SAN DIEGO AREA

REGIONAL STANDARD DRAWINGS

STANDARD DRAWINGS FOR AGENCIES IN THE SAN DIEGO REGION

Recommended by the Regional Standards Committee
Maintained and Published by the San Diego County Department of Public Works
MAY, 1986
Regional Standards Committee

May 1986

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

REVISIONS

The Regional Standards Committee will continuously accept proposed revisions and/or proposed new standard drawings for review. They should be submitted to the Regional Standards staff at the Department of Public Works, County of San Diego, 5555 Overland Avenue, San Diego, California 92123, Attention Manoochir Bahmanian. Should the proposed revision be very minor in nature, i.e., a grammatical error, etc., the staff will make the necessary change without taking it to the Regional Standards Committee. Once enough proposals have been submitted to warrant a Regional Standards Committee meeting, the staff will prepare an agenda and schedule a meeting.

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

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

[Signature]

Ray Hall
Chairman, Regional Standards Committee
### TABLE OF CONTENTS

#### CONCRETE STRUCTURES

<table>
<thead>
<tr>
<th>C-1</th>
<th>Masonry Retaining Wall Type 1B (Level Backfill)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-2</td>
<td>Masonry Retaining Wall Types I &amp; II (Sloping Backfill)</td>
</tr>
<tr>
<td>C-3</td>
<td>Masonry Retaining Wall Types III, IV &amp; V, (Level Backfill)</td>
</tr>
<tr>
<td>C-4</td>
<td>Masonry Retaining Wall Type 4B (Live Load Surcharge or Sloping Backfill)</td>
</tr>
<tr>
<td>C-5</td>
<td>Masonry Retaining Wall Type 5B (Level Backfill)</td>
</tr>
<tr>
<td>C-6</td>
<td>Masonry Retaining Wall Type 6 (Live Load Surcharge or Sloping Backfill)</td>
</tr>
<tr>
<td>C-7</td>
<td>General Notes for Masonry Retaining Walls</td>
</tr>
<tr>
<td>C-8</td>
<td>Details for Masonry Retaining Wall</td>
</tr>
<tr>
<td>C-9</td>
<td>Gravity Retaining Walls</td>
</tr>
<tr>
<td>C-10</td>
<td>General Notes and Details for Gravity Retaining Walls</td>
</tr>
<tr>
<td>C-11</td>
<td>Reinforced Concrete Retaining Wall Type 1</td>
</tr>
<tr>
<td>C-12</td>
<td>Reinforced Concrete Retaining Wall Type 1A</td>
</tr>
<tr>
<td>C-13</td>
<td>Reinforced Concrete Retaining Wall Details No. 1</td>
</tr>
<tr>
<td>C-14</td>
<td>Reinforced Concrete Retaining Wall Details No. 2</td>
</tr>
<tr>
<td>C-15</td>
<td>Reinforced Concrete Retaining Wall Details No. 3</td>
</tr>
</tbody>
</table>

#### DRAINAGE SYSTEMS

<table>
<thead>
<tr>
<th>D-1</th>
<th>Curb Inlet - Type A</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-2</td>
<td>Curb Inlet - Type B</td>
</tr>
<tr>
<td>D-3</td>
<td>Curb Inlet - Type C</td>
</tr>
<tr>
<td>D-4</td>
<td>Curb Inlet - Type D</td>
</tr>
<tr>
<td>D-5</td>
<td>Curb Inlet - Type D (Details)</td>
</tr>
<tr>
<td>D-7</td>
<td>Catch Basin - Type F</td>
</tr>
<tr>
<td>D-8</td>
<td>Curb Inlet - Type G</td>
</tr>
<tr>
<td>D-9</td>
<td>Storm Drain Cleanout - Type A</td>
</tr>
<tr>
<td>D-10</td>
<td>Storm Drain Cleanout - Type B</td>
</tr>
<tr>
<td>D-11</td>
<td>Inlets and Cleanouts - Notes and Details</td>
</tr>
<tr>
<td>D-12</td>
<td>Curb Inlet Opening</td>
</tr>
<tr>
<td>D-13</td>
<td>Welded Steel Grate Frame</td>
</tr>
<tr>
<td>D-15</td>
<td>Drainage Structure Grate</td>
</tr>
<tr>
<td>D-16</td>
<td>Corrugated Steel Pipe Inlets - Types A &amp; B</td>
</tr>
<tr>
<td>D-17</td>
<td>Corrugated Steel Pipe Inlets - Details</td>
</tr>
<tr>
<td>D-18</td>
<td>Slotted Corrugated Steel Pipe Drains 12&quot; through 24&quot;</td>
</tr>
<tr>
<td>D-19</td>
<td>Slotted Drain Connections to Standard Inlets</td>
</tr>
<tr>
<td>D-20</td>
<td>Concrete Apron for Curb Inlet</td>
</tr>
<tr>
<td>D-22</td>
<td>Asphalt Concrete Spillway</td>
</tr>
<tr>
<td>D-23</td>
<td>Tapered Inlet and Downdrain Flume</td>
</tr>
<tr>
<td>D-24</td>
<td>Entrance Taper and Downdrain Pipe</td>
</tr>
<tr>
<td>D-25</td>
<td>Curb Outlet - Type A</td>
</tr>
<tr>
<td>D-27</td>
<td>Sidewalk Underdrain Pipe</td>
</tr>
<tr>
<td>D-29</td>
<td>Catch Basin - Type I</td>
</tr>
<tr>
<td>D-30</td>
<td>Straight Headwall - Type A (Circular Pipe)</td>
</tr>
<tr>
<td>D-31</td>
<td>Straight Headwall - Type A (CSP - Arch)</td>
</tr>
<tr>
<td>D-32</td>
<td>Straight Headwall - Type B (Circular Pipe)</td>
</tr>
<tr>
<td>D-33</td>
<td>Straight Headwall - Type B (CSP - Arch)</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>D-34</td>
<td>Wing and U Type Headwalls for 12&quot; to 36&quot; Pipe</td>
</tr>
<tr>
<td>D-35</td>
<td>Wing and U Type Headwalls for 42&quot; to 84&quot; Pipe</td>
</tr>
<tr>
<td>D-36</td>
<td>L Type Headwalls - Circular Pipe</td>
</tr>
<tr>
<td>D-37</td>
<td>L Type Headwalls - CSP Arch</td>
</tr>
<tr>
<td>D-38</td>
<td>Curtain Wall</td>
</tr>
<tr>
<td>D-39</td>
<td>Inlet Apron for Culverts Up to 42&quot; Diameter</td>
</tr>
<tr>
<td>D-40</td>
<td>Rip Rap Energy Dissipator</td>
</tr>
<tr>
<td>D-41</td>
<td>Concrete Energy Dissipator</td>
</tr>
<tr>
<td>D-42</td>
<td>Concrete Energy Dissipator (Reinforcement) 18&quot; to 30&quot; Diameter Pipe</td>
</tr>
<tr>
<td>D-43</td>
<td>Concrete Energy Dissipator (Reinforcement) 36&quot; to 72&quot; Diameter Pipe</td>
</tr>
<tr>
<td>D-44</td>
<td>Pipe Culvert Headwalls, Endwalls and Warped Wingwalls</td>
</tr>
<tr>
<td>D-45</td>
<td>Curb Inlet - Type J Median</td>
</tr>
<tr>
<td>D-60</td>
<td>Pipe Bedding and Trench Backfill for Storm Drains</td>
</tr>
<tr>
<td>D-61</td>
<td>Rounded Pipe Ends In Drainage Structures</td>
</tr>
<tr>
<td>D-62</td>
<td>Pipe Collar</td>
</tr>
<tr>
<td>D-63</td>
<td>Concrete Lug</td>
</tr>
<tr>
<td>D-70</td>
<td>Minor Drainage Channel</td>
</tr>
<tr>
<td>D-71</td>
<td>Major Drainage Channel</td>
</tr>
<tr>
<td>D-72</td>
<td>Cutoff Wall for Drainage Channel</td>
</tr>
<tr>
<td>D-73</td>
<td>Pipe to Channel Connection</td>
</tr>
<tr>
<td>D-74</td>
<td>Graded Earth Channel</td>
</tr>
</tbody>
</table>

**ELECTRICAL SYSTEMS**

| E-1   | Street Lighting Standard                                     |       |                                                |
| E-2   | Grounding of Concrete Lighting Standards                     |       |                                                |
| E-33  | Pedestal for Electrical Equipment                            |       |                                                |

**GENERAL SURFACE IMPROVEMENTS**

<p>| G-1   | Curbs and Gutters - Separate                                 |       |                                                |
| G-2   | Curbs and Gutters - Combined                                 |       |                                                |
| G-3   | Monolithic Curb, Gutter and Sidewalk                        |       |                                                |
| G-4   | Curb and Gutter - Rolled                                     |       |                                                |
| G-5   | Dikes (Berms) - Asphalt Concrete                             |       |                                                |
| G-6   | Curbs and Gutter - Medians                                   |       |                                                |
| G-7   | Sidewalk - Typical Sections                                  |       |                                                |
| G-9   | Sidewalk Joint Locations                                     |       |                                                |
| G-10  | Concrete Joint Details                                       |       |                                                |
| G-11  | Portland Cement Concrete Curb, Gutter, Sidewalk &amp; Pavement Removal and Replacement |       |                                                |
| G-12  | Cross Gutter                                                 |       |                                                |</p>
<table>
<thead>
<tr>
<th>TABLE OF CONTENTS - Continued</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-13 Mid-Block Cross Gutter</td>
</tr>
<tr>
<td>G-14 Concrete Driveways</td>
</tr>
<tr>
<td>G-15 Driveway Location - Adjacent to Curb</td>
</tr>
<tr>
<td>Returns and Street Lines</td>
</tr>
<tr>
<td>G-16 Driveway Location and Width Requirements</td>
</tr>
<tr>
<td>G-17 Alley Apron</td>
</tr>
<tr>
<td>G-18 Concrete Pavement, Width 40’ or Less</td>
</tr>
<tr>
<td>G-19 Concrete Pavement, Width 40’ to 62’</td>
</tr>
<tr>
<td>G-20 Concrete Pavement, Width 53’ to 69’</td>
</tr>
<tr>
<td>G-21 Concrete Pavement, Alley Section, Width 40’ or Less</td>
</tr>
<tr>
<td>G-22 Cutoff Wall at End of Pavement</td>
</tr>
<tr>
<td>G-23 Cutoff Wall at End of Alley Pavement</td>
</tr>
<tr>
<td>G-24 Trench Resurfacing - Types A and B</td>
</tr>
<tr>
<td>G-25 Trench Resurfacing - Types C and D</td>
</tr>
<tr>
<td>G-26 Concrete Driveway Commercial Alternate</td>
</tr>
<tr>
<td>G-27 Pedestrian Ramp, Types A and B</td>
</tr>
<tr>
<td>G-28 Pedestrian Ramp, Type A-1 and B-1</td>
</tr>
<tr>
<td>G-29 Pedestrian Ramp, Type C</td>
</tr>
<tr>
<td>G-30 Pedestrian Ramp, Type C-1</td>
</tr>
<tr>
<td>G-31 Pedestrian Ramp, Type D</td>
</tr>
<tr>
<td>I-22</td>
</tr>
<tr>
<td>I-23</td>
</tr>
<tr>
<td>I-24</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>I-28</td>
</tr>
<tr>
<td>I-29</td>
</tr>
<tr>
<td>I-30</td>
</tr>
<tr>
<td>I-31</td>
</tr>
</tbody>
</table>

**LANDSCAPING**

| L-1 | Tree and Shrub Planting |
| L-2 | Tree Staking |
| L-3 | Concrete Mowing Strip |
| L-4 | Steel Grate Tree Well Cover |

**MISCELLANEOUS**

| M-1 | 24" Manhole Frame and Cover - Heavy Duty |
| M-2 | 24" Manhole Frame and Cover - Light Duty |
| M-3 | 36" Manhole Frame and Two Concentric Covers - Heavy Duty |
| M-4 | Manhole Cover Locking Device |
| M-5 | Chain Link Gate |
| M-6 | Chain Line Fence |
| M-7 | Metal Beam Guard Rail - Installation |
| M-8 | Metal Beam Guard Rail - Details |
| M-9 | Guard Post and Barricade |
| M-10 | Street Survey Monument |
| M-11 | Bench Mark - Brass Plug |
| M-12 | Datums |
| M-13 | Survey Monuments |
| M-14 | Metric Equivalents |
| M-15 | Joint Trench Utilities Location |
| M-16 | Demountable Post |
| M-17 | Tennis Court Fence - Chain Link |
| M-18 | Drinking Fountain |
| M-19 | Fire Hydrant Markers |
| M-20 | Chain Link Fence Details |

**SEWERAGE SYSTEMS**

| S-1 | Manhole - 4'x2' Diameter |
| S-2 | Manhole - 5'x3' Diameter |
| S-3 | Sewer Main Cleanout |
| S-4 | Pipe Bedding and Trench Backfill for Sewers |
| S-6 | Concrete Cradle |
| S-7 | Concrete Encasement |
| S-8 | Concrete Backfill |
| S-9 | Concrete Anchor |
| S-10 | Cutoff Wall |
| S-11  | Concrete Protection for Existing Sewer Pipe |
| S-12  | Concrete Support for Undercut Sewer Pipe    |
| S-13  | House Connection (Sewer Lateral)           |
| S-14  | Deep Cut House Connection (Sewer Lateral)   |
| S-15  | House Connection Sewer Repair               |
| S-16  | Cleanout - Force Main                      |
| S-17  | Manhole - 4'x3' Diameter (for 15" Maximum Diameter Pipe) |
| S-19  | Metallic Tape Locator for Non-Metallic Sewer Pipe |

**WATER SYSTEMS**

| W-1   | 1" Water Service                               |
| W-2   | 1 1/2" and 2" Water Services                   |
| W-3   | 1" and 2" Manual Air Releases                  |
| W-4   | 1" and 2" Air and Vacuum Valves                |
| W-5   | 4" and 6" Air and Vacuum Valves                |
| W-6   | 2" Blow-Off Assemblies - Type A                |
| W-7   | 2" Blow-Off Assemblies - Types B, C and D      |
| W-8   | 4" and 6" Blow-Off Assemblies - Type A         |
| W-9   | 4" and 6" Blow-Off Assemblies - Type B         |
| W-10  | 6" Fire Hydrant                                |
| W-11  | Fire Hydrant Locations                         |
| W-12  | Valve Well Installation                        |
| W-13  | Valve Stem Extension                           |
| W-14  | Air and Vacuum Valve Enclosures                |
| W-15  | Water Box Locations                            |
| W-16  | Protection Post                                |
| W-17  | Concrete Thrust Blocks                         |
| W-18  | Thrust Block Bearing Areas                     |
| W-19  | Concrete Valve Blocking                        |
| W-20  | Anchor Block (Vertical Bend Only)              |
| W-21  | Pipe Bedding and Trench Backfill for Water Mains |
| W-22  | Thrust Anchor for Water Main Reducer - 4" thru 6" |
| W-23  | Multiple Service Assembly - Dead End Main      |
| W-24  | Split Butt Strap                               |
| W-25  | Metallic Tape Locator for Non-Metallic Water Pipe |
CONCRETE STRUCTURES
NOTES
1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all block cells with grout.
### SLOPE OF RETAINED EARTH  
**HORIZONTAL RUN TO VERTICAL RISE**

<table>
<thead>
<tr>
<th>Wall Height</th>
<th>Level</th>
<th>5 to 1</th>
<th>4 to 1</th>
<th>3 to 1</th>
<th>2 to 1</th>
<th>1 1/2 to 1</th>
<th>1 to 1</th>
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<td>A</td>
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<td>2'-0&quot;</td>
<td>1N1 1' 1'-4&quot;</td>
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<td>1N1 2' 2'-0&quot;</td>
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<td>A</td>
<td>A</td>
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<td>1N1 2' 2'-1&quot;</td>
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<td>A</td>
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<td>4'-0&quot;</td>
<td>1N1 2' 2'-1&quot;</td>
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<td>B</td>
<td>B</td>
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<td>1N1 2' 2'-3&quot;</td>
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<td>1N1 2' 2'-7&quot;</td>
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<td>1N1 2' 2'-9&quot;</td>
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**NOTES:**

1. When wall Type II is required, the first four courses of block, regardless of wall height, shall consist of 12" wide masonry units.
2. Horizontal Steel -- Two #3 bars shall be placed longitudinally in the footing as shown. One #3 bar or ladder mesh shall be placed longitudinally in the mortar joint every 16 inches as the blocks are laid up.
3. See Standard Drawing C-7 for additional requirements.

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**SAN DIEGO REGIONAL STANDARD DRAWING**

**MASTERY RETAINING WALL**

**TYPE I & TYPE II**

**SLOPING BACKFILL**

**DRAWING NUMBER** C-2

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

**San Diego K.C. 1980**

**Date** 10-82
### Table: Masonry Retaining Wall Specifications

<table>
<thead>
<tr>
<th>Wall Height</th>
<th>Wall Type</th>
<th>H</th>
<th>Footing W</th>
<th>Key Size</th>
<th>&quot;A&quot; Bars</th>
<th>&quot;B&quot; Bars</th>
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<td>III</td>
<td>3&quot;</td>
<td>1'-0&quot;</td>
<td>None</td>
<td># 3 @ 32&quot; o/c</td>
<td>None</td>
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<tr>
<td>2'-0&quot;</td>
<td>III</td>
<td>3&quot;</td>
<td>2'-0&quot;</td>
<td>None</td>
<td># 3 @ 24&quot; o/c</td>
<td>None</td>
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<tr>
<td>2'-8&quot;</td>
<td>III</td>
<td>3&quot;</td>
<td>2'-8&quot;</td>
<td>None</td>
<td># 3 @ 24&quot; o/c</td>
<td>None</td>
</tr>
<tr>
<td>3'-4&quot;</td>
<td>III</td>
<td>3&quot;</td>
<td>3'-4&quot;</td>
<td>None</td>
<td># 3 @ 24&quot; o/c</td>
<td>None</td>
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<tr>
<td>4'-0&quot;</td>
<td>III</td>
<td>3&quot;</td>
<td>4'-0&quot;</td>
<td>None</td>
<td># 3 @ 16&quot; o/c</td>
<td>None</td>
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<td>IV</td>
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<td>4'-8&quot;</td>
<td>None</td>
<td># 4 @ 24&quot; o/c</td>
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<tr>
<td>5'-4&quot;</td>
<td>IV</td>
<td>8&quot;</td>
<td>5'-4&quot;</td>
<td>6&quot; x 6&quot;</td>
<td># 4 @ 16&quot; o/c</td>
<td>None</td>
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<td>6'-0&quot;</td>
<td>V</td>
<td>8&quot;</td>
<td>6'-0&quot;</td>
<td>8&quot; x 8&quot;</td>
<td># 4 @ 16&quot; o/c</td>
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<td>6'-8&quot;</td>
<td>V</td>
<td>1'-1&quot;</td>
<td>6'-8&quot;</td>
<td>8&quot; x 8&quot;</td>
<td># 4 @ 16&quot; o/c</td>
<td>None</td>
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<tr>
<td>8'-0&quot;</td>
<td>V</td>
<td>1'-8&quot;</td>
<td>8'-0&quot;</td>
<td>12&quot; x 12&quot;</td>
<td># 5 @ 18&quot; o/c</td>
<td>None</td>
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</tbody>
</table>

### Notes:
1. Footing sizes are based on 1000 lbs. per square foot maximum soil bearing value.
2. Wall height is measured from the top of the footing to the top of the wall.
   Walls not shown in the table above, must be designed specifically for the existing condition.
3. The walls shown here are designed as walls retaining level earth for a distance equal to wall height.
4. See Standard Drawing C-7 for additional requirements.
5. When wall Type V is required, the lower 16" of wall height is required to consist of 12" width masonry units.
6. Horizontal Steel: # 3 bars shall be placed longitudinally in the footing as shown.
   # 3 bars or ladder mesh shall be placed longitudinally in the mortar joint every sixteen inches as the blocks are laid up.

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**SAN DIEGO REGIONAL STANDARD DRAWING**

**MASONRY RETAINING WALL**

**TYPES III IV & V**

**(LEVEL BACKFILL)**
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.

ELEVATION

DIMENSIONS AND REINFORCING STEEL

<table>
<thead>
<tr>
<th></th>
<th>Sloping</th>
<th>Live Load</th>
<th>Sloping</th>
<th>Live Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>H (max)</td>
<td>5' - 4&quot;</td>
<td>3' - 8&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T (min)</td>
<td>0' - 10&quot;</td>
<td>0' - 8&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W (min)</td>
<td>4' - 0&quot;</td>
<td>3' - 0&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A bars</td>
<td># 4 @ 16&quot;</td>
<td># 4 @ 16&quot;</td>
<td></td>
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<tr>
<td>B bars</td>
<td># 6 @ 16&quot;</td>
<td></td>
<td></td>
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<tr>
<td>Surcharge</td>
<td></td>
<td></td>
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<tr>
<td>K (min)</td>
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<td>1' - 0&quot;</td>
<td>0' - 8&quot;</td>
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<td>1900 psf.</td>
<td>1700 psf.</td>
<td>1430 psf.</td>
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SAN DIEGO REGIONAL STANDARD DRAWING

MASONRY RETAINING WALL TYPE 4B
(LIVE LOAD SURCHARGE OR SLOPING BACKFILL)

DRAWING NUMBER C-4

RECOMMENDED BY THE SAN DIEGO
REGIONAL STANDARDS COMMITTEE

MASONRY RETAINING WALL TYPE 4B
(LIVE LOAD SURCHARGE OR SLOPING BACKFILL)
TYPICAL SECTION
over 5' - 4"

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

ELEVATION

<table>
<thead>
<tr>
<th>DIMENSIONS AND REINFORCING STEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>H (max)</td>
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<tr>
<td>T (min)</td>
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<tr>
<td>W (min)</td>
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<tr>
<td>R</td>
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<tr>
<td>S</td>
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<tr>
<td>K</td>
</tr>
<tr>
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<tr>
<td>B bars</td>
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<tr>
<td>C bars</td>
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<tr>
<td>D bars</td>
</tr>
<tr>
<td>E bars</td>
</tr>
<tr>
<td>max soil press. (psf)</td>
</tr>
</tbody>
</table>

SAN DIEGO REGIONAL STANDARD DRAWING

MASSONRY RETAINING WALL TYPE 5B
(LEVEL BACKFILL)
PLANT

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

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.

ELEVATION

TYPICAL SECTION

DIMENSIONS AND REINFORCING STEEL

|         | H (max) | 5' - 4" | 3' - 8"
|---------|---------|---------|--------
| T (min) | 0' - 10"| 0' - 8"
| W (min) | 3' - 10"| 2' - 9"
| A bars  | # 4 @ 16"|        |
| B bars  | # 6 @ 16"| # 4 @ 16"

Max. Toe
Press. P.S.F. 2000 1400

MASONRY RETAINING WALL TYPE 6 (LIVE LOAD SURCHARGE OR SLOPING BACKFILL)
**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:** (Wall Types 18, 48, 58 and 6):

**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:**

\[
\begin{align*}
F'm &= 600 \text{ psi} \\
F'm &= 200 \text{ psi} \\
F_s &= 20,000 \text{ psi} \\
n &= 50 \\
Earth &= 120 \text{ psi} \\
\text{Equivalent Fluid Pressure} &= 36 \text{ psi}
\end{align*}
\]

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 \( \theta = 33^\circ 42' \).

**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. Bars shall conform to the Manual of Standard Practice, A.C.I. Backing for hooks is four diameters. All bar embedments are clear distances to outside of bar. Spacing for parallel bars is center to center of bars.

**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 and mortar mixes shall be as specified in the "Standard Specifications for Public Works Construction". 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 at 6 foot intervals along the length of the wall and located at the level of the bottom course of block. The drains shall be 4" in diameter, formed by placing a block on its side, or leaving out every head joint in the first course of block. Backfill behind wall drains or open head joints shall be loose rubble or gravel.

**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.

---

**SAN DIEGO REGIONAL STANDARD DRAWING**

**GENERAL NOTES FOR MASONRY RETAINING WALLS**

---

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

---

**DRAWING NUMBER C-7**
TYPICAL SECTION

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

1 1/2 : 1 Slope Unlimited
OR
2' Level Surcharge (Vehicle Traffic)

TYPE—B WALL

1" Chamfer

1' - 0"

1" Chamfer

1' - 0"

H/2 + 10"

TYPE—C WALL

1" Chamfer

1' - 0"

Level Surface

H/2

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

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

\[ F_c = 1200 \text{ psi} \quad F'c = 3000 \text{ psi} \]

Earth = 120 pcf and equivalent fluid pressure = 36 psf per foot of height

Walls shown for 1 1/2:1 unlimited sloping surcharge are designed in accordance with Rankine's Formula for unlimited sloping surcharge with \( g = 33\frac{2}{3} \text{ ft} \).

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 30 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.

SECTION A-A

Embedment 2 3/8" min.

3/4" dia. 3/8"

Split permitted

RUBBER WATERSTOP

Use only when watertight joint is required.

SAN DIEGO REGIONAL STANDARD DRAWING

GENERAL NOTES AND DETAILS

FOR GRAVITY RETAINING WALLS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

ANNO Architect 1979

C-10

SAN DIEGO REGIONAL STANDARD DRAWING

General Notes and Details

For Gravity Retaining Walls

Recommended by the San Diego Regional Standards Committee

Revision By Approved Date

Conc. MB Date

C-10
**SPREAD FOOTING SECTION**

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

**TABLE OF REINFORCING STEEL DIMENSIONS AND DATA**

<table>
<thead>
<tr>
<th>Design H</th>
<th>H = 4'</th>
<th>H = 6'</th>
<th>H = 8'</th>
<th>H = 10'</th>
<th>H = 12'</th>
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<tr>
<td>W</td>
<td>3'-2&quot;</td>
<td>4'-2&quot;</td>
<td>5'-2&quot;</td>
<td>6'-2&quot;</td>
<td>7'-2&quot;</td>
</tr>
<tr>
<td>B</td>
<td>2'-2&quot;</td>
<td>2'-10&quot;</td>
<td>3'-4&quot;</td>
<td>4'-2&quot;</td>
<td>4'-10&quot;</td>
</tr>
</tbody>
</table>

**ELEVATION**

Numbers above # bars indicate distances from top of footing to upper end of # bars.

**NOTES**

**Design Conditions**

Design H may be exceeded by 6" before going to the next size. Foating key is required except 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**
  - $f_c = 1500$ psi
  - $f_p = 3250$ psi
  - $f_s = 24,000$ psi
  - $n \times 10 = 120$ psi

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

**Case 2:** Earth pressure determined from Rankine's formula with $b = 33 + 48°$.

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

**SAN DIEGO REGIONAL STANDARD DRAWING**

**REINFORCED CONCRETE RETAINING WALL**

**TYPE 1A**

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

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

DETAIL 3-2

WALL EXPANSION JOINTS AND WEAKENED PLANES

DETAIL 3-3

WALL EXPANSION JOINT

DETAIL 3-4

WATERSTOP

DETAIL 3-6

Notes:
A. 4"*4" drain @ 25' on center @ center (9" x 9" for Type 3 and 9.25" x 9.25" for Type 4 Retaining Walls). For walls adjacent to sidewalks or curbs, provide 4" cast iron or asbestos cement pipe under the sidewalk to discharge thru curb face. Exposed wall drains shall be located 3' above finished grade.
B. 6" square aluminum or galvanized steel wire mesh hardware cloth (Min wire diameter 0.03"). Anchor firmly to backface.
C. One cubic foot pervious backfill material in a burlap sack, securely tied.
D. Pervious backfill material continuously behind retaining wall.

*3 bar

1/4" chamfer

Front face of wall

1/4" premolded expansion joint

FILTER UNLESS OTHER THICKNESS AND/OR MATERIAL IS SHOWN ELSEWHERE

2 1/4" min

2 1/4" min

*3 bar

2 1/4" min

WATERSTOP

Holes will be permitted in the outer 1/4" of the web for wire, rings, etc. Tie web to 3 reinforcing bars @ 12" max intervals to support the waterstop in proper position during concrete placement. Alternative detail may be submitted for approval of the Engineer

Top of wall

Detail 3-4

9 1/2" max

Detail 3-2

1 1/8" max

Detail 3-1

1 1/8" max

Top of footing

Detail 3-4

WATERSTOP TO HAVE 5 OR MORE PAIRS OF RAISED RIBS TO PROVIDE 0.1 sq in. rib cross section area on each half of the waterstop. Height of ribs to be 3/32" min.

SAN DIEGO REGIONAL STANDARD DRAWING

REINFORCED CONCRETE
RETAINING WALL DETAILS NO. 3

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

W.F. N. Bumgardle 12/31/76
Coordinator  R.C.E. 19807  Date

DRAWING NUMBER  C-15
DRAINAGE SYSTEMS
PLAN

SECTION C-C

- 6" min.
- 30.0 Dia. Lap
- 7 1/2" 3" Clr.
- 4 #4 around pipe
- Slope floor 12:1 towards outlet
- Transition to normal curb height in 10 ft. on both sides unless otherwise noted.

SECTION B-B

- Galv. steel angle continuous and protection bar. See drawing D-12
- #4 @ 12"
- Wing where occurs one or both sides

SECTION A-A

- 10" Unless otherwise shown
- Slope gutter 3" or match existing roadway surface
- Rounded pipe ends see Drawing D-61
- Elev shown on plans 12:1

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
- 15"

SAN DIEGO REGIONAL STANDARD DRAWING

CURB INLET - TYPE A

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
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-grate end of grate as shown on D-20.

LEGEND ON PLANS
15' Type C-1 Inlet
DIMENSIONS
T = 8" if V is less than 8'.
T = 10' if V is 8' or more.
V = 5' unless otherwise specified.
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

SECTION E–E
Weakened Plane Joint
Straight Grade

SECTION C–C
Weakened Plane Joint
Straight Grade

SECTION D–D

Weakened Plane Joint

NOTES
1. Steel Plate should be of one continuous
piece with curve portion a circular arc.
Length = Width + 18' + circular arc.
2. # 4 rebar 30" long, 1" O.C. shall be
installed in top of walls for ties to top
and gutters.
3. The reinforcing steel in the top slab
shall be # 3 bars 6" O.C. unless otherwise
specified. Clearance shall be 1 1/2" from
the bottom of the slab.
4. Concrete for the inlet top 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

<table>
<thead>
<tr>
<th>PT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>K</th>
<th>M</th>
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<tbody>
<tr>
<td></td>
<td>F.C.</td>
<td>4 1/4&quot;</td>
<td>5 1/2&quot;</td>
<td>6&quot;</td>
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<td>9&quot;</td>
<td>9&quot;</td>
<td>9&quot;</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>

SECTION A–A

Top of Curb

Curb Line

1" support bolt, see Details 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.

SECTION B-B

SAN DIEGO REGIONAL STANDARD DRAWING
CURB INLET - TYPE D (DETAILS)
#4 @ 6" both ways

Manhole frame and cover. See drawing M-2.

Elev shown on plans

11" unless shown otherwise on plans

Rounded pipe ends
See drawing D-61

4 - #4 around pipe

Slope floor 12:1 towards outlet

SECTION A-A

SECTION B-B

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 1/2" clear spacing between reinforcing and surface.

LEGEND ON PLANS

---

SAN DIEGO REGIONAL STANDARD DRAWING

CATCH BASIN - TYPE F

Drawing Number D-7
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
NOTES
2. Concrete base shall be 580-C-3260
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

SAN DIEGO REGIONAL STANDARD DRAWING

STORM DRAIN CLEANOUT - TYPE A

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER D-9
# 4 @ 6" O.C.

# 4 bars placed diagonally

**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".
NOTES
1. Concrete shall be S60-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.

SAN DIEGO REGIONAL STANDARD DRAWING

INLETS AND CLEANOUTS
NOTES AND DETAILS

Revision By Approved Date
Notes
Correction

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

D-11

DRAWING NUMBER
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" steel protection bar.
4. Install additional bars at 3 1/2" clear spacing above first bar when opening exceeds 13".
5. When curb inlet opening length exceeds 8' install 1" steel support bolts, spaced at not more than 5' o.c.
NOTES

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

\[
\begin{align*}
5.00 \times 77 + 8.53 \times 92 &= 656.6 \\
&= 4.96 \\
&= A
\end{align*}
\]

\[
D = 3.05 \times 1.97 = 5.94
\]
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.

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

CORRUGATED STEEL PIPE INLETS
TYPES A AND B

DRAWING NUMBER
D-16
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>
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<tbody>
<tr>
<td>welded</td>
<td>5</td>
<td>2</td>
<td>9&quot;</td>
<td>3/4&quot;</td>
<td>3/4&quot;</td>
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<tr>
<td>cast</td>
<td>3</td>
<td>2</td>
<td>2&quot;</td>
<td>3/4&quot;</td>
<td>3/4&quot;</td>
</tr>
</tbody>
</table>

Grind all exposed corners 1/4" Radius 6" x 1/4" x 0'-6" R. Washer with 7/8" Hex Nut

Brackets @ 10" Ctrs. Max. 4 1/2" x 1/4" Bent Plate 4 1/2" holes in bracket and rail for 1/2" bolts

2-Holes slotted 3/8" x 1" for 1/2" Bolts

SPlice Plate 2 1/2" x 3/8" x 0'-10"

1/16" holes in pipe 2" x 3/16" x 0'-2" R. washer

STEP DETAIL

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

LADDER DETAIL

H = 5' - 0" or GREATER

SAN DIEGO REGIONAL STANDARD DRAWING

CORRUGATED STEEL PIPE INLETS DETAILS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER D-17
OVERSIDE DRAIN

cross bar spacer
see note 3
1 3/4"

3/16 x 1 1/2
fillet weld

3/16"
6"

SECTION D-D
GRATE SLOT DETAIL

1 3/4" ± 1/8"
6" thru 1/16"

D

GRATE SLOT WELDING DETAIL

20' - 0' Unit

Grate slot welded to pipe
see Grate Slot Welding Detail

ELBOW

TEE

TEE–SAG CONDITION

Elbow or Tee

Elbow or Tee

SEE NOTE 8

SEE NOTE 4

BAND PLUG

RISER

METAL CAP DETAIL

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.
Plan:
- Variable Curb opening
- Curb Line
- Type C-1 Curb Inlet
- Meet normal crown or existing pavement
- Valley Straight Grade

Section A-A:
- Normal Curb Face
- Normal Gutter Grade
- Variable gutter Depression
- 10' 10" curb face
- Meet normal crown or existing pavement

Section B-B:
- Curb Line
- 6'
- Meet normal crown or existing pavement
- varies round off

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.

SECTION A-A
NOTE
Cross-sectional area of ditch may be rounded, or trapezoidal.

SECTION B-B

ALTERNATE SECTION B-B

LEGEND ON PLANS

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

- **Top of Berm**
- **Edge of Fill**
- **Bulkhead and Taper**
- **Outlet Pipe**
- **Anchor Assemblies**
- **SECTION A-A**

**PLATE DETAIL**

Material to be \( \frac{1}{4} \) pole 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>
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<td>8&quot;</td>
<td>12&quot;</td>
<td>24&quot;</td>
<td>25&quot;</td>
</tr>
</tbody>
</table>

**NOTES**

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

**LEGEND ON PLANS**

- Sag Cond.

**SAN DIEGO REGIONAL STANDARD DRAWING**

**DRAWING NUMBER** D-24
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 0/2 apart.
3. Concrete shall be 520-C-2500
4. Pipe shall be circular asbestos cement, cast iron or rigid plastic.
NOTES
2. When "V" exceeds 4', steps shall be installed.
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

---

#### Table: Single and Double Headwall Dimensions

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<th>D</th>
<th>H</th>
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<th>L</th>
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ELEVATION DOUBLE HEADWALL  ELEVATION SINGLE HEADWALL

SECTION

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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

SAN DIEGO REGIONAL STANDARD DRAWING

STRAIGHT HEADWALL - TYPE A
[C.S.P.-ARCH]
DOUBLE PIPE ELEVATION

SECTION A—A

SINGLE PIPE ELEVATION

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<th>B</th>
<th>H</th>
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</table>

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

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

STRAIGHT HEADWALL - TYPE B
(CIRCULAR PIPE)
NOTES
1. Concrete shall be 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

==C

SAN DIEGO REGIONAL STANDARD DRAWING
WING AND U TYPE HEADWALLS
FOR 12" TO 36" PIPES

DIAMETER OF PIPE | DIMENSIONS | SINGLE PIPE | DOUBLE PIPE
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>L</td>
<td>E</td>
<td>F</td>
<td>L</td>
</tr>
<tr>
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<td>1'-3&quot;</td>
<td>1'-10 1/2&quot;</td>
</tr>
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<td>1'-9&quot;</td>
<td>2'-7 1/2&quot;</td>
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<td>3'-4 1/2&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>4'-11 1/2&quot;</td>
<td>2'-9&quot;</td>
<td>4'-1 1/2&quot;</td>
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</tbody>
</table>

As shown

On plan

2.49 | 1.36

2.55 | 1.62

Legend on Plans

==C

Recommended by the San Diego Regional Standards Committee

Date: Dec. 1975

Drawing: RCD 1977

Revision By Approved Date

Conc. M.B. 5-86
ELEVATION

SECTION B-B

<table>
<thead>
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<th>DIA. OF PIPE</th>
<th>DIMENSIONS</th>
<th>SINGLE PIPE</th>
<th>DOUBLE PIPE</th>
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<td>3'-9&quot;</td>
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<td>6'-3 3/4&quot;</td>
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<td>84&quot;</td>
<td>9'-10 3/4&quot;</td>
<td>5'-6&quot;</td>
<td>8'-3&quot;</td>
</tr>
</tbody>
</table>

WING WALL REINFORCING

ALT. DETAIL C

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 550-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

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.

LEGEND ON PLANS

---
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.

LEGEND ON PLANS
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.

**LEGEND ON PLANS**

---

**SAN DIEGO REGIONAL STANDARD DRAWING**

**CURTAIN WALL**

**DRAWING NUMBER** D-38
NOTES
1. When more than one pipe is used the profile view shown shall hold for the distance across all pipe openings. Sections A-A and B-B shall be from the outermost pipe. The distance between pipes shall be D/2 for round and Span/3 for arch pipe. (12" minimum)
2. Culvert shall be cut off even with apron surface when required by the Agency.
3. Use Inlet Apron only where a flared end section can not be utilized.
4. Place weep holes when required by the Agency.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

INLET APRON FOR CULVERTS
UP TO 42" DIAMETER
SECTION A-A

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.) Cobblestones 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.f.
   Maximum Outlet Velocity = 35 f.p.s.
2. Concrete shall be 560-C-3250.
3. Reinforcing shall conform to ASTM designation A615 and may be grade 40 or 60. Reinforcing shall be placed with 2" clear concrete cover unless noted otherwise. Splices shall not be permitted except as indicated on the plans.
4. For pipe grades not exceeding 20%, inlet box may be omitted.
5. If inlet box is omitted, construct pipe collar as shown.
6. Unless noted otherwise, all reinforcing bar bends shall be fabricated with standard hooks.
7. Five foot high chain link fencing, embed post 18" deep in walls and encase with Class B mortar.
8. In Sandy and Silty soil:
   a) Riprap and aggregate base cutoff wall required at the end of rock apron.
   b) Filter cloth (Polyfilter X or equivalent) shall be installed on native soil and base, minimum of 1 ft. overlaps at joints.
9. Rip rap and subbase classification shall be as shown on plans.

Pipe Dia (in) | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 72
---|---|---|---|---|---|---|---|---|---
Area (sq. ft) | 1.77 | 3.14 | 4.91 | 7.07 | 9.92 | 12.57 | 15.90 | 19.63 | 23.57
Max. Q (c.f.s) | 21 | 38 | 59 | 85 | 115 | 151 | 191 | 236 | 339

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<td>11&quot; - 12&quot;</td>
<td>18&quot; - 18&quot;</td>
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<tr>
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<td>4&quot; - 8&quot;</td>
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<td>12&quot; - 12&quot;</td>
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</table>

CONCRETE ENERGY DISSIPATOR

SAN DIEGO REGIONAL STANDARD DRAWING

DRAWING NUMBER D-41
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.
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.

<table>
<thead>
<tr>
<th>Pipe dia. (in.)</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>54</th>
<th>60</th>
<th>72</th>
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<td></td>
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<tr>
<td>B bar</td>
<td>5 @ 12&quot;</td>
<td>6 @ 12&quot;</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>C bar</td>
<td>4 @ 12&quot;</td>
<td>5 @ 12&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D bar</td>
<td>1 @ 12&quot;</td>
<td>5 @ 12&quot;</td>
<td>6 @ 12&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E bar</td>
<td>4 @ 12&quot;</td>
<td>5 @ 12&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F bar</td>
<td>4 @ 9&quot;</td>
<td>5 @ 9&quot;</td>
<td>#6@8&quot;</td>
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</tr>
<tr>
<td>G bar</td>
<td>#7</td>
<td>#7</td>
<td>#11</td>
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</tr>
</tbody>
</table>

SAN DIEGO REGIONAL STANDARD DRAWING

CONCRETE ENERGY DISSIPATOR (REINFORCEMENT)
36" TO 72" DIAMETER PIPE

DRAWING NUMBER D-43
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.

SECTION A–A

SECTION B–B

LEGEND ON PLANS
4' Type J Inlet

SAN DIEGO REGIONAL STANDARD DRAWING
CURB INLET-TYPE J MEDIAN

DRAWING NUMBER D-45
NOTES
1. For trenching on improved streets see Standard Drawing G-24 or G-25 for resurfacing details.
2. (*) indicates minimum relative compaction.

SECTION

1" max graded aggregate.

Pipe O.D.

8" min
12" max

invert elevation

4" clearance (min)

Trench Width

Max limit of slope excavation allowed

Trench Depth

Backfill

Upper Zone (3' 0"
90%

Middle Zone
90%

Pipe Zone
90%

Bedding
NOTE
The rounded areas may be built up of cement mortar or poured in place with the drainage structure.

\[ R = \text{Thickness of pipe} \]

\[ R = \text{Inside diameter of pipe} \]
NOTES:
1. Pipe collar does not have to be finished if covered, but must have a minimum of 6" of concrete around joint.
2. Concrete shall be 560-C-3250

LEGEND ON PLANS

---

SANDIEGO REGIONAL STANDARD DRAWING

PIECE COLLAR

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

D-62

DECLARATION OF CONC. M.B. 5-86

REVISION BY APPROVED DATE

DRAWING NUMBER

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

LEGEND ON PLANS
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.

LEGEND ON PLANS
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
TYPICAL SECTION

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

LEGEND ON PLANS
NOTES
1. Longitudinal slope of lined ditch shall be 2% minimum.
2. Over slope down ditches shall employ 6" thickened edge section at both sides of ditch.
### SINGLE BOX REGIONAL STANDARD DRAWING

#### SAN DIEGO REGIONS REGIONAL STANDARD DRAWING

**SPAN**

**HEIGHT**

<table>
<thead>
<tr>
<th>2'</th>
<th>3'</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
<th>7'</th>
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</table>

**STRENGTH CLASSIFICATION**

**MAX FILL OVER TOP**

<table>
<thead>
<tr>
<th>Top Size</th>
<th>Bottom Size</th>
<th>Span Size</th>
<th>Spacing</th>
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<td>18</td>
<td>15</td>
</tr>
</tbody>
</table>

**Notes:**

- For reinforcement clearance, refer to Section 8.2.13.1 of the Standard Details.
- For bars of height less than that shown in table, use next greater height when dimensions and reinforcing steel, and make necessary changes in bar lengths, number of spacers and quantities.

---

**FLAT INVERT**

**V INVERT**

**TRAPEZOIDAL INVERT**

**ALTERNATIVE INVERTS**

(When shown)

For cover less than 2 feet, provide a spacers.

**Typical Sections:**

- 2' THRU 6' SPANS
- 7' THRU 12' SPANS

**Details:**

- See Detail A
- See Detail B
- See Detail C

**Construction Notes:**

- Provide paving match when necessary.
- Provide paving match where minimum strip is used.
### San Diego Regional Standard Drawing

**Double Box Culvert Drawing D-17**

#### Typical Section

**Showing reinforcement for interior walls 8" and over**

**“Flat Invert” Alternative** *(When shown)*

---

### Tables

#### Span Height

<table>
<thead>
<tr>
<th>Span</th>
<th>2'</th>
<th>3'</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
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<tbody>
<tr>
<td>Height</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
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<tr>
<td>2'</td>
<td>4'</td>
<td>5'</td>
<td>6'</td>
<td>7'</td>
<td>8'</td>
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<tr>
<td>4'</td>
<td>5'</td>
<td>6'</td>
<td>7'</td>
<td>8'</td>
<td>9'</td>
</tr>
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**Provide paving notch when cap is exposed and where PCC pavement or approach slab is used.**

<table>
<thead>
<tr>
<th>Top Slab</th>
<th>#</th>
<th>3</th>
<th>4</th>
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<td>4'</td>
<td>5'</td>
<td>6'</td>
<td>7'</td>
<td>8'</td>
<td>9'</td>
</tr>
</tbody>
</table>

**For reinforcement clearance, except at bottom, see “Miscellaneous Details.”**

---

For boxes of height less than that shown in table, use next greater table height slabs, wall dimensions and reinforcing steel, and make necessary changes in bar lengths, number of spacers and quantities. **Number of "d" bars in table is slab total for both cells.**
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<th>SPAN HEIGHT</th>
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<tr>
<td>Length</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
</tbody>
</table>

For cover less than 2 feet, extend "C" bars full length, top slab only. Provide additional 4 #12 bars and adjust quantities.
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 8" 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.

SECTION

LEGEND ON PLANS
ELECTRICAL SYSTEMS
DIRECT BURIAL FOUNDATION

<table>
<thead>
<tr>
<th>POLE HEIGHT</th>
<th>MOUNTING HEIGHT</th>
<th>LAMP SIZE (WATTS)</th>
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<td>27' ± 1'</td>
<td>170 M.V.</td>
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<td>100 H.P.S.</td>
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<tr>
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<td></td>
<td>90 L.P.S.</td>
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<tr>
<td>28' ± 2'</td>
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<td>250 H.P.S.</td>
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<td></td>
<td>180 L.P.S.</td>
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<td>26' - 3''</td>
<td>70 H.P.S.</td>
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<tr>
<td>26' - 0''</td>
<td>26' - 3''</td>
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</tr>
<tr>
<td></td>
<td>30' - 0''</td>
<td>150 H.P.S.</td>
</tr>
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</table>

ANCHOR BASE FOUNDATION

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

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

DIRECT BURIAL FOUNDATION

1. #8 copper wire grounded to pole steel with lug
2. Clamp
3. #8 copper wire grounded to pole steel with lug

STEEL CONDUIT

NON-METALLIC CONDUIT

ANCHOR BASE FOUNDATION

1. 1/2" Rigid steel Conduit
2. Attach ground wire under anchor nut

STEEL CONDUIT

NON-METALLIC CONDUIT

DETAIL A
NOTE:
Concrete shall be class 560-C-3250

1/2" min. cover for bars and conduits.

Galvanized steel conduits.
Size and number as required.

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

Permissible to auger hole and pour against soil.

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

1/4" X 2" galvanized steel bars.

Grout cap protrusion to be sloped for drainage.

Length as required

Ground Line

Panel Board

Meter

NOTE:
Concrete shall be class 560-C-3250

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

SECTION A-A
STEEL & CONCRETE DIMENSIONS

SECTION B-B
CONDUIT & EQUIPMENT

SAN DIEGO REGIONAL STANDARD DRAWING
PEDESTAL FOR
ELECTRICAL EQUIPMENT

DRAWING NUMBER E-33
GENERAL SURFACE IMPROVEMENTS
6" CURB
Area = 0.89 SQ. FT.

8" CURB
Area = 1.09 SQ. FT.

GUTTER

NOTES:
1. Concrete shall be 520-C-2500.
**Type G & H Curb**

**Type** | **W** | **Area (sq. ft.)**
--- | --- | ---
G | 24" | 1.34
H | 30" | 1.81

* with 6" Curb Face

**Notes:**
1. Concrete shall be 520-C-2500.
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

Revision By Approved Date
Thickness 0.5 7.79
Thickness 0.25 M.B. G-82
Cone 9° M.B. 086
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 S20-C-2500.

LEGEND ON PLANS
NOTES
1. Dikes are 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.

APPROX. DIKE QUANTITIES

<table>
<thead>
<tr>
<th>TYPE</th>
<th>TON/FT.</th>
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<tbody>
<tr>
<td>A</td>
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<td>0.0583</td>
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<td>C-9&quot;</td>
<td>0.0702</td>
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<tr>
<td>D</td>
<td>0.0062</td>
</tr>
</tbody>
</table>

LEGEND ON PLANS
Type A Dike
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

SUN DIEGO REGIONAL STANDARD DRAWING
CURBS AND GUTTER - MEDIANS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER G-6
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.
NOTE
When distance from, "Area to be removed", to existing joint, edge or score mark is less than minimum shown, "Area to be removed", shall be extended to that joint, edge or score mark.
Contact joints per Standard Drawing G-10 when separate pours are made.

PLAN

SECTION A-A

NOTES:

1. Concrete shall be 560-C-3250.
2. = Weakened plane joints.
3. = Typical flowlines.
4. o = Elevations to be shown on plans.
5. Return segments to be 5/8" thick.
6. Curb between P.C.R.s shall be considered as part of cross gutter.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

CROSS GUTTER

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER G-12
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

---

SAN DIEGO REGIONAL STANDARD DRAWING

MID-BLOCK CROSS GUTTER

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Coordination R.C.E. 19807 Dated 1-25
NOTES
1. No concrete shall be placed until forms and subgrade are inspected by the Agency.
2. Concrete shall be 320-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)

LEGEND ON PLANS
Q of — Residential (Commercial) Driveway

SAN DIEGO REGIONAL STANDARD DRAWING
CONCRETE DRIVEWAYS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE
Alfred D. Stavely, Dec. 1979

DRAWING NUMBER G-14

Revision By Approved Date

Thickness

Thickness

Conc.

Limits
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 drive ways on lots having 21'-foot frontage or less, shall be located at least 3 feet from the side property line extended.
2. Not more than 40% of the property frontage on residential lots, nor 60% of the property frontage on commercial lots may be allocated for driveway curb openings, except that lots having frontage of 25 feet or less are entitled to one 12 foot driveway (18 foot curb opening).
3. All driveways and curb openings shall be a minimum of 3 feet from any obstruction, i.e., poles, hydrants, etc.
4. No portion of any driveway shall be allowed across a line extending normal to the roadway from the front corner of the property, except that joint-use driveways may be permitted in special instances where written approval of both property owners is filed with the Agency.
TYPICAL PLAN

Gutter Elevation shown on plans
Toe of Gutter Elevation

Elevation shown on plans

5 1/2"

-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.).

LEGEND ON PLANS

ALLEY APRON

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER G-17


TYPICAL SECTION

Pavement Width = 40' or less
10' minimum

1/2" R

Contact Joint

20' maximum

1/2" R

TYPICAL PLAN

Weakened Plane Joints

15'

Contact Joints

15'

Transverse Contact Joints shall be constructed at end of Pour

15'

Expansion Joints shall be constructed at locations shown on plans.

NOTES
1. Concrete shall be 560-C-325G.
3. Adjust 15' interval between Transverse Joints to match adjacent existing improvements.

SAN DIEGO REGIONAL STANDARD DRAWING

CONCRETE PAVEMENT,
WIDTH 40' OR LESS
Contact Joints

1/2" R

Pavement Width = 52' or less, but more than 40' 10' min

TYPICAL SECTION

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

TYPICAL PLAN

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

Curb and Gutter
Surface Course
Expansion Joint
Base Course

5'-0"
1'-6"

520-C-2500 Concrete

SECTION A-A

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING
CUTOFF WALL AT END OF PAVEMENT

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

ALAN D. KRAUS
Contractor R.C.E. 19967

DRAWING NUMBER G-22

Revision By Approved Date
Conc. S M A 5-86

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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. Asphallic 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.
Non-contiguous Sidewalk

Driveway width shown on plans

Property Line

Optional contact joint

Contiguous Sidewalk

Depressed Curb

Gutter

Curb

3'-0" 3'-0"

3'-0" 3'-0"

PLAN

Curb Opening = Driveway Width + 12'

Driveway width shown on plans

Depressed Curb

12"R (typ.)

Bottom of curb

12"R (typ.)

ELEVATION

Edge of sidewalk

5½" Normal rise 1/4" per foot

1" above gutter

2"R

SECTION

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

LEGEND ON PLANS

% of Alt. Commercial Driveway

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Chairman M.C. DSMB 1-82

DRAWING NUMBER G-26

SAN DIEGO REGIONAL STANDARD DRAWING

CONCRETE DRIVEWAY

COMMERCIAL ALTERNATE

Revision By Approved Date

Conc. M.B. 5-82
### PEDESTRIAN RAMP
#### TYPES A AND B

#### TYPE A
- Back of sidewalk
- R=10'

#### TYPE B
- Top of curb
- 12" wide border with 1/4" grooves approx. 3/8" O.C.

#### SECTION A-A
- 4'
- 12"

**NOTE**
See Standard Drawing G-32 for general notes.

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**SAN DIEGO REGIONAL STANDARD DRAWING**

**PEDESTRIAN RAMP**

**TYPES A AND B**

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**Revision** | **Approved** | **Date**
---|---|---

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**DRAWING NUMBER** G-27
NOTES
See Standard Drawing G-32 for general notes

SAN DIEGO REGIONAL STANDARD DRAWING
PEDESTRIAN RAMP
TYPES A-I AND B-I
SECTION A–A

NOTES
1. Type C ramps are only to be used to mitigate existing conditions and are not to be used in new construction.
Meet existing curb & gutter

12" wide border with ¼" grooves approx. ¼" O.C.

8:1 Slope

Meet existing curb & gutter.

PLAN

Top of existing curb

Existing gutter

3' Min. trans.

Curb height in table

1'

SECTION A-A

2. * Indicates points to be set prior to pouring of concrete.

<table>
<thead>
<tr>
<th>Curb Height</th>
<th>X*</th>
<th>Y*</th>
<th>Z*</th>
<th>Curb Height</th>
<th>X*</th>
<th>Y*</th>
<th>Z*</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0&quot;</td>
<td>3 13/16&quot;</td>
<td>3' - 3 1/2&quot;</td>
<td>1' - 8&quot;</td>
<td>5' 11 1/8&quot;</td>
<td>3' - 0&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5&quot;</td>
<td>4 3/8&quot;</td>
<td>3' - 11 3/8&quot;</td>
<td>2' - 0&quot;</td>
<td>5' 7/8&quot;</td>
<td>3' - 4&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0&quot;</td>
<td>5 1/8&quot;</td>
<td>4' - 7 1/4&quot;</td>
<td>2' - 4&quot;</td>
<td>6' 7/8&quot;</td>
<td>3' - 8&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5&quot;</td>
<td>5 13/16&quot;</td>
<td>5' - 3 1/8&quot;</td>
<td>2' - 8&quot;</td>
<td>7' 13 3/4&quot;</td>
<td>4' - 0&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

½" Lip @ 45°

12" border

¼" Rise per foot

NOTES
NOTE

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.
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. Tamper 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 5½ 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 accelerated admixture, such as Calcium Chloride, may be used only with prior approval of the agencies Engineer.
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.
   c. Tampers or vibrators shall be used.
2. Cement slurry backfill shall be as follows:
   a. Alleys and local residential streets . . . . Class (190-E-400)
   b. All other streets . . . . . . . . . . Class (180-E-800)
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. Tamper 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 O. (1) (a).
SPRINKLER IRRIGATION SYSTEMS
NOTES
1. Teflon tape, 3/4" wide, shall be used on all threaded connections.
2. Close nipples shall not be used.

LEGEND ON PLANS
Show a number to indicate type head.
NOTES
1. All fittings shall be P.V.C. Sch. 40.
2. Teflon tape, 3/4” wide, shall be used on all threaded connections.
3. Short nipples shall not be used.

LEGEND ON PLANS
Show a number to indicate type head.

SAN DIEGO REGIONAL STANDARD DRAWING
SPRINKLER HEAD
POP UP SPRAY TYPE
NOTES
1. All fittings shall be P.V.C. Sch. 40.
2. All nipples shall be P.V.C. Sch. 80.
3. Teflon tape, 3/4" wide, shall be used on all threaded connections.
4. Short nipples shall not be used.

LEGEND ON PLANS
Show a number to indicate type head.

SAN DIEGO REGIONAL STANDARD DRAWING

LAWN SPRINKLER HEAD
POP UP ROTARY [WITH SWING JOINT]

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

COORDINATOR: ECE 19667 Date

DRAWING NUMBER I-3
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.

LEGEND ON PLANS
Q.C.V. ☺
NOTES
1. Hose bibb shall be loose key operated, all brass or bronze construction, angle pattern with removable bonnet and stem assembly, replaceable seat washers and stem packing glands.
2. Unless otherwise specified, the hose connection thread shall be 3/4" male hose thread (pacific coast), and the riser opening thread shall be 3/4" female I.P.S. Discharge opening shall be 90° to riser opening.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

HOSE BIBB
(GARDEN VALVE)
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.

LEGEND ON PLANS

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**SAN DIEGO REGIONAL STANDARD DRAWING**

**BACKFLOW PREVENTER**

**ATMOSPHERIC VACUUM BREAKER**

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

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

BACKFLOW PREVENTER - CONTINUOUS PRESS. VAC. BREAKER ASSY.
(2" & SMALLER)
NOTES
1. All fittings on assembly 3" and larger shall be flanged.
2. Cast iron pipe shall be polyethylene wrapped with a 2" wide plastic backed adhesive tape.
   Use 1/4" overlap.
3. Cast iron pipe and fittings shall be cement mortar lined.
4. Pressure vacuum breaker assembly shall be installed above a sufficient number of sprinkler heads
   closest to the vacuum breaker assembly so that at no time will it be subjected to back pressure
   or drainage.
5. All exposed cast iron shall be painted with one coat of red lead and two finish coats of
   exterior enamel.
6. All fittings 2" and smaller shall be red brass.
7. 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 the Engineer.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

BACKFLOW PREVENTER PRESS.
TYPE VAC. BREAKER ASSEMBLY

RECOMMENDED BY THE SAN DIEGO
REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER 1-9
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.

ALTERNATE PIPE SLEEVE INSTALLATION

LOCKING CAP WEATHER-MATIC
# 906-L or approved equal.

2" P.V.C. pipe, Sch. 40

2"x2"x1" Tee
P.V.C., Sch. 40

3"

1" P.V.C. cap.
Sch. 40

1" P.V.C. pipe, Sch. 40

LEGEND ON PLANS

M.C.V.
Unmortared Brick Foundation

Valve Box

Plan

Finished Grade

Valve box with lock top

4 1/2"

Control wires
18" lead length
(Pig tailed)

Red brass nipple

Red brass 90° elbow

Red brass nipple

P.V.C. Union & nipples

P.V.C. Nipples

TYPICAL ELEMENTARY DIAGRAM FOR WIRING ELECTRICAL REMOTE CONTROL VALVE

ELEVATION

NOTES
1. No splicing shall be made outside of the valve box except that made in a pull-box.
2. Close nipples shall not be used.
3. Spare wires terminating in valve boxes shall have their ends insulated, the same as for a splice.
4. When two or more valves are installed in the same location, they shall be in manifold using
   red brass fittings, with a gate valve installed at the start of the manifold.
5. All valves shall be installed with a union on the downstream side of the valve. The union
   shall be P.V.C.

LEGEND ON PLANS

R.C.V.

SAN DIEGO REGIONAL STANDARD DRAWING

REMOTE CONTROL VALVE

Drawing Number 1-14

Recommended by the San Diego Regional Standards Committee

Valve

Revision

By

Approved

Date

TPF

P.M.

10-72

0-14
NOTES
1. Install pull boxes as shown on plans.
2. At junctions where runs combine, splice common ground in pull box.
3. Pull box cover shall be permanently marked "ELECTRIC".
4. Conductors for each controller clock shall be harnessed separately and at sufficient intervals to maintain a definite bundle.
5. All splices shall be made with a properly set mechanical splice connector entirely enclosed in self-curing epoxy resin and shall be completely water-proof.
6. All spare wire ends shall be insulated in the same manner as wire splices.

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

Revision | By | Approved | Date
--- | --- | --- | ---

SAN DIEGO REGIONAL STANDARD DRAWING

ELECTRICAL PULL BOX
FOR DIRECT BURIAL CONTROL WIRES
AND SPLICE DETAILS

DRAWING NUMBER I-15

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Coordinator R.C.E. 19807 Date
NOTE
See Standard Drawing I-25 or I-26 for water line trench details.

NORMAL LOCATIONS OF CONTROL WIRES

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

Slope concrete away from conduits.

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

Pedestal Case

Valve Control (Bushing)

Power Supply (Coupling Adapter)

560-C-3250 Concrete (min 3" encasement around conduits)

12" R min.

Controller Cabinet

1" P.V.C. or Galvanized Steel Conduit for power supply.

2" P.V.C. Conduit for control wire

Slope concrete away from conduits.

Finished Grade

ELEVATION

NOTES
1. Where two or more controllers are mounted on a common concrete base, a minimum of three inches shall be left between controller cabinets.
2. Anchor controller pedestal to base as required by manufacturer.
3. Make all electrical connections inside controller cabinet.
4. For location of supply conduit and conductors, see electrical plans.
5. Stiffeners shall be fastened to controller and pedestal cases by 3/16" x 3/4" O.N. cadmium plated stove bolts not more than 12" on center (minimum 6 bolts per stiffener).
6. Controller shall be grounded at power supply by ground wire.

LEGEND ON PLANS

Revision  By  Approved  Date
Conduit  MB  10-25
Conc.  MB  10-25

SAN DIEGO REGIONAL STANDARD DRAWING
IRRIGATION SYSTEMS
ELECTRIC CONTROLLER CLOCK PEDESTAL MOUNTING

Drawing Number 1-17

Recommended by the San Diego Regional Standards Committee
Automatic controller clock in a weatherproof, tamperproof lockable case: wall mounted per manufacturer's specifications.

Wall

Foundation of Building

Finished Grade

12" R min

SIDE VIEW

Where two or more controllers are mounted together, a minimum of three inches shall be left between controller cabinets.

Controller Cabinet

2" Rigid Steel Conduit for Control Wire

Anchor conduit firmly to wall with galvanized pipe clamps using fasteners appropriate for type of wall.

3/4" Rigid Steel Conduit for Power Supply

Valve Control (Bushing)

Power Supply (Coupling, Adapter)

ELEVATION

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

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

IRRIGATION SYSTEMS
ELECTRIC CONTROLLER CLOCK
WALL MOUNTING

DRAWING NUMBER I-18

Revision By Approved Date
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 ⅛" overlap.

LEGEND ON PLANS

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

PLAN

ELEVATION

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

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

LEGEND ON PLANS
**NOTES**

1. Backfill material shall be compacted to a relative compaction of 90% or more.
2. 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, ¼” 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 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.
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

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SAN DIEGO REGIONAL STANDARD DRAWING

CONNECTION DETAIL FOR
NEW ASBESTOS CEMENT SUPPLY MAINS
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.

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

Red Brass Fittings and Nipples

ELEVATION

NOTE
Close nipples shall not be used.

LEGEND ON PLANS

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SAN DIEGO REGIONAL STANDARD DRAWING

CONNECTION DETAIL
FOR EXISTING SUPPLY MAINS

DRAWING NUMBER 1-29
3" Nipple (or length as required)

1/2" dia. Galvanized Pipe Stake

Impact Head

Galvanized Coupling with set screw

Galvanized Riser (length noted on plan)

Two Clamps (galv. or cad. plated), machine peened friction type.

12" Nipple

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.

ELEVATION

LEGEND ON PLANS
Show a number to indicate type head
NOTES
1. All risers, unions, elbows and nipples shall be red brass.
2. Close nipples shall not be used.
3. 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.

<table>
<thead>
<tr>
<th>Revision</th>
<th>By</th>
<th>Approved</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

BACKFLOW PREVENTER
REDUCED PRESS. PRINCIPLE

DRAWING NUMBER 1-31
TREE PLANTING - SLOPES

Chamfer as needed to eliminate soil stuffing.

Do not remove side growth along trunk. Prune to reduce crown weight when necessary.

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.

2 x Ball width

min

2 x Ball depth

min

SHRUB PLANTING - SLOPES

Chamfer as needed to eliminate soil stuffing.

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.

2 x Ball width

min

2 x Ball depth

min

TREE PLANTING - LEVEL GROUND

SHRUB PLANTING - LEVEL GROUND
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

SAN DIEGO REGIONAL STANDARD DRAWING

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER L-2

TREES STAKING
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 exceptions: where outside face of basement walls are 4' 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.

# 4 - Reinforcing bars on four sides, lap 15" at corners, 2/3" min. concrete cover over reinforcement.

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

STEEL GRATE
TREE WELL COVER

DRAWING NUMBER L-4

Revision By Approved Date

Page dimensions: 612.0x791.0
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.

MANHOLE COVER
CAST IRON WT. 155 LB.

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

RECOMMENDED BY THE SAN DIEGO
REGIONAL STANDARDS COMMITTEE
Coordinator R.C.E. 1980 Date

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

HALF PLAN FRAME & COVER

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

HALF SECTION FRAME & COVER

DETAIL.

SAN DIEGO REGIONAL STANDARD DRAWING

36" MANHOLE FRAME AND TWO CONCENTRIC COVERS
HEAVY DUTY

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER M-3
DETAIL PLAN

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.

NOTE
For manhole frame and cover details, see Standard Drawing M-1 (single cover).

SECTION A-A

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

NOTE
For manhole frame and two concentric covers, see detailed Standard Drawing M-3.
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 206-6 of the Standard Specifications for Public Works Construction unless specifically noted on this drawing.

DISTANCE BETWEEN GATE POSTS IS GATE LENGTH SHOWN ON PLANS

LENGTH OF GATE LEAF

FITTING

GATE FRAME

TRUSS RODS

STRETCHER BAR

LATCH

FENCE

REPEAT OPPOSITE SIDE

FASTENER

PLUNGER BAR

GATE STOP

ROADWAY OR GROUND

10" DIAMETER STOP FOOTING.
OMIT IF ROADWAY IS CONCRETE.

EXTENSION POST AND BARBED WIRE

SAN DIEGO REGIONAL STANDARD DRAWING

CHAIN LINK GATE

LEGEND ON PLANS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

COORDINATOR: R.C.E. 19667

DRAWING NUMBER: M-5
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.
SECTION AT SUPPORT

Toenail with 1-16d gal nail on each side of the block
Cut steel washer
5/8" Carriage bolt with hex nut
6" x 8" x 1'-2" Douglas Fir Block.
6" x 8" x 5'-4" Douglas Fir Post, pressure treated.

SECTION WITH / WITHOUT DIKE

Variable
Top of Post
Flat plate washer

Ground Line or Shoulder Surfacing under railing

Top of rail

0.17" Dike (Optional)
2'-2" Max.

0.5" Dike Sect. - Hinge point

Edge of shoulder

PLAN

Rail Splice
6'-3"

8"

Traffic

6" x 8" Block between post and rail on all posts
Lap in direction of traffic

Traffic

ELEVATION

1'-0"

2'-3" Min.

3'-0"

6" x 8" Douglas Fir Post

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

TERMINAL SECTION
TYPE "A"

TERMINAL SECTION
TYPE "B"

5/8" Ø BUTTON HEAD BOLT

5/8" Ø RECESS NUT

FLAT PLATE WASHER

RAIL SPLICE

NOTES
1. See Standard Drawing M-7 for guard rail installation.
2. All metal elements shall be galvanized.
CONTINUOUS BARRICADE

NOTES
1. Posts to be 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 1 ½" galvanized lag screws.
4. Reflector signs - California Type N. Size 18"x 18" - Yellow with nine (9) - 3/4" reflectors (center mount).
   a. Reflectors shall be red for use on dead end streets, in all other cases they shall be yellow.
   b. Reflector material shall be plastic or other approved reflectorized material.
5. Sign material shall be aluminum alloy 5061-T6 or 5052-H38, aluminum thickness 0.063 inches.

LEGEND ON PLANS
□ Barricade
X Guard Post

SAN DIEGO REGIONAL STANDARD DRAWING

GUARD POST AND BARRICADE

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Coordination R.C.E. 1995
Coordination R.C.E. 1995
Date

DRAWING NUMBER M-9
Slope surface of grout pad to drain away from cover, and to meet existing grade.

**PLAN—IN UNPAVED AREA**

**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.

**TYPICAL MONUMENT SECTION IN PAVED AREA**

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

**LOCATION OF STREET SURVEY MONUMENT**
NOTES
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.
<table>
<thead>
<tr>
<th></th>
<th>COUNTY OF SAN DIEGO</th>
<th>PORT OF SAN DIEGO</th>
<th>OLD CITY OF SAN DIEGO STAFF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S.G.S. STAFF</td>
<td></td>
<td>OLD CITY OF SAN DIEGO STAFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(PRIOR TO MARCH 1963)</td>
</tr>
<tr>
<td>Highest Tide</td>
<td>6.12</td>
<td>9.00</td>
<td>0</td>
</tr>
<tr>
<td>Mean Higher Water</td>
<td>4.91</td>
<td>7.79</td>
<td>1.21</td>
</tr>
<tr>
<td>Mean High Water</td>
<td>2.73</td>
<td>5.61</td>
<td>3.39</td>
</tr>
<tr>
<td>Mean Sea Level</td>
<td>0</td>
<td>2.88</td>
<td>6.12</td>
</tr>
<tr>
<td>Mean Lower</td>
<td>2.88</td>
<td>0</td>
<td>9.00</td>
</tr>
<tr>
<td>Low Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest Tide</td>
<td>5.06</td>
<td>2.18</td>
<td>11.18</td>
</tr>
</tbody>
</table>

**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.
- Bay charts and topography up to the mean high tide based on zero at the mean lower low water.

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

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

SET MONUMENTS - Criteria for Locating and Character

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

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

SURVEY MONUMENTS

DRAWING NUMBER M-13
<table>
<thead>
<tr>
<th>Weight</th>
<th>1 Gram = 15,4324 grains</th>
<th>1 Grain = 0.0648 g.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Gram = 0.0353 oz.</td>
<td>1 Ounce = 28.3495 g.</td>
</tr>
<tr>
<td></td>
<td>1 Kg. = 2.2046 lb.</td>
<td>1 Pound = 0.4536 kg.</td>
</tr>
<tr>
<td></td>
<td>1 Kg. = 0.0011 ton</td>
<td>1 Ton = 907.1848 kg.</td>
</tr>
<tr>
<td></td>
<td>1 Ton (met) = 1.1023 ton</td>
<td>1 Ton = 0.9072 ton (met)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Volume</th>
<th>1 Cu. cm. = 0.0610 cu. in.</th>
<th>1 Cu in. = 16.3872 cu. cm.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Cu. m. = 35.3134 cu. ft.</td>
<td>1 Cu ft. = 0.0283 cu. m.</td>
</tr>
<tr>
<td></td>
<td>1 Cu. m. = 1.3079 cu. yd.</td>
<td>1 Cu yd. = 0.7646 cu. m.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
<th>1 Liter = 61.0250 cu. in.</th>
<th>1 Cu. in. = 0.0164 liter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Liter = 0.0353 cu. ft.</td>
<td>1 Cu. ft. = 26.3162 liters</td>
</tr>
<tr>
<td></td>
<td>1 Liter = 0.2642 gal. (U.S.)</td>
<td>1 Gal. = 3.7853 liters</td>
</tr>
<tr>
<td></td>
<td>1 Liter = 0.0284 bu. (U.S.)</td>
<td>1 Bu. = 35.2383 liters</td>
</tr>
</tbody>
</table>

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

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

**Temperature**

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

Degrees Centigrade = \(\frac{5}{9}\) (Degrees Fahrenheit - 32)
NOTES
1. Generally utilities are to be installed under the applicable specifications for the particular utility and the specifications of the owner agency.
2. The location of utilities as shown by the Standard Drawing shall in no way violate existing codes or regulations applicable to individual utilities.
3. Gas main to be placed on property side of trench. Electric primary should be diagonally opposite gas main where possible (Types D, E and F).
4. Installation of sewer and/or water utilities are not permitted in the joint trench shown above.
5. Minimum depth of gas pipe may, subject to gas company inspectors approval, be reduced to 24" where necessary to clear foreign structure crossings.
6. Depth and width of trench varies.
7. When approved by all utilities concerned secondary electric, telephone and CATV may be concurrently installed with random separation.
8. CATV main or trunk line conduit required along all streets, except cul-de-sac streets less than 2500' in length which may be served by feeder lines only.
9. CATV 1½" feeder conduit shall run across streets with each power service line and capped at edge of sidewalk.
10. All CATV terminals and conduits shall be terminated at generally accepted locations and marked. A map shall be filed with the appropriate agency showing the location of the CATV system.
11. In no case shall CATV conduits be placed within 12" of electric or gas lines. Also conduits are not to be placed directly over gas lines.
12. CATV conduit may be placed with the TELCO conduit provided the TELCO minimum depth is held.
13. Types A, B and C apply when an electric secondary conduit only is used. Types D, E and F apply when an electric primary (and secondary) conduit is used.

<table>
<thead>
<tr>
<th>Revision</th>
<th>By</th>
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<th>Date</th>
<th></th>
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<tbody>
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</tr>
</tbody>
</table>

SAN DIEGO REGIONAL STANDARD DRAWING

JOINT TRENCH UTILITIES LOCATION

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER M-15
1/4" Steel Plate welded to top and burrs removed

1/4" Expansion Joint

Back of curb or joint in walk

Concrete to be same as walk

18" Diameter

4" Diameter Steel Pipe

5" Diameter Steel Pipe Sleeve

HASP DETAIL
(Showing Welds)

Four links
Three links

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

5" Diameter Steel Pipe Sleeve

NOTES
1. Chain to be 1/4" 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.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

DEMOUNTABLE POST

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER M-16
ELEVATION

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

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

<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>2.375 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>
1. Drinking Fountain - Haws model 3376 or approved equal.
2. 3/8" dia. expansion anchors with flat (recessed heads) screws 4 places.
3. 1 1/4" P.V.C. pipe with sweep 90° ell connection to fountain drain.
4. 9 1/2" x 16" concrete yard box with hinged locking top (Brooks No. 3HL or equal) set on red brick foundation.
5. 4" x 40 lin. ft. perforated underdrain pipe, encased in crushed rock (3/4" size). Pipe to be A.D.S. or equal.
6. 1" gate valve with red brass cross handle and union. Install as per Std. Dwg. I-12
7. 2" dia. galv. pipe sleeve with red brass lock cap per Std. Dwg. I-12
8. Rigid copper pipe from gate valve to fountain assembly connection.
9. 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 1% 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

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

DRINKING FOUNTAIN

DRAWING NUMBER M-18
STREET LOCATIONS

FREeway LOCATION

MARKERS — Shall be blue 2-way stimsonite life-lite 88A8 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

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Chairman J.D. L tiles Oct 1982

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

Line post

Diagonal brace

Tension wires

2" Max.

Portland cement concrete

10'

END AND CORNER POST ASSEMBLY

Line post

Tension wires

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

1'

10'

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

Portland cement concrete

2" Cir.

10'

GATE ASSEMBLY

SAN DIEGO REGIONAL STANDARD DRAWING

CHAIN LINK FENCE DETAILS

DRAWING NUMBER M-20
SEWERAGE SYSTEMS
**SECTION B–B**

Manhole Frame and Cover, see drawing M-1.

**SECTION A–A**

Road Surface

**SECTION C–C**

Approved steel reinforced Polypropylene Step

**STEP DETAIL**

4" min.

14" min.

**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.

**LEGEND ON PLANS**

M.H. No. 2
NOTES:
1. Manhole frame and all joints shall be set in Class "C" mortar.
2. All precast components shall be manufactured in accordance with ASTM C-478.
3. Vertical wall of cone shall be on the upstream side of the manhole.
4. Concrete base shall be 560-C-3250.
5. Approved water stop required for plastic pipe connections.
6. Precast sections shall be used within dimension "A" as required, in order of preference listed:
   A. Cone (notched for pipe if dimension "A" is less than 3').
   B. 6" to 24" of 3' diameter grade rings.
   C. 5' diameter shaft to maximum height of 60'.
   D. Additional 3' diameter risers.
7. Flexible pipe joints shall be required within 12" of inside face of manhole except for plastic pipe.

LEGEND ON PLANS
M.H. No. 2

Manhole Frame and Cover see drawing M-3.
Section of 12" Metallic, Asbestos Cement or Plastic Pipe

12" Cast Iron Gate Cap

Top of Pavement

Approved Cap

12" 12"

560-C-3250 Concrete

Std. 1/8 Bend

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

Std. 1/8 Bend

Type A

Section of 12" Metallic, Asbestos Cement or Plastic Pipe

12" Cast Iron Gate Cap

Top of Pavement

Approved Cap

12" 12"

560-C-3250 Concrete

Std. 1/8 Bend

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

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.

SEWER

GATE CAP
(Heavy Duty)

LEGEND ON PLANS

S-3
TYPE A
STANDARD INSTALLATION

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.

TYPE B
ROCK TO SPRINGLINE

TYPE C
ROCK ENVELOPE
Trench Width

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

Trench Depth

Bell
Pipe O.D.

470-C-2000 Concrete

Invert Elevation

Concrete Block

SECTION

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

CONCRETE CRADLE

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Coordinator R.C.E. 1969

DRAWING NUMBER S-6
NOTE:
Encase pipe to the nearest flexible joint.
SECTION

LEGEND ON PLANS

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

SAN DIEGO REGIONAL STANDARD DRAWING

CONCRETE BACKFILL

DRAWING NUMBER S-8
Blocks to be laid as tightly as possible to downstream side of notch.

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

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

No. 3 wire ladder type reinforcement in all horizontal joints.
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.

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

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

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

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

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

Letter "S" stamped or chiseled in face of curb not less than 1 1/2" high and 3/16" deep.

Wire, #12 or heavier. Extend 2' to 3' above ground at time of backfill.

Surface of street

Top of curb measured at 2'

Angle variable

Maximum 45°

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

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

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

LEGEND ON PLANS

Revision By Approved Date

SAN DIEGO REGIONAL STANDARD DRAWING

HOUSE CONNECTION
(SEWER LATERAL)

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

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

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING
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.

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

CLEANOUT - SEWER FORCE MAIN
**SECTION B-B**

**SECTION C-C**

- **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 for the 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 the face of manhole (except for plastic pipe).
  7. Precast base permitted as approved by the Agency.
  8. Precast sections shall be used within dimension "A" as required, in order of preference listed:
     A. Cone (notched for pipe if dimension "A" is less than 3').
     B. 6" to 24" of 3' diameter grade rings.
     C. 4' diameter shaft to maximum height of 60'.
     D. Additional 3' diameter risers.

**LEGEND ON PLANS**

- M.H. No. 2
6" Metal tape
Install at top of pipe zone
or a maximum of 36" deep

SECTION

PLAN

Sewer

Laterai (Typical)

Metal tape

Sewer

No Tape

5'-0"

Varies

Min.
NOTES
1. Service clamp and gasket required on 4" A.C. pipe.
2. Tap not permitted in milled sections of A.C. pipe.

Water Main

TOP TAP
(where permitted by Agency)

Water Main

15°
12"R

12"R

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

1" W

SAN DIEGO REGIONAL STANDARD DRAWING

1" WATER SERVICE

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER W-1
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 (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).

LEGEND ON PLANS
2" 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
3. 90° Brass Street Ell
4. Pipe to Tubing Adaptor
5. Copper Tubing
6. Ball Valve
7. Brass Plug
8. Meter Box (see Standard Drawing W-15 for location).

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

1" AND 2" MANUAL AIR RELEASES

DRAWING NUMBER W-3
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° Els (not required in above metal ground enclosures).

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

1" AND 2" AIR AND VACUUM VALVES
See Drawing W-14 for type of Enclosures

Varies - See Plans
(or as approved by Agency)

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)

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

4" AND 6" AIR AND VACUUM VALVES

DRAWING NUMBER W-5
1. Bronze Service Clamp (double strap). On steel mains use clamp or weld on coupling as required by Agency. Install insulating bushing as required by Agency.
2. Bronze Corporation Stop (installed with key on side and open tap) and adaptor as required by Agency.
3. Copper Tubing
4. 90° Elb.
5. Pipe to Tubing Adaptor
6. Ball Valve
7. Brass 2" Iron Pipe Thread x 2 1/2" Hose Pipe Thread Adaptor.
8. 2 1/2" Hose Cap with chain, Brass.
9. Meter Box (see Standard Drawing W-15 for location).

Legend on Plans

San Diego Regional Standard Drawing

2" Blow-Off Assembly - Type A
1. Bronze Service Clamp (double strap) or Pretapped Coupling. On steel mains use clamp or weld on coupling as required by Agency. Install insulating bushing as required by Agency.

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

3. 45° Ell

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

5. 2" Valve

6. 2" Pipe

7. 90° Ell

8. 2" Threaded Cap


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

LEGEND ON PLANS
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.
7 Galvanized Iron Coupling, threaded.
8 Galvanized Iron Plug.
9 Gate Well Cap with 4” skirt.
10 Valve Well (see Standard Drawing W–12).

LEGEND ON PLANS

SAN DIEGO REGIONAL STANDARD DRAWING

4" AND 6" BLOW-OFF ASSEMBLIES
TYPE B

DRAWING NUMBER W-9
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

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

DRAWING NUMBER W-10

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. Hydrant shall be located 5' minimum from curb return and 3' minimum 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.

NOTE
Pipe sections shall be tack welded together.

NOTES
1. Clearance around cover shall permit lifting by hand without damage to pipe. Maximum clearance shall be 3/16".

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.
**PLAN**

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Dia (in.)</th>
<th>H (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot; &amp; 2&quot;</td>
<td>14&quot;</td>
<td>24&quot;</td>
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<tr>
<td>4&quot;</td>
<td>14&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>16&quot;</td>
<td>38&quot;</td>
</tr>
</tbody>
</table>

**TYPE A**

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 B**

**TYPE C**
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

Property Line

Curb
Meter Box
Sidewalk

TYPE C
NO CURB

Road Surface
Meter Box
Slope up

TYPE D
NO CURB

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.

Type-A Support Block

Type-B Thrust Block

Anchor = 5/8” dia. reinf. bars thus

Bricks under hub only

Bearing area as shown on Drawing W-18

Cross hatched area for key into trench wall.
Concrete shall be 470-C-2000.

# 5 bars

2" minimum cover

45°; 22 1/2°; 11 1/4°

<table>
<thead>
<tr>
<th>Pipe Nominal Dia</th>
<th>Cubic Ft. of Concrete Required per 100 P.S.I. Pressure*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>4</td>
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<td>27</td>
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<td>10</td>
<td>* *</td>
</tr>
<tr>
<td>12</td>
<td>* *</td>
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</tbody>
</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.

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.

470-C-2000 Concrete

#4 bar @ 9” O.C. both ways
1" Water service per Dwg W-1
2" 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.

<table>
<thead>
<tr>
<th>Service Connection</th>
<th>Main Connection Item 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
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</tr>
<tr>
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<td>4</td>
<td>2&quot;</td>
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<tr>
<td>5</td>
<td>2 1/2&quot;</td>
</tr>
<tr>
<td>6</td>
<td>3&quot;</td>
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</tbody>
</table>

SECTION A-A

ELEVATION
NOTE:
Contractor shall provide handholes as required to complete the work.
**SECTION**

1. Use 2" tape for depths of 30" or less.
2. Use 3" tape for depths greater than 30".

**PLAN**

Metal tape - Install at top of pipe zone or a maximum of 36" deep.

---

**SAN DIEGO REGIONAL STANDARD DRAWING**

**METALLIC TAPE LOCATOR**

**FOR NON-METALLIC WATER PIPE**

**DRAWING NUMBER** W-25
## INDEX

### -A-

<table>
<thead>
<tr>
<th>Description</th>
<th>Drawing No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR AND VACUUM VALVE</td>
<td></td>
</tr>
<tr>
<td>1&quot; and 2&quot;</td>
<td>W-4</td>
</tr>
<tr>
<td>4&quot; and 6&quot;</td>
<td>W-5</td>
</tr>
<tr>
<td>Enclosure</td>
<td>W-14</td>
</tr>
<tr>
<td>AIR RELEASE VALVE</td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>W-3</td>
</tr>
<tr>
<td>ALLEY</td>
<td></td>
</tr>
<tr>
<td>Apron, Concrete</td>
<td>G-17</td>
</tr>
<tr>
<td>Concrete, Pavement</td>
<td>G-21</td>
</tr>
<tr>
<td>ANCHOR, PIPE</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>S-9</td>
</tr>
<tr>
<td>Thrust</td>
<td>W-22</td>
</tr>
<tr>
<td>Valve</td>
<td>W-19</td>
</tr>
<tr>
<td>Vertical Bend</td>
<td>W-20</td>
</tr>
</tbody>
</table>

### -B-

<table>
<thead>
<tr>
<th>Description</th>
<th>Drawing No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACKFILL, PIPE TRENCH</td>
<td></td>
</tr>
<tr>
<td>Irrigation</td>
<td>1-25, 1-26</td>
</tr>
<tr>
<td>Sewer</td>
<td>S-4, S-5,</td>
</tr>
<tr>
<td>Storm Drain</td>
<td>D-60</td>
</tr>
<tr>
<td>Water Main</td>
<td>W-21</td>
</tr>
<tr>
<td>BACKFLOW PREVENTER</td>
<td></td>
</tr>
<tr>
<td>Continuous Pressure</td>
<td>1-8, 1-9</td>
</tr>
<tr>
<td>Reduced Pressure</td>
<td>1-31</td>
</tr>
<tr>
<td>Vacuum Breaker</td>
<td>1-7</td>
</tr>
<tr>
<td>BARRICADE, STREET</td>
<td>M-9</td>
</tr>
<tr>
<td>BENCH MARK, BRASS PLUG.</td>
<td>M-11</td>
</tr>
<tr>
<td>BERM, ASPHALT CONCRETE</td>
<td>G-5</td>
</tr>
<tr>
<td>BLOCK, CONCRETE</td>
<td></td>
</tr>
<tr>
<td>Anchor</td>
<td>W-20, W-22</td>
</tr>
<tr>
<td>Thrust</td>
<td>W-17, W-22</td>
</tr>
<tr>
<td>Valve</td>
<td>W-19</td>
</tr>
<tr>
<td>BLOW-OFF, WATER</td>
<td></td>
</tr>
<tr>
<td>2&quot;</td>
<td>W-6, W-7</td>
</tr>
<tr>
<td>4&quot; and 6&quot;</td>
<td>W-8, W-9</td>
</tr>
<tr>
<td>BROW DITCH.</td>
<td>D-75</td>
</tr>
</tbody>
</table>

### -C-

<table>
<thead>
<tr>
<th>Description</th>
<th>Drawing No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUTT STRAP, SPLIT</td>
<td>W-24</td>
</tr>
<tr>
<td>CATCH BASIN</td>
<td></td>
</tr>
<tr>
<td>Corrugated Steel Pipe,</td>
<td></td>
</tr>
<tr>
<td>Type A, B</td>
<td>D-16</td>
</tr>
<tr>
<td>Grate Top, Type G, I</td>
<td>D-8, D-29</td>
</tr>
<tr>
<td>Side Opening, Type F</td>
<td>D-7</td>
</tr>
<tr>
<td>CHANNEL, DRAINAGE</td>
<td></td>
</tr>
<tr>
<td>Cutoff Wall</td>
<td>D-72</td>
</tr>
<tr>
<td>Debris Fence</td>
<td>D-82</td>
</tr>
<tr>
<td>Earthen</td>
<td>D-74</td>
</tr>
<tr>
<td>Lined, Concrete</td>
<td>D-70, D-71</td>
</tr>
<tr>
<td>Pipe Connection</td>
<td>D-73</td>
</tr>
<tr>
<td>CLEANOUT</td>
<td></td>
</tr>
<tr>
<td>Sewer, Force Main</td>
<td>S-16</td>
</tr>
<tr>
<td>Sewer, Gravity</td>
<td>S-3</td>
</tr>
<tr>
<td>Storm Drain, Type A, B</td>
<td>D-9, D-10</td>
</tr>
<tr>
<td>Storm Drain, Notes and Details</td>
<td>D-11</td>
</tr>
<tr>
<td>CONCRETE</td>
<td></td>
</tr>
<tr>
<td>Backfill, Sewer</td>
<td>S-8</td>
</tr>
<tr>
<td>Collar, Pipe</td>
<td>D-62</td>
</tr>
<tr>
<td>Cradle, Sewer</td>
<td>S-6</td>
</tr>
<tr>
<td>Encasement, Sewer</td>
<td>S-7, S-12</td>
</tr>
<tr>
<td>Lug, Pipe</td>
<td>D-63</td>
</tr>
<tr>
<td>Mowing Strip</td>
<td>L-3</td>
</tr>
<tr>
<td>Removal and Replacement</td>
<td>G-11</td>
</tr>
<tr>
<td>CORRUGATED STEEL PIPE</td>
<td></td>
</tr>
<tr>
<td>Inlets, Type A, B</td>
<td>D-16, D-17</td>
</tr>
<tr>
<td>Slotted Drain</td>
<td>D-18, D-19</td>
</tr>
<tr>
<td>CULVERT, BOX</td>
<td></td>
</tr>
<tr>
<td>Double</td>
<td>D-77</td>
</tr>
<tr>
<td>Miscellaneous Details</td>
<td>D-81</td>
</tr>
<tr>
<td>Single</td>
<td>D-76</td>
</tr>
<tr>
<td>Triple</td>
<td>D-78</td>
</tr>
<tr>
<td>Wingwalls, Type A, B &amp; C.</td>
<td>D-79</td>
</tr>
<tr>
<td>Wingwalls, Warped</td>
<td>D-80</td>
</tr>
<tr>
<td>CURB AND GUTTER</td>
<td></td>
</tr>
<tr>
<td>Combined</td>
<td>G-2</td>
</tr>
<tr>
<td>Median</td>
<td>G-6</td>
</tr>
<tr>
<td>INDEX</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Monolithic With Sidewalk</strong></td>
<td>Drawing No.</td>
</tr>
<tr>
<td></td>
<td>G-3</td>
</tr>
<tr>
<td><strong>Removal and Replacement</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ralled</strong></td>
<td>G-4</td>
</tr>
<tr>
<td><strong>Separate</strong></td>
<td>G-1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CURB INLET</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Apron, Concrete: D-20</td>
</tr>
<tr>
<td>Grate: D-15</td>
</tr>
<tr>
<td>Median, Type J: D-45</td>
</tr>
<tr>
<td>Notes and Details: D-11</td>
</tr>
<tr>
<td>Opening: D-12</td>
</tr>
<tr>
<td>Side Opening Only: D-1, D-2, D-4</td>
</tr>
<tr>
<td>Side Opening w/Grate: D-3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CURB OUTLET</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete, Type A: D-25</td>
</tr>
<tr>
<td>Pipe: D-27</td>
</tr>
</tbody>
</table>

| **Curtain Wall** | D-38 |

<table>
<thead>
<tr>
<th><strong>Cutoff Wall</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alley Pavement: G-23</td>
</tr>
<tr>
<td>Channel: D-72</td>
</tr>
<tr>
<td>Street Pavement: G-22</td>
</tr>
<tr>
<td>Trench: S-10</td>
</tr>
</tbody>
</table>

| **Datums** | M-12 |

| **Debris Fence** | D-82 |

| **DiKe, A.C.** | G-5 |

<table>
<thead>
<tr>
<th><strong>Dissipator, Energy</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete: D-41, D-42, D-43</td>
</tr>
<tr>
<td>Rip Rap: D-40</td>
</tr>
</tbody>
</table>

| **Ditch; Brow, Terrace** | D-75 |

<table>
<thead>
<tr>
<th><strong>DownDrain</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt Concrete: D-22</td>
</tr>
<tr>
<td>Flume: D-23</td>
</tr>
<tr>
<td>Pipe: D-24</td>
</tr>
</tbody>
</table>

| **Drinking Fountain** | M-18 |

| **Electrical Equipment, Pedestal** | E-33 |

<table>
<thead>
<tr>
<th><strong>EncaSement</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewer Pipe: S-7</td>
</tr>
<tr>
<td>Sewer Pipe, Undercut: S-12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fence</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain Link: M-6</td>
</tr>
<tr>
<td>Debris Fence: D-82</td>
</tr>
<tr>
<td>Details: M-20</td>
</tr>
<tr>
<td>Tennis Court: M-17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fire Hydrant</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; Hydrant: W-10</td>
</tr>
<tr>
<td>Locations: W-11</td>
</tr>
<tr>
<td>Markers: M-19</td>
</tr>
</tbody>
</table>

| **Flume Down Drain** | D-23 |

<table>
<thead>
<tr>
<th><strong>Frame</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grate: D-13</td>
</tr>
<tr>
<td>Manhole: M-1, M-2, M-3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Grate</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage: D-15</td>
</tr>
<tr>
<td>Frame: D-13</td>
</tr>
<tr>
<td>Tree Well: L-4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Guard Rail, Metal Ream</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Details: M-8</td>
</tr>
<tr>
<td>Installation: M-7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Gutter</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross: G-12</td>
</tr>
<tr>
<td>Cross, Mid-Block: G-13</td>
</tr>
</tbody>
</table>
INDEX

- H -

HEADWALL
Gravity Type. .................. D-32, D-33
L Type. .................. D-36, D-37
Straight, Type A, B. .............. D-30, D-31
Warped. .................. D-44
Wing and U Type .................. D-34, D-35

HYDRANT MARKERS, FIRE ............. M-19

- I -

INLET APRON .................. D-39

INLET, DRAIN
Corrugated Steel Pipe,
Type A & B. .............. D-16, D-17
Slotted,
Corrugated Steel Pipe ... D-18, D-19

- J -

JOINT TRENCH .............. M-15

- L -

LATERAL
Sewer .................. S-13
Sewer, Deep Cut ............ S-14
Sewer, Repair ............. S-15
Water .................. W-1, W-2

LIGHTING
Grounding .................. E-2
Standard ................. E-1

LUG, CONCRETE .......... D-62

- M -

MANHOLE, FRAME AND COVER
24" Heavy Duty. ............. M-1
24" Light Duty. ............... M-2
36" Two Concentric Covers .... M-3
Locking Device. ............. M-4

MANHOLE, SEWER
4' x 2' Diameter .................. S-1
4' x 3' Diameter .................. S-17
5' x 3' Diameter .................. S-2

MEDIAN CURB INLET ........ D-45

METER BOX LOCATION ............. W-15

METRIC EQUIVALENTS ........ M-14

MONUMENT
Bench Mark. ............. M-11
Street Survey ........... M-10
Survey .................. M-13

MOWING STRIP, CONCRETE ........ L-3

- P -

PAVEMENT, CONCRETE
Alley Section ........... G-21
Joints .................. G-10
Width 40' or Less ....... G-18
Width 40' to 62' ......... G-19
Width 63' to 69' .......... G-20

PEDESTAL, ELECTRICAL EQUIP. .. E-33

PIPE
Collar .................. D-62
Lug .................. D-63
Rounded Ends .......... D-61
Slotted .............. D-18, D-19

PLANTING, TREE AND SHRUB. ... L-1, L-2

POST
Demountable ............. M-16
Guard .................. M-9
Protection ........... W-16

PULL BOX .................. V-15

- R -

RAILING, METAL BEAM ......... M-7, M-8
<table>
<thead>
<tr>
<th>INDEX</th>
<th>Drawing No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAMP, PEDESTRIAN.</td>
<td>G-27, G-28,</td>
</tr>
<tr>
<td></td>
<td>G-29, G-30,</td>
</tr>
<tr>
<td></td>
<td>G-31</td>
</tr>
<tr>
<td>General Notes</td>
<td>G-32</td>
</tr>
<tr>
<td>RETAINING WALL</td>
<td>C-11, C-12,</td>
</tr>
<tr>
<td></td>
<td>C-13, C-14,</td>
</tr>
<tr>
<td></td>
<td>C-10</td>
</tr>
<tr>
<td>Details, Concrete</td>
<td>C-7, C-8</td>
</tr>
<tr>
<td>Details, Gravity</td>
<td>C-9</td>
</tr>
<tr>
<td>Details, Masonary</td>
<td>C-1, C-2,</td>
</tr>
<tr>
<td></td>
<td>C-3, C-4,</td>
</tr>
<tr>
<td></td>
<td>C-5, C-6</td>
</tr>
<tr>
<td>SEWER LATERAL</td>
<td>S-13, S-14</td>
</tr>
<tr>
<td>SIDEWALK</td>
<td>D-27</td>
</tr>
<tr>
<td>Drain Outlet</td>
<td>G-10</td>
</tr>
<tr>
<td>Joint Details</td>
<td>G-9</td>
</tr>
<tr>
<td>Joint Locations</td>
<td>G-3</td>
</tr>
<tr>
<td>Monolithic Curb</td>
<td>D-27</td>
</tr>
<tr>
<td>Pipe Underdrain</td>
<td>G-11</td>
</tr>
<tr>
<td>Removal and Replacement</td>
<td>G-3, G-7</td>
</tr>
<tr>
<td>SPRINKLER</td>
<td>I-21, I-22,</td>
</tr>
<tr>
<td></td>
<td>I-23</td>
</tr>
<tr>
<td>Above Ground Installation</td>
<td>I-17, I-18,</td>
</tr>
<tr>
<td>Controller Mounting</td>
<td>I-28, I-29,</td>
</tr>
<tr>
<td>Connection, Manifold</td>
<td>I-1</td>
</tr>
<tr>
<td>Head, Fixed Spray</td>
<td>I-3</td>
</tr>
<tr>
<td>Head, Pop Up Rotary</td>
<td>I-2</td>
</tr>
<tr>
<td>Head, Pop Up Spray</td>
<td>I-19, I-30,</td>
</tr>
<tr>
<td>Pull Box, Electrical</td>
<td>I-15</td>
</tr>
<tr>
<td>Trench Detail</td>
<td>I-25, I-26</td>
</tr>
<tr>
<td>STAKING, TREE</td>
<td>L-2</td>
</tr>
<tr>
<td>STREET LIGHT</td>
<td>E-2</td>
</tr>
<tr>
<td>Foundation</td>
<td>E-2</td>
</tr>
<tr>
<td>Grounding</td>
<td>E-1</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>TAPE LOCATOR, METALLIC</td>
<td>S-19</td>
</tr>
<tr>
<td>Sewer Pipe</td>
<td>W-25</td>
</tr>
<tr>
<td>Water Pipe</td>
<td></td>
</tr>
<tr>
<td>TENNIS COURT FENCE</td>
<td>M-17</td>
</tr>
<tr>
<td>TERRACE DITCH</td>
<td>D-75</td>
</tr>
<tr>
<td>THRUST ANCHORS</td>
<td>W-18</td>
</tr>
<tr>
<td>Bearing Area</td>
<td>W-17, W-19,</td>
</tr>
<tr>
<td>Concrete</td>
<td>W-20, W-22</td>
</tr>
<tr>
<td>TRENCH DETAILS</td>
<td>I-25, I-26,</td>
</tr>
<tr>
<td>Irrigation</td>
<td>M-15</td>
</tr>
<tr>
<td>Joint Utilities</td>
<td>G-33, G-34,</td>
</tr>
<tr>
<td></td>
<td>G-35</td>
</tr>
<tr>
<td>Narrow</td>
<td>G-24, G-25,</td>
</tr>
<tr>
<td>Resurfacing</td>
<td>S-4, S-5,</td>
</tr>
<tr>
<td>Sewer</td>
<td>S-18</td>
</tr>
<tr>
<td>Storm Drain</td>
<td>D-60</td>
</tr>
<tr>
<td>Water Main</td>
<td>W-21</td>
</tr>
<tr>
<td>UNDERDRAIN, SIDEWALK</td>
<td>D-27</td>
</tr>
<tr>
<td>Pipe</td>
<td>D-25</td>
</tr>
<tr>
<td>Concrete, Reinforced</td>
<td></td>
</tr>
<tr>
<td>VALVE, SPRINKLER</td>
<td>I-10, I-11,</td>
</tr>
<tr>
<td>Check</td>
<td>I-12</td>
</tr>
<tr>
<td>Gate</td>
<td>I-6</td>
</tr>
<tr>
<td>Hose Bibb</td>
<td>I-13, I-21,</td>
</tr>
<tr>
<td>Manual</td>
<td>I-14</td>
</tr>
<tr>
<td>Remote Control</td>
<td>I-5, I-22,</td>
</tr>
<tr>
<td>Quick Coupling</td>
<td>I-27</td>
</tr>
<tr>
<td>Well</td>
<td></td>
</tr>
<tr>
<td>VALVE, WATER</td>
<td>W-4, W-5</td>
</tr>
<tr>
<td>Air and Vacuum</td>
<td>W-19</td>
</tr>
<tr>
<td>Blocking, Concrete</td>
<td>W-14</td>
</tr>
<tr>
<td>Enclosure, Air and Vacuum</td>
<td>W-13</td>
</tr>
<tr>
<td>Stem Extension</td>
<td>W-12</td>
</tr>
<tr>
<td>Well Installation</td>
<td></td>
</tr>
<tr>
<td>WATER SERVICE</td>
<td>Drawing No.</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>1&quot;</td>
<td>W-1</td>
</tr>
<tr>
<td>1-1/2&quot; and 2&quot;</td>
<td>W-2</td>
</tr>
<tr>
<td>Multiple</td>
<td>W-23</td>
</tr>
</tbody>
</table>
## COUNTY OF SAN DIEGO

### INDEX OF DESIGN STANDARDS

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS-1</td>
<td>Typical Roadway Sections</td>
</tr>
<tr>
<td>DS-2</td>
<td>Hillside Residential Street, Alt. No. 1</td>
</tr>
<tr>
<td>DS-3</td>
<td>Hillside Residential Street, Alt. No. 2</td>
</tr>
<tr>
<td>DS-4</td>
<td>Hillside Residential Street, Alt. No. 3</td>
</tr>
<tr>
<td>DS-5</td>
<td>Temporary Turn-Around at Dead-End Street</td>
</tr>
<tr>
<td>DS-6</td>
<td>Turn-Around and Calculations</td>
</tr>
<tr>
<td>DS-7</td>
<td>Asphalt Concrete Driveway</td>
</tr>
<tr>
<td>DS-8</td>
<td>Lot Grading</td>
</tr>
<tr>
<td>DS-9</td>
<td>Fencing, Cut Banks</td>
</tr>
<tr>
<td>DS-10</td>
<td>Grading of Slopes</td>
</tr>
<tr>
<td>DS-11</td>
<td>Required Setbacks</td>
</tr>
<tr>
<td>DS-12</td>
<td>Construction Plan Symbols</td>
</tr>
<tr>
<td>DS-13</td>
<td>Standard Street Sign</td>
</tr>
<tr>
<td>DS-14</td>
<td>Dip Section (For Private Streets)</td>
</tr>
<tr>
<td>DS-15</td>
<td>Street Knuckle</td>
</tr>
</tbody>
</table>
## TYPICAL ROADWAY SECTION
### SYMMETRICAL ABOUT CENTERLINE

<table>
<thead>
<tr>
<th>TYPE OF ROAD OR STREET</th>
<th>R/W</th>
<th>ROADBED</th>
<th>TRAVELED WAY</th>
<th>SHOULDER</th>
<th>MEDIAN</th>
<th>TRAVELED WAY</th>
<th>SHOULDER</th>
<th>PARKWAY STRIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIME ARTERIAL</td>
<td>126'</td>
<td>10'6'</td>
<td>36'</td>
<td>8'</td>
<td>18'</td>
<td>10'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAFFIC VOLUME OF 16,000 V.P.D. OR MORE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAJOR ROAD</td>
<td>102'</td>
<td>8'2'</td>
<td>24'</td>
<td>6'</td>
<td>18'</td>
<td>10'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAFFIC VOLUME 10,000 TO 16,000 V.P.D.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLLECTOR ROAD</td>
<td>84'</td>
<td>6'4'</td>
<td>24'</td>
<td>0'</td>
<td>10'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAFFIC VOLUME 5,000 TO 10,000 V.P.D.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESIDENTIAL COLLECTOR STREET</td>
<td>60'</td>
<td>4'0'</td>
<td>12'</td>
<td>6'</td>
<td>0'</td>
<td>10'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAFFIC VOLUME 150 TO 700 DWELLING UNITS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESIDENTIAL STREET</td>
<td>58'</td>
<td>3'6'</td>
<td>12'</td>
<td>6'</td>
<td>0'</td>
<td>10'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAFFIC VOLUME 150 DWELLING UNITS OR LESS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESIDENTIAL CUL-DE-SAC STREET</td>
<td>52'</td>
<td>3'2'</td>
<td>12'</td>
<td>4'</td>
<td>0'</td>
<td>10'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAFFIC VOLUME 30 DWELLING UNITS OR LESS, 600' MAX LENGTH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESIDENTIAL LOOP STREET</td>
<td>52'</td>
<td>3'2'</td>
<td>12'</td>
<td>4'</td>
<td>0'</td>
<td>10'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAFFIC VOLUME 30 DWELLING UNITS OR LESS, 600' MAX LENGTH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM. &amp; IND. COLLECTOR STREET</td>
<td>88'</td>
<td>6'8'</td>
<td>24'</td>
<td>10'</td>
<td>0'</td>
<td>10'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAFFIC VOLUME FROM COMMERCIAL OR INDUSTRIAL STS.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM. &amp; IND. STREET</td>
<td>72'</td>
<td>5'2'</td>
<td>16'</td>
<td>10'</td>
<td>0'</td>
<td>10'</td>
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<tr>
<td>TRAFFIC VOLUME FROM ABUTTING COMMERCIAL LOTS</td>
<td></td>
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<tr>
<td>COMM. &amp; IND. CUL-DE-SAC STREET</td>
<td>72'</td>
<td>5'2'</td>
<td>16'</td>
<td>10'</td>
<td>0'</td>
<td>10'</td>
<td></td>
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<tr>
<td>TRAFFIC VOLUME FROM ABUTTING COMMERCIAL LOTS</td>
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</tr>
<tr>
<td>FRONTAGE ROAD</td>
<td>SEE NOTE 4</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ADJACENT TO FREEWAY RIGHT OF WAY</td>
<td></td>
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</table>

### NOTE:
1. STREET CLASSIFICATIONS (EXCEPT PRIME ARTERIAL) AND TYPICAL ROADWAY SECTIONS FROM SAN DIEGO COUNTY TECHNICAL ROAD POLICY (WAL. 9-1964).
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 Roadway Requirements.
4. A Frontage Road adjacent to Freeway R/W, Traveled Way and Median Standard for Road Classification and/or Traffic Volume, Shoulder Adjacent to Freeway 2', Parkway Strip Adjacent to Freeway varies from 4' to 10'.

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**SAN DIEGO COUNTY DESIGN STANDARD**

**TYPICAL ROADWAY SECTIONS**

**REVISION BY APPROVED DATE**

FORMERLY STANDARD DRAWING 310-3

**NUMBER DS-1**
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 80% OF THE LOTS HAVE A NET AREA NOT LESS THAN 20,000 SQUARE FEET.
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 90% 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.

SAN DIEGO COUNTY DESIGN STANDARD
HILLSDIE RESIDENTIAL STREET
ALTERNATE No. 2
NUMBER DS-3
PLANS

Typical Roadway Section

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 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 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

| $R_W$ | A | B | C | D | $\triangle$ | $R_{curb}$ | L | T | R | L | T | R | L | T | R | L | T | $\triangle$ |
|-------|---|---|---|---|-----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|-----------|
| 52'   | 26' | 16' | 10' | 5095 | 46°42'30" | 32' | 26.09 | 13.82 | 22' | 17.93 | 9.50 | 273°25'00" | 38' | 181.34 | 48' | 223.06 |
| 56'   | 29' | 18' | 10' | 5099 | 42°50'00" | 37' | 27.66 | 14.52 | 27' | 20.18 | 10.59 | 265°40'00" | 38' | 176.20 | 48' | 222.56 |
| 60'   | 30' | 20' | 10' | 6815 | 29°35'31" | 100' | 51.65 | 26.44 | 90' | 46.46 | 23.77 | 229°11'02" | 38' | 158.63 | 48' | 200.38 |
| 72'   | 36' | 26' | 10' | 8139 | 32°51'36" | 100' | 57.35 | 29.46 | 90' | 51.62 | 26.54 | 245°43'12" | 50' | 214.43 | 60' | 257.32 |

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**San Diego County Design Standard**

**Turnaround and Calculations**

**Recommended by:**

**Approved by County Engineer:**

**Checked by:**

**Drawn by:**

**Date:** 2/7/76

**Revision by:**

**Approved Date:**

**Formerly Standard Drawing:** 3-04-3

**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 3-14 FOR CONCRETE DRIVEWAYS.

4. SEE STANDARD DRAWING 6-15 & 6-16 FOR LOCATION & WIDTH REQUIREMENTS.
NOTES:
1. ELEV. 4 IS TO BE DETERMINED FOR THE MOST REMOTE CORNER OF THE LOT FROM THE DRAIN POINT. ELEV. 4 = ELEV. B PLUS 1/8 TIMES ONE-HALF THE PERIMETER OF THE LOT.
2. MIN. 1% SLOPE 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 5 TO 1 SLOPE RATIO, AND ALONG THE TOP OF WALLS EXCEEDING 4' VERTICAL HEIGHT.

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

ALL FILL MUST BE COMPACTED TO A MINIMUM OF 90% OF THE MAXIMUM DENSITY WITH THE EXCEPTION OF THE OUTER 6' OF THE SLOPE SURFACE WHICH MAY BE GRIT ROLLED TO 85% DENSITY.

TYPICAL FILL SLOPE

SAN DIEGO COUNTY DESIGN STANDARD

GRADING OF SLOPES

Table 1

<table>
<thead>
<tr>
<th>H FEET</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 15'</td>
<td>3'</td>
</tr>
<tr>
<td>OVER 15'</td>
<td>3'</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>H FEET</th>
<th>L FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>0' - 5'</td>
<td>-</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>
PROPERTY LINE SETBACKS

PROPERTY LINE

BUILDING SETBACKS

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'</td>
<td>6'</td>
<td>3'</td>
</tr>
<tr>
<td>15 - 30</td>
<td>3'</td>
<td>3'</td>
<td>5'</td>
</tr>
<tr>
<td>OVER 30</td>
<td>5'</td>
<td>5'</td>
<td>5'</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.

SAN DIEGO COUNTY DESIGN STANDARD

REQUIRED SETBACKS

REVISION BY APPROVED DATE
FORMERLY STANDARD DRAWING 209
NUMBER DS-11
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.

POST CAP DETAIL

Curb and Sidewalk Width Setback
Contiguous 6' or less Sidewalk Width
Contiguous more than 6' 2'-0"
Separate — 2'-0"

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.)

SETBACK (SEE TABLE)
Slope to 1/4" above grade

10" diameter footing of 564-C-3000 concrete

MINOR STREET
TO METROPOLITAN AREA OR HIGHER TYPE ROAD

STREET NAME SIGN LOCATION
(numbers indicate priority of location selection)

NOTES
1. 4 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.

SAN DIEGO COUNTY DESIGN STANDARD

STANDARD STREET SIGN

DRAWN BY
CHECKED BY
RECOMMENDED BY
APPROVED BY COUNTY ENGINEER

DATE 10/24/76

REVISION BY APPROVED DATE
FORMERLY STANDARD DRAWING 30-XC
NUMBER DS-13
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>
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<tr>
<td>56'</td>
<td>36'</td>
<td>64'</td>
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<td>52'</td>
<td>32'</td>
<td>60'</td>
<td>30'</td>
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</tr>
<tr>
<td>48'</td>
<td>28'</td>
<td>56'</td>
<td>30'</td>
<td>10'</td>
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</table>

* DIMENSIONS SHOWN ARE MINIMUMS

SAN DIEGO COUNTY DESIGN STANDARD

STREET KNUCKLE

NUMBER DS-15