a number to indicate type head—

---

P.V.C. Sch. 80, 3" Nipple
(or length as req'd)

P.V.C. Sch. 80, 3" Nipple

PLAN

2"

Header Board or Sidewalk

1/2" above finished grade

P.V.C. Sch. 40, 3" Nipple
(or length as req'd)

P.V.C. Sch. 80
12" Nipple

ELEVATION

15" minimum
21" maximum

---

SAN DIEGO REGIONAL STANDARD DRAWING

LAWN SPRINKLER HEAD
POP UP SPRAY TYPE

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

<Signature> Dec. 1975
Coordinator R.C.E. 19607 Date

DRAWING NUMBER 1-2
NOTES
1. All fittings shall be P.V.C. Sch. 40.
2. All nipples shall be P.V.C. Sch. 80.
3. Teflon tape, 3/4" wide, shall be used on all threaded connections.
4. Short nipples shall not be used.

LEGEND ON PLANS
Show a number to indicate type head
Dimensions of concrete anchor are minimums.

Edge of existing curb or sidewalk.

Finished Grade

1/2" min. 1" max.

Existing Improvement

LOCATION OF SPRINKLER HEADS ADJACENT TO EXISTING IMPROVEMENTS

P.V.C. Elbow, Tee, or Adapter, sch. 40

P.V.C. 90° El, sch. 40

P.V.C. Nipple 8" long, sch. 80

P.V.C. Nipple 6" long

P.V.C. Coupling (shouldered)

Galv. Nipple 2" long

Galv. Nipple 2" C-2000 Concrete

NOTES
1. Teflon tape, 3/4" wide, shall be used on all threaded connections.
2. Close nipples shall not be used.

LEGEND ON PLANS
Show a number to indicate type head

SAN DIEGO REGIONAL STANDARD DRAWING

LAWN SPRINKLER HEAD
POP UP ROTARY {WITH ANCHOR BLOCK}
NOTES
1. Quick coupling valves in lawn areas shall be set to grade.
2. Quick coupling valves in shrub areas shall be set 4 inches above grade.
3. Dimensions of concrete anchors are minimums.
4. Close nipples shall not be used.
NOTES
1. Hose bibb shall be loose key operated, all brass or bronze construction, angle pattern with removable bonnet and stem assembly, replaceable seat washers and stem packing glands.
2. Unless otherwise specified, the hose connection thread shall be 3/4" male hose thread (pacific coast), and the riser opening thread shall be 3/4" female I.P.S. Discharge opening shall be 90° to riser opening.

LEGEND ON PLANS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

HOSE BIBB
(GARDEN VALVE)
NOTES
1. Atmospheric vacuum breakers shall be installed approximately 8" above the finished grade and above a sufficient number of sprinkler heads closest to the vacuum breaker so that at no time will it be subjected to back pressure or drainage.
2. Close nipples shall not be used.
3. All fittings, including the atmospheric vacuum breaker, shall not be of smaller size than the valve.
4. Teflon tape, 3/4" wide, shall be used on all threaded connections.
5. For use on lines 2 inches and smaller.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

ATMOSPHERIC VACUUM BREAKER
(2" AND SMALLER)
NOTES
1. Continuous pressure vacuum breakers shall be installed approximately 12 inches above finished grade and at the highest point in the line.
2. Continuous pressure vacuum breakers shall not be subjected to back pressure or drainage.
3. Teflon tape 3/4" wide shall be used on all threaded connections.
4. Close nipples shall not be used.

LEGEND ON PLANS

---

SAN DIEGO REGIONAL STANDARD DRAWING

CONTINUOUS PRESSURE VACUUM BREAKER ASSEMBLY
(2" AND SMALLER)

DRAWING NUMBER 1-8

REVISED

NOTE 1

D.S. 7-77
Pressure vacuum breaker assembly with check valves and brass test cocks. Size to be shown on plans.

NOTES
1. All fittings on assembly shall be flanged.
2. Cast iron pipe shall be polyethylene wrapped with a 2" wide plastic backed adhesive tape. Use 1/2" overlap.
3. Cast iron pipe and fittings shall be cement mortar lined.
4. Pressure vacuum breaker assembly shall be installed above a sufficient number of sprinkler heads closest to the vacuum breaker assembly so that at no time will it be subjected to back pressure or drainage.
5. All exposed cast iron shall be painted with one coat of red lead and two finish coats of exterior enamel.
FINISHED GRADE

1/2" thick felt expansion joint material. Cover opening around pipe completely, both ends.

Flanged Adaptor from water meter.

P.V.C. Female Adaptor

Union

17" x 30" x 12" concrete service box with two piece lid.

12" minimum

SECTION A-A

NOTES
1. Not for use in traffic areas.
2. All check valves shall have test cocks.
3. Use concrete block supports (2 req'd) when needed to match shallow meter installation.
4. All nipples and pipe fittings shall be red brass.
5. Gate valve handwheel shall be red brass or bronze.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

DOUBLE CHECK VALVE ASSEMBLY
(2" AND SMALLER)
NOTES
1. 3" and 4" pipe: 2'-6" x 4'-0" utility box with 4" walls.
   6" and 8" pipe: 2'-6" x 6'-0" utility box with 4" walls.
2. All exposed cast iron shall be painted with one coat of red lead and two finish coats of exterior enamel.

LEGEND ON PLANS

DOUBLE CHECK VALVE ASSEMBLY
(3'' AND LARGER)
NOTES
1. All valves shall be furnished with a standard manual control valve with bronze cross handle.
2. All valves shall be installed with a union on the downstream side of the valve. The union may be part of the valve or furnished separately—unions shall be ground joint, red brass or bronze.
3. All valves shall be installed within 12" of the water main, unless otherwise shown on the plans.
4. Close nipples shall not be used.

LEGEND ON PLANS
G.V.

SAN DIEGO REGIONAL STANDARD DRAWING

GATE VALVE
(2' AND SMALLER)
NOTES

1. All Manual Valves shall be furnished with a standard manual control valve bronze cross handle.
2. All manual angle valves shall be installed with a union on the downstream side of the valve. The union may be part of the valve or furnished separately — unions shall be ground joint, red brass or bronze.
3. All valves shall be installed with 12" of the water main, unless otherwise shown on the plans.
4. All Manual Valves shall be furnished with a removable bonnet and packing gland nut.
5. Close Nipples shall not be used.

LEGEND ON PLANS

M.C.V.

SAN DIEGO REGIONAL STANDARD DRAWING

MANUAL VALVES

DRAWING NUMBER I-13
NOTES
1. No splicing shall be made outside of the valve box except that made in a pull-box.
2. Close nipples shall not be used.
3. Spare wires terminating in valve boxes shall have their ends insulated, the same as for a splice.
4. When two or more valves are installed in the same location, they shall be in manifold using red brass fittings, with a gate valve installed at the start of the manifold.
5. All valves shall be installed with a union on the downstream side of the valve. The union may be part of the valve or furnished separately—unions shall be ground joint, red brass/bronze.

LEGEND ON PLANS
\[ R.C.V. \]
NOTES
1. Install pull boxes as shown on plans.
2. At junctions where runs combine, splice common ground in pull box.
3. Pull box cover shall be permanently marked "ELECTRIC".
4. Conductors for each controller clock shall be harnessed separately and at sufficient intervals to maintain a definite bundle.
5. All splices shall be made with a properly set mechanical splice connector entirely enclosed in self-curing epoxy resin and shall be completely water-proof.
6. All spare wire ends shall be insulated in the same manner as wire splices.

LEGEND ON PLANS
--- P.B. ---

SAN DIEGO REGIONAL STANDARD DRAWING

ELECTRICAL PULL BOX
FOR DIRECT BURIAL CONTROL WIRES
AND SPLICE DETAILS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER I-15
NOTE
See Standard Drawing I-25 or I-26 for water line trench details.

NORMA L LOCATIONS OF CONTROL WIRES

ALTERNATE LOCATION OF CONTROL WIRES
Automatic controller clock in weatherproof, tamperproof lockable case mounted on pedestal case.

Slope concrete away from conduits.

Finished Grade

1 1/2” x 1 1/2” x 1/4” angle iron stiffeners (galvanized and painted to match case)

Pedestal Case

Valve Control (Bushing)

Power Supply (Coupling Adapter)

564 - C - 3000 Concrete (min 3” encasement around conduits)

- 12” R min.

3/4” P.V.C. Conduit for power supply

2” P.V.C. Conduit for control wire

Slope concrete away from conduits.

Controller Cabinet

ELEVATION

NOTES

1. Where two or more controllers are mounted on a common concrete base, a minimum of three inches shall be left between controller cabinets.

2. Anchor controller pedestal to base as required by manufacturer.

3. Make all electrical connections inside controller cabinet.

4. For location of supply conduit and conductors, see electrical plans.

5. Stiffeners shall be fastened to controller and pedestal cases by 3/16” x 3/4” O.N. cadmium plated stove bolts not more than 12” on center (minimum 6 bolts per stiffener).

6. Controller shall be grounded at power supply by ground wire.

LEGEND ON PLANS

P

SAN DIEGO REGIONAL STANDARD DRAWING

IRRIGATION SYSTEMS
ELECTRIC CONTROLLER CLOCK
PEDESTAL MOUNTING

DRAWING NUMBER I-17
Automatic controller clock in a weatherproof, tamperproof lockable case: wall mounted per manufacturer's specifications.

**SIDE VIEW**

- Wall
- Foundation of Building
- Finished Grade
- 12" R min

**ELEVATION**

- Where two or more controllers are mounted together, a minimum of three inches shall be left between controller cabinets.
- Controller Cabinet
- 2" Rigid Steel Conduit for Control Wire
- Anchor conduit firmly to wall with galvanized pipe clamps using fasteners appropriate for type of wall.
- 3/4" Rigid Steel Conduit for Power Supply
- Finished Grade
- Valve Control (Bushing)
- Power Supply (Coupling, Adapter)

**NOTES**
1. For location of supply conduit and conductor, refer to the plans.
2. Controller shall be grounded at power supply by ground wire.
3. Make all electrical connections inside controller cabinet.

**SAN DIEGO REGIONAL STANDARD DRAWING**

**IRRIGATION SYSTEMS**

**ELECTRIC CONTROLLER CLOCK**

**WALL MOUNTING**
LEVEL INSTALLATION

1/2" Dia. Galvanized Pipe Stake, 30" long

Galv. Coupling with set screw
Galv. Riser (length noted on plan)
Two Clamps (galv. or cad. plated), machine peened friction type.

Length as required

Finished Grade

SLOPE INSTALLATION

Galv. Riser (length noted on plan)

Two Clamps (galv. or cad. plated), machine peened friction type.
Swing Joint (two galv. short nipples and two galv. 90° elbows)

Impact Head
Galv. Coupling with set screw

1/2" dia. galv. Pipe Stake (length as required)

90° unless otherwise shown on plans.

Length as required

18" min

Finished Grade

LEGEND ON PLANS

Show a number to indicate type head
One clamp (galv. or cad. plated) machine peened friction type, looped around supply line and stake.

1/2" dia. Galvanized Pipe Stake 24" long

NOTE
Stake shall be placed no greater than 15' apart and at each riser.
NOTE
All Galvanized Pipe, Nipples and Fittings installed underground shall be wrapped with 2" wide plastic backed adhesive tape, use ½" overlap.

LEGEND ON PLANS

- M.C.V.
- G.V.
SWING JOINT DETAIL

PLAN

ELEVATION

NOTE
Swing Joints shall be used at each change of grade.

LEGEND ON PLANS

San Diego Regional Standard Drawing

Swing Joint and Pipe Installation On Slopes Above Ground Pipe Installations

Recommended by the San Diego Regional Standards Committee

Drawing Number 1-23
NOTES
1. Double swing joint shall be used where changes of grade and alignment occur simultaneously.
2. Double swing joint shall be used for expansion joint on long runs of galvanized pipe.
   (300' maximum runs)

LEGEND ON PLANS
NOTES
1. Backfill material shall be compacted to a relative compaction of 90% or more.
2. No P.V.C. pressure pipeline shall be installed within 3' of, and parallel to another line, unless otherwise specified.
3. All P.V.C. pipe shall lay free in the trench with no induced strain and with sufficient allowance for expansion and contraction as recommended by the manufacturer.
4. Teflon tape, 3/4" wide, shall be used on all threaded connections.
5. The letter W shall be stamped or chiseled on the improvement (curb—sidewalk) directly above the pressure pipeline.
6. All plastic pressure pipe under pavement shall be installed in a P.V.C. sleeve.
NOTES
1. Backfill material shall be compacted to a relative compaction of 90% or more.
2. All pipeline fittings shall be cast iron, short body, Class 250, cement mortar lined and polyethylene wrapped. All fittings shall have thrust blocks or anchors.
3. The letter W shall be stamped or chiseled on the improvement (curb-sidewalk) directly above the pressure pipeline.
NOTES
1. Close nipples shall not be used.
2. Cast iron tapped tee shall be short body, class 250, cement mortar lined and polyethylene wrapped.
3. All tapped tees shall have a type A support block. See Standard Drawing W-19.

LEGEND ON PLANS

RED BRASS FITTINGS & NIPPLES

CAST IRON TAPPED TEE

SHUT-OFF VALVE. SEE DRAWING 1-12 OR 1-13 FOR DETAILS.

FINISHED GRADE

SAN DIEGO REGIONAL STANDARD DRAWING
CONNECTION DETAIL FOR NEW ASBESTOS CEMENT SUPPLY MAINS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER 1-28
May Be: Bronze, double strap service clamp; cast iron tapped clamp coupling with stainless steel bolts; cast iron boltless tapping sleeve; or cast iron (cement mortar lined) cutting in tapped tee.

Shut-Off Valve. See drawing I-12 or I-13 for details.

Red Brass Nipple →
Existing Asbestos Cement Pipe or Cast Iron Pipe Supply Main

PLAN

Finished Grade

Shut-Off Valve. See drawing I-12 or I-13 for details.

Red Brass Fittings and Nipples

ELEVATION

NOTE
Close nipples shall not be used.

LEGEND ON PLANS
NOTES

1. All fittings shall be P.V.C, Sch. 40 (except as noted).
2. All nipples shall be P.V.C. Sch. 80 (except as noted).
3. Teflon tape, 3/4" wide, shall be used on all threaded connections.
4. Short nipples shall not be used.

LEGEND ON PLANS

Show a number to indicate type head

SAN DIEGO REGIONAL STANDARD DRAWING

IMPACT HEAD
(WITH SWING JOINT)

DRAWING NUMBER I-30
2 stakes and 2 ties. Tie tree trunk 6" above bending moment of tree. Tie should provide flexibility of trunk but not allow rubbing of trunk against stake. Cut stakes off 6" above ties. For single stake trees, place stake on windward side of tree.
MANHOLE COVER FRAME
CAST IRON WT. 175 LB.

DETAIL

MANHOLE COVER
CAST IRON WT. 155 LB.

NOTES
1. Frame and cover shall be cast iron.
2. Weights: Frame 175 lbs.
   Cover 155 lbs.

FOR MARK
Sewer Projects  Sewer
Storm Drain Projects  Storm Drain
Water Projects  Water

SAN DIEGO REGIONAL STANDARD DRAWING
24" MANHOLE FRAME AND COVER
HEAVY DUTY

DRAWING NUMBER M-1
NOTES
1. Frame and cover shall be cast iron.
2. Frame and cover for use in non-traffic area only.
3. Weights: Frame 30 lbs
   Cover 100 lbs

SAN DIEGO REGIONAL STANDARD DRAWING
24" MANHOLE FRAME AND COVER
LIGHT DUTY
For inner cover, see Standard Drawing M-1.

HALF PLAN FRAME & COVER

HALF SECTION FRAME & COVER

NOTES
1. Weights:
   Inner Cover = 155 lbs
   Outer Cover = 300 lbs.
   Frame = 330 lbs.
2. Material: Cast Iron
3. Machine seats to prevent noise
4. Fillet radii to be 1/2".

S.D. 6-76
4-76

SAN DIEGO REGIONAL STANDARD DRAWING

36" MANHOLE FRAME AND TWO CONCENTRIC COVERS
HEAVY DUTY

DRAWING NUMBER M-3
Drill and tap hole, install 5/8" x 1 1/2" stainless steel, hexagonal socket head cap screw (2 required), Unified National Coarse Thread -- 11 per inch -- with 1 1/2" O.D. x 11/16" I.D. x .078" thick stainless steel washer.

Dashed line indicates outline of outer cover when two concentric covers are to be used.

NOTE
For manhole frame and two concentric covers, see detailed Standard Drawing M-3.
Distance between gate posts is gate length shown on plans

Length of gate leaf

Post Top
Gate Post
Hinge

Repeat opposite side

Fitting

Gate Frame

Truss Rods

Stretcher

Intermediate

Member

Same as fence height

Galv. Chain-link, 2" mesh, 9 ga.

Fastener

Roadway or ground

Plunger Bar
Gate Stop

10" diameter stop footing. Omit if roadway is concrete.

HALF ELEVATION DOUBLE SWING GATE

Diameter of footing = 4 times outside diameter of post.

EXTENSION POST AND BARBED WIRE

NOTES
1. All footings shall be 470-C-2000 concrete.
2. The following items shall be furnished and installed only when shown on the plans and/or called for in the special provisions:
   a. Barbed Wire
   b. Extension Post

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

CHAIN LINK GATE

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Drawing Number M-5
NOTES
1. All footings shall be 470-C-2000 concrete.
2. The following items shall be furnished and installed only when shown on the plans and/or called for in the special provisions:
   a. Barbed Wire
   b. Extension Arm
   c. Top Horizontal Rail

LEGEND ON PLANS
---
Toenail with 1-16d gal. nail on each side of the block

Cut steel washer

5/8" Carriage bolt with hex nut

6"x8"x1'2" Douglas Fir Block.

6"x8"x5'4" Douglas Fir Post, pressure treated.

SECTION AT SUPPORT

Flat plate washer

Ground Line or Shoulder Surfacing under railing

SECTION AT BERM

Toe of Dike/Face of Curb

Post spacing 6'-3" C.to C.

LINE POSTS

Rail Splice

6'-3"

Traffic

ELEVATION

6"x8" Block between post and rail on all posts

Lap in direction of traffic

Traffic

Plan

NOTE
See Standard Drawing M-8 for additional details.
RETURN SECTION

TERMINAL SECTION

TERMINAL SECTION

RETURN SECTION

TERMINAL SECTION

TERMINAL SECTION

SECTION THRU RAIL ELEMENT

5/8" Ø BUTTON HEAD BOLT

5/8" Ø RECESS NUT

FLAT PLATE WASHER

RAIL SPLICE

NOTES

1. See Standard Drawing M-7 for guard rail installation.

2. All metal elements shall be galvanized.
CONTINUOUS BARRICADE

NOTES
1. Posts to be 6" x 6", structural grade redwood or pressure treated (with wood preservative) Douglas Fir, surfaced four sides; cross pieces to be 2" x 8" select grade Douglas Fir, surfaced four sides.
2. All exposed portions of barricades shall be painted with two coats of white exterior enamel over prime coat.
3. Connections shall be made with 3/8" x 6" galvanized lag screws with one (1) washer each. Reflector sign fasteners to be 3/8" x 1½" galvanized lag screws.
4. Reflector signs - California Type N. Size 18" x 18" - Yellow with nine (9) - 3¼" reflectors (center mount).
   a. Reflectors shall be red for use on dead end streets, in all other cases they shall be yellow.
   b. Sign material shall be plastic or other approved reflectorized material.

SAN DIEGO REGIONAL STANDARD DRAWING

GUARD POST AND BARRICADE

LEGEND ON PLANS
Legend

Barricade
Guard Post

DELIVERY OF THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

ARCHITECT

COORDINATING OFFICE: 1987

DRAWING NUMBER M-9

REVISION

By

Approved

Date

Rev.

Date

0.5

7.79

0.5

7.79
NOTES
1. Cover and frame to be cast integrally with pipe box.
2. Monument base may be cast in place or precast.
3. Form and taper exposed upper 6" of cast in place base to a top diameter of 5". (Precast base shall be sand backfilled).
4. Monument marker shall be a domed brass, 3" in diameter.
5. Monument Location:
   a) Set on all centerline intersections unless actual location is modified by the Agency and shown in modified location on map. When centerline intersection is impractical, offset 5 feet on centerline of major street, (see detail at right). If neither centerline can be occupied, two monuments will be set in line around the front on the perimeter of a 10-foot diameter circle, whose center is the point.
   b) Set on centerline at intervals not exceeding 1000 feet on straight runs.
   c) Set on centerline at points of curvature.
   d) Set on center at center points of cul-de-sacs.
   e) Set on center line when center point of cul-de-sac is offset from centerline.
   f) These standards may be modified at the discretion of the Agency in cases where strict compliance with results in more monuments than it considers necessary. The following technique for reducing the number of monuments will be routine.
   g) Substitution of one monument on the "Point of Intersection" for monuments at the "Beginning of Curve" and the "Ending of Curve" when the "Point of Intersection" falls within the pavement area.
   h) Deletion of any monument otherwise required by these standards when its position can be determined by turning one angle from a point on a straight line between two other monuments, providing such point is not more than 300 feet from the point on which the deleted monument would have been placed.

Alternate location of monument. Tie distances shown on final subdivision map if alternate location is used.

LOCATION OF STREET SURVEY MONUMENT
NOTES
1. Material - Brass A.S.T.M. B-16. All machine tolerances 1/64"±, machine finish.
2. May be installed in fresh concrete at time of installation of concrete structure.
3. Location—in most stable, permanent location in vicinity, such as in base for street light standard or traffic signal (behind sidewalk), in curb (not near joint, on curve or near trees), on top of drainage headwall, in foundation for building or retaining wall or in concrete pads for transformers, pump stations etc.

INSTALLATION IN EXISTING CONCRETE
(Typical for Type A or B)
COUNTY OF SAN DIEGO  
CITY OF SAN DIEGO  
U.S.C. & G. (LAND)  
U.S.G.S. STAFF  

6.12

PORT OF SAN DIEGO  
U.S.C. & G.  
(BAY CHART)  

9.00

OLD CITY OF SAN DIEGO STAFF  
(PRIOR TO MARCH 1963)  

0

HIGHEST TIDE  
4.91

7.79

1.21

MEAN HIGHER WATER  
2.73

5.61

3.39

MEAN HIGH WATER  
2.01

4.89

4.11

MEAN SEA LEVEL  
0

2.88

6.12

MEAN LOWER  
LOW WATER  
2.88

0

9.00

LOWEST TIDE  
5.06

2.18

11.16

LEGEND

U.S.C. & G.  
U.S.G.S.  
MEAN HIGH WATER  
MEAN HIGHER WATER  

= United States Coast and Geodetic Survey.  
= United States Geological Survey.  
= Mean of all high water in San Diego Bay.  
= Mean of all higher water in San Diego Bay.  
Bay charts and topography up to the mean high tide based on zero at the mean lower low water.

SOURCE

Data based on U.S.C. & G. "Sea Level Datum of 1929".
FOUND MONUMENTS

Found monuments must denote the character of the monument, how it is identified and the record, or no record as applicable.

SET MONUMENTS - Criteria for Locating and Character

On subdivision boundaries, permanent monuments are required; and must be shown on the map at intervals as specified by the local agency. The location of such points that are unacceptable or will be destroyed by construction may be established by ties to permanent reference monuments shown on the final map.

A permanent monument shall be no less substantial than the following:

a. An iron pipe of minimum two inch diameter not less than two feet in length placed upright in the ground so that the top of said pipe is flush with the surface. Said pipe shall be filled with a metal or cement plug at least three inches in depth and centered with a metal tack and disc; or

b. A metal plug with tack and disc set flush with the surface in portland cement concrete sidewalk, curb or pavement; or other monument satisfactory to the City Engineer or County Surveyor.

Lot corners and points of curves along street and alley right of way lines where portland cement concrete sidewalks, curbs or pavement exist, or will be constructed as part of the subdivision requirements, shall be identified with tack and disc set flush with the surface along an extension of the lot line at an approved offset, to be measured radially or at right angles to the right of way line in said sidewalk, curb or pavement. In case the sideline of the lot is not radial or at right angles to the right of way line a disc shall be set along an extension of the sideline at an offset to be measured radially or at right angles to the right of way line. Where no such concrete work exists, and none will be required to be constructed, all lot corners, angle points and points of curve shall be marked with a monument no less substantial than a one-half inch steel rod or pipe, 18 inches long, set flush with the surface.

EXAMPLE OF OFFSET DISCS

---

SAN DIEGO REGIONAL STANDARD DRAWING

SURVEY MONUMENTS

LEGEND

- Fd 2" Iron Pipe Marked RCE XXXX or per Map XXX unless otherwise noted
- Fd Street Survey Monument Stamped RCE XXXX or LS XXXX
- Set 2" x 24" Iron Pipe Marked RCE XXXX or LS XXXX
- Set Lead and Disc Stamped RCE XXXX or LS XXXX
- Set 1/2" x 18" Iron Pipe Marked RCE XXXX or LS XXXX
- Set Street Survey Monument Stamped RCE XXXX or LS XXXX per Standard Drawing M-10

The addition of other symbols is permissible where such will result in a clearer map.

The following notes should be used in the legend where applicable.

Unless otherwise shown on this map:

1. All lot corners except as described below will be monumented by a ½ inch by 18 inch iron pin stamped (RCE or LS number).

2. Lot corners along the sideline of dedicated street right of way will be monumented by a disc stamped (RCE or LS number), set along an extension of the lot line at an offset of ___ in the curb or sidewalk. The offset shall be measured radially, or at right angles, to the right of way line. (See example below.)

3. All points of curve of the sidelines of dedicated streets will be monumented by a disc stamped (RCE or LS number), set at an offset of ___ in the curb or sidewalk. The offset shall be measured radially.
# Metric Equivalents

## Weights

<table>
<thead>
<tr>
<th>Unit</th>
<th>Metric Equivalent</th>
<th>Unit</th>
<th>Metric Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gram</td>
<td>15.4324 grains</td>
<td>1 Grain</td>
<td>0.0648 g</td>
</tr>
<tr>
<td>1 Gram</td>
<td>0.0353 oz</td>
<td>1 Ounce</td>
<td>28.3495 g</td>
</tr>
<tr>
<td>1 Kg.</td>
<td>2.2046 lb.</td>
<td>1 Pound</td>
<td>0.4536 kg</td>
</tr>
<tr>
<td>1 Kg.</td>
<td>0.0011 ton</td>
<td>1 Ton</td>
<td>907.1848 kg</td>
</tr>
<tr>
<td>1 Ton (met.)</td>
<td>1.1023 ton</td>
<td>1 Ton</td>
<td>0.9072 ton (met)</td>
</tr>
</tbody>
</table>

## Areas

<table>
<thead>
<tr>
<th>Unit</th>
<th>Metric Equivalent</th>
<th>Unit</th>
<th>Metric Equivalent</th>
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</thead>
<tbody>
<tr>
<td>1 Sq. cm.</td>
<td>0.1550 sq. in.</td>
<td>1 Sq. in.</td>
<td>6.4516 sq. cm.</td>
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<tr>
<td>1 Sq. m.</td>
<td>10.7639 sq. ft.</td>
<td>1 Sq. ft.</td>
<td>0.0929 sq. m.</td>
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<tr>
<td>1 Sq. m.</td>
<td>1.1960 sq. yd.</td>
<td>1 Sq. yd.</td>
<td>0.8361 sq. m.</td>
</tr>
<tr>
<td>1 Hectare</td>
<td>2.4710 acres</td>
<td>1 Acre</td>
<td>0.4047 hectare</td>
</tr>
<tr>
<td>1 Sq. km.</td>
<td>0.3861 sq. mile</td>
<td>1 Sq. mile</td>
<td>2.5900 sq. km.</td>
</tr>
<tr>
<td>1 Sq. km.</td>
<td>247.10 acres</td>
<td>1 Acre</td>
<td>0.0040 sq. km.</td>
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</table>

## Volumes

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<tr>
<th>Unit</th>
<th>Metric Equivalent</th>
<th>Unit</th>
<th>Metric Equivalent</th>
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</thead>
<tbody>
<tr>
<td>1 Cu. cm.</td>
<td>0.0610 cu. in.</td>
<td>1 Cu. in.</td>
<td>16.3872 cu. cm.</td>
</tr>
<tr>
<td>1 Cu. m.</td>
<td>35.3134 cu. ft.</td>
<td>1 Cu. ft.</td>
<td>0.0283 cu. m.</td>
</tr>
<tr>
<td>1 Cu. m.</td>
<td>1.3079 cu. yd.</td>
<td>1 Cu. yd.</td>
<td>0.7646 cu. m.</td>
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## Capacities

<table>
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<th>Unit</th>
<th>Metric Equivalent</th>
<th>Unit</th>
<th>Metric Equivalent</th>
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</thead>
<tbody>
<tr>
<td>1 Liter</td>
<td>61.0250 cu. in.</td>
<td>1 Cu. in.</td>
<td>0.0164 liter</td>
</tr>
<tr>
<td>1 Liter</td>
<td>0.0353 cu. ft.</td>
<td>1 Cu. ft.</td>
<td>28.3162 liters</td>
</tr>
<tr>
<td>1 Liter</td>
<td>0.2642 gal. (U.S.)</td>
<td>1 Gal.</td>
<td>3.7853 liters</td>
</tr>
<tr>
<td>1 Liter</td>
<td>0.0284 bu. (U.S.)</td>
<td>1 Bu.</td>
<td>35.2383 liters</td>
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## Lengths

<table>
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<tr>
<th>Unit</th>
<th>Metric Equivalent</th>
<th>Unit</th>
<th>Metric Equivalent</th>
</tr>
</thead>
<tbody>
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<td>0.0394 in.</td>
<td>1 In.</td>
<td>25.4000 mm.</td>
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<tr>
<td>1 CM.</td>
<td>0.3937 in.</td>
<td>1 In.</td>
<td>2.5400 cm.</td>
</tr>
<tr>
<td>1 Meter</td>
<td>3.2808 ft.</td>
<td>1 Ft.</td>
<td>0.3048 m.</td>
</tr>
<tr>
<td>1 Meter</td>
<td>1.0936 yd.</td>
<td>1 Yd.</td>
<td>0.9144 m.</td>
</tr>
<tr>
<td>1 Km.</td>
<td>0.6214 mile</td>
<td>1 Mile</td>
<td>1.6093 km.</td>
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## Metric Prefixes

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<th>Prefix</th>
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<tbody>
<tr>
<td>100000000</td>
<td>mega</td>
<td>1/10</td>
<td>deci</td>
</tr>
<tr>
<td>1000</td>
<td>kilo</td>
<td>1/100</td>
<td>centi</td>
</tr>
<tr>
<td>100</td>
<td>hecto</td>
<td>1/1000</td>
<td>milli</td>
</tr>
<tr>
<td>10</td>
<td>deka</td>
<td>1/1000000</td>
<td>micro</td>
</tr>
</tbody>
</table>

## Temperature

Degrees Fahrenheit = \( \frac{9}{5} \) (Degrees Celsius) + 32

Degrees Centigrade = \( \frac{5}{9} \) (Degrees Fahrenheit - 32)
NOTES

1. Generally utilities are to be installed under the applicable specifications for the particular utility and the specifications of the owner agency.

2. The location of utilities as shown by the Standard Drawing shall in no way violate existing codes or regulations applicable to individual utilities.

3. Gas main to be placed on property side of trench. Electric primary should be diagonally opposite gas main where possible (Types D, E, and F).

4. Installation of sewer and/or water utilities are not permitted in the joint trench shown above.

5. Minimum depth of gas pipe may, subject to gas company inspectors' approval, be reduced to 24" where necessary to clear foreign structure crossings.

6. Depth and width of trench varies.

7. When approved by all utilities concerned secondary electric, telephone and CATV may be concurrently installed with random separation.

8. CATV main or trunk line conduit required along all streets, except cul-de-sac streets less than 2500' in length which may be served by feeder lines only.

9. CATV 1½" feeder conduit shall run across streets with each power service line and capped at edge of sidewalk.

10. All CATV terminals and conduits shall be terminated at generally accepted locations and marked. A map shall be filed with the appropriate agency showing the location of the CATV system.

11. In no case shall CATV conduits be placed within 12" of electric or gas lines. Also conduits are not to be placed directly over gas lines.

12. CATV conduit may be placed with the TELCO conduit provided the TELCO minimum depth is held.

13. Types A, B, and C apply when an electric secondary conduit only is used. Types D, E, and F apply when an electric primary (and secondary) conduit is used.
NOTES
1. Chain to be 3/8" proof coil chain galvanized steel. Weld four links to post and three links to pipe sleeve.
2. All metal to be hot-dip galvanized after fabrication.
**NOTE**

Chain-link fabric shall be erected on the interior side of the courts.

**CAUTION:** This standard is not to be used if any wind screen is to be applied to the fence.

---

**DESCRIPTION** | **MIN. SIZE IN INCHES** | **MIN. WEIGHT PER LIN FT IN LBS**
--- | --- | ---
Line Post | 2.375 O.D. | 3.65
Terminal Post | 2.875 O.D. | 5.79
Top Rail | 1.660 O.D. | 2.27
Bracing | 1.660 O.D. | 2.27
Gate Frame | 1.660 O.D. | 2.27
SEWERAGE SYSTEMS
NOTES
1. Manhole frame and all joints shall be set in Class "C" mortar.
2. All precast components shall be manufactured in accordance with ASTM C-478 except step spacing.
3. Vertical wall of cone shall be on the upstream side of the manhole.
4. Concrete base shall be 564-C-3000.
5. Approved water stop required for plastic pipe connections.
6. Flexible pipe joints shall be required within 12" of inside face of manhole.
7. Precast base permitted as approved by Agency.

LEGEND ON PLANS
M.H. No. 2
NOTES
1. Manhole frame and all joints shall be set in Class "C" mortar.
2. All precast components shall be manufactured in accordance with ASTM C-478.
3. Vertical wall of cone shall be on the upstream side of the manhole.
4. Concrete base shall be 564-C-3000.
5. Approved water stop required for plastic pipe connections.
6. Precast sections shall be used within dimension "A" as required, in order of preference listed:
   A. Cone (notched for pipe if dimension "A" is less than 3').
   B. 6" to 24" of 3' diameter grade rings.
   C. 5' diameter shaft to maximum height of 60'.
   D. Additional 3' diameter risers.
7. Flexible pipe joints shall be required within 12" of inside face of manhole.
NOTES
1. Gate cap shall be labeled "Sewer".
2. Cleanouts may be used for either V.C.P. or plastic sewer mains.
3. Riser to be same diameter as sewer main.

LEGEND ON PLANS

GATE CAP
(Heavy Duty)
NOTES
1. For trenching in improved streets, see Standard Drawings G-24 or G-25 for trench resurfacing.
2. (*) indicates minimum relative compaction.
3. Minimum depth of cover from the top of pipe to finish grade for all sanitary sewer installations shall be 3'. For cover less than 3', see Standard Drawing S-7 for concrete encasement.
NOTES
1. For trenching in improved streets, see Standard Drawings G-24 or G-25 for trench resurfacing.
2. (*) indicates minimum relative compaction.
3. Minimum depth of cover from the top of pipe to finish grade for all sanitary sewer installations shall be 3'. For cover less than 3', see Standard Drawing S-7 for concrete encasement.

Pipe OD
6" min-8" max
4" to 18" pipe

Invert Elevation
Springline

4" min beneath pipe or 1" min
beneath bell, whichever is greater

1" max graded aggregate to springline

Trench Depth
Backfill
Upper Zone (3'-6")
90% *
Middle Zone
85% *
Pipe Zone
90% *
Bedding

Maximum limit of slope excavation allowed
LEGEND ON PLANS

- 470-C-2000 Concrete
- 6" minimum - 8" maximum
- 4" to 18" pipe
- D/4 min
- Concrete Block
- Invert Elevation
- Pipe O.D.
- Bell

SECTION

SAN DIEGO REGIONAL STANDARD DRAWING

CONCRETE ENCASEMENT

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Drawing Number S-7
Trench Width

470 - C - 2000 Concrete

6" minimum - 8" maximum
4" to 18" pipe

Bell

Pipe O.D.

Invert Elevation

1" maximum graded aggregate

Limit of Aggregate:
4" min beneath pipe or
1" min beneath bell,
whichever is greater.

SECTION

CONCRETE BACKFILL
Blocks to be laid as tightly as possible to downstream side of notch.

470-C-2000 Concrete or 8" x 8" x 16" concrete block. Fill cores with grout.

No. 9 wire ladder type reinforcement in all horizontal joints.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

CONCRETE ANCHOR

DRAWING NUMBER S-9
NOTES

Type B:
1. No vertical joints permitted.
2. Horizontal joints must overlay by 2 corrugations.
3. Corrugations to run horizontally.
4. Alternate material: corrugated fiberglass.
5. Front Elevation and Plan views similar to Type A.

8" x 8" x 16" concrete block.
Fill cores with grout

1/2" expansion joint material or jute around pipe.

Galvanized Corrugated Sheet Metal
18 Gage or heavier to be laid as tightly as possible to downstream side of notch.
Make flush with ground surface

LEGEND ON PLANS
CONCRETE PROTECTION
FOR EXISTING SEWER PIPE
TYPICAL SECTION

NOTE
For water line construction encasement shall extend to first joint beyond 2 feet at both sides of trench or to a distance of 4 feet, whichever is less.

SECTION A–A

#5 bars
Maximum 12" c. to c.
Additional #5 bar as required.

#5 bars required when crossing waterline only.

LEGEND ON PLANS
Standard Wye, or Tee, or "Cut in" connection. Where a "Cut in" connection is used, it shall be surrounded with 4" of Class 470 - C - 2000 Concrete.

Letter "S" stamped or chiseled in face of curb not less than 1 1/2" high and 3/16" deep. Wire, #12 or heavier. Extend 2' to 3' above ground at time of backfill.

Surface of street

Rock Anchor

Pipe Bedding of 1" maximum aggregate (1" below bell)

Detail showing the manner of connecting opposite laterals to a sewer main. Two connections shall not be made in the same length of pipe.

NOTES
1. In no case shall a lateral connect to the sewer main directly on top of the pipe.
2. Sewer laterals shall have a minimum slope of 2%.
3. All joints on sewer lateral pipe shall be compression type or approved solvent weld.
4. Lateral shall extend to property line unless otherwise shown on plans.

LEGEND ON PLANS

---

SAN DIEGO REGIONAL STANDARD DRAWING

HOUSE CONNECTION
(SEWER LATERAL)

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Drawing Number S-13
NOTE
All joints on sewer lateral pipe shall be compression type or approved solvent weld.

LEGEND ON PLANS

470-C-2000 concrete base
Trench Width

45°
45°

Standard Wye, Tee, or Wye Saddle

See drawing S-13 for continuation of sewer lateral to property line.

Variable Length

2 - 1/8 Bends

Variable

The vertical pipe shall be braced while backfilling trench.

1/8 Bend

2" minimum cover around lateral.

Pipe O.D.
NOTE
For water line construction repair pipe shall extend to first joint beyond
2 ft. at both sides of trench or to a distance of 4 ft., whichever is less.
NOTES

1. Similar poly vinyl chloride components may be used in accordance with A.S.T.M. Standard Specification D-3033.

2. Concrete slab to be 564-C-3000

3. Use heavy duty manhole frame and cover, Std. Dwg. M-1, in areas subject to vehicular traffic; use light duty manhole frame and cover, Std. Dwg. M-2, in all other locations.

LEGEND ON PLANS

---

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARD COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

CLEANOUT-SEWER FORCE MAIN

---

DRAWING NUMBER S-16
NOTES
1. Manhole frame and all joints shall be set in Class "C" mortar.
2. All precast components shall be manufactured in accordance with ASTM C-478 except step spacing.
3. Vertical wall of cone shall be on the upstream side of the manhole.
4. Concrete base shall be 564 - C - 3000.
5. Approved water stop required for plastic pipe connections.
6. Flexible pipe joints shall be required within 12" of inside face of manhole.
7. Precast base permitted as approved by Agency.
8. Precast sections shall be used within dimension "A" as required, in order of preference listed.
   A. Cone (notched for pipe if dimension "A" is less than 3"
   B. 6" to 24" of 3" diameter grade rings.
   C. 4" diameter shaft to maximum height of 60".
   D. Additional 3" diameter risers.

LEGEND ON PLANS
M.H. No. 2

SAN DIEGO REGIONAL STANDARD DRAWING
MANHOLE - 4' x 3' DIAMETER
(FOR 21" MAX. DIA. PIPE)

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER S-17
NOTES
1. Service clamp and gasket required on 4" A.C. pipe.
2. Tap not permitted in molded sections of A.C. pipe.

1. Bronze Corporation Stop (installed with key on side and open tap) and Adaptor as required by Agency.
   Note: On steel mains use clamp or weld on coupling as required by Agency.
   Install insulating bushing as required by Agency.
2. Copper Tubing or Plastic Pipe (no intermediate joints permitted without approval of the Agency).
3. Bronze Angle Service Stop with Locking Device and Meter Coupling attached.
4. Meter Box (see Standard Drawing W-15 for location).
5. 90° Ell

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

1" WATER SERVICE

DRAWING NUMBER W-1
1 Bronze Service Clamp (double strap). On steel mains use clamp or weld on coupling as required by Agency. Install insulating bushing as required by Agency.
2 Bronze Corporation Stop (installed with key on side and open tap).
3 Copper Tubing or Plastic Pipe except where otherwise specified by the Agency.
4 Coupling as required by Agency when service is 20' or longer, except on Polyethylene Pipe.
5 90° Elb
6 Bronze Angle Service Stop with Locking Device and adaptable to 1 1/2" and 2" Meter Flange.
7 Meter Box (see Standard Drawing W-15 for location).

NOTE
Silver Soldered Joints may be used where approved by the Agency.
1. Bronze Service Clamp (double strap). On steel mains use clamp or weld on coupling as required by Agency. Install insulating bushing as required by Agency.
2. Bronze Corporation Stop
3. 90° Brass Street Ell
4. Pipe to Tubing Adaptor
5. Copper Tubing
6. Ball Valve
7. Brass Plug
8. Meter Box (see Standard Drawing W-15 for location).

LEGEND ON PLANS

1" and 2" Manual Air Releases

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Drawing Number W-3
Double Strap Bronze Service Clamp. On steel mains use clamp or weld on coupling as required by Agency. Install insulating bushing as required by Agency.

1. Corporation Stop
2. Pipe x Tubing 90° Ell
3. 90° Sweat Ell
4. Copper Tubing
5. Female Adaptor
6. Air and Vacuum Valve
7. 2-90° Ells (not required in above metal ground enclosures).

LEGEND ON PLANS
See Drawing W-14 for type of Enclosures

Legend on Plans

1. Flanged Outlet, Cement Lined and Coated Steel
2. Flanged, 90° Ell, Cement Lined and Coated Steel
3. Valve
4. Valve Well and Cap (see Standard Drawing W-12)
5. Steel Pipe, Cement Lined and Coated
6. Air and Vacuum Valve
7. 2-90° Ells (not required with above ground metal enclosures)
1. Bronze Service Clamp (double strap). On steel mains use clamp or weld on coupling as required by Agency. Install insulating bushing as required by Agency.
2. Bronze Corporation Stop (installed with key on side and open tap) and adaptor as required by Agency.
3. Copper Tubing
4. 90° El El
5. Pipe to Tubing Adaptor
6. Ball Valve
7. Brass 2" Iron Pipe Thread x 2 1/2" Hose Pipe Thread Adaptor.
8. 2 1/2" Hose Cap with chain, Brass.
9. Meter Box (see Standard Drawing W-15 for location).
1. Bronze Service Clamp (double strap) or Pretapped Coupling. On steel mains use clamp or weld on coupling as required by Agency. Install insulating bushing as required by Agency.

2. 2" Nipple (2"x 3")

3. 45° Ell

4. 2" Nipple (2"x 6")

5. 2" Valve

6. 2" Pipe

7. 90° Ell

8. 2" Threaded Cap


NOTES
1. Type of installation and materials to be specified by Agency.
2. See Standard Drawing W-6 for end of main detail.
1. Flanged Tee or Welded Saddle.
2. Short Radius 90° Flanged Bend, Cement Lined and Coated.
4. Flanged Valve.
5. Steel Pipe (or P. V. C. Schedule 80 Pipe Where Permitted by Agency).
7. 90° Bend (Same Material as Item 5).

LEGEND ON PLANS
1. Main Size x Flanged Outlet, cement lined and coated.
2. Flanged Gate Valve (F x RT for A.C. Pipe).
3. Cast Iron Pipe or A.C. Pipe (6 1/2' min for A.C. Pipe).
4. F x F 90° Bend (F x RT for A.C. Pipe).
5. Galvanized Iron Pipe, threaded and flanged.
6. 10" Class 200 A.C. Pipe Gate Well.
9. Gate Well Cap with 4" skirt.
NOTE
Items 2, 3 & 6 may be cement lined and coated flanged steel pipe where permitted by Agency.

1. Fire Hydrant
2. 12" long Extension Spool
3. Extension Spool
4. 3/4"x 3" Hex. Head Machine Bolts and Nuts, Typical.
5. Hydrant Ell
6. Asbestos Cement Pipe
7. Valve
8. Valve Well Installation (see Standard Drawing W-12)

LEGEND ON PLANS
NOTES:

1. Apron, where required by Agency, shall be 4" thick (470-C-2000) concrete.
2. When distance from hydrant to the top or toe of slope is less than 2'-0", special hydrant installation will be required by Agency.
3. Where hydrant is not protected by a vertical face curb protective posts are required. See Standard Drawing W-16 for details.
4. Hydrant shall be located 5' from curb return, 3' min from driveway, on property line extension, or as shown on plans.
NOTES
1. Provide clamp or felt to hold pipe sections (item 2) together during backfill.
2. Pipe shall be saw or machine cut on each end, no beveled sections will be permitted.
3. The final adjustment to finish grade may be made with an asbestos cement ring of 1" minimum height.

GENERAL NOTES
1. Clearance around cover shall permit lifting by hand without damage to pipe.
   Maximum clearance shall be 3/16".
NOTES
1. Extension to be used when top of valve nut is 5' or more below finish grade.
2. Paint all finished surfaces with asphalt varnish.
**Type A**

- Steel enclosure, paint as specified by Agency.
- Meter box, see Standard Drawing W-15 for location.
- 2' x 2' pad, 470 - C - 2000 Concrete

**Type B**

- 3/16" Steel Cover continuous weld to Cylinder
- 2 1/2" x 2 1/2" Angle (3 places) weld to Cylinder

**Type C**

<table>
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<th>Dia</th>
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<td>1&quot; &amp; 2&quot;</td>
<td>14&quot;</td>
<td>24&quot;</td>
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<td>14&quot;</td>
<td>30&quot;</td>
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<tr>
<td>6&quot;</td>
<td>16&quot;</td>
<td>36&quot;</td>
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</table>

Plan:

- Diameter
- 3/8" Anchor Bolts and Nuts (3 places)

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**SAN DIEGO REGIONAL STANDARD DRAWING**

**AIR AND VACUUM VALVE ENCLOSURES**

**DRAWING NUMBER** W-14
TYPE *A1
WITH OR WITHOUT COMMERCIAL OR RESIDENTIAL SIDEWALK
- Curb or asphalt berm
- Meter Box
- Sidewalk

TYPE *A2
CONTIGUOUS SIDEWALK
- Curb
- Sidewalk
- Meter Box

TYPE B
NON-CONTIGUOUS SIDEWALK
- Curb
- Meter Box
- Sidewalk

TYPE C
NO CURB
- Road Surface
- Meter Box

TYPE D
NO CURB
- Road Surface
- Meter Box

* Agency to determine alternate
4" steel pipe filled with 470 - C - 2000 concrete and painted in accordance with Agency requirements.
NOTES
1. Concrete shall be 470 - C - 2000.
2. See Standard Drawing W-18 for bearing areas.
NOTES
1. Based on 225 psi test pressure and bearing values of dry soils.
2. Values from curves are for tees and deadends, i.e.; straight line thrust.
   For 90° bend: 1.4 value from curve.
   For 45° bend: 0.8 value from curve.
   For 22 1/2° bend: 0.4 value from curve.
3. For conditions not covered by curves, special thrust blocks must be computed and approved.
NOTE
Concrete shall be 470-C-2000.
Concrete shall be 470-C-2000.

# 5 bars

2" minimum cover

45°; 22 1/2°; 11 1/4°

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<td></td>
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<td>4</td>
<td>7</td>
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<td>6</td>
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* Increase volumes shown in proportion to pressures existing when pressure testing pipeline.

* Special design required.
NOTES
1. For trenching on improved streets see standard drawing G-24 or G-25 for resurfacing details.
2. (*) indicates minimum relative compaction.
NOTE:
Bearing area shall be the difference between the bearing areas required for thrust anchorage of mains on each side of reducer as found from Std. Dwg. W-18 plus the area of the trench opening, except that minimum dimensions shown shall be adhered to.
1. 1" Water service per Dwg W-1
2. 1" Curb stop
3. Main connection X multiple branch connection
4. Brass coupling or 45° elbow
5. Brass nipple - 4" min. length
6. Brass 45° elbow
7. Cast iron cap
8. Asbestos cement pipe
9. Thrust block per Dwg W-17

NOTE: Nipple lengths to be sufficient to allow service connection to clear thrust block.

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<td>1½&quot;</td>
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<tr>
<td>3</td>
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<td>4</td>
<td>2&quot;</td>
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6" Stop Shop Coat

NOTE:
Contractor shall provide handholes as required to complete the work
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