SAN DIEGO AREA
REGIONAL STANDARD DRAWINGS

STANDARD DRAWINGS FOR AGENCIES IN THE SAN DIEGO REGION
Recommended by the Regional Standards Committee
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Department of Public Works
SEPTEMBER, 1988
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1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all block cells with grout.
1 1/2 : 1 sloping backfill or 250 psf, live load surcharge

mortar cap

# 4 total 2

A bars

# 4 total 2

12" block

2"

# 4 total 5

T

1" - 6"

1" - 0"

W

W/2

Key

H = 5' - 4"

H = 3' - 8"

TYPICAL SECTION over 3' - 8"

Horizontal reinf. not shown

TYPICAL SECTION

3' - 8" max.

ELEVATION

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

DIMENSIONS AND REINFORCING STEEL

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| H (max) | 5' - 4" | 3' - 8"
| T (min) | 0' - 10" | 0' - 10" |
| W (min) | 5' - 0" | 3' - 9"
| A bars  | # 4 @ 16" |       |
| B bars  | # 6 @ 16" | # 4 @ 16" |
| max. toe press. (psf) | 700 | 550 |
NOTES
1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all blockcells with grout.

---

**SAN DIEGO REGIONAL STANDARD DRAWING**

**MASTERY RETAINING WALL TYPE 3**

**(LEVEL BACKFILL)**

**DIMENSIONS AND REINFORCING STEEL**

<table>
<thead>
<tr>
<th></th>
<th>H (max)</th>
<th>T (min)</th>
<th>W (min)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tbody>
<tr>
<td>H (max)</td>
<td>3' - 8&quot;</td>
<td>5' - 4&quot;</td>
<td>8' - 0&quot;</td>
<td>#4 total 2</td>
<td>#4 total 2</td>
<td>#4 total 2</td>
<td>#4 total 2</td>
<td>#4 total 2</td>
</tr>
<tr>
<td>T (min)</td>
<td>0' - 8&quot;</td>
<td>0' - 16&quot;</td>
<td>1' - 0&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#6 @ 16&quot;</td>
<td>#4 total 4</td>
</tr>
<tr>
<td>W (min)</td>
<td>2' - 4&quot;</td>
<td>3' - 2&quot;</td>
<td>4' - 9&quot;</td>
<td>#4 total 2</td>
<td>#4 total 2</td>
<td>#4 total 2</td>
<td>#6 @ 16&quot;</td>
<td>#4 total 6</td>
</tr>
</tbody>
</table>

**max. soil press. (psf)**

| 1100 | 1600 | 2200 |

---

**TYPICAL SECTION**

5' - 4" max

**ELEVATION**

**TYPICAL SECTION**

over 5' - 4"
TYPICAL SECTION
over 3' - 8"

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

DIMENSIONS AND REINFORCING STEEL

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| H (max)| 5' - 4" | 3' - 8"
| T (min)| 0' - 10" | 0' - 8"
| W (min)| 4' - 0" | 3' - 0"
| A bars | # 4 @ 16" | # 4 @ 16"
| B bars | # 6 @ 16" | |
| Surcharge | sloping | live load | sloping | live load |
| C bars | # 6 @ 8" | # 6 @ 16" | # 6 @ 16" | # 6 @ 16"
| K (min) | 1' - 0" | 0' - 8" | 1' - 0" | 0' - 8"
| Toe press. | 2700 psf | 1900 psf | 1700 psf | 1430 psf |
NOTES
1. See Standard Drawing C-7 and C-8 for additional notes and details.
2. Fill all block cells with grout.

TYPICAL SECTION
over 5' - 4"

MORTAR CAP

# 4 tot. 2 bars

H = 8' - 0"

H = 5' - 4"

H = 3' - 8"

TYPICAL SECTION
5' - 4" max

ELEVATION

DIMENSIONS AND REINFORCING STEEL

<table>
<thead>
<tr>
<th></th>
<th>3' - 8&quot;</th>
<th>5' - 4&quot;</th>
<th>8' - 0&quot;</th>
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<tbody>
<tr>
<td>H (max)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T (min)</td>
<td>0' - 8&quot;</td>
<td>0' - 10&quot;</td>
<td>1' - 0&quot;</td>
</tr>
<tr>
<td>W (min)</td>
<td>2' - 1&quot;</td>
<td>3' - 1&quot;</td>
<td>4' - 3&quot;</td>
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<tr>
<td>R</td>
<td>0' - 9&quot;</td>
<td>1' - 2&quot;</td>
<td>1' - 5&quot;</td>
</tr>
<tr>
<td>S</td>
<td>0' - 8 1/2&quot;</td>
<td>1' - 1/2&quot;</td>
<td>1' - 7 1/2&quot;</td>
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<tr>
<td>K</td>
<td>0' - 8&quot;</td>
<td>0' - 8&quot;</td>
<td>0' - 12&quot;</td>
</tr>
<tr>
<td>A bars</td>
<td># 4 @ 32&quot;</td>
<td># 4 @ 32&quot;</td>
<td># 4 @ 32&quot;</td>
</tr>
<tr>
<td>B bars</td>
<td></td>
<td># 4 @ 32&quot;</td>
<td># 4 @ 32&quot;</td>
</tr>
<tr>
<td>C bars</td>
<td></td>
<td></td>
<td># 7 @ 16&quot;</td>
</tr>
<tr>
<td>D bars</td>
<td># 4 @ 32&quot;</td>
<td># 4 @ 16&quot;</td>
<td># 4 @ 16&quot;</td>
</tr>
<tr>
<td>E bars</td>
<td># 4 total 5</td>
<td># 4 total 5</td>
<td># 4 total 6</td>
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<tr>
<td>max soil press. (psf)</td>
<td>774</td>
<td>1030</td>
<td>1660</td>
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</table>
1 1/2:1 sloping backfill or 250 psf. live load surcharge.

**Plan**

- Mortar cap
- #4 total 2 bars
- #4 total 2 bars
- #5 @ 16" bars
- #4 total 5 bars
- 3" clr.
- Horizontal reinf. not shown

**Typical Section**

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

- Mortar cap
- #4 total 2 bars
- B bars
- 3" clr.
- 3' - 8" max

**Elevation**

**Notes**

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

**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' - 10&quot;</td>
<td>4 @ 16&quot;</td>
<td>6 @ 16&quot;</td>
<td>2000</td>
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<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>

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

**SAN DIEGO REGIONAL STANDARD DRAWING**

**Masonry Retaining Wall Type 6**

(Live Load Surcharge or Sloping Backfill)**

**Drawing Number**

C-6

**Revision**

**By**

**Approved**

**Date**
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:

\[
\begin{align*}
F_c &= 1200 \text{ psi} \\
F'c &= 3000 \text{ psi} \\
F_s &= 20,000 \text{ psi} \\
n &= 10
\end{align*}
\]

Reinforced Masonry:

\[
\begin{align*}
F'm &= 600 \text{ psi} \\
F_{m} &= 200 \text{ psi} \\
F_s &= 20,000 \text{ psi} \\
n &= 50
\end{align*}
\]

Earth = 120 pcf and Equivalent Fluid Pressure = 36 psf per foot of height. Walls shown for 1\%:1 unlimited sloping surcharge are designed in accordance with Rankine's formula for unlimited sloping surcharge with a \(\theta = 33^\circ 42'\).  

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. Backing for hooks is four diameters. All bar embeddings are clear distances to outside of bar. Spacing for parallel bars is center to center of bars.

MASONRY:

All reinforced masonry retaining walls shall be constructed of regular or light weight standard units conforming to the "Standard Specifications for Public Works Construction."

JOINTS:

Vertical control joints shall be placed at 32 foot intervals maximum. Joints shall be designed to resist shear and other lateral forces while permitting longitudinal movement. Vertical expansion joints shall be placed at 96 foot intervals maximum.

CONCRETE:

Footing concrete shall be 560-C-3250, using B aggregate when placing conditions permit.

BACKFILL:

No backfill material shall be placed against masonry retaining walls until grout has reached design strength or until grout has cured for a minimum of 28 days. 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%.

FENCING:

Safety fencing shall be installed at the top of the wall as required by the agency.

INSPECTIONS:

Call for inspections as follows:

A. When the footing has been formed, with the steel tied securely in final position, and is ready for the concrete to be placed.

B. Where cleanout holes are not provided:

1. After the blocks have been laid up to a height of 4', or full height for walls up to 5', with steel in place but before the grout is poured, and . . . .

2. After the first lift is properly grouted, the blocks have been laid up to the top of the wall with the steel tied securely in place but before the upper lift is grouted.

Where cleanout holes are provided:

After the blocks have been laid up to the top of the wall, with the steel tied securely in place, but before grouting.

C. After grouting is complete and after rock or rubble wall drains are in place but before earth backfill is placed.

D. Final inspection when all work has been completed.

CONCRETE GROUT AND MORTAR MIXES:

Concrete grout shall attain a minimum compressive strength of 2,000 psi in 28 days and mortar shall attain 1,800 psi in 28 days. All cells shall be filled with grout. Rod or vibrate grout within 10 minutes of pouring to insure consolidation. Bring grout to a point 2" from the top of masonry units when grouting of second lift is to be continued at another time.

MORTAR KEY:

To insure proper bonding between the footing and the first course of block, a mortar key shall be formed by embedding a flat 2 x 4 flush with and at the top of the freshly poured footing. The 2 x 4 should be removed after the concrete has started to harden (approximately 1 hour). A mortar key may be omitted if the first course of block is set into the fresh concrete when the footing is poured, and a good bond is obtained.

WALL DRAINS:

Wall drains shall be provided in accordance with Standard Drawing C-8.

SOIL:

All footings shall extend at least 12 inches into undisturbed natural soil or approved compacted fill. Soil should be dampened prior to placing concrete in footings.

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SAN DIEGO REGIONAL STANDARD DRAWING

GENERAL NOTES FOR MASONRY RETAINING WALLS
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

9" 12" block wall

5 1/4" 8" block wall

Vertical reinf.
Top of footing

CAP DETAIL       KEY DETAIL

NOTES:
1. All masonry retaining walls shall be constructed with cap, key and drainage details as shown hereon.
2. 4" diameter drain may be formed by placing a block on it's side.
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.

Top of wall

Finished Ground Line

Level Reference

TYPICAL ELEVATION

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

Concrete shall be 560-C-3250.

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

Fe = 1200 psi  F'e = 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 \( \phi = 33^\circ \ 42' \).

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'' centers 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''

Rubber Waterstop

Use only when watertight joint is required.
SPREAD FOOTING SECTION

Place concrete on or against undisturbed material, except as permitted by the Engineer.

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

<table>
<thead>
<tr>
<th>TABLE OF REINFORCING STEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMENSIONS AND DATA</td>
</tr>
<tr>
<td>Design H</td>
</tr>
<tr>
<td>W</td>
</tr>
<tr>
<td>G</td>
</tr>
<tr>
<td>B</td>
</tr>
</tbody>
</table>

- Bars: #5 @ 24, #6 @ 22, #7 @ 18, #8 @ 14
- Total bars: 6 @ 24, 6 @ 36, 6 @ 48, 6 @ 54, 6 @ 42

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

For pile footing Design H-6' 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 size is required except when found unnecessary by the Engineer. Special footing design is required where foundation material is incapable of supporting the pressure loads listed in table.

Design Data:
f'c = 1500 psi  f'k = 3250 psi  f's = 34,000 psi
n = 0.43  earth = 120 acf

Case 1: Equivalent fluid pressure = 36 psi max for determination of the pressure. 27 psi min for determination of heel pressure.

Case 2: Earth pressure determined from Rankin's formula with G = 23 - 45.

Use Reinforcement for H = 6' 10'

Typical Layout Example

For piers required, see Details 3-3 and 3-4, drawing C-15
20' V.C. at Top of Wall Slope Change

Place waterstop as shown when required.

FOOTING STEP

Depth of excavations as shown on the plans.

Backfill sufficiently to prevent ponding.

To be done after removal of all fill material and before backfilling behind wall.

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

DESIGN AND DRAINAGE

PLAN

Layout line

Top of wall level

Ground line near side

ELEVATION

RETURN WALL TYPE 'A'

Use where H < 8' or less

RETURN WALL TYPE 'B'

Use where H = 8' or more on offset walls

RETURN WALL TYPE 'C'

Use where H = 10' or more on straight walls

RETURN WALL TYPE 'D'

Use where H < 6' or less

NOTES:

Design may be exceeded by 6" before going to the next size.

Footing key is required except when found unnecessary by the Engineer.

Special footing design is required where foundation material is incapable of supporting the pressure loads listed in table.

When wall not required unless shown elsewhere.

Design Data:

For 1500 psi H = 2250 psi T = 24,000 psi n = 10 earth = 120 pcf

2' Surchage: 36 pcf max. for determination of toe pressure. Equivalent fluid pressure = 27 pcf min. for determination of heel pressure.

Earth pressures for 2' unlimited slope:

n = 6.5, for determination from Rankine formula with 8 = 33° 42'.

Approx Wall Offset Values

Values for offsetting forms to be determined by the Engineer.
WEAKENED PLANES

DETAIL 3-2

Notes:
A. 4" drains 25 max. center to center. (3" c.c. for Type 2 and 5.5" c.c. for Type 4 Reinforced Walls). For walls adjacent to sidewalks or curbs, provide 4" cast iron or asbestos cement pipe under the sidewalk in discharge thru curb face. Exposed wall drains shall be located 3" above finished grade.
B. 6" square aluminum or galvanized steel wire 4 mesh hardware cloth (Min. wire diameter 0.035") Anchor firmly to back-face.
C. One cubic foot pervious backfill material in a burlap sack, securely tied.
D. Pervious backfill material continuous behind retaining wall.

WALL EXPANSION JOINTS
AND WEAKENED PLANES

DETAIL 3-3

WATERSTOP

DETAIL 3-6

Holes will be permitted in the outer 1/4 of the web for wire, rings, etc. Tie web to 3 reinforcing bars at 12" max. intervals. 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" 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 A-1 inlet

SAN DIEGO REGIONAL STANDARD DRAWING
CURB INLET - TYPE A

<table>
<thead>
<tr>
<th>Revision</th>
<th>By</th>
<th>Approved</th>
<th>Date</th>
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<tbody>
<tr>
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<td>T#</td>
<td>M.C.</td>
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<tr>
<td>Rebar</td>
<td>T#</td>
<td>M.C.</td>
<td>5-86</td>
</tr>
</tbody>
</table>

DRAWING NUMBER D-1
NOTES:
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

SAN DIEGO REGIONAL STANDARD DRAWING
CURB INLET - TYPE B
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.
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.

PLAN

Weakened Plane Joint

SECTION E--E

Weakened Plane Joint

SECTION C--C

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 9" O.C. unless otherwise
specified. Clearance shall be 1 1/2" from
the bottom of the slab.
4. Concrete for the inlet to be placed
at the same time as the s/w curb and
gutter.
5. Concrete shall be 560-C-3250
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

PT | A | B | C | D | E | F | G | H | K | M
---|---|---|---|---|---|---|---|---|---|---
F.C. | 4½" | 5½" | 6" | 7½" | 9" | 9" | 9" | 9" | 9" | 8"

SECTION A--A

1" support bolt, see Detail A
on drawing D-5.

SAN DIEGO REGIONAL STANDARD DRAWING

CURB INLET - TYPE D
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.
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.
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".
8. Only end bearing grates shall be used. See Std. Drawing D-15.

For frame and grate details, see dwgs. D-13, D-15.

SECTION A—A

LEGEND ON PLANS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SANDIEGO REGIONAL STANDARD DRAWING

CATCH BASIN - TYPE G

DRAWING NUMBER D-8
NOTES
2. Concrete base shall be 560-C-3250
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 PLANS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>PIPE DIA</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
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</thead>
<tbody>
<tr>
<td>A 4</td>
<td>up to 39&quot;</td>
<td>4'</td>
<td>4'</td>
<td>6'</td>
</tr>
<tr>
<td>A 5</td>
<td>42&quot; to 48&quot;</td>
<td>5'</td>
<td>4'</td>
<td>6'</td>
</tr>
<tr>
<td>A 6</td>
<td>51&quot; to 60&quot;</td>
<td>6'</td>
<td>4'</td>
<td>6'</td>
</tr>
<tr>
<td>A 7</td>
<td>63&quot; to 72&quot;</td>
<td>7'</td>
<td>4'</td>
<td>7'</td>
</tr>
<tr>
<td>A 8</td>
<td>75&quot; to 84&quot;</td>
<td>8'</td>
<td>4'</td>
<td>8'</td>
</tr>
</tbody>
</table>
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 560-C-3250
6. Exposed edges of concrete shall be rounded with a radius of 1/2".

LEGEND ON PLANS

---  
NOTES
1. Concrete shall be 560-C-3250 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 inlet opening height (H) exceeds 6" install 1" diameter 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" diameter steel support bolts, spaced at not more than 5' on center.
NOTES

1. Hot dip galvanize all parts after fabrication.
NOTES:
1. Hot dip galvanize all parts after fabrication.
2. Dimensions to Centerline of bars unless otherwise noted.
3. Weight: 141 lbs.
SECTION A-A

TYPE A

SECTION C-C

TYPE B

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
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>
<th>4&quot; SPACING</th>
<th>6&quot; SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>welded</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>3/4&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>Cast</td>
<td>13</td>
<td>2</td>
<td>2</td>
<td>3/4&quot;</td>
<td>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 electroforged to bearing bars.

CROSS BAR DETAIL
GRATE (WELDED STEEL)

CROSS BAR DETAIL
ALTERNATIVE CAST NODULAR IRON GRATE OR CAST STEEL GRATE

Grind all exposed corners 1/8" Radius

6" x 1/4" x 0"-6" R. Washer with 7/8" Hole

Brackets @ 10" Ctrs Max.
4½" x 1½" Bent Plate 5/8" holes in bracket end rail for 1/2" bolts

2-Holes slotted 5/8" x 1" for 1/2" Bolts

Splice Plate 2½" x 3½" x 0"-10"
OVERSIDE DRAIN

cross bar spacer
see note 3

3/16 x 1 1/2
fillet weld

SECTION D-D
GRATE SLOT DETAIL

1 3/4" ± 1/8"

6" ± 1/4" O.C.

GRATE SLOT WELDING DETAIL

20" - 0" Unit

1"

1"

GRATE SLOT DRAIN

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.
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.
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 520-C-2500

LEGEND ON PLANS
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.
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.
ENTRANCE TAPER—TYPE 1
ALTERNATIVE A

- Spot weld and make water tight with asphaltic plastic cement. Bulkhead and Taper to be galvanized corrugated metal.

PLAN
Bulkhead and Taper of same thickness as Tail Pipe with 0.075" Max. Tail Pipe of same thickness as Downdrain Pipe

END VIEW

Tail Pipe of same thickness as Downdrain Pipe

ENTRANCE TAPER—TYPE 1
ALTERNATIVE B

- Spot welded and made watertight with asphaltic plastic cement. 0.075" thick smooth galvanized bulkhead with reinforcing bands.

PLAN
Tail Pipe of same thickness as Downdrain Pipe

END VIEW

Tail Pipe of same thickness as Downdrain Pipe

ANCHOR ASSEMBLY
ALTERNATIVE-A

- Band Coupler to be same with anchor coupler used for pipe sections.

ANCHOR ASSEMBLY
ALTERNATIVE-B

- Cables and Cable Clamps to be used when specified.

PLATE DETAIL

Material to be 1/4" plate 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>
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<tbody>
<tr>
<td>8&quot;</td>
<td>16&quot;</td>
<td>25&quot;</td>
<td>1/2&quot;</td>
<td>15&quot;</td>
<td>1/2&quot;</td>
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<td>36&quot;</td>
<td>25&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.
NOTES
1. Concrete shall be 560-C-3250
2. D-inside diameter of pipe or depth of channel.
3. Section to be sloped laterally with top conforming to the
   grades of the existing sidewalk and curb.
4. Manhole frame and cover may be deleted with open channel.
5. Trowel finish top surface and reproduce markings of existing sidewalk and curb.
6. Trowel finish floor of outlet.
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 520-C-2500
4. Pipe shall be circular asbestos cement, cast iron or rigid plastic.

Drain shall not occupy the hatched area

BLOCK CORNER
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-81.

NOTES
1. Concrete shall be 560-C-3250
2. All reinforcing steel #4 bars. All vertical and horizontal tie bars 18" maximum spacing.

<table>
<thead>
<tr>
<th>D</th>
<th>H</th>
<th>SINGLE</th>
<th>DOUBLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L</td>
<td>Conc C.Y.</td>
</tr>
<tr>
<td>12&quot;</td>
<td>2'-0&quot;</td>
<td>5' - 0&quot;</td>
<td>35</td>
</tr>
<tr>
<td>15&quot;</td>
<td>2'-11&quot;</td>
<td>6' - 0&quot;</td>
<td>40</td>
</tr>
<tr>
<td>18&quot;</td>
<td>3'-2&quot;</td>
<td>7' - 0&quot;</td>
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</tr>
<tr>
<td>42&quot;</td>
<td>5'-2&quot;</td>
<td>13' - 0&quot;</td>
<td>140</td>
</tr>
<tr>
<td>45&quot;</td>
<td>5'-5&quot;</td>
<td>14' - 0&quot;</td>
<td>150</td>
</tr>
<tr>
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<td>16' - 0&quot;</td>
<td>180</td>
</tr>
<tr>
<td>54&quot;</td>
<td>6'-2&quot;</td>
<td>17' - 0&quot;</td>
<td>190</td>
</tr>
</tbody>
</table>

LEGEND ON PLANS

---

SANDIEGO REGIONAL STANDARD DRAWING

STRAIGHT HEADWALL - TYPE A
(CIRCULAR PIPE)
ELEVATION DOUBLE HEADWALL

ELEVATION SINGLE HEADWALL

SECTION

<table>
<thead>
<tr>
<th>C.S.P. ARCH SIZE</th>
<th>SINGLE</th>
<th>DOUBLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot; x 11&quot;</td>
<td>2'-7&quot;</td>
<td>37</td>
</tr>
<tr>
<td>21&quot; x 15&quot;</td>
<td>2'-11&quot;</td>
<td>45</td>
</tr>
<tr>
<td>24&quot; x 18&quot;</td>
<td>3'-2&quot;</td>
<td>50</td>
</tr>
<tr>
<td>28&quot; x 20&quot;</td>
<td>3'-4&quot;</td>
<td>60</td>
</tr>
<tr>
<td>35&quot; x 24&quot;</td>
<td>3'-8&quot;</td>
<td>85</td>
</tr>
<tr>
<td>42&quot; x 29&quot;</td>
<td>4'-1&quot;</td>
<td>110</td>
</tr>
<tr>
<td>49&quot; x 33&quot;</td>
<td>4'-5&quot;</td>
<td>130</td>
</tr>
<tr>
<td>57&quot; x 38&quot;</td>
<td>4'-10&quot;</td>
<td>155</td>
</tr>
<tr>
<td>64&quot; x 43&quot;</td>
<td>5'-3&quot;</td>
<td>175</td>
</tr>
<tr>
<td>71&quot; x 47&quot;</td>
<td>5'-7&quot;</td>
<td>195</td>
</tr>
</tbody>
</table>

NOTES:
1. Concrete shall be 560-C-3250.
2. All reinforcing steel #4 bars. All vertical and horizontal tie bars 18” maximum spacing.

LEGEND ON PLANS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

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

DRAWING NUMBER D-31
DOUBLE PIPE ELEVATION

SECTION A-A

A

A

D(2) (1" min)

L

A

SINGLE PIPE ELEVATION

A

L

NOTES
1. Concrete shall be 560-C-3250
2. Exposed corners to be chamfered 3/4".

---

<table>
<thead>
<tr>
<th>D</th>
<th>A</th>
<th>B</th>
<th>H</th>
<th>SINGLE Conc</th>
<th>SINGLE</th>
<th>DOUBLE Conc</th>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>C.Y. L</td>
<td></td>
<td>C.Y. L</td>
<td></td>
</tr>
<tr>
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<td>2'-0&quot;</td>
<td>1'-0&quot;</td>
<td>4'-0&quot;</td>
<td>4'-0&quot;</td>
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<td>4'-3&quot;</td>
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<td>7'-1&quot;</td>
<td>.85</td>
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<td>1'-2&quot;</td>
<td>4'-6&quot;</td>
<td>6'-0&quot;</td>
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<td>36&quot;</td>
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<td>2'-0&quot;</td>
<td>7'-0&quot;</td>
<td>12'-0&quot;</td>
<td>3.74</td>
<td>17'-0&quot;</td>
<td>5.05</td>
</tr>
</tbody>
</table>

---

LEGEND ON PLANS

---

SAN DIEGO REGIONAL STANDARD DRAWING

STRAIGHT HEADWALL - TYPE B
(CIRCULAR PIPE)

DRAWING NUMBER D-32

---

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

ARCH T. NOAL, Dec. 1975

CONTRACT NO. RE 19607

S.F. 5-86

---
NOTES
1. Concrete shall be 560-C-3250
2. Exposed corners to be chamfered 3/4".

LEGEND ON PLANS

---
NOTES:
1. Concrete shall be 560-C-3250
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
ELEVATION

SECTION A-A

SECTION B-B

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 560-C-3250
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.

LEGEND ON PLANS

- =
- =

SAN DIEGO REGIONAL STANDARD DRAWING
WING AND U TYPE HEADWALLS FOR 42" TO 84" PIPES
DRAWING NUMBER D-35
NOTES
1. Concrete shall be 560-C-3250
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.
NOTES

1. Concrete shall be 560-C-3250.
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.
**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 560-C-3250
3. Keep the pipe-end clear of obstructions to permit easy placing of culvert extension.

---

**TABLE:**

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</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'-8&quot;</td>
<td>2'-8&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. 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.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

INLET APRON FOR CULVERTS UP TO 42" DIAMETER

DRAWING NUMBER D-39
NOTES:

1. Plans shall specify:
   A) Rock class and thickness (T).
   B) Filter material, number of layers and thickness.

2. Rip rap shall be either quarry stone or broken concrete
   (if shown on the plans.) Cobble stones are not acceptable.

3. Rip rap shall be placed over a filter blanket which
   may be either granular material or plastic filter cloth.

4. See standard special provisions for selection of rip rap
   and filter blanket.

5. Rip rap energy dissipators shall be designated as either
   Type 1 or Type 2. Type 1 shall be with concrete sill;
   Type 2 shall be without sill.
NOTES

1. Design:
   Equivalent Fluid Pressure = 60 p.s.i.
   Maximum Outlet Velocity = 35 f.p.s.
2. Concrete shall be 500-C-3250
3. Reinforcement shall conform to ASTM designation A615 and may be
   grade 40 or 60. Reinforcement 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. Riprap 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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</thead>
<tbody>
<tr>
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<td>4.91</td>
<td>7.07</td>
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<tr>
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<td>38</td>
<td>59</td>
<td>85</td>
<td>115</td>
<td>151</td>
<td>194</td>
<td>236</td>
<td>339</td>
</tr>
<tr>
<td>W</td>
<td>5”</td>
<td>6”</td>
<td>6”</td>
<td>9”</td>
<td>9”</td>
<td>10”</td>
<td>11”</td>
<td>12”</td>
<td>14”</td>
</tr>
<tr>
<td>H</td>
<td>4”</td>
<td>5”</td>
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<td>12”</td>
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</tr>
</tbody>
</table>
NOTES
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.
HEADING ELEVATION

END SILL ELEVATION

SECTION C-C

SECTION A-A

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

SECTION D-D

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.
NOTES:
2. Dimension shown becomes 2'-0" when opening on both sides. Adjust manhole as required.
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. Maintain 1 1/2" clear spacing between reinforcing and surface unless otherwise noted.
NOTES
1. For trenching on improved streets see Standard Drawing G-24 or G-25 for resurfacing details.
2. (*) indicates minimum relative compaction.
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.
2. Concrete shall be 560-C-3250.
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.
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 560-C-3250

LEGEND ON PLANS
NOTES
1. Concrete shall be 560-C-3250
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

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

TYPICAL SECTION

LEGEND ON PLANS
BROW DITCH

3" 470-C-2000 concrete or 3" 2500 psi, air placed concrete with 1½"x1½" 17 gauge stucco netting.

TYPE A

30" min
12"

Brow Ditch bottom may be rounded at the option of the contractor.

TYPE B

12" max
12"

12" min

NOTE
1. Longitudinal slope of lined ditch shall be 2% minimum.
2. Over slope down ditches shall employ 6" thickened edge section at both sides of ditch.

NOTES

BOTTOM DRAINAGE DITCHES

REVISED 11-4-76

A.P.C. 10-85

B height 1 4¼ 7-86

DRAINAGE DITCHES

LEGEND ON PLANS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER D-75
<table>
<thead>
<tr>
<th>SPAN</th>
<th>2'</th>
<th>3'</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
</tr>
</thead>
<tbody>
<tr>
<td>16'</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>24'</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>30'</td>
<td>8</td>
<td>10</td>
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</tr>
<tr>
<td>36'</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>24</td>
</tr>
</tbody>
</table>

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.
For cover less than 2 feet, provide #4 @ 18 ea. way & adjust quantities.

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

Optional const. j.t.

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

TYPICAL SECTIONS 2' THRU 6' SPANS

TYPICAL SECTION 7' THRU 12' SPANS

FLAT INVERT

V. INVERT

TRAPEZOIDAL INVERT

ALTERNATIVE INVERTS (When shown)
### Span Classification

<table>
<thead>
<tr>
<th>Span</th>
<th>2'</th>
<th>3'</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'</td>
<td>1/2</td>
<td>3/4</td>
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</tr>
<tr>
<td>4'</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5'</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>6'</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Concrete Grades
- C20: 2,310 psi
- C25: 2,800 psi
- C30: 3,290 psi
- C35: 3,780 psi

### Double Box Culvert Details No. 1

#### Concrete Cylinders
- **Concrete Cylinders (per lin ft):**
  - 2,310 psi: 2,310 psi
  - 2,800 psi: 2,800 psi
  - 3,290 psi: 3,290 psi
  - 3,780 psi: 3,780 psi

#### Steel Bars
- **Steel Bar Spacing:**
  - 1 in
  - 2 in
  - 3 in
  - 4 in
  - 5 in
  - 6 in

#### Beam Reinforcement
- **Beam Reinforcement:**
  - 1 in
  - 2 in
  - 3 in
  - 4 in
  - 5 in
  - 6 in

#### Note:
For bars of height less than that shown in table, use next greater table height slab, 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 both cells.

---

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

**Drawing Number:** D-77A

**Revision:** By Approved Date

**San Diego Regional Standard Drawing**

**DOUBLE BOX CULVERT DETAILS NO. 1**
For cover less than 2 feet, provide #4 @ 18 ea. way. & adjust quantities.

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

Typical Section
(Showing reinforcement for interior walls 8" and over)

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

"Flat Invert" Alternative
(When shown)
### Table 1: Strength Classification

<table>
<thead>
<tr>
<th>Span</th>
<th>2'</th>
<th>3'</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>3'</td>
<td>F</td>
<td>G</td>
<td>H</td>
<td>I</td>
<td>J</td>
</tr>
<tr>
<td>4'</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
<td>O</td>
</tr>
<tr>
<td>5'</td>
<td>P</td>
<td>Q</td>
<td>R</td>
<td>S</td>
<td>T</td>
</tr>
<tr>
<td>6'</td>
<td>U</td>
<td>V</td>
<td>W</td>
<td>X</td>
<td>Y</td>
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### Table 2: Concrete Cylinders

<table>
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<th>Concrete Cylinders</th>
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<th>1.000</th>
<th>1.250</th>
<th>1.500</th>
<th>1.750</th>
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</thead>
<tbody>
<tr>
<td>Cylinders No.</td>
<td>715</td>
<td>603</td>
<td>453</td>
<td>335</td>
<td>256</td>
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</table>

### Table 3: Spacers

<table>
<thead>
<tr>
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<th>58</th>
<th>62</th>
<th>66</th>
<th>70</th>
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<tbody>
<tr>
<td>Concrete Cylinders</td>
<td>715</td>
<td>603</td>
<td>453</td>
<td>335</td>
<td>256</td>
</tr>
</tbody>
</table>

Note:

For bars of height less than that shown in table, use next greater table height sizes, 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 cover less than 2 feet, extend "c" bars full length, top slab only. Provide additional 4 spacers @ 18+ and adjust quantities.

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

TYPICAL SECTION

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

"FLAT INVERT" ALTERNATIVE
(When shown)
Extend all longitudinal bars in box walls 2'-0" into wings, except where expansion joint occurs.

**Type "A"**

*Angle of Flare*

Toe of slope
Elev. "a"

**Type "B"**

Where design H" exceeds 3' or length of wingwall exceeds 10 "H", place 1/2" EB Joint Filter at junction of box and wall.

**Type "C"**

NOTE: Where 1/4" surcharge exceeds 5", use Type B Retaining Wall.

**Type "C"**

Elev. "a"
Typical Section
H = 4’ thru 12’

Typical Section
H = 13’ thru 16’

Design Notes:
- Unit Stresses: $f_1 = 20,000$ psi, $f_2 = 12,000$ psi, $f_3 = 1000$ psi
- Maximum Toe Pressure = 1.5 Tons / sq. ft.
- Elevations, length and angle of slope of wings may vary by the Engineer to suit conditions encountered in the field. Walls designed for 2’ live load surcharge, 1/4” slope of surcharge not to exceed 3’ in elevation plus 2’ live load surcharge, or unlimited 2’ surcharge.
- Dimensions “H”, “L”, “M”, “N”. Elev “O” and “Angle of slope” (as apply) are shown on the plans.

Reinforced Concrete Wingwalls

<table>
<thead>
<tr>
<th>H’</th>
<th>4’</th>
<th>5’</th>
<th>6’</th>
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<th>10’</th>
<th>11’</th>
<th>12’</th>
<th>13’</th>
<th>14’</th>
<th>15’</th>
<th>16’</th>
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<tbody>
<tr>
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<td></td>
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</tbody>
</table>

Use reinforcement for H > 12’

Typical Layout Example

SAN DIEGO REGIONAL STANDARD DRAWING
BOX CULVERT WINGWALL
TYPES A, B & C
DETAILS NO. 2

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE
Allan S. Kaplan, Pres. 1971
Coordinator: R.C.E. 1980 - Dean

DRAWING NUMBER D-79B

Quantities do not include that portion above the design “H” limit
BOX CULVERT WARPED WINGWALL
DETAILS NO. 1
ALTERNATIVE WARPED WINGWALL

Use where additional protection to toe of embankment is required.

<table>
<thead>
<tr>
<th>Element/ Slope</th>
<th>&quot;H&quot;</th>
<th>8&quot; or less</th>
<th>10'</th>
<th>12'</th>
<th>14'</th>
<th>16'</th>
<th>18'</th>
<th>20'</th>
<th>22' or more</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&quot;H&quot;</td>
<td>8&quot; or less</td>
<td>10'</td>
<td>12'</td>
<td>14'</td>
<td>16'</td>
<td>18'</td>
<td>20'</td>
<td>22' or more</td>
</tr>
<tr>
<td></td>
<td>&quot;H&quot;</td>
<td>8&quot; or less</td>
<td>10'</td>
<td>12'</td>
<td>14'</td>
<td>16'</td>
<td>18'</td>
<td>20'</td>
<td>22' or more</td>
</tr>
</tbody>
</table>

WALL DIMENSIONS AND REINFORCING

STIFFENING BEAM DIMENSIONS AND REINFORCING

Notes:
- Walls designed for 2' surcharge; earth load = 1200 cu ft, equivalent fluid pressure = 36' cu ft.
- Vary "D" of warped wall uniformly from that at cut-off wall to that at culvert, for max "H" > 12.
- Designation is anticipated increase upon thickness, to 7" min, to provide 2" min reinforcement coverage.
- Dimensions "L", "W", "H", "N", Elev "E", "Angle of flare", and end slope (as apply) are shown on plans.
- Concrete shall be class 560-B-3250.

SAN DIEGO REGIONAL STANDARD DRAWING

BOX CULVERT WARPED WINGWALL

DETAILS NO. 2

DRAWING NUMBER D-80B
GENERAL NOTES

QUANTITIES: Quantities are for the sloped invert slab and do not include splices in longitudinal bars, nor temperature reinforcement for exposed top culvert or concrete or reinforcement for parapets or cutoff walls.

SPECIFIC COVERAGE: Box standard plans are not to be used for culverts in a corrosive environment or where there is a severe abrasive flow condition.

DESIGNATION: Show on plans as span x height - strength classification, x length. Thus 4 x 4 x 14 G 60, followed by alternatives.

ALTERNATIVES: Invert will be sloped unless "trapoidal invert" or "flat invert" or "V invert" is included in designation. Ends of culvert will be rounded unless "square ends" are designated. Parapets will be as shown unless "steel parapet" is designated in plans. Such designations may be different for inlet and outlet ends.

REINFORCEMENT: Main reinforcement is positioned transverse or, for curved culverts, radial; when radial, reinforcing spacing is measured along the h.

CONSTRUCTION NOTES

CONCRETE:
Bottom slab & walls shall be class 560-B-3350
Top slab shall be class 560-C-3250

EXPANSION JOINTS:
No expansion joints shall be placed on the slab and walls - when cover is less than span length, place 1/2 expansion joint filler 30" centers 2 at 30" centers under paved roadway lanes and place bridge detail 3-2 at 30" centers under paved roadway lanes - when cover is more than span length, place 2" expansion joint filler 30" centers and additional 1/2 expansion joints at locations of change in foundation character, as directed by the engineer.

CONSTRUCTION LOADS:
Not permitted until concrete has reached a strength of 3,000 psi or age of 28 days, whichever occurs first. And falsework plans have been submitted by the contractor to the engineer and approved.

CONSTRUCTION JOINTS:
Temporary joints may be permitted if normal (or radial) to % of RCB. Otherwise, the contractor is to submit a proposal for consideration.

BRIDGE DETAIL 3-2
(Portion)
See Standard Drawing C-15

USE OF STANDARD DRAWING

"STRENGTH CLASSIFICATION" symbolized by the letters "A," "B," "C," etc., in 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.

BOX CULVERT

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER D-81A

MISCELLANEOUS DETAILS NO. 1

SPECIFICATIONS


SECTIONS DESIGNED FOR CULVERT IN A TRENCH ON HARD FOUNDATION, OR CULVERT UNTRENCHED ON YIELDING FOUNDATION FOR CULVERTS ON PILES OR ROCK FOUNDATIONS, SPECIAL DESIGN WILL BE REQUIRED.

LOADING

LIVE LOAD: For legal highway loads, use H520-44 or alternative. With 5% impact for all cover depths, no impact on invert cover less than 2'-wheel load distribution on the top slab is E = 1T555 + 3.2 longitudinal and concentrated along the span, wheel load distribution on the invert slab is 1.25 longitudinal and uniformly over the breath of the culvert.

COVER 2' OR MORE - Wheel loads distributed uniformly over a square, the sides of which are 1.75 times the depth of cover, but not less longitudinally than he on the top slab or 1.5 on the invert slab when such areas from several wheel concentrations overlap. The total load shall be considered as uniformly distributed over the area defined by the outside limits of the individual areas, but the overall longitudinal dimension shall not exceed the total length of the supporting slab. Neglect live load on single spans when cover is more than 1.5 and exceeds span, and on multiple spans when cover exceeds distance between exterior walls.

DEAD LOAD: Earth load of 100pcf and an equivalent fluid pressure of 30 psf reduced to 184 psf and 225 psf respectively for clear spans of 20 or less.

UNIT STRESSES:
F_c = 20,000 psi
F_p = 1,200 psi

REINFORCEMENT Embedment is 1/2 dia. clear, min 1" and in 1/2 increments, except as noted.

DISTRIBUTION: "G" bars expressed as a % of main positive reinforcement.

CLASSIFICATION "A" top slab = 100.
Bottom slab = 4 @ 18" max.

CLASSIFICATION "B" to "E" top and bottom slabs = 4 @ 18" max.
PARAPET DETAILS FOR SINGLE SPAN CULVERTS

PART SECTION

Length of Culvert

*4 hoops @ 12" I c.l.
4" bars, tot. 3
R = T3

PART PLAN - SKewed

"D" Bars or Spacers
Skew
& Culvert
Main reinforc.

PARAPET DETAILS FOR MULTIPLE SPAN CULVERTS

PART SECTION

Length of Culvert

*4 Hoops @ 12" I c.l.
4" bars, tot. 3
R = T3

PART PLAN - SKewed

Note: Hook reinforc. same as above

PARAPET DETAIL FOR SKewed CULVERTS W/O WINGWALLS

End of parapet normal to face of parapet

& RC Box

CULVERT EXTENSION

20° SKewed MAXIMUM

Cover: 1" AND GREATER

Cover Slab
2"-0" 2"-0"

Remove Perapet and Hoops Flush

Optional extension

Existing Construction

1/2 Exp fill filler, Secured with
8d Nails @ 18" Max Spacing

New Construction

12" Remove and Splice to Existing
Longitudinal Rebar in invert.

Place Expansion Joint a Minimum of
2S or 2H from joining.

Existing Construction

New Construction

Cover: EXPOSED TOP AND GREATER

Remove and Splice to Existing
Longitudinal Rebar in all Members.
NOTES:

1. Fence fabric shall be 2" mesh, 9 gage galvanized wire, chainlink placed on the upstream side of the posts and tension cables.

2. Tension cable shall be 5/16" diameter steel at 18" c/c secured at ends with cable clamps. Secure fence to cable with No. 12 galv. steel wire looped at 6" c/c.

3. Posts shall be 3" diameter steel pipe, 5.79 lb./ft. Fill with mortar after placing.

4. Fence fabric shall be secured to posts with 9 gage wire clips at 9" c/c.

LEGEND ON PLANS

SANDiego REGIONal Standards DRAWING

DEBRIS FENCE

| RECOMMENDED BY THE SANDIEGO REGIONal Standards COMMITTEE |
| SAN Diego REGIONal Standards DRAWING |
| DRAWING NUMBER D-82 |
ELECTRICAL SYSTEMS
DIRECT BURIAL FOUNDATION

<table>
<thead>
<tr>
<th>POLE HEIGHT</th>
<th>MOUNTING HEIGHT</th>
<th>LAMP SIZE (WATTS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25' ± 2'</td>
<td>27' ± 1'</td>
<td>170 M.V.</td>
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<tr>
<td></td>
<td></td>
<td>100 H.P.S.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90 L.P.S.</td>
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<tr>
<td>28' ± 2'</td>
<td>30' ± 1'</td>
<td>400 M.V.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>250 H.P.S.</td>
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<tr>
<td></td>
<td></td>
<td>180 L.P.S.</td>
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<tr>
<td>23' - 0''</td>
<td>26' - 9''</td>
<td>70 H.P.S.</td>
</tr>
<tr>
<td>26' - 6''</td>
<td>30' - 0''</td>
<td>150 H.P.S.</td>
</tr>
</tbody>
</table>

560 - C - 3250 P.C.C. Anchor base square or round, add 1' to each dimension for loose soil or soft clay conditions.

ANCHOR BASE FOUNDATION

Finished Grade Anchor bolts must not protrude.

Anchor Bolts (4 req.) 1"x36"x4" hook, galvanized. Use two leveling nuts with washers (all galv.) on each bolt.

1/4" minimum bolt clearance


**DIRECT BURIAL FOUNDATION**

**ANCHOR BASE FOUNDATION**

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.

---

**STEEL CONDUIT**

**NON-METALLIC CONDUIT**

---

**DETAIL A**

Steel Conduit

Anchor Rods
1½" min. cover for bars and conduits.

Galvanized steel conduits. Size and number as required.

1¼" X 2" galvanized steel bars.

10" Diameter use Sonotube for smooth finish (Class 1)

Permissible to auger hole and pour against soil.

NOTE:
Concrete shall be class 560-C-3250

1" galvanized steel conduit for service ground (where required).

Panel Board

Grout cap protrusion to be sloped for drainage.

Ground Line

METER

3/4" x 8" copper covered steel ground rod.

SECTION A--A
STEEL & CONCRETE DIMENSIONS

SECTION B--B
CONDUIT & EQUIPMENT

SAN DIEGO REGIONAL STANDARD DRAWING
PEDESTAL FOR ELECTRICAL EQUIPMENT

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

D-3-33
GENERAL SURFACE IMPROVEMENTS
GUTTER

NOTES:

1. Concrete shall be 520-C-2500.
3. Slope top of curb 1/4" per foot toward street.
NOTES:
1. Concrete shall be 520-C-2500.
3. Slope top of curb 1/4" per foot toward street.

LEGEND ON PLANS
NOTES
1. Concrete shall be 520-C-2500.
3. Monolithic curb, gutter and sidewalk is to be used with Agency approval only.

LEGEND ON PLANS

SANDiego REGIONAL STANDARd DRAWING

MONOLITHIC CURB, GUTTER AND SIDEWALK

DRAWING NUMBER G-3
Curb Area
(2.23 sq. ft.)

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-6.1 for Rolled Curb Inlet.
3. Concrete shall be 520-G-2500.
**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**

**APPROX. DIKE QUANTITIES**

<table>
<thead>
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<th>TYPE</th>
<th>TONS/LIN. FT.</th>
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<tr>
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<tr>
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<td>C-9&quot;</td>
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<td>D</td>
<td>0.0062</td>
</tr>
<tr>
<td>E</td>
<td>0.0407</td>
</tr>
<tr>
<td>F</td>
<td>0.0623</td>
</tr>
</tbody>
</table>
B-1
AREA = 0.79 SQ.FT.

B-2
AREA = 1.29 SQ.FT.

B-3
AREA = 0.29 SQ.FT.

B-4
AREA = 0.35 SQ.FT.

NOTES
1. Concrete shall be 520-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 520-C-2500.
NOTES
1. Expansion Joints _______ at curb returns, adjacent to structures and at 45’ intervals.
   (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.

SAN DIEGO REGIONAL STANDARD DRAWING

SIDEWALK JOINT LOCATIONS

DRAWING NUMBER G-9
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.
Notes:

1. Concrete shall be 560-C-3250.
2. = Weakened plane joints.
3. Typical flowlines.
4. = Elevations to be shown on plans.
5. Return segments to be 5½" thick.
6. Curb between P.C.R.s shall be considered as part of cross gutter.

Legend on Plans:

- 1/2" R typical
- Top of Paving
- Base material as shown on plans

Plan:

Contact Joints per Standard Drawing G-10 when separate pours are made.
Transitional area, depress toe of gutter to match cross gutter slope.

5½" unless otherwise shown on plan

1.5% 10' 1.5%

1/2" R Typical

Base material as shown on plans

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 560-C-3250.

LEGEND ON PLANS
NOTES
1. No concrete shall be placed until forms and subgrade are inspected by the Agency.
2. Concrete shall be 520-C-2500.
3. See standard drawings G-15 and G-16 for width and location requirements.
4. Driveway ramp to extend to 10 feet from curb face or to property line whichever is less. (For commercial driveways only)
5. See Standard Drawings G-2 and G-10 for curb and joint details.

LEGEND ON PLANS
- Q of Residential (Commercial) Driveway

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

CONCRETE DRIVEWAYS

DRAWING NUMBER G-14
**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 more than 25', 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 driveways 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.
TYPICAL PLAN

Gutter Elevation shown on plans
Toe of Gutter Elevation

Elevation shown on plans

1/2"R

1 1/2" except where elevations shown indicate otherwise

Q SECTION

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).
5. ———— = 1/2" expansion joints.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

ALLEY APRON

DRAWING NUMBER G-17
NOTES
1. Concrete shall be 560-C-3250.
3. Adjust 15' interval between Transverse Joints to match adjacent existing improvements.

TYPICAL SECTION

Pavement Width = 40' or less
10' minimum

TYPICAL PLAN

CONTACT JOINT

WEAKENED PLANE JOINTS

CONTACT JOINTS

TRANSVERSE CONTACT JOINTS SHALL BE CONSTRUCTED AT END OF POUR

EXPANSION JOINTS SHALL BE CONSTRUCTED AT LOCATIONS SHOWN ON PLANS.
NOTES
1. Concrete shall be 560-C-3250.
3. Adjust 15' interval between Transverse Joints to match adjacent existing improvements.
Pavement Width = 69' or less, but more than 53'.

TYPICAL SECTION

TYPICAL PLAN

NOTES
1. Concrete shall be 560-C-3250.
2. See Standard Drawing G-10 for Joint Details.
3. Adjust 15' interval between Transverse Joints to match adjacent existing improvements.
TYPICAL SECTION

TYPICAL PLAN

NOTES
1. Concrete shall be 560-C-3250
3. Adjust 15' interval between Transverse Joints
to match adjacent existing improvements.
Curb and Gutter
Surface Course
Expansion Joint
Base Course

ELEVATION

520-C-2500 Concrete

SECTION A-A

LEGEND ON PLANS
Width As Shown On Plan

Alley Pavement

ELEVATION

SECTION A-A

Thickness shown on plans

560-C-3250 Concrete

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING
CUTOFF WALL AT END OF ALLEY PAVEMENT
DRAWING NUMBER G-23
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.
7. Sloughing of trench under pavement shall be cause for requiring additional pavement and base.
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.
2. Sloughing of trench under pavement shall be cause for requiring additional pavement and base.

NOTES TYPE-C
1. Concrete shall be colored black where required to match existing pavement. Method to be specified by Agency.
2. Minimum concrete thickness:
   - Alleys and local residential street: 5 inches
   - Major streets and highway: 7 inches
   Trench resurfacing in P.C.C. pavement shall have the above minimum thickness or match the existing concrete thickness plus one inch whichever is greater.

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.
NOTES
1. No concrete shall be placed until forms and subgrade are inspected by the Agency.
2. Concrete shall be 520-C-2500.
CONSTRUCTION NOTES

1. Set false header for back of ramp at curb height above gutter grade to maximum 6".

2. Where shown on the plans, construct monolithic curb for retention of street drainage or to meet adjacent improvements.

NOTE
See Standard Drawing G-32 for general notes.
<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curb Height</td>
<td>Ramp Length</td>
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<td>0' - 8&quot;</td>
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<td>3' - 0&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>9' - 11&quot;</td>
<td>3' - 0&quot;</td>
</tr>
</tbody>
</table>

NOTES


2. If inadequate space exists in existing sidewalk to provide 4' minimum behind ramp use Standard Drawing G-30.

SECTION A-A
SECTION A–A

NOTES

1. Type C ramps are only to be used to mitigate existing conditions where inadequate right of way exists to use standard drawing G-27, G-28 or G-30 and are not to be used in new construction.


<table>
<thead>
<tr>
<th>X*</th>
<th>Y*</th>
</tr>
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<tbody>
<tr>
<td>Curb Height</td>
<td>Ramp Length</td>
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<tr>
<td>13&quot;</td>
<td>10' - 6&quot;</td>
</tr>
</tbody>
</table>
NOTES
2. See Standard Drawing G-27 for dimensions X, Y, Z, CT.

SAN DIEGO REGIONAL STANDARD DRAWING
PEDESTRIAN RAMP
TYPE C-1
(IN EXISTING SIDEWALK)
### Table

<table>
<thead>
<tr>
<th>X Curb Height</th>
<th>Y Ramp Length</th>
<th>Z Side Slope</th>
</tr>
</thead>
<tbody>
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<td>1' - 4&quot;</td>
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<td>3.0&quot;</td>
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<td>1' - 8&quot;</td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>3' - 0&quot;</td>
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<td>4' - 0&quot;</td>
<td>2' - 8&quot;</td>
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</tr>
<tr>
<td>8.0&quot;</td>
<td>7' - 6&quot;</td>
<td>3' - 0&quot;</td>
</tr>
</tbody>
</table>

### Notes

12" wide border with 1/4" grooves approx. 3/8" O.C.

Meet existing sidewalk

12" wide border with 1/4" grooves approx. 3/8" O.C.

### Section A-A

See Standard Drawing G-32 for general notes.
1. Pedestrian ramps shown on Standard Drawings G-27 through G-30 do not conform to the requirements of the State Building Code (Part 2, Title 24, C.A.C.) and are not recommended for use on projects with Federal or State funding.

2. Areas shown thus: Shall have a heavy broom “ripple” texture finish, transverse to axis of ramp.

3. Areas shown thus: Are the minimum required for a complete ramp installation and shall be concrete class 520-C-2500.

4. When pedestrian ramps are installed in or adjacent to existing colored concrete, the new ramp shall be tinted to match existing concrete color.

5. The removal of existing concrete curb, gutter, sidewalk and pavement for pedestrian ramp installation shall comply with San Diego Regional Standard Drawing G-11.

6. If obstructions such as inlets, utility poles, fire hydrants, etc., are encountered, the ramp locations may be adjusted upon the approval of the Engineer.

7. Where shown on plans, construct herringbone grooves 1/4" deep x 1/4" wide, 1-1/2" apart. Grooves shall be aligned parallel to crosswalk stripes to direct blind pedestrians into appropriate crosswalk.
NOTES

1. Concrete encasement or sand cement slurry backfill shall have a maximum slump of 4 inches.
2. Concrete encasement and sand cement slurry backfill shall be thoroughly consolidated to encase conduits. Tampers or vibrators shall be used.
3. Concrete shall be screeded off to match existing pavement grade and floated to assure proper edge match.
4. A tack coat shall be applied to the concrete and existing asphalt pavement prior to placing the new asphalt pavement wearing surface.
5. Existing A.C. pavement will not require sawcutting when using rockwheel for excavation.
6. Concrete trench cover shall be a minimum 5 1/2 inches thick in alleys or local residential streets and 7 inches thick in all other streets.
7. Allow concrete backfill or concrete trench cover seven calendar days minimum but no longer than thirty calendar days to cure and dry before applying the asphalt concrete wearing surface.
8. In major or prime arterial streets, an approved set accelerating admixture, such as Calcium Chloride, may be used only with prior approval of the Agencies Engineer.
9. Only Type A shall be permitted for supply cables of 750 volts or less. See California Public Utility Commission General Order No. 128, Rule 33.4 D. (1) (b).
10. Select material with a minimum sand equivalent of 50 shall be backfilled to 3" above the conduit. Concrete encasement (480-D-2000) may be substituted for select material when a cold joint of 8 mil. plastic sheeting is installed 3" above conduit.
NOTES

1. Cement Slurry Backfill:
   a. Cement slurry backfill shall have a maximum slump of 4 inches.
   b. Cement slurry backfill shall be thoroughly consolidated to encase conduits.
      Tamper or vibrators shall be used.
   c. Cement slurry backfill shall be as follows:
      Alleys and local residential streets ........ Class (190-E-400)
      All other streets ...................... Class (380-E-800)

2. A tack coat shall be applied to the cement slurry backfill and existing asphalt pavement prior to placing the new asphalt surface.

3. Asphalitic Concrete Resurfacing:
   Type C
   a. Allow cement slurry backfill 24 hours minimum to cure before resurfacing.
   b. Thickness shall match the existing A.C. with a minimum of 2 inches.
   c. A.C. shall be hot mix.

   Type D
   a. Allow cement slurry backfill seven days minimum to cure before planing.
   b. Plane existing asphalt pavement and slurry backfill 1 inch minimum or one half thickness of existing A.C. not to exceed 2 inches.
   c. A.C. shall be hot mix.

4. A.C. resurfacing shall be sealed or chip sealed when required by the agencies Engineer.

5. Existing A.C. pavement will not require sawcutting when using rockwheel for excavation.
NOTES

1. Concrete backfill or sand cement slurry backfill shall have a maximum slump of 4 inches.

2. Concrete backfill and sand cement slurry backfill shall be thoroughly consolidated to encase conduits. Tamperers or vibrators shall be used.

3. Concrete shall be screeded off to match existing pavement grade and floated to assure proper edge match.

4. Concrete trench cover shall be a minimum of 5½ inches thick in alleys or local residential streets and 7 inches thick in all other streets.

5. Existing concrete pavement will not require sawcutting when using rockwheel for excavation.

6. In major or prime arterial streets, an approved set accelerating admixture, such as Calcium Chloride, may be used only with prior approval of the agencies Engineer.

7. Only Type E shall be permitted for supply cables of 750 volts or less. See California Public Utility Commission General Order No. 128, Rule 33.4 D. (1) (b).

8. Select material with a minimum sand equivalent of 50 shall be backfilled to 3” above the conduit. Concrete encasement (480-D-2000) may be substituted for select material when a cold joint of 8 mil. plastic sheeting is installed 3” above conduit.
NOTES:
1. Trench resurfacing shall be done according to governmental (permitting) Agency's requirements.

2. The sand used for the slurry backfill shall meet the requirements for fine aggregate Subsection 400-1.3 listed in the Standard Specifications for Public Works Construction. Slurry must be firm prior to trench resurfacing.

3. Slurry backfill may be used in permeable soils and shall not be used where it will impede subsurface drainage.
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.
4. Anti-drain/Excess Flow Valve shall be installed under all heads unless heads have a "Built-in" Anti-drain or check valve.
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.
5. Anti-drain/Excess Flow Valve shall be installed under all heads unless heads have a "Built-in" Anti-drain or check valve.

ELEVATION

LEGEND ON PLANS
Show a number to indicate type head.

SAN DIEGO REGIONAL STANDARD DRAWING

LAWN SPRINKLER HEAD
POP UP ROTARY (WITH SWING JOINT)
NOTES
1. Quick coupling valves in lawn areas shall be set to grade.
2. Quick coupling valves in shrub areas shall be set 2 inches above grade.
3. Dimensions of concrete anchors are minimum.
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.
NOTES
1. Atmospheric vacuum breakers shall be installed approximately 6" 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.
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

** ✓ **

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**SAN DIEGO REGIONAL STANDARD DRAWING**

**BACKFLOW PREVENTER - CONTINUOUS PRESS. VAC. BREAKER ASSY.**

(2" & SMALLER)
NOTES:

1. All fittings on assembly shall be flanged.
2. Buried cast iron pipe and fittings shall be polyethylene wrapped with 2 inch wide plastic backed adhesive tape (8 mil thickness). Use 1/2 inch overlap.
3. Cast iron pipe and fittings shall be cement mortar lined.
4. All exposed cast iron shall be painted with one coat of primer and two coats of exterior enamel.
5. Concrete pad shall be 24 inches wide.
6. Backflow preventer assembly shall be tested upon installation by a certified backflow device tester. Contractor shall provide Engineer with written test results completed by certified backflow tester prior to the backflow preventer assembly's acceptance by Engineer.
7. Adapt inlet and outlet fittings to main as required.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

BACKFLOW PREVENTER
REDUCED PRESSURE PRINCIPLE
ASSEMBLY-LARGER THAN 2"
NOTES
1. All valves shall be furnished with a standard manual control valve bronze cross handle.
2. All valves shall be installed within 12" of the water main, unless otherwise shown on the plans.
3. 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 valves shall be installed with 12" of the water main, unless otherwise shown on the plans.
3. All Manual Valves shall be furnished with a removable bonnet and packing gland nut.
4. Close Nipples shall not be used.
5. Locking cap shall be mounted flush with finish grade in turf areas & 1 inch above finish grade in shrub areas.

LEGEND ON PLANS

### SAN DIEGO REGIONAL STANDARD DRAWING

**MANUAL VALVES**

**ANGLE VALVE**

- P.V.C. Female Adaptor
- Short Red Brass Nipple
- Red Brass Riser
- P.V.C. Female Adaptor
- 2" P.V.C. Pipe Sleeve
- 15" minimum
- 21" maximum

**GLOBE VALVE**

(special cases only)

- Short Red Brass Nipple
- P.V.C. Female Adaptor
- From supply
- 15" minimum
- 21" maximum

**ALTERNATE PIPE SLEEVE INSTALLATION**

- 2"x2"x1" Tee
- P.V.C., Sch. 40
- 3"
- 1" P.V.C. cap.
- P.V.C., Sch. 40
- 2" P.V.C. pipe, Sch. 40
- Locking cap weather-matic # 906-L or approved equal.
NOTES
1. Splicing shall be made in valve boxes and pull boxes only. See Standard Drawing I-15 for splice details.
2. Drop 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 globe valve installed at the start on the manifold.
5. All valves shall be installed with a union on the downstream side of the valve. The union shall be P.V.C.
6. Valve/controller identification shall be painted on valve box covers. Use only aluminum asphaltic base water-proof paint.

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 resin and shall be completely water-proof.
6. All spare wire ends shall be insulated in the same manner as wire splices.
7. If specified, all splices shall be soldered with metallic alloy solder prior to installing connectors.
8. Wire bundles inside pull boxes shall be at least 4 inches from the underside of the box cover. Minimum size pull box shall be as shown above. Larger boxes may be necessary to meet 4 inch clearance requirement.
NOTE
See Standard Drawing I-25 or I-26 for water line trench details.

NORMAL LOCATIONS OF CONTROL WIRES

ALTERNATE LOCATION OF CONTROL WIRES

1. Bedding material shall have a sand equivalent of 50, minimum
2. Place a 3" wide red continuous plastic tape trench marker, 9" to 12" below finish grade, directly above the direct burial control wires.
Steel enclosure as approved by Agency. Enclosure shall be painted inside and out with zinc rich primer coat and two finish coats of exterior enamel, as approved by Agency.

Anchor bolts, 1/2" dia., 4" long, cadmium plated, hook length 1" (4 places).

3/4" exterior grade AB plywood backboard. Prime and paint with two coats of exterior enamel, as approved by Agency. Paint both sides and edges of backboard.

1 1/2" x 1 1/2" x 1/4" galv. steel angle stiffeners. Secure controller and backboard with cadmium plated 3/16" stove bolts, six places minimum. Set stiffeners 6" apart.

NOTES:
1. Install in each enclosure, one 25 watt incandescent lamp in a two-prong plug in light socket. Install in receptacle.
2. A 15 amp (minimum) circuit is required at each double receptacle (120 V).
Automatic controller clock in a weatherproof, tamperproof lockable case; wall mounted per manufacturer's specifications.

**SIDE VIEW**

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

**ELEVATION**

- 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.

**LEGEND ON PLANS**

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**SAN DIEGO REGIONAL STANDARD DRAWING**

**IRRIGATION SYSTEMS**

**ELECTRIC CONTROLLER CLOCK**

**WALL MOUNTING**
LEVEL INSTALLATION

1/2" Dia. Galvanized Pipe Stake,
Impact Head
Galv. Coupling with set screw
Galv. Riser (length noted on plan)
Two Clamps (galv. or cad. plated), machine peened friction type.
Supply Line Tee
Finished Grade
Length as required
24" min

SLOPE INSTALLATION

Galv. Riser (length noted on plan)
Two Clamps (galv. or cad. plated), machine peened friction type.
Impact Head
Swing Joint (two galv. short nipples and two galv. 90° elbows)
Galv. Coupling with set screw
Supply Line Tee
1/2" dia. galv. Pipe Stake (length as required)
Length as required
90° unless otherwise shown on plans.
Finished Grade
24" min

LEGEND ON PLANS
Show a number to indicate type head –○
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 1/2'' 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.
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)
NOTES
1. Backfill material shall be compacted to a relative compaction of 90% or more.
2. 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.
3. Teflon tape, ¾" wide, shall be used on all threaded connections.
4. The letter W shall be stamped or chiseled on the improvement (curb—sidewalk) directly above the pressure pipeline.
5. All plastic pressure pipe under pavement shall be installed in a P.V.C. sleeve.
6. Minimum clearance between pressure pipes shall be 2 inches.
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.
4. No P.V.C. pressure pipeline shall be installed within 3' of any line, unless otherwise specified.
Provide 6" concrete pad in paved areas.

Concrete Pavement

Valve Well Cap

A.C. Pavement

45° chamfer

8" A.C. pipe Class 150

Wood Blocks

Top of Bonnet

3/16" Relief

Symetrical about axis

CAST IRON VALVE WELL CAP

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Valve Well and Cover

DRAWING NUMBER I-27
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

---

A.C. Pipe
Cast Iron Tapped Tee

PLAN

A.C. Pipe

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

Red Brass Fittings & Nipples
Cast Iron Tapped Tee

ELEVATION
Red Brass Nipple

Existing Asbestos Cement Pipe or Cast Iron Pipe Supply Main

PLAN

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.

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.
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)
NOTES

1. All risers, unions, elbows and nipples shall be red brass.
2. Close nipples shall not be used.
3. Teflon tape 3/4" wide shall be used on all threaded connections.
4. Concrete pad shall be 18" wide.
5. Backflow preventer assembly shall be tested upon installation by a certified backflow device tester. Contractor shall provide the Engineer with written test results completed by certified backflow tester prior to the backflow preventer assembly's acceptance by the Engineer.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

BACKFLOW PREVENTER
REDUCED PRESSURE PRINCIPLE
ASSEMBLY - 2" AND SMALLER

DRAWING NUMBER I-31
NOTES:
1. All pipes shall be 1 1/2-inch diameter galvanized schedule 40 steel.
2. X dimension shall be sized to accommodate type of backflow device being protected.
3. Paint entire fence with one coat metal primer and two coats of exterior yellow colored enamel.
4. Guard fence shall be centered on backflow device.
LANDSCAPING
**TREE PLANTING - SLOPES**

Chamfer as needed to eliminate soil sluffing.

- Top of ball 1" above finish grade.
- 2" Mulch
- 4" Berm firmly compacted
- Prepared Soil Mix
- Plant Tab
- Prepared soil mix, puddle and settle prior to setting tree.
- Scarify soil, add equal amount prepared soil and thoroughly mix.

**TREE PLANTING - LEVEL GROUND**

- 2 x Ball depth
- 2 x Ball width

**SHRUB PLANTING - SLOPES**

Chamfer as needed to eliminate soil sluffing.

- Top of ball 1" above finished grade.
- 2" Mulch
- 4" Berm firmly compacted
- Prepared Soil Mix
- Plant Tab
- Prepared soil mix, puddle and settle prior to setting shrub.
- Scarify soil, add equal amount prepared soil and thoroughly mix.

**SHRUB PLANTING - LEVEL GROUND**

- 2 x Ball depth
- 2 x Ball width
Hose: Loop shall be 1" greater in diameter than tree trunk

No. 12 galvanized wire, min.

PLAN

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.

TREE STAKING – SLOPES

TREE STAKING – LEVEL GROUND
NOTES:
1. Rebar shall be continuous with 12 inch overlap at splices.
2. Concrete shall be class 520-C-2500 and same color as any adjacent concrete.
3. Install weakened plane joints at each fence post.
4. Install expansion joints where the mowing strip abuts any concrete improvement.
NOTES
1. The location and species of each tree shall have prior approval of the Agency.
2. Sidewalk to be removed for tree planting shall be saw-cut full depth.
3. Fill below grate with 3/4" x No. 4 clean crushed rock. If the grate is used for security, all bolts, nuts, and washers shall be hot dipped galvanized. All steel items shall be hot dipped galvanized after fabrication.
4. Grate shall be two separate pieces, 2' x 4' in size, with the following exception: where outside face of basement walls are 8' 0" from curb line, one piece of grate (not adjacent to curb) shall be 1' 4" x 4'. The grating bearing bars shall be 1-1/4" x 3/16" minimum and 1/2" O.C. maximum; cross bearing bars (round, hexagonal, and/or square) shall be 3/8" minimum size and shall not exceed 6" O.C., welded to each bearing bar.
5. Immediate notification shall be given to the engineer of any below grade improvements encountered.

TREES SIZE

SECTION A-A

ELEVATION

PLAN

SAN DIEGO REGIONAL STANDARD DRAWING

STEEL GRATE
TREE WELL COVER
NOTES:
1. See Electric Plans for fixture/pole/footing details.
2. Use monolithic pour for new construction.
3. Poles shall be 6'-0" from face of curb, where applicable.
4. Pole pads shall drain at 2% minimum in same direction as sidewalk.
5. Concrete for pad shall be the same as specified for sidewalk.
MANHOLE COVER FRAME
CAST IRON WT. 175 LB.

NOTES
1. Frame and cover shall be cast iron.
2. Weights: Frame 175 lbs.
   Cover 155 lbs.
3. Imported covers and frames shall have the country of origin marking in compliance with federal regulations.

© 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
3/4" radius lug slot in both sides of rim
3/4" dia. pick hole
2"x1" diamond mat, 1/8" deep

Open position mark, 1/8" deep groove in both sides of rim and cover

22" dia. clear opening

Letters 1" high, no other inscription to appear on exposed surfaces.

SECTION THROUGH RIM

23 5/8" outside dia. of cover
7/8"

SECTION THROUGH FRAME & COVER

21 3/4" dia.
1 1/2"
5/8"
2 1/8"

SECTION THROUGH LUG

same angle throughout

Outline where rib joins rim
Outline where ribs join

3/8" 3/4" 3/8"

SECTION THROUGH RIB AT MID RADIUS

BOTTOM OF COVER

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
4. Imported covers and frames shall have the country of origin marking in compliance with federal regulations.

SAN DIEGO REGIONAL STANDARD DRAWING

24' MANHOLE FRAME AND COVER
LIGHT DUTY
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".
5. Imported covers and frames shall have the country of origin marking in compliance with federal regulations.

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 cover details, see Standard Drawing M-1 (single cover).
Distance between gate posts is gate length shown on plans

Length of gate leaf

- Fitting
- Gate Frame
- Gate Post
- Gate Post Hinge
- Fence
- Intermediate Member
- Galv. Chain-link, 2" mesh, 9 ga.
- Same as fence height
- Plunger Bar
- Gate Stop
- 10" diameter stop footing.
  Omit if roadway is concrete.
- Roadway or ground

HALF ELEVATION DOUBLE SWING GATE

NOTES
1. All footings shall be 520-C-2500 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
3. Chain link fence shall conform to Section 206 of the Standard Specifications for Public Works Construction unless specifically noted on this drawing.

EXTENSION POST AND BARBED WIRE

Diameter of footing = 4 times outside diameter of post.

Clear opening shown on plans.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

CHAIN LINK GATE

Drawing Number M-5

Revision
By
Approved
Date
Walk gate
Conc.

Walk gate M. E. 10-88
Conc. M. M. 5-88
NOTES
1. All footings shall be 520 C-2500 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
3. Chain link fence shall conform to Section 206-6 of the Standard Specifications for Public Works Construction unless specifically noted on this drawing.

LEGEND ON PLANS
---

EXTENSION ARM AND BARBED WIRE
Toenail with 1-16d gal rail 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.

Ground Line or Shoulder Surfacing under railing

SECTION AT SUPPORT

Variable

Top of rail

0.17' Dike (Optional)

Edge of shoulder

2'-2" Min. 2'-3" Max.

0.5' Dike Sect.

3'-0"

3'-0"

Variety

SECTION WITH / WITHOUT DIKE

Post spacing 6'-3" C to C.

LINE POSTS

Rail Splice

6'-3"

Traffic

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

6'-3"

Post bolt slot

Lap in direction of traffic

Traffic

6"x8" Douglas Fir Post

PLAN

ELEVATION

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

**TERMINAL SECTION**

**TERMINAL SECTION**

**5/8" BUTTON HEAD BOLT**

**5/8" RECESS NUT**

**FLAT PLATE WASHER**

**RAIL SPLICE**

**SECTION THRU RAIL ELEMENT**

**NOTES**
1. See Standard Drawing M-7 for guard rail installation.
2. All metal elements shall be galvanized.
NOTES
1. Posts to be 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) - ¾" 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 aluminum alloy 6061-T6 or 5052-H38, aluminum thickness 0.063 inches.
5. Six foot long hat section metal post per Caltrans Std. Plan A74-A optional for guard post.
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 centerline 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 therewith 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.

LOCATION OF STREET SURVEY MONUMENT

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

ELEVATION

TYPE-A

Type-B

INSTALLATION IN EXISTING CONCRETE
Typical for Type A or B
LEGEND

MEAN HIGH WATER = Mean of all high water in San Diego Bay.
MEAN HIGHER WATER = Mean of all higher water in San Diego Bay.

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

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 ¾" 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 ¾ 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, 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, sidewalk). The offset shall be measured radially.
<table>
<thead>
<tr>
<th>Unit</th>
<th>Metric Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gram</td>
<td>15.4324 grains</td>
</tr>
<tr>
<td>1 Gram</td>
<td>0.0353 oz.</td>
</tr>
<tr>
<td>1 Kg.</td>
<td>2.2046 lb.</td>
</tr>
<tr>
<td>1 Kg.</td>
<td>0.0011 ton</td>
</tr>
<tr>
<td>1 Ton (met)</td>
<td>1.1023 ton</td>
</tr>
<tr>
<td>1 Sq. cm.</td>
<td>0.0001 sq. m.</td>
</tr>
<tr>
<td>1 Sq. m.</td>
<td>10,000 sq. cm.</td>
</tr>
<tr>
<td>1 Sq. m.</td>
<td>1.1960 sq. yd.</td>
</tr>
<tr>
<td>1 Hectare</td>
<td>2.4710 acres</td>
</tr>
<tr>
<td>1 Sq. km.</td>
<td>0.3861 sq. mile</td>
</tr>
<tr>
<td>1 Sq. km.</td>
<td>247.10 acres</td>
</tr>
<tr>
<td>1 Cu. cm.</td>
<td>0.0610 cu. in.</td>
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<tr>
<td>1 Cu. m.</td>
<td>1,000 cu. ft.</td>
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<tr>
<td>1 Cu. m.</td>
<td>1.3079 cu. yd.</td>
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<tr>
<td>1 Liter</td>
<td>0.0010 cu. ft.</td>
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<tr>
<td>1 Liter</td>
<td>35.3147 cu. ft.</td>
</tr>
<tr>
<td>1 Liter</td>
<td>1.0567 cu. yd.</td>
</tr>
<tr>
<td>1 Liter</td>
<td>0.2642 gal. (U.S.)</td>
</tr>
<tr>
<td>1 Liter</td>
<td>0.0284 bu. (U.S.)</td>
</tr>
<tr>
<td>1 MM.</td>
<td>0.0394 in.</td>
</tr>
<tr>
<td>1 CM.</td>
<td>0.3937 in</td>
</tr>
<tr>
<td>1 Meter</td>
<td>3.2808 ft.</td>
</tr>
<tr>
<td>1 Meter</td>
<td>1.0936 yd.</td>
</tr>
<tr>
<td>1 Km.</td>
<td>0.6214 mile</td>
</tr>
</tbody>
</table>

**WEIGHT**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Metric Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Grain</td>
<td>0.0648 g.</td>
</tr>
<tr>
<td>1 Ounce</td>
<td>28.3495 g.</td>
</tr>
<tr>
<td>1 Pound</td>
<td>453.5924 g.</td>
</tr>
<tr>
<td>1 Ton</td>
<td>907.1848 kg.</td>
</tr>
<tr>
<td>1 Ton (met)</td>
<td>0.9072 ton (met)</td>
</tr>
</tbody>
</table>

**AREA**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Metric Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sq. in.</td>
<td>6.4516 sq. cm.</td>
</tr>
<tr>
<td>1 Sq. ft.</td>
<td>0.0929 sq. m.</td>
</tr>
<tr>
<td>1 Sq. yd.</td>
<td>0.8361 sq. m.</td>
</tr>
<tr>
<td>1 Acre</td>
<td>4046.86 sq. m.</td>
</tr>
<tr>
<td>1 Sq. mile</td>
<td>2.5900 sq. km.</td>
</tr>
<tr>
<td>1 Acre</td>
<td>0.0040 sq. km.</td>
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**VOLUME**

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<thead>
<tr>
<th>Unit</th>
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<tbody>
<tr>
<td>1 Cu. in.</td>
<td>16.3872 cu. cm.</td>
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<tr>
<td>1 Cu. ft.</td>
<td>0.0283 cu. m.</td>
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<tr>
<td>1 Cu. yd.</td>
<td>0.7646 cu. m.</td>
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**CAPACITY**

<table>
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</thead>
<tbody>
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<td>1 Cu. in.</td>
<td>0.0164 liter</td>
</tr>
<tr>
<td>1 Cu. ft.</td>
<td>28.3168 liters</td>
</tr>
<tr>
<td>1 Gal.</td>
<td>3.7854 liters</td>
</tr>
<tr>
<td>1 Bu.</td>
<td>35.2391 liters</td>
</tr>
</tbody>
</table>

**LENGTH**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Metric Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 In.</td>
<td>25.4000 mm.</td>
</tr>
<tr>
<td>1 Ft.</td>
<td>2.5400 cm.</td>
</tr>
<tr>
<td>1 Yd.</td>
<td>0.9144 m.</td>
</tr>
<tr>
<td>1 Mile</td>
<td>1.6093 km.</td>
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</tbody>
</table>

**MULTIPLE PREFIX**

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Multiplier</th>
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<tbody>
<tr>
<td>mega</td>
<td>10,000,000</td>
</tr>
<tr>
<td>kilo</td>
<td>1000</td>
</tr>
<tr>
<td>hecto</td>
<td>100</td>
</tr>
<tr>
<td>deka</td>
<td>10</td>
</tr>
</tbody>
</table>

**METRIC PREFIX**

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10</td>
<td>deci</td>
</tr>
<tr>
<td>1/100</td>
<td>centi</td>
</tr>
<tr>
<td>1/1000</td>
<td>milli</td>
</tr>
<tr>
<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. All dimensions are typical unless otherwise noted.
2. Generally utilities are to be installed under the applicable specifications for the particular utility and the specifications of the owner Agency.
3. The location of utilities as shown by the Standard Drawing shall in no way violate existing codes or regulations applicable to individual utilities.
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 structure crossings.
6. Depth and width of trench varies.
7. CATV main or trunk line conduit required along all streets, except cul-de-sac streets less than 1000' in length which may be served by feeder lines only.
8. CATV 1 1/2" feeder conduit shall run across streets with each power service line and capped at edge of sidewalk.
9. 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 locations of the CATV system.
10. In no case shall CATV conduits be placed within 12" of gas lines. Also conduits are not to be placed directly over gas lines.
11. CATV conduit may be placed with the TELCO conduit provided the TELCO minimum depth is held.
4" Diameter Steel Pipe

3/4" Steel Plate welded to top and burrs removed

1/8"  

3/4" Expansion Joint

Back of curb or joint in walk

Concrete to be same as walk

9" 9"
18" Diameter

5" Diameter Steel Pipe Sleeve

- Four links
- Three links
- Make bowl shaped recess in concrete to accommodate three links of chain

1/8"  

12" from bottom of post

5" Diameter Steel Pipe Sleeve

NOTES
1. Chain to be 3/4" 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 Drawing is not to be used if any wind screen is to be applied to the fence.

**For Edge Beam, Slab, and Select Fill details, see plans.**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MIN. SIZE IN INCHES</th>
<th>MIN. WEIGHT PER LIN FT IN LBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Post</td>
<td>2.375 O.D.</td>
<td>3.65</td>
</tr>
<tr>
<td>Terminal Post</td>
<td>2.875 O.D.</td>
<td>5.79</td>
</tr>
<tr>
<td>Top Rail</td>
<td>1.660 O.D.</td>
<td>2.27</td>
</tr>
<tr>
<td>Bracing</td>
<td>1.660 O.D.</td>
<td>2.27</td>
</tr>
<tr>
<td>Gate Frame</td>
<td>1.660 O.D.</td>
<td>2.27</td>
</tr>
</tbody>
</table>

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

COORDINATOR: R.C.E. 25297

DATE: 7-89

DRAWING NUMBER: M-17
Drinking Fountain - Haws model 3376 or approved equal.
3/8" dia. expansion anchors with flat (recessed heads) screws 4 places.
1¼" P.V.C. pipe with sweep 90° ell connection to fountain drain.
9½" x 16" concrete yard box with hinged locking top (Brooks No. 3HL or equal) set on red brick foundation.
4" x 40 lin. ft. perforated underdrain pipe, encased in crushed rock (3/4" size). Pipe to be A.O.S. or equal.
1" gate valve with red brass cross handle and union. Install as per Std. Dwg. I-12
2" dia. galv. pipe sleeve with red brass lock cap per Std. Dwg. I-12
Rigid copper pipe from gate valve to fountain assembly connection.
Concrete pavement.

NOTES
1. Install fountain so that right hand side faces prevailing wind.
2. Hand form a concrete bowl at bottom of yard box to facilitate sand clean out.
3. Perforated drain pipe and trench are to drain away from fountain at 1½ min. slope. Keep drain in lawn areas.
4. Item no. 6 is a one inch gate valve. Use red brass bushing reducers to adapt to feed pipe.

TYPICAL PLAN

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Chairman R.C.E.C. 1982

DRAWING NUMBER M-18

SAN DIEGO REGIONAL STANDARD DRAWING

LEGEND ON PLANS

\[ (\text{Legend}) \]

LEGEND ON PLANS

\[ (\text{Legend}) \]
**STREET LOCATIONS**

**MARKERS** – Shall be blue 2-way stimsonite lifelite 88AB or equal.

**ADHESIVE** – An ample amount of two part (A&B) epoxy or equal.

**SURFACES** – Clean and dry prior to installation per manufacturer’s recommendations. Install markers with reflective surfaces facing oncoming vehicles and offset 2” from lane lines toward fire hydrant.

**NOTES:**
1. Fire Department will provide location(s) for all markers in PRO’s, Commercial Lots and other areas outside of Public Right of Way.
2. Markers must be installed at all new and relocated hydrants and within all resurfacing projects.
3. For streets without lane lines or streets with raised pavement markers and no painted lane lines, install markers 6” from centerline or existing markers.

**LEGEND ON PLANS**

- **Marker**
- **Fire Hydrant**

---

**SAN DIEGO REGIONAL STANDARD DRAWING**

**FIRE HYDRANT MARKERS**

**DRAWING NUMBER** M-19
Horizontal brace with truss rod may be used as an alternate to a diagonal brace.

Portland cement concrete

2" Max.

Line post

Diagonal brace

Tension wires

10'

10'

END AND CORNER POST ASSEMBLY

Line posts at 1000' max. intervals braced and trussed in both directions.

Truss rods

Tension wires

1'

LINE POST BRACING

Gate post

Horizontal brace with 3/8" steel truss rods.

Gate

Length as specified

8' Max.

Gate panel

Vertical stay

Latch post

Diagonal brace or horizontal brace with truss rods

2" Clr.

10'

10'

GATE ASSEMBLY

SAN DIEGO REGIONAL STANDARD DRAWING

CHAIN LINK FENCE DETAILS

REVCOMENDATION BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER M-20
NOTES:
1. Sidewalk shall have a minimum of four (4) foot clear area (path, not including curb) passing pedestals, pullboxes and other structures.
TYPICAL STREET
NEW CONSTRUCTION

NOTE:
At catch basin locations, joint trench shall be 4 feet minimum from back of curb to inside wall of trench.
NOTE:
At catch basin locations, joint trench shall be 4 feet minimum from back of curb to inside wall of trench.
**Railing Notes**

1. 1/4" expansion JTS at 16/2 CTRS.
2. Weld and grind smooth all connections.
3. All railing to be hot dipped galvanized after fabrication.
4. Pipe to be seamless Steel ASTM A53, Grade B.

**Handrail Bracket**

- 3/8" x 5" Dia. R.
- 5/8" x 1-1/2" R.
- 2-1/4"

**Welding Details**

- 3/4" bolts and anchors approved by the engineer.
- 1/4" x 1-1/2" R.
- 2-5/8"

**Mounting Detail**

- Post shall be grouted in place using "POR-ROK" grout, or equal.

**San Diego Regional Standard Drawing**

**Drawing Number** M-24

**Pedestrian Protective Railings**

**Detail No. 1**
GENERAL NOTES:

1. Post type guardrails, and handrails for stairs or landings 30 inches or less above grade or floor below shall have only one intermediate rail centered between the step nosing limit (or if specified the top of curb) and top of railing.

2. Post type guardrails, and handrails for stairs or landings more than 30 inches above grade or floor below shall have intermediate rails equally spaced such that a sphere 6 inches in diameter cannot pass through.

3. Where handrail extensions interfere with transverse walkways the horizontal portions shall not encroach but be turned away from stairs and parallel to walkway.
Handrail per Std. Dwg. M-24

Riser = 4" Min.  7" Max.

Tread = 11" Min.

32" 32"

6" 6"

12" EXTENSION

NOSING LIMIT

12" EXTENSION

2" RADIUS ON ALL BENDS

12" MAX. RISE W/O A LANDING

1 1/2" RADIUS PROVIDE CURB ON EACH SIDE WHEN SPECIFIED

60" WITHOUT CURB

SECTION A-A

NOTES:
1. BROOM FINISH ON TREADS, TROWELED FINISH ON ALL OTHER EXPOSED SURFACES.
2. 1/4" SLOPE ON TREADS FOR DRAINAGE.
3. LOCATE HANDRAIL ON BOTH SIDES.
NOTES
1. Sign shall be 18" x 24" and constructed of 0.8" aluminum.
2. Lettering, symbol and border shall be reflectorized white, on a blue background.
3. Lettering shall be 1 inch and 2 inches high.
4. Attach sign with two piece SC-7 diecast aluminum sign clamps.
NOTE:
Pavement symbol shall be painted white on a blue background.
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.
3. Vertical wall of cone shall be on the upstream side of the manhole.
4. Concrete base shall be 554-C-3000.
5. Approved water stop required for plastic pipe connectors.
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 18" of 3" diameter grade rings/and/or risers.
   C. 5" diameter shaft variable height.
   D. Top step to be 15" Max. from top of frame and cover.
7. Flexible pipe joints shall be required within 12" of inside face of manhole except for plastic pipe.
8. All patching within manhole base shall be epoxy mortar.
9. Prior approval of precast base is required by the Agency.

LEGEND ON PLANS

MANHOLE 5' x 3' DIAMETER

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER S-2

M.H. No. 2
Section of 12" Metallic, Asbestos Cement or Plastic Pipe
12" Cast Iron Gate Cap
Top of Pavement
Approved Cap

Section of 12" Metallic, Asbestos Cement or Plastic Pipe
12" Cast Iron Gate Cap
Approved Cap

560-C-3250 Concrete

Backfill to top of 1/8 bend with 1" maximum aggregate

Std. 1/8 Bend

Std. 1/8 Bend

Close end with clay cap and grout in place or use mechanical joint plug

Standard Wye Branch

Type A

Type B

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.

13 5/8"
6"
11 1/2"

GATE CAP
(Heavy Duty)

Legend on Plans

San Diego Regional Standard Drawing

Sewer Main Cleanout

Revision By Approved Date

Recommended by the San Diego Regional Standards Committee

Allan A. Knudson Dec. 1973

Drawing Number S-3
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 feet. For cover less than 3 feet, see Standard Drawing S-7 for concrete encasement.
4. See Type A installation for details not shown for Types B and C.
NOTE:
Encase pipe to the nearest flexible joint.
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

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING
CONCRETE BACKFILL
8" min Trench Width 8" min

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

PLAN

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

FRONT ELEVATION

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

SIDE ELEVATION

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

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. 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
CUTOFF WALL

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

DRAWING NUMBER S-10

TYPE A

SIDE ELEVATION

ELEVATION

TYPE B

FRONT ELEVATION

PLAN

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

PLAN

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

Angle variable Maximum 45º

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

ELEVATION

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)

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

LEGEND ON PLANS

---

S-14

DEEP CUT HOUSE CONNECTION
(SEWER LATERAL)
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 560-C-3250

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.
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 560-C-3250.
5. Approved water stop required for plastic pipe connections.
6. Flexible pipe joints shall be required within 12" of inside face of manhole (except for plastic pipe.)
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. 3' to 18' of 3' diameter grade rings and/or risers.
   C. 4' diameter shaft variable height.
   D. Top step to be 15' Max. from top of frame and cover.
9. All patching within manhole base shall be epoxy mortar.
10. Prior approval of precast base is required by the Agency.
6" Metal tape
Install at top of pipe zone
or a maximum of 36" deep
WATER SYSTEMS
NOTES
1. Service clamp and gasket required on 4'' A.C. pipe.
2. Tap not permitted in milled sections of A.C. pipe.

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
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° Ell

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).
See drawing W-14, for type and location of enclosures.

1. 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.
2. Corporation Stop
3. Pipe x Tubing 90° Ell
4. 90° Sweat Ell
5. Copper Tubing
6. Female Adaptor
7. Air and Vacuum Valve
8. 2-90° Elks (not required in above metal ground enclosures).

LEGEND ON PLANS

SANDiego REGIoNAL STANDARDS COMMITTEE

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

1" AND 2" AIR AND VACUUM VALVES

SANDiego REGIoNAL STANDARDS DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

1" AND 2" AIR AND VACUUM VALVES

Revision | By | Approved | Date
Notes | |
---|---|---|---
| | | 2.7.9 |
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)
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.

Bronze Corporation Stop (installed with key on side and open tap) and adaptor as required by Agency.

Copper Tubing

90\degree Elbow

Pipe to Tubing Adaptor

Ball Valve

Brass 2\" Iron Pipe Thread x 2 1/2\" Hose Pipe Thread Adaptor.

2 1/2\" Hose Cap with chain, Brass.

Meter Box (see Standard Drawing W-15 for location).
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.

1. 2" Nipple (2"x 3")
2. 45° Ell
3. 2" Nipple (2"x 6")
4. 2" Valve
5. 2" Pipe
6. 90° Ell
7. 2" Threaded Cap
8. Valve Well Installation, See Standard Drawing W-12

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
**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.
10. Valve Well (see Standard Drawing W-12).
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

SAN DIEGO REGIONAL STANDARD DRAWING

6" FIRE HYDRANT
NOTES:

1. Apron, where required by Agency, shall be 4" thick (520-C-2500) 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 of curb protective posts are required. See Standard Drawing W-16 for details.
4. The centerline of the hydrant shall be located 5' minimum from curb return and minimum 3'-6" from driveway or any fixed obstruction.
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.

NOTES
1. Clearance around cover shall permit lifting by hand without
damage to pipe. Maximum clearance shall be 3/16".
2. See Standard Drawing W-13 for valve stem extension, when
required by Agency.

CAST IRON
VALVE WELL CAP
DETAIL
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.

SAN DIEGO REGIONAL STANDARD DRAWING

Valve Stem Extension

Drawing Number W-13
3/16" Steel Cover continuous weld to Cylinder

- 2 1/2" x 2 1/2" Angle (3 places) weld to Cylinder

PLAN

<table>
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<tr>
<th>Valve Size</th>
<th>Dia</th>
<th>H</th>
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<tr>
<td>6&quot;</td>
<td>16&quot;</td>
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</table>

TYPE A

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

TYPE C

1. Steel enclosure, paint as specified by Agency.
2. Meter box, see Standard Drawing W-15 for location.
3. 2' x 2' pad, 470 - C - 2000 Concrete
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

Property Line

12"

8"

NOTE:
Meter boxes shall not be located within driveways.

Type D
NO CURB

Road Surface
Meter Box

Slope up

Road Surface
Meter Box

Slope down

* 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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<th>Cubic Ft. Of Concrete Required per 100 P.S.I. Pressure</th>
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<td>15</td>
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<td>8</td>
<td>27</td>
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<td>10</td>
<td>**</td>
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<td>12</td>
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</table>

* 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.

Trench Width

Maximum limit of slope excavation allowed.

Pipe O.D.

6" min.
6" max.

8" min.
8" max.

Invert Elevation

6" Minimum clearance
(4" for steel pipe.)
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" 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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SECTION A-A

ELEVATION

Drill and tap to std. thread
ELEVATION

SECTION A-A

NOTE:
Contractor shall provide handholes as required to complete the work
Metal tape - Install at top of pipe zone or a maximum of 36" deep.

* 1. Use 2" tape for depths of 30" or less.
   2. Use 3" tape for depths greater than 30".
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<tr>
<td>TRAFFIC VOLUME FROM ADJACENT COMMERCIAL LOTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRONTAGE ROAD</td>
<td>SEE</td>
<td>NOTE 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADJACENT TO FREEWAY RIGHT OF WAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*COMM. & IND. = COMMERCIAL & INDUSTRIAL

NOTE: 1. STREET CLASSIFICATIONS (EXCEPT PRIME ARTERIAL) AND TYPICAL ROADWAY SECTIONS FROM SAN DIEGO COUNTY TECHNICAL ROAD POLICY (Jan. 1, 1944).
2. PRIME ARTERIAL SECTION BASED UPON MINIMUM STANDARDS "NATIONAL COMMITTEE ON URBAN TRANSPORTATION".
3. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR SIDEWALK, CURB, AND ROWWAY REQUIREMENTS.
4. FRONTAGE ROAD ADJACENT TO FREEWAY R/W, TRAVELED WAY AND MEDIAN STANDARD FOR ROAD CLASSIFICATION AND/OR TRAFFIC VOLUME, SHOULDER ADJACENT TO FREEWAY 3', PARKWAY STRIP ADJACENT TO FREEWAY VARIES FROM 9' TO 10' SHOULDER AND PARKWAY STRIP AWAY FROM FREEWAY STANDARD FOR TRAFFIC VOLUME AND/OR ROAD CLASSIFICATION.
NOTES:

1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROADWAY REQUIREMENTS.

2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY SECT 4.22.

3. REQUIRED: ONE 600 SQUARE FOOT PERPENDICULAR PARKING BAY PER LOT. THE SURVEYOR-ROAD COMMISSIONER MAY ALSO ESTABLISH ALTERNATE STANDARD TYPICAL SECTIONS WHICH WILL PROVIDE A MINIMUM OF TWO.

4. USE OF THIS STREET SECTION LIMITED TO AREAS IN WHICH AT LEAST 50% OF THE LOTS HAVE A NET AREA NOT LESS THAN 20,000 SQUARE FEET.

PARKING STALLS PER LOT.

SAN DIEGO COUNTY DESIGN STANDARD
HILLSIDE RESIDENTIAL STREET
ALTERNATE No. 1
NUMBER DS-2
NOTES:
1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROADWAY REQUIREMENTS.
2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY Sect. 4.22
3. USE OF THIS STREET SECTION LIMITED TO AREAS IN WHICH AT LEAST 80% OF THE LOTS HAVE A NET AREA OF NOT LESS THAN 20,000 SQUARE FEET.
4. USE OF HILLSIDE RESIDENTIAL STREET STANDARDS ARE APPLICABLE ONLY TO STREETS CLASSIFIED AS RESIDENTIAL, RESIDENTIAL, GUL-DE-SAC, OR RESIDENTIAL LOOP STREETS AND ARE NOT APPLICABLE TO STREETS IN AREAS ZONED FOR COMMERCIAL, INDUSTRIAL OR MULTIPLE RESIDENTIAL USE.
NOTES:

1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROAD REQUIREMENTS.

2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY SECT. 4.22.

3. USE OF THIS STREET SECTION LIMITED TO AREAS IN WHICH AT LEAST 60% OF THE LOTS HAVE A NET AREA OF NOT LESS THAN 20,000 SQUARE FEET.

4. USE OF HILLSIDE RESIDENTIAL STREET STANDARDS ARE APPLICABLE ONLY TO STREETS CLASSIFIED AS RESIDENTIAL, RESIDENTIAL CUL-DE-SAC, OR RESIDENTIAL LOOP STREETS AND ARE NOT APPLICABLE TO STREETS IN AREAS ZONED FOR COMMERCIAL, INDUSTRIAL OR MULTIPLE RESIDENTIAL USE.
NOTE:
1. FOR USE ON EITHER 36' OR 40' WIDTH STREETS.
### Dimensions

<table>
<thead>
<tr>
<th>Curve 1</th>
<th>Curve 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Radius (R)</strong></td>
<td><strong>Radius (R)</strong></td>
</tr>
<tr>
<td><strong>A</strong></td>
<td><strong>B</strong></td>
</tr>
<tr>
<td>52'</td>
<td>26'</td>
</tr>
<tr>
<td>56'</td>
<td>28'</td>
</tr>
<tr>
<td>60'</td>
<td>30'</td>
</tr>
<tr>
<td>72'</td>
<td>36'</td>
</tr>
</tbody>
</table>

---

**San Diego County Design Standard**

**Turnaround and Calculations**

**Number DS-6**
NOTES:

1. DRIVEWAYS WITH GRADES GREATER THAN 15% SHALL BE SURFACED WITH ASPHALT CONCRETE OR PORTLAND CEMENT CONCRETE.

2. MAXIMUM GRADE BREAK 14%.

3. SEE STANDARD DRAWING 9-14 FOR CONCRETE DRIVEWAYS.

4. SEE STANDARD DRAWING 9-15 & 9-16 FOR LOCATION & WIDTH REQUIREMENTS.
TYPICAL FINISHED GRADING

NOTES:
1. ELEV. A IS TO BE DETERMINED FOR THE most REMOTE CORNER OF THE LOT FROM
   THE DRAIN POINT. ELEV. A = ELEV. B PLUS 1/8 TIMES ONE-HALF THE PERIMETER OF THE LOT.
2. MIN. 10 IN. SAG TO STREET OR OTHER DISCHARGE POINT.
3. ALL SLOPE SURFACES TO BE PROTECTED BY APPROVED EROSION CONTROL.
NOTES:

1. CHAIN LINK FENCE OR ALTERNATE ACCEPTABLE TO THE COUNTY ENGINEER SHALL BE INSTALLED ALONG THE TOP OF SLOPES EXCEEDING 15 FEET VERTICAL HEIGHT AND 3 TO 1 SLOPE RATIO, AND ALONG THE TOP OF WELLS EXCEEDING 4' VERTICAL HEIGHT.

2. RETAINING WALLS AND CHAIN LINK FENCE OR ALTERNATE SHALL BE CONSTRUCTED IN ACCORDANCE WITH COUNTY OF SAN DIEGO STANDARD SPECIFICATIONS.
TYPICAL CUT SLOPE

ALL FILL MUST BE COMPACTED TO A MINIMUM OF 90% OF THE MAXIMUM DENSITY WITH THE EXCEPTION OF THE OUTER 8' OF THE SLOPE SURFACE WHICH MAY BE GRADED ROLLED TO 85% DENSITY.

TYPICAL FILL SLOPE

TABLE 1
REOUIRED SETBACK

<table>
<thead>
<tr>
<th>Angle</th>
<th>Setback</th>
</tr>
</thead>
<tbody>
<tr>
<td>0° - 15°</td>
<td>5'</td>
</tr>
<tr>
<td>OVER 15°</td>
<td>5'</td>
</tr>
</tbody>
</table>

TABLE 2
SLOPE Rounding

<table>
<thead>
<tr>
<th>Angle</th>
<th>L Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>0° - 5°</td>
<td>2.5'</td>
</tr>
<tr>
<td>5° - 20°</td>
<td>2.5'</td>
</tr>
<tr>
<td>20° - 40°</td>
<td>5'</td>
</tr>
<tr>
<td>OVER 40°</td>
<td>10'</td>
</tr>
</tbody>
</table>
REQUIRED SETBACKS

<table>
<thead>
<tr>
<th>H FEET</th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 15</td>
<td>1' - 6&quot;</td>
<td>5'</td>
<td>3'</td>
</tr>
<tr>
<td>15 - 30</td>
<td>3'</td>
<td>5'</td>
<td>5'</td>
</tr>
<tr>
<td>OVER 30</td>
<td>5'</td>
<td>5'</td>
<td>3'</td>
</tr>
</tbody>
</table>

a. Distance from toe of slope to property line
b. Distance from edge of foundation to toe or top of slope.
c. Distance from top of slope to property line.
d. Total slope height measured vertically.
Typical layout of legend and border on variable length sign blade of extruded aluminum with reverse screened reflective sheeting engineering grade. White letters and border on green background.

1. 5" U.C., 3 3/4" L.C.
2. 4 11/16" spacing of two 11/32" holes centered on both top and bottom edge of blade to match holes in sign bracket assemblies.
3. 2" x 2 3/4" Arrow
4. 2" U.C.

Drill hole to secure cap to post with screw or rivet.

Setback (see table) Slope to 1/4'' above grade

Drill 11/32" hole thru near side flange typ. 2 pcs.
Drill and tap for 5/16"-18 bolts in line with 11/32" diameter holes.
Drill and Tap for 5/16"-18 cone pointed screw (3 pcs.)

NOTES
1.  denotes 4 11/16" spacing shall match the holes in the extruded blades.
2. Bracket to be die cast aluminum.
3. All attaching screws shall be vandal proof type.

STREET NAME SIGN LOCATION
(numbers indicate priority of location selection)
NOTES:
1. Dip sections shall conform to Section 5.7-10(d) of the San Diego County Standards.
2. The maximum water depth, based on a 10 year frequency storm, shall be 10”. The depth (D) in feet multiplied by the velocity (V) in feet per second shall be equal to six or less. (DxV=6)
3. Vertical curves shall be designed based on road design speed and the percent change in longitudinal road grade.
4. Low Flow pipes may be omitted if the conditions of Note 2 can be met without their use.
NOTES:
1. $\Delta = 110^\circ$ Max., $70^\circ$ Min. If $\Delta$ is greater than $110^\circ$, then 200 Ft. minimum centerline radius required.
2. Centerline curve data: $\Delta$, R, L, T to be shown on plans.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>$R_1$</th>
<th>$R_2$</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>72'</td>
<td>52'</td>
<td>80'</td>
<td>40'</td>
<td>10'</td>
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<tr>
<td>60'</td>
<td>40'</td>
<td>68'</td>
<td>30'</td>
<td>10'</td>
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<tr>
<td>56'</td>
<td>36'</td>
<td>64'</td>
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<tr>
<td>52'</td>
<td>32'</td>
<td>60'</td>
<td>30'</td>
<td>10'</td>
</tr>
<tr>
<td>48'</td>
<td>28'</td>
<td>56'</td>
<td>30'</td>
<td>10'</td>
</tr>
</tbody>
</table>

* DIMENSIONS SHOWN ARE MINIMUMS

SAN DIEGO COUNTY DESIGN STANDARD

STREET KNUCKLE

NUMBER DS-15