# BOOK LISTING

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PREFACE

This Guidelines and Standards Book contains information to assist planners and engineers with the design and construction of water facilities. The City's intent is to ensure uniformity of design concepts, formats, methodologies, procedures, construction materials, types of equipment and quality of work products. These standards have been produced and adopted to encourage exceptional quality while using current technology for all Water Department facilities.

These Guidelines and Standards are not a substitute for good engineering. Sound judgement must be exercised in all applications to create quality and cost efficient facilities.

Water Department management encourages the creation of relationships between project stakeholders that promotes engineering excellence and timely completion of projects. City staff and consultants are encouraged to take the time at the beginning of all projects to identify common goals, common interests, lines of communication, and a commitment to cooperative problem solving.

LARRY GARDNER
Water Department Director
## Revision Table

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<td>Pipe Clamp for Individual Pipes</td>
</tr>
<tr>
<td>M 418</td>
<td>Pipe Support for Individual Pipes</td>
</tr>
<tr>
<td>M 419</td>
<td>Drainage Sump with Duplex Pumps</td>
</tr>
<tr>
<td>M 420</td>
<td>Air Intake or Relief Vent</td>
</tr>
<tr>
<td>M 421</td>
<td>Power Roof Ventilator</td>
</tr>
<tr>
<td>M 422</td>
<td>Air Duct Details</td>
</tr>
<tr>
<td>M 423</td>
<td>Pressure Gauge and Pressure Switch, Metal Pipe Mounted</td>
</tr>
<tr>
<td>M 424</td>
<td>Pressure Gauge or Pressure Switch, Metal Pipe Mounted</td>
</tr>
</tbody>
</table>

**Electrical**

| E 501 | Fixture Mounting Details |
| E 502 | Typical Pullbox |
| E 503 | Typical Duct Bank |
| E 504 | Duct Bank Expansion |
| E 505 | Conduit Placement |
| E 506 | Pedestal Mounted Disconnect |
| E 507 | Expansion Coupling |
| E 508 | Conduit Termination for Equipment |
| E 509 | Ground Rod and Well Installation |
| E 510 | Wall Hung Fixture Mounting |
| E 511 | Switchgear/MCC/Panel Grounding |
| E 512 | Fence Grounding |
| E 513 | Cable to Rod Connection |
| E 514 | Switchboard MCC Mounting |
| E 515 | Receptacle Installation on Concrete |

**Instrumentation**

| I 601 | Ultrasonic Level Indication Tank Installation |
| I 602 | Ultrasonic Transmitter Installation Details |
| I 603 | Level Transmitter-Remote Mtd. Atmospheric Reference |
| I 604 | Flow Transmitter-Line Mtd. Liquid Service |
| I 605 | Pressure Transmitter-Line Mtd. Liquid Service |
| I 606 | Pressure Transmitter-Remote Mtd. Liquid Service |
| I 607 | Pressure Switch-Remote Mtd. Liquid Service |
| I 608 | Pressure Switch w/Gauge Liquid Service |
| I 609 | D/P Transmitter-Remote Mtd. Liquid Service |
| I 610 | D/P Transmitter w/Gauge Liquid Service |
| I 611 | Instrument Installation Detail D/P Indicator-Remote Mounted |
| I 612 | Flow Transmitter-Remote Mounted Liquid Service |
| I 613 | Flow Transmitter-Remote Mounted Liquid Service-Above Taps |
| I 614 | Instrument Air Supply Takeoff q/ Filter Regulator |
| I 615 | Ball Float Switch |
| I 616 | Flood Alarm Switch |
| I 617 | Float Switch |
| I 618 | Instrument Support Single Mounting |
| I 619 | Instrument Support Double Mounting |
| I 620 | Instrument Support Single Column Mounting |
| I 621 | Instrument Support 2" Line Mount Above-Clamp |
| 622 | Instrument Support 3"-14" Line Mount |
| 623 | Typical Piping / Tubing Support |
| 624 | Typical Pneumatic Tubing Support |
| 625 | Tubing Support Raceway Detail |
| 626 | Ventilated Telemetry Cabinet |
| 627 | Wall Mounted Telemetry Cabinet |
| 628 | Grade mounted Telemetry Cabinet |
| 629 | Pole Mounted Directional Antenna |
| 630 | Magnetic Flowmeter, Transmitter, and Ultrasonic Generator |
| 631 | Magnetic Flowmeter, Transmitter and Ultrasonic Generator and Zero Return Unit |

**Corrosion Control**

| 701 | Flush Mounted Coupon Test Station |
| 702 | Post Mounted Coupon Test Station |
| 703 | Coupon Detail |
| 704 | Polarization Cell |
| 705 | Test Station Housing |
| 706 | Exothermic Weld |
| 707 | Test Stations for Insulating Joint Inside Vault |
| 708 | Test Stations for Insulating Joint, Direct Burial |
| 709 | Test Station for Foreign Pipeline Crossing |
| 710 | Galvanic Anode Test Station |
| 711 | Galvanic Anode Lead to Drain Cable Connection |
| 712 | Above Grade Galvanic Anode Junction Box |
| 713 | Alternative Anode Vent Pipe |
| 714 | Galvanic Ribbon Anode Test Station Post Mounted |
| 715 | Dielectric Insulating Flange and Union |
| 716 | Terminal Box for Galvanic Anodes, Post Mounted |
| 717 | Galvanic Ribbon Anode and Wire Splices |
| 718 | Rectifier and Anode Junction Box Installation Detail |
| 719 | Deep Well Anode Bed |
| 720 | Anode Wellhead Assembly Detail |
| 721 | Impressed Current Deep Well Anode Junction Box |
| 722 | Impressed Current Anode Surface Bed |
| 723 | Cable Identifier |
| 724 | AC Electrical Splice Box |
| 725 | Pipeline Ground |
The standard and guide details have been prepared to be incorporated into Water Department project drawings. The details are available in electronic format and have been developed in Microstation. These details are typically inserted in detail sheets by discipline.

Related References

In the development of Book 3, the City of San Diego Standard Drawings were referenced. The City of San Diego Standard Drawings include all of the San Diego Area Regional Standard Drawings, as developed by the San Diego Regional Standards Committee, plus those additional standard drawings which are unique to public works construction in the City of San Diego.

Book 2 – Facility Design Guidelines criteria on storage facilities, transmission and distribution pipelines and pumping stations were reviewed in conjunction with these drawings.

Book 4 – Standard and Guide Specifications should be reviewed in conjunction with Book 3, Standard and Guide Details to ensure that the material requirements and other requirements are the same.

Book 5 – CADD Standards describes the standard G-sheets including site plan, abbreviations, symbols, and the standard border. Information on the drawing requirements are included in Book 5.

Revisions

Revisions to these standards or new details will be accepted for review. These should be submitted to the CIP Program Manager at the Water Department following the deviation procedure described in Book 1, General Design Guidelines. Any revisions made to the drawings will be indicated in the revision list at the front of this book.

The DESIGN CONSULTANTS are responsible for the designs and must resolve all conflicts, inconsistencies, errors and omissions in any conflicting or inconsistent guidelines and standards to ensure that the completed designs meet the standards.

Numbering Procedures

The standard detail drawings for the CIP are identified by a single discipline letter and a three digit drawing number. To discern between drawing types, the drawing numbers are also grouped according to subject. The table below summarizes the numbering scheme. Note that the corrosion control details are regarded as civil drawings but have been assigned 700 series drawing numbers to denote the specialized nature of their contents.
<table>
<thead>
<tr>
<th>Discipline</th>
<th>Letter Designator</th>
<th>Drawing Number Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil</td>
<td>C</td>
<td>100’s</td>
</tr>
<tr>
<td>Architectural</td>
<td>A</td>
<td>200’s</td>
</tr>
<tr>
<td>Structural</td>
<td>S</td>
<td>300’s</td>
</tr>
<tr>
<td>Mechanical</td>
<td>M</td>
<td>400’s</td>
</tr>
<tr>
<td>Electrical</td>
<td>E</td>
<td>500’s</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>I</td>
<td>600’s</td>
</tr>
<tr>
<td>Corrosion Control</td>
<td>C</td>
<td>700’s</td>
</tr>
</tbody>
</table>
NOTES:
1. SIZE WELD IN ACCORDANCE WITH THE STRUCTURAL WELDING CODE
   (AMERICAN WELDING SOCIETY).
2. A: 2' MIN FOR PIPE LESS THAN 36' DIA
   A: 3' MIN FOR PIPE 36' AND GREATER - DOUBLE LAP

LAP-WELDED STEEL PIPE JOINT

WATER DEPARTMENT
City of San Diego

LAP-WELDED STEEL PIPE JOINT C-101 CIP

REVISION BY APPROVED DATE

STANDARD DETAIL

CIP

REVISED BY INITIALS DATE

LAP-WELDED STEEL PIPE JOINT C-101
NOTE:

SIZE WELD IN ACCORDANCE WITH THE STRUCTURAL WELDING CODE (AMERICAN WELDING SOCIETY)

BUTT-WELDED STEEL PIPE JOINT
FIELD APPLIED CEMENT MORTAR

18" MAX

2" MAX

2" x 4" x 12 GA WMM
TACK WELD TO BUTT-STRAP

FIELD APPLIED CEMENT MORTAR

FIELD APPLIED CEMENT MORTAR

FRM TACK WELDING TO CYL

FOR CONCRETE CYL PIPE TACK WELD REINFORCING TO CYL

PL SAME THICKNESS AS STEEL SHELL, \( \frac{3}{8} \)" MIN

ALTERNATE WELD (TYP) SEE NOTE

CHIP MORTAR AS REQD FOR WELDING

TYPICAL BUTT-STRAP JOINT

NOTES:

1. WELD BUTT-STRAP INSIDE AND OUTSIDE ON PIPES 36" AND GREATER

2. ALTERNATE WELD INSIDE OR OUTSIDE ON PIPES LESS THAN 36"

BUTT-STRAP JOINT FOR: RC CYLINDER PIPE

ROD WRAPPED STEEL CYLINDER PIPE

AND MORTAR LINED AND COATED STEEL PIPE

TYPICAL HANDHOLE

(WTD ON PIPE SMALLER THAN 24" DIA)

WATER DEPARTMENT

City of San Diego

BUTT-STRAP JOINT

FOR STEEL CYLINDER PIPE

C-103

CIP
WALL FLANGE CENTERED IN WALL
SEE TABLE BELOW

PIPE FLUSH WITH WALL IF PIPE TERMINATES AT STRUCTURE. COAT CUT END OF PIPE WITH EPOXY.

SEE DWGS

END TO SUIT CONNECTING PIPE SEE DWGS

WALL FLANGE PLATE THK

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>STEEL PLATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>30&quot; &amp; UNDER</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>31&quot; TO 60&quot;</td>
<td>5/16&quot;</td>
</tr>
<tr>
<td>61&quot; &amp; OVER</td>
<td>3/8&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. STEEL FOR WALL FLANGE SHALL MEET THE SAME SPECIFICATIONS AS DOES STEEL FOR CONNECTING PIPELINE.
2. OUTSIDE DIAMETER TO MATCH THAT OF CONNECTING PIPE

STEEL PIPE THROUGH OR TERMINATING AT WALL

C-104
CIP

WATER DEPARTMENT
City of San Diego

STEEL PIPE THROUGH OR TERMINATING AT WALL

C-104
CIP
NOTES:

1. ALL JOINTS OF CARRIER PIPE WITHIN CASING SHALL BE WELDED

2. CARRIER PIPE SHALL BE TESTED BEFORE INSTALLATION OF END SEALS ON CASING

3. CASING SPACERS SHALL BE SO BOLTED AROUND THE PIPE THAT THE PLASTIC RUNNERS ARE LOCATED SYMMETRICALLY ABOUT THE VERTICAL AXIS OF PIPE

4. INNER DIAMETER OF THE STEEL CASING SHALL BE AT LEAST 12 INCHES LARGER THAN THE OUTER DIAMETER OF THE CARRIER PIPE

Glass Reinforced Plastic Runners (See Specs)

For Alternative Backfill Material (See Specs)

Steel Casing for Carrier Pipe

(City of San Diego)

WATER DEPARTMENT

City of San Diego

STEEL CASING FOR CARRIER PIPE

(See Specs for Alternatives)

C-105

CIP
ANCHORS (SEE SPECS)

SHIM AND SEALANT ALL AROUND AND BOTH SIDES

SCREEN UNIT ON EXTERIOR SURFACE AT FAN OR DUCT LOCATIONS

SHIM AND SEALANT

CONCRETE WALL

LOUVER BLADES

LOUVER AT CONCRETE WALL

A-201

CIP
LOUVER IN MASONRY WALL

MASONRY

SHIM AND SEALANT ALL AROUND AND BOTH SIDES

SCREEN UNIT ON EXTERIOR SURFACE AT LOCATIONS OF FANS OR DUCTS

LOUVER BLADES

LOUVER FRAME

ANCHORS (SEE SPECS)

SHIM AND SEALANT

EXTERIOR SURFACE AT LOCATIONS OF FANS OR DUCTS

LOUVER IN MASONRY WALL

A-202

WATER DEPARTMENT
City of San Diego

LOUVER IN MASONRY WALL

A-202

REVIEWED BY  INITIALS  DATE

STANDARD DETAIL

CIP
ROOFING SYSTEM OVER INSULATION SYSTEM ON METAL DECKING

SLEEVE AND LEAD FLANGE OR OVERFLOW DRAIN

2'-0' MAX

ROOF DRAIN AND OVERFLOW DRAIN

OVERFLOW DRAIN

UNDERDECK CLAMP

TAPERED INSULATION TO DRAIN

RAINWATER LEADER

ROOF DRAIN AND OVERFLOW PIPE

SIZES AND TYPES MAY VARY. SEE DRAWINGS

2'' MAX ABOVE ROOF DRAIN LINE
OPENING SIZE
3' X 3' (MIN.)

BASE FLASHING
SYSTEM

CANT

ROOF
INSULATION
SYSTEM

ROOFING
SYSTEM

PRESSURE TREATED
DOUGLAS FIR
SUBFRAME.
THICKNESS AS
REQUIRED FOR
INSULATION W/
NOT LESS THAN
TWO BOLTS
PER SIDE.

LIGHTWEIGHT
ALUMINUM
ROOF SCUTTLE
OR HATCH

STRUCTURAL
DECKING
SYSTEM

SPRING
ASSISTED

ALTERNATE CONDITION:
3/8” BENT STEEL
SUB-FRAME WELDED
TOGETHER AS A UNIT
AND WELDED TO
STRUCTURAL
STEEL DECK ON FRAME.

LADDER WITH
LADDER-UP DEVICE
NOT SHOWN

ROOF HATCH DETAIL

WATER DEPARTMENT
City of San Diego

REVISION BY APPROVED DATE

REVIEWED BY INITIALS DATE

ROOF HATCH DETAIL

A-204
**Notes to Design Consultant:**

1. This detail is to be used for strip footings under walls and for mat-type foundation slabs. Locate joints on drawings.
2. Call out waterstop on drawings where required.
3. Callout 1/2" x 1/2" joint sealant on drawings where required and see specification for material.
4. Location (cover) of reinforcing shall be clearly defined on drawings if different than shown on this detail.

**Foundation or Base Slab Vertical Construction Joint Type I**

---

**REVISION** | **BY** | **APPROVED** | **DATE**
--- | --- | --- | ---

**REVIEWED BY** | **INITIALS** | **DATE**
--- | --- | ---

**WATER DEPARTMENT**
City of San Diego

**STANDARD DETAIL**

**FOUNDATION OR BASE SLAB VERTICAL CONSTRUCTION JOINT TYPE I**

---

*OPTIONAL TENSION LAP SPLICES PER GENERAL STRUCTURAL NOTES UNLESS OTHERWISE INDICATED ON DRAWINGS*
Notes to Design Consultant:

1. This detail is to be used for strip footings under walls and for mat-type foundation slabs. Locate joints on drawings.
2. Call out waterstop on drawings where required.
3. Callout $\frac{1}{2} " \times \frac{1}{2} "$ joint sealant on drawings where required and see specification for material.
4. Location (cover) of reinforcing shall be clearly defined on drawings if different than shown on this detail.

* OPTIONAL TENSION LAP SPLICES PER GENERAL STRUCTURAL NOTES UNLESS OTHERWISE INDICATED ON DRAWINGS

FOUNDATION OR BASE SLAB VERTICAL CONSTRUCTION JOINT TYPE 2 (S-302 CIP)
Notes to Design Consultant:

1. This detail should be used for slab-on-grade for buildings and non-water bearing structures subject to heavy uniform and vehicular traffic loadings. Locate joints on drawings.
2. Call 1/2" x 1/2" joint sealant drawings where required and specification for material.
3. Location (cover) of reinforcing shall be clearly defined on the drawings if different than shown on this detail.
Notes to Design Consultant:

1. This detail should be used for slab-on-grade for buildings and non-water bearing structures is subject to light uniform loading.
2. Callout \( \frac{1}{2} \text{x} \frac{1}{2} \) joint sealant on drawings where required and see specification for material.
3. Location (cover) of reinforcing shall be clearly defined on the drawings if different than shown on this detail.
Notes to Design Consultant:

1. Located joints on drawings.
2. Call out waterstop on drawings where required.
3. Callout 1/2" x 1/2" joint sealant on drawings where required and see specification for material.
4. Location (cover) of reinforcing shall be clearly defined on drawings if different than shown on this detail.
1. Located joints on drawings.
2. Call out waterstop on drawings where required.
3. Callout \( \frac{1}{2} " \times \frac{1}{2} " \) joint sealant on drawings where required and see specification for material.
4. Location (cover) of reinforcing shall be clearly defined on drawings if different than shown on this detail.

Notes to Design Consultant:
**Notes to Design Consultant:**

1. Located joints on drawings.
2. Call out waterstop on drawings where required.
3. Callout 1/2" x 1/2" joint sealant on drawings where required and see specification for material.
4. Location (cover) of reinforcing shall be clearly defined on drawings if different than shown on this detail.
Notes to Design Consultant:

1. Located joints on drawings.
2. Call out waterstop on drawings where required.
3. Callout 1/2" x 1/2" joint sealant on drawings where required and see specification for material.
4. Location (cover) of reinforcing shall be clearly defined on drawings if different than shown on this detail.
Notes to Design Consultant:

1. Provide dowels if concrete is subject to heavy load which must be transferred across joint. Locate joints on drawings.
2. Call out waterstop and dowels on drawing where required.
3. Specify joint sealant, expansion material and back-up material in project technical specifications.
4. Location (cover) of reinforcing shall be clearly defined on drawings.
Notes to Design Consultant:

1. Provide dowels if concrete subject to heavy load which must be transferred across joint.

2. Call out waterstop and dowels on drawing where required.

3. The specification will more fully describe joint materials.
NOTES:
1. FOR WALLS, PROVIDE JOINTS ON BOTH FACES.
2. FOR SLAB-ON-GRADE, PROVIDE JOINT ON EXPOSED FACE ONLY.

WALL AND SLAB-CONTROL JOINT TYPE I

Notes to Design Consultants:
1. Locate joints on drawings.
2. Specify joint sealant requirements in project technical specifications.
3. Do not specify use of plastic strip in lieu of joint sealant.
3/4" DIAMETER @ 18"
O/C DOWEL PROVIDE
ONLY WHERE INDICATED
ON DRAWINGS

SAW CUT OR BLOCK
AND FILL WITH JOINT
SEALANT MATERIAL.
SEE NOTES

CUT REINFORCING
ACROSS JOINT
UNLESS OTHERWISE
NOTED

COAT THIS SIDE
OF DOWEL WITH
BOND BREAKER

NOTES:
1. FOR WALLS, PROVIDE JOINTS ON BOTH FACES.
2. FOR SLAB-ON-GRADE, PROVIDE JOINT ON EXPOSED FACE ONLY.

WALL AND SLAB CONTROL JOINT TYPE 2

Notes to Design Consultant:
1. This detail to be used for slab and wall where flexibility is required. Locate joints on drawings.
2. Specify joint sealant requirements in project technical.
3. Do not specify use of plastic strip in lieu of joint sealant.
Notes to Design Consultant:

1. Type and location of waterstop shall be indicated on drawings.

2. Use of joint sealant with construction joint shall be indicated on drawings.
EXISTING CONCRETE EXTENSION CONSTRUCTION JOINT

Notes to Design Consultant:

1. To be used where continuity required between existing concrete and new concrete. Located joint on drawings.
2. Specify surface joint preparation, bonding agent and joint sealant requirement in project technical specifications.
3. Reinforcing size and spacing should be indicated on drawings.
Notes to Design Consultant:

1. This detail to be used for light & medium weight equipment base. Adequacy shall be verified for heavy equipment base.
2. Pedestal reinforcing adequacy shall be verified.
3. Anchor bolt requirements shall be verified. Anchor bolt projection and embedment length shall be verified and adjusted to meet design requirements.
AN EMO R BOLT WITH NUT & WASHER.
SIZE & LOCATION PER EQUIPMENT
MANUFACTURER'S APPROVED
SUBMITTAL.

EQUIPMENT BASE PLATE
OR SOLE PLATE

1" MIN.
NON-SHRINK
GROUT

1/2" CLEAR
TOP OF
CONCRETE

FINISH
GRADE

2' CLR.

1/6" MIN.

LEVELING NUT
WHEN REQUIRED

#5 @ 9" E.W.

PROJECTION

EMBEDMENT
LENGTH

#5 @ 9"
PROVIDE
CORNER
REINFORCING
AS REQUIRED

6" MIN.

2'0"

2' CLR.

3' CLR.

SUB BASE IF INDICATED
ON DRAWINGS

#5 @ 9" EACH WAY

TYP. ALL SIDES
EQUIPMENT FOUNDATION

EQUIPMENT FOUNDA TION

Notes to Design Consultant:

1. This detail to be used for light equipment foundation.
2. Modify this detail, as required, for large, heavy equipment foundations.
   Reinforcing adequacy shall be verified.
3. Anchor bolt requirements shall be verified. Anchor bolt projection and embedment
   length shall be verified and adjusted to meet design requirements.

WATER DEPARTMENT
City of San Diego

REVISION BY APPROVED DATE

REVIEWED BY INITIALS DATE

STANDARD DETAIL
CIP

EQUIPMENT FOUNDATION
S-316
CIP

S-316
Notes to Design Consultant:

1. This detail to be used under electrical MCC units, and other house keeping light equipment pad.

2. Provide height of pad on drawings.

3. This detail to be used only for equipment pad height ≤ 6".
ADDITIONAL CORNER REINFORCING
SAME SIZE AND SPACING AS WALL
REINFORCING UNLESS OTHERWISE
INDICATED ON DRAWINGS

REINFORCING AS INDICATED
ON DRAWINGS (TYP.)

*TENSION LAP SPLICES
PER GENERAL
STRUCTURAL NOTES
UNLESS OTHERWISE
INDICATED ON DWGS.

SINGLY REINFORCED WALL L-CORNER
TYPE I
Notes to Design Consultant:

1. Use this detail if there is a vertical joint at the junction of the walls, and waterstop required.

2. The specifications shall fully describe the waterstop.
ALTERNATE HOOK DIRECTION

Ld = DEVELOPMENT LENGTH PER GENERAL STRUCTURAL
NOTES UNLESS OTHERWISE INDICATED ON DRAWINGS

REINFORCING AS INDICATED ON DRAWINGS (TYP.)

SINGLY REINFORCED WALL T-CORNER TYPE I

S-320
CIP

WATER DEPARTMENT
City of San Diego

SINGLY REINFORCED WALL T-CORNER TYPE I

S-320
CIP
Notes to Design Consultant:

1. Use this detail if there is a vertical joint at the junction of the walls, and waterstop required.

2. The specifications shall fully describe the waterstop.

ADDITIONAL CORNER REINFORCING
SAME SIZE AND SPACING AS WALL
REINFORCING UNLESS OTHERWISE
INDICATED ON DRAWINGS

ALTERNATE HOOK
DIRECTION

CONSTRUCTION JOINT
AS INDICATED ON
DRAWING

* TENSION LAP SPLICES
PER GENERAL
STRUCTURAL NOTES
UNLESS OTHERWISE
INDICATED ON DRAWINGS.

6"-PVC WATERSTOP
0"-BENTONITE WATERSTOP
WATERSTOP WHERE
INDICATED ON DRAWINGS.
SEE STANDARD DETAIL S-313

REINFORCING AS INDICATED
ON DRAWINGS (TYP.)

ADDITIONAL CORNER REINFORCING
SAME SIZE AND SPACING AS WALL
REINFORCING UNLESS OTHERWISE
INDICATED ON DRAWINGS

Notes to Design Consultant:

1. Use this detail if there is a vertical joint at the junction of the walls, and waterstop required.

2. The specifications shall fully describe the waterstop.
Notes to Design Consultant:

1. Use this detail if there is a vertical joint in any of the walls at the junction.

2. The specifications shall fully describe the waterstop.
ADDITIONAL CORNER REINFORCING
SAME SIZE AND SPACING AS WALL
REINFORCING UNLESS OTHERWISE
INDICATED ON DRAWINGS

PLACE VERTICAL CORNER
BARS AS INDICATED
ON DRAWINGS

0' TYP.

TENSION LAP SPLICES
PER GENERAL
STRUCTURAL NOTES
UNLESS OTHERWISE
INDICATED ON DWGS.

REINFORCING AS INDICATED
ON DRAWINGS (TYP.)

Ld = DEVELOPMENT LENGTH
PER GENERAL
STRUCTURAL NOTES,
UNLESS OTHERWISE
INDICATED ON DRAWINGS

DOUBLE REINFORCED WALL L-CORNER
TYPE I

S-323
CIP
ADDITIONAL CORNER REINFORCING
SAME SIZE AND SPACING AS WALL
REINFORCING UNLESS OTHERWISE
INDICATED ON DRAWINGS

0 ft TYP.

*TENSION LAP SPLICES
PER GENERAL
STRUCTURAL NOTES
UNLESS OTHERWISE
INDICATED ON DWGS.

REINFORCING AS INDICATED
ON DRAWINGS (TYP.)

DOUBLE REINFORCED WALL L-CORNER
TYPE 2

WATER DEPARTMENT
City of San Diego

DOUBLE REINFORCED WALL
L-CORNER TYPE 2

S-324
CIP
**T-Corner**

**Double Reinforced Wall T-Corner Type I**

$L_d =$ Development Length Per General Structural Notes, but 90° Hook Not Less Than Standard.

Place Vertical Corner Bars As Indicated On Drawings

---

**Double Reinforced Wall T-Corner Type I**

---

**Water Department**

City of San Diego

---

**CIP**

---

**S-325**
Notes to Design Consultant:

1. Use this detail if there is a vertical joint at the junction of the walls, and waterstop required.

2. The specifications shall fully describe the waterstop.
Notes to Design Consultant:

1. Use this detail if there is a vertical joint in any of the walls at the junction.

2. The specifications shall fully describe the waterstop.
TENSION LAP SPLICE PER GENERAL STRUCTURAL NOTES UNLESS OTHERWISE INDICATED ON DRAWINGS

NOTE:
ONLY HORIZ. REINF. SHOWN

FOUNDATION STRIP FOOTING
L INTERSECTION

S-328
CIP
Note to Design Consultant

1. Use Type 1 for foot traffic, Type 2 for light vehicular and Type 3 for heavy vehicular traffic.
PROVIDE 1-#5 AT CENTER OF WALL OR SLAB FOR SINGLE REINFORCED MEMBER. (SEE NOTE 2)
PROVIDE 1-#5 EACH FACE OF WALL OR SLAB FOR DOUBLY REINFORCED MEMBER. (SEE NOTE 2)

CIRCULAR OR RECTANGULAR OPENING (8' OR LARGER IN DIAMETER OR SIZE)

2" CLR (TYP.)

48 BAR DIAMETER (TYP.) (MINIMUM 2'-0")

NOTES:
1. AREA OF ADDED REINFORCING AT EACH EDGE OF OPENING IN EACH DIRECTION SHALL BE AT LEAST \( \frac{1}{2} \) THE CROSS SECTIONAL AREA OF THE INTERRUPTED REINFORCING.

2. PROVIDE STANDARD HOOKS ON REINFORCING IF STRAIGHT EXTENSION PAST THE OPENING CANNOT BE OBTAINED.

3. PLACE ADDED REINFORCING IN SAME PLANES AS MAIN REINFORCING.

OPENING REINFORCEMENT

S-330

CIP
STAIR NOSING

(TYP.)

1" NOSING

4" WIDE ABRASIVE SAFETY NOSING. TERMINATE WITHIN 3 INCHES OF EDGES. (TYP. ALL STEPS INCLUDING LANDING)

TWO ANCHORS MIN. PER STEP SIZE PER MANUFACTURERS REQUIREMENT

1" CLR.

STEP NOSING

STAIR NOSING

S-331
CIP
SINGLE - V- GROOVE WELD

DOUBLE - V- GROOVE WELD

NOTES:

1. WELDING PROCEDURES SHALL BE PER AWS D1.4 REQUIREMENT.

2. USE E-80 ELECTRODE FOR GRADE 60 AND E-70 FOR GRADE 40 BARS.

DIRECT BUTT-WELDED SPLICES
HORIZONTAL REINFORCING BARS

Note to Design Consultant

Welding of rebar is not allowed except when approved by engineer.
DOUBLE - BEVEL - GROOVE WELD

SINGLE - BEVEL - GROOVE WELD

NOTES:

1. WELDING PROCEDURES SHALL BE PER AWS D1.4 REQUIREMENT.
2. USE E980 ELECTRIDE FOR GRADE 60 AND E70 FOR GRADE 40 BARS.

DIRECT BUTT-WELDED SPLICES
VERTICAL REINFORCING BARS

Note to Design Consultant

Welding rebar are not allowed except when approved by engineer.
Note to Design Consultant

Welding rebar are not allowed except when approved by engineer.
REVISION BY 50 DIA. 2'-0" MIN.

ADD (2) #6 VERTICAL @ CORNER END UNLESS OTHERWISE NOTED.

SEE PLAN FOR TYP. WALL REINF.

VERTICAL REINFORCING NOT SHOWN FOR CLARITY

NOTE:
ALL EXTERIOR JOINTS TO BE RAKED AND INTERIOR JOINTS TO BE TOOLED
SEE PROJECT SPECIFICATIONS.

MASONRY WALL L-CORNER
NOTE:
ALL EXTERIOR JOINTS TO BE RAKED
AND INTERIOR JOINTS TO BE TOOLLED
SEE PROJECT SPECIFICATIONS

MASONRY WALL T-CORNER

50 DIA.
2'-0" MIN. (TYP.)

ADD (2) #6 VERTICAL @ INTERSECTION UNLESS OTHERWISE NOTED.

SEE PLAN FOR TYP. WALL REINF.
REINFORCING PER PLANS
HORIZONTAL BARS DO NOT
PENETRATE JOINT

RAKE

JT. SEALANT
(EACH SIDES)

NO GROUT
IN RAKE

MASONRY WALL CONTROL JOINT

Note to Consultant:

1. Locate control joint at 20' + cc.
WALL BARs,
BEND @ Lintel

ADDITIONAL EDGE
BARs SAME AS
WALL BARs (TYP.)

CONTINUOUS IF
COINCIDES WITH
OTHER OPENINGS
OR BOND BEAM BARs

WALL BAR

LAP LENGTH PER
GENERAL NOTES

MATCHING DOWELS
SAME AS WALL
BARs, SEE
SECTIONS

DEVELOPMENT
LENGTH PER
GENERAL NOTES

OPENING 4' WIDE OR LESS

WALL DOOR OPENING REINFORCEMENT

Note to Consultant

1. Verify reinforcement for design loading.

2. Provide reinforcing details for opening wider than 4'-0".
Notes to Consultant

1. Verify reinforcement for design loading.
2. Provide reinforcing details for opening wider than 4'-0".
3. Additional reinforcement not required for opening smaller than 16" x 16".

WATER DEPARTMENT
City of San Diego

WATER DEPARTMENT
City of San Diego

WALL WINDOW OPENING REINFORCEMENT S-339
<table>
<thead>
<tr>
<th>BOLT DIAMETER, D, in.</th>
<th>1/2</th>
<th>5/8</th>
<th>3/4</th>
<th>7/8</th>
<th>1</th>
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<th>1/4</th>
<th>1 3/8</th>
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<tbody>
<tr>
<td>ALLOWABLE TENSION</td>
<td>3.9</td>
<td>6.1</td>
<td>8.8</td>
<td>12.0</td>
<td>15.7</td>
<td>19.9</td>
<td>24.5</td>
<td>29.7</td>
<td>35.3</td>
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<td>KIPS</td>
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<td>3.1</td>
<td>4.4</td>
<td>6.0</td>
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<td>12.3</td>
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<td>17.7</td>
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<table>
<thead>
<tr>
<th>REQ'D EMBEDMENT LENGTH, L</th>
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<tbody>
<tr>
<td>TYPE 1 DEPTH</td>
</tr>
<tr>
<td>1'-4*</td>
</tr>
<tr>
<td>1'-8*</td>
</tr>
<tr>
<td>2'-0*</td>
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<td>2'-10*</td>
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<td>3'-6*</td>
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<td>4'-4*</td>
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<tr>
<td>5'-3*</td>
</tr>
<tr>
<td>6'-4*</td>
</tr>
</tbody>
</table>

| TYPE 1A SLEEVE             |
| 2' DIA. x6'                |
| 2' DIA. x8'                |
| 2' DIA. x12'               |
| 2'/2 DIA. x12'             |
| 3' DIA. x5'                |
| 3' DIA. x15'               |
| 3'/2 DIA. x15'             |

| TYPE 2 DEPTH               |
| 0'-9'                      |
| 1'-1/2'                    |
| 1'-3/4'                    |
| 1'-8'                      |
| 2'-2/4'                    |
| 2'-10/2'                   |
| 3'-3/4'                    |
| 4'-8'                      |

| TYPE 2A DEPTH              |
| 1'-3'                      |
| 1'-5/4'                    |
| 1'-9/2'                    |
| 1'-13/4'                   |
| 2'-8'                      |
| 3'-2/4'                    |
| 4'-1/2'                    |
| 4'-10/4'                   |
| 5'-11''                    |

Note to Consultant

1. Tension and shear capacity based on normal anchor bolt spacing, minimum concrete reinforcement and 4000 PSI concrete.

2. Allowables based on tensile stress of 20 KSI and shear stress of 10 KSI on gross area.
CHECKERED PLATE SUPPORT AT FLOOR

Notes to Consultant:

1. Specify material on drawings.
2. Indicate required thickness on drawings.
CHECKERED PLATE SUPPORT AT WALL

Notes to Consultant:

1. Specify material on drawings.
2. Indicate required thickness on drawings.
Notes to Consultant:

1. Specify material on drawings.

2. Indicate required depth on drawings.

3. Indicate minimum seat angle size on drawings.
Notes to Consultant:

1. Specify material on drawings.

2. Indicate required depth on drawings.

3. Indicate minimum seat angle and bolt spacing size on drawings.
LADDER SAFETY CAGE

- **2'-3**" WELD TO LADDER RUNNER OR RAILING (SIMILAR)
- **3'-6"** RAILING
- **1'-11/2"** TOP OF LANDING
- **1'-4"**
- **1/4" x 2"** INTERMEDIATE HOOP GUARDS AT 4'-0" MAX SPACING
- **1/4" x 3"** HOOP GUARD TOP AND BOTTOM
- **2'-7"** MAX
- **7'-6"** MAX
- **1'-11/2" x 2/"** (TYP) GRIND ALL CORNERS
- **(7) 1/4" x 2"** BARS (TYP)

**bottom landing**

**LADDER SAFETY CAGE**

**S-345**

**CIP**

WATER DEPARTMENT
City of San Diego

**S-345**
11/4" DIA. PIPE HANDRAIL

BRACKET SUPPORT

1/2" DIA. (316 S.S.) DBD
MIN. EMBEDMENT = 4"

SECTION A-A

6'-0" MAX.

2'-9"

WALL MOUNTED HANDRAIL

WATER DEPARTMENT
City of San Diego
FOR HANGER RODS

\( \frac{3}{8} \)" DIA AND SMALLER

(4) #4 BAR, 3'-0" LONG

UNIVERSAL CONCRETE INSERT GRINNELL FIG 282

OR EQUAL

LOCK-NUT AND WASHER

LINKED EYE ROD

ADJUSTABLE CLEVIS FOR STEEL PIPE. GRINNELL FIG 260

OR EQUAL

ADJUSTABLE CLEVIS FOR CAST IRON PIPE. GRINNELL FIG 590

OR EQUAL

ADJUSTABLE STEEL RING HANGER. GRINNELL FIG 269

OR EQUAL. WHEN USED WITH PVC OR FIBERGLASS PIPE,

PROVIDE STEEL SHIELD AROUND PIPE AT HANGER WITH LOOSE FIT.

COPPER TUBES TO HAVE 2" WIDE STRIP OF RUBBER FABRIC

NOTE: GALVANIZE ALL PARTS AFTER FABRICATION

Pipe Hanger Rods and Support Spacing

<table>
<thead>
<tr>
<th>PIPE DIA (INCHES)</th>
<th>ROD DIA (INCHES)</th>
<th>MAX SUPPORT SPACING (FEET)</th>
<th>WEIGHT LIMIT (LBS)</th>
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<tr>
<td>1&quot; SMALLER ( \frac{3}{8} )&quot;</td>
<td>6</td>
<td>5</td>
<td>610</td>
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<td>( \frac{1}{4} ) TO 2</td>
<td>( \frac{3}{8} )&quot;</td>
<td>9</td>
<td>5</td>
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<tr>
<td>2( \frac{1}{2} ) TO 3( \frac{1}{2} )</td>
<td>( \frac{1}{2} )&quot;</td>
<td>12</td>
<td>5</td>
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<tr>
<td>4 TO 5</td>
<td>( \frac{5}{8} )&quot;</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>6, 8</td>
<td>( \frac{3}{4} )&quot;</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>10, 12</td>
<td>( \frac{7}{8} )&quot;</td>
<td>18</td>
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<tr>
<td>14, 16</td>
<td>1&quot;</td>
<td>20</td>
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</tbody>
</table>

1. TYPE A - FOR CONCRETE INSERT. ALLOW 1430 LB LOAD MAX
2. TYPE B - FOR 4" SO BEARING PLATE. ALLOW 3800 LB LOAD MAX
3. CONCRETE STRENGTH TO BE 3000 PSI OR MORE
4. DESIGN IS FOR STATIC LOAD ONLY
5. ANCHORS SHALL BE 316 SS IF HANGER WILL BE SUBMERGED

Notes:

- WATER DEPARTMENT

City of San Diego

Pipe Hanger

M-401

CIP
### Adjustable Pipe Support Dimensions in Inches

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D Minimum</th>
<th>D Maximum</th>
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<td>4</td>
<td>13-1/2</td>
<td>32-5/8</td>
<td>34-3/4</td>
</tr>
</tbody>
</table>

**Non-Shrink Grout**

- 1" Minimum
- 3" Minimum

**Galvanized Steel Anchor Bolt**

With two nuts and one lockwasher.

(Typ of 4 at 90°)

316 SS if buried or submerged.

---

**ADJUSTABLE PIPE SUPPORT**

**Dimension: 2-1/2 to 36" Diameter**

**Usage:**

- 50 lb threaded reducing flange, galvanized
- Adjustable pipe support with 'U' bolt

---

**WATER DEPARTMENT**

City of San Diego

**ADJUSTABLE PIPE SUPPORT**

**Dimension: 2-1/2 to 36" Diameter**

**Usage:**

- 50 lb threaded reducing flange, galvanized
- Adjustable pipe support with 'U' bolt

---

**Revision by: IAPROVED**

**Date:**

**Standard Detail:**

**CIP**

**Reviewed by: INITIALS**

**Date:**

**Water Department**

City of San Diego

**Adjustable Pipe Support**

**Dimension: 2-1/2 to 36" Diameter**

**Usage:**

- 50 lb threaded reducing flange, galvanized
- Adjustable pipe support with 'U' bolt

---

**Revision by: IAPROVED**

**Date:**

**Standard Detail:**

**CIP**

**Reviewed by: INITIALS**

**Date:**

**Water Department**

City of San Diego

**Adjustable Pipe Support**

**Dimension: 2-1/2 to 36" Diameter**

**Usage:**

- 50 lb threaded reducing flange, galvanized
- Adjustable pipe support with 'U' bolt
STEEL PIPE ONLY
(FOR PVC PLATE USE FUSION OR SOLVENT WELD)

STEEL PIPE SLEEVE,
GALVANIZED AFTER FABRICATION
OR PVC SCHD 80 PIPE SLEEVE

3/6 V

FUSION OR SOLVENT RUBBER SEAL

ADJUSTABLE LINKED RUBBER SEAL

PIPE THRU WALL

3" TYPICAL

1/4" THICK PLATE WALL FLANGE,
SAME MATERIAL AS SLEEVE

METHOD A

CAULK WITH
BRAIDED YARN
OR COTTON ROPE

SAME AS SHOWN IN
METHOD A ABOVE

PIPE THRU WALL

1" MIN CLEARANCE

FILL WITH POLYURETHANE
SEALANT, TYPICAL BOTH ENDS

METHOD B

5/8" MIN TYPICAL
BOTH ENDS

NOTES:
1. NOT FOR USE IN RETAINING WALLS
   AND HYDRAULIC STRUCTURES.
2. SEALANT TO COMPLY WITH FIRE
   RATING OF WALL

SLEEVED WALL PIPE OPENING

M-403
CIP

WATER DEPARTMENT
City of San Diego

SLEEVED WALL PIPE OPENING

M-403
CIP
MIN 1/4" PLATE OR THICKNESS OF PIPELINE

EPOXY COATING ALL AROUND TO A DEPTH OF 1" MIN (FOR STL PIPE ONLY)

3" (TYP) FLANGE OR END TO SUIT MECHANICAL TYPE COUPLING AS INDICATED ON DRAWINGS

1" MIN

6" MIN

4" PIPE AND SMALLER 1/4" PLATE WALL FLANGE, SAME MATERIAL AS PIPE

6" PIPE AND LARGER 3/8" PLATE WALL FLANGE, SAME MATERIAL AS PIPE

PIPE THRU WALL OR FLOOR MATERIAL AS SHOWN ON DRAWINGS. FOR LINING AND COATING SEE SPECIFICATIONS

FABRICATED STEEL PIPE THIMBLE TYPE I

M-404

City of San Diego

WATER DEPARTMENT

CIP

M-404
WALL OR FLOOR

3/8

MINIMUM 1/4" PLATE OR THICKNESS OF PIPELINE

LINING AND COATING
SAME AS PIPELINE

6" MIN

3" (TYP)

FLANGES OR ENDS TO
SLIIT MECHANICAL TYPE
COUPLINGS AS
INDICATED ON
DRAWINGS

6" MIN

4" PIPE AND SMALLER 1/4" PLATE
WALL FLANGE, SAME MATERIAL
AS PIPE

6" PIPE AND LARGER 3/8" PLATE
WALL FLANGE, SAME MATERIAL
AS PIPE

PIPE THRU WALL
OR FLOOR, MATERIAL AS
INDICATED ON
DRAWINGS

FABRICATED STEEL PIPE THIMBLE
TYPE 2

M-405

CIP

WATER DEPARTMENT
City of San Diego

FABRICATED STEEL PIPE THIMBLE
TYPE 2
CAST IRON THIMBLE WITH MECHANICAL TYPE COUPLING

MIN 6" OR AS SHOWN ON DRAWINGS

DUCTILE IRON OR CAST IRON THIMBLE WITH INTEGRALLY CAST SEEP RING, LINING AND COATING SAME AS PIPELINE

FLANGE, OR END TO SUIT MECHANICAL TYPE COUPLING, AS INDICATED ON DRAWINGS

2'-0" WALL OR FLOOR (TYP)
LJ BAR 3'-0" LONG (TYP)

MAX DISTANCE BETWEEN RODS = 4'-0"

CONCRETE INSERT GALV UNISTRUT M-26 WITH M-2712 SWIVEL NUT, GRINNELL FIG 282 OR EQUAL (TYP)

1/2" DIA HANGER ROD, GALVANIZED (TYP)

PIPE STRAP, UNISTRUT SERIES P-2558, POWER-STRUT SERIES PS-3126, OR EQUAL (TYP)

NOTE:
WHEN USED WITH PVC OR FIBERGLASS PIPE, PROVIDE GALVANIZED STEEL SHIELD AROUND PIPE AT CLIP WITH LOOSE FIT. WRAP COPPER TUBES WITH 2" WIDE STRIP OF RUBBER FABRIC

CHANNEL, UNISTRUT SERIES, P-5500, POWER-STRUT SERIES PS-150, OR EQUAL. LENGTH TO SUIT, AT 5'-0" OC MAX UNLESS OTHERWISE INDICATED

TRAPEZE PIPE HANGER

M-407

CIP
ONE LAYER OF EXPANSION JOINT FILLER WRAP AROUND PIPE

FLAT BAR, FOR THICKNESS SEE TABLE AT RIGHT (SEE NOTE 4)

TWO 1/2" HEX BOLTS W/NUITS WHEN STRAP IS USED (TYP)

"D" DIA GALVANIZED STEEL ANCHOR BOLT W/TWO HEX NUTS FOR LEVELING AFTER INSTALLATION (TYP OF 4) (SEE NOTE 4)

1/2" R TOOLED EDGE (TYP)

CONCRETE PIER

1/4" CHAMFER (TYP)

NOTES:

1. WHEN SUPPORTING PIPE AND FLANGE ALTERNATELY ON THE SAME LINE, CONCRETE PIERs FOR PIPE SUPPORTs SHALL ALL HAVE SAME DIMENSION "H" FOR FLANGE CONTROL

2. PIPE SUPPORTs TO BE LOCATED IN PLAN AT POINTS MARKED THUS(X)

3. WHERE DIFFERENTIAL SETTLEMENT IS LIKELY TO OCCUR, OMIT GROUT AS DIRECTED BY THE ENGINEER

4. USE 316 SS WHEN BURIED, SUBMERGED OR W/IN 24' OF WATER SURFACE IN HYDRAULIC STRUCTURES

WATER DEPARTMENT
City of San Diego

PIPE SUPPORT WITH STRAP

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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DIMENSIONS IN INCHES

REVISION BY APPROVED DATE
REVIEWED BY INITIALS DATE

WATER DEPARTMENT
City of San Diego

PIPE SUPPORT WITH STRAP

M-408

CIP
NOTE:
1. THIS SLEEVE IS TO BE USED BETWEEN DRY AREAS ONLY
2. NOT FOR SLABS ON GRADE

FLOOR PIPE SLEEVE

POLYURETHANE SEALANT

FLOOR SLAB

CAULK WITH BRAIDED YARN OR COTTON ROPE

PIPE THROUGH FLOOR (SEE SPECS FOR LINING AND COATING)

1/4" PLATE WALL FLANGE, MATERIAL SAME AS SLEEVE

STEEL PIPE SLEEVE, 1/4" THICK MINIMUM (SEE SPECS FOR PAINTING AND COATINGS)

NOTE:
SEALANT SHALL COMPLY WITH FIRE RATING OF FLOOR

FLOOR PIPE SLEEVE

M-409

CIP

WATER DEPARTMENT
City of San Diego

FLOOR PIPE SLEEVE

M-409

CIP
STUD BOLT, MIN 1/2" DIA
WITH TWO HEX NUTS
& LOCKWASHERS, SET
IN ADHESIVE EPOXY
TYPE ANCHOR

FLAT BAR 1/2" X 1/4" PIPE
CLAMP. WHEN USED WITH
PVC OR FIBERGLASS PIPE
PROVIDE STEEL SHEILD
AROUND PIPE AT CLAMP WITH
LOOSE FIT. WRAP COPPER
TUBES WITH 2' WIDE STRIP
OF RUBBER FABRIC

NOTE:
GALVANIZE ALL PARTS AFTER
FABRICATION. WHERE SUBMERGED,
PIPE CLAMP, ANCHORS, NUTS,
LOCKWASHERS AND SHIELDS TO BE
TYPE 316 SS

PIPE CLAMP

M-410
CIP
FLUSH MOUNTED PIPE SUPPORT

'Z' FITTING UNISTRUT NO. P-5545, POWER-STRUT NO. PS-2601, OR EQUAL (TYP)

GALVANIZED FRAMING SUPPORT, UNISTRUCT SERIES P-5500, POWER-STRUT SERIES PS-150 OR EQUAL AT 5'-0" MAX UNLESS OTHERWISE SHOWN ON DRAWINGS

PIPE CLAMP POWER STRUT SERIES 3126, ELCIN FIG. 42, UNISTRUT 2558 OR EQUAL.
WHEN USED WITH PVC OR FIBERGLASS PIPE, PROVIDE STEEL SHIELD AROUND PIPE AT CLAMP WITH LOOSE FIT. FOR COPPER TUBES PROVIDE 2" WIDE RUBBER FABRIC STRIP

WHERE LENGTH EXCEEDS 3'-0", PROVIDE INTERMEDIATE SUPPORTS AT MAX 3'-0" OC UNISTRUT NO. P-5547, POWER-STRUT NO. PS-2648, OR EQUAL

ADHESIVE EPOXY ANCHOR-3/4" DIA (MIN) W/NUT AND LOCKWASHER, (TYP)

FLUSH MOUNTED PIPE SUPPORT
'U' BOLT W/DOUBLE NUTS & LOCKWASHERS. GRINNELL FIG. 137, TOLCO FIG 110 OR EQUAL. WHEN USED WITH PVC OR FIBERGLASS PIPE, PROVIDE STEEL SHIELD AROUND PIPE AT 'U' BOLT WITH LOOSE FIT. WRAP COPPER TUBES WITH 2" WIDE STRIP OF RUBBER FABRIC.

WELDED STEEL BRACKET GRINNELL FIG. 195, 199 TOLCO FIG 30M, 30H OR EQUAL.

GALVANIZED ADHESIVE STUD ANCHOR WITH NUT AND LOCKWASHER (TYP).

NOTE:
GALVANIZE ALL PARTS AFTER FABRICATION WHERE SUBMERGED, BRACKET, 'U' BOLT, LOCKWASHERS AND ANCHORS TO BE 316 SS.

PIECE BRACKET

M-412

CIP

WATER DEPARTMENT
City of San Diego

PIECE BRACKET
Y2" GALVANIZED UNISTRUT SWIVEL 282 OR CONCRETE ~SERT ANGLE CLIP I-BEAM CLAMP, ADHESIVE ANCHOR M-26 WITH M-27 12GRINNELL FIGURE 133 W/NUT AND CTVP BOTH SIDES 2 X 2 X 2" LONG (TYP BOTH SIDES) STEEL BEAM OR EQUAL, CTVP LOCKWASHER (GALVANIZED) CONCRETE BEAM -:::1:-.:'

DUCT CTVP BOTH SIDES) SUPPORT ANGLE CTVP) LENGTH AS RED'D ON WOOD BEAM ON STEEL BEAM ON CONCRETE BEAM CONCRETE BEAM OR SLAB HANGER

SIZING AND SPACING (INCHES)

<table>
<thead>
<tr>
<th>MAX DUCT SIZE</th>
<th>ROD DIA</th>
<th>SUPPORT ANGLE</th>
<th>MAXIMUM SPACING</th>
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HANGERS FOR DUCTS

WATER DEPARTMENT
City of San Diego

HANGERS FOR DUCTS
M-413
CIP

REVISION BY APPROVED DATE

STANDARD DETAIL

WATER DEPARTMENT
City of San Diego

HANGERS FOR DUCTS
M-413
PIPE OD

FOR INSULATED PIPES, EXTEND INSULATION THROUGH SLEEVE

RISER CLAMP, GRINNELL FIG 261 OR EQUAL

EXTERIOR INSULATION

POLYURETHANE SEALANT

1/4" PLATE WALL FLANGE

STEEL PIPE SLEEVE 1/4" THICK MINIMUM, GALVANIZE AFTER FABRICATION

ID = PIPE OD + 1" MIN (UNINSULATED PIPES)

CONCRETE SLAB

ID = INSULATION OD + 1" MIN (INSULATED PIPES)

CAULK WITH BRAIDED YARN OR COTTON ROPE

NOTES:
1. THIS SLEEVE IS TO BE USED BETWEEN DRY AREAS ONLY
2. SEALANT SHALL COMPLY WITH FIRE RATING OF FLOOR

VERTICAL PIPE SUPPORT SLEEVE

M-414
CIP

WATER DEPARTMENT
City of San Diego
FLANGE AND SPIGOT DUCTILE IRON OR CAST IRON THIMBLE

DUCTILE IRON OR CAST IRON THIMBLE WITH INTEGRALLY CAST SEEP RING, (LINING AND COATING SAME AS PIPELINE)

DRILLED AND TAPPED FOR BOLT (TYP)

GASKET

FLANGE SHOULD SET FLUSH TO WALL OR FLOOR UNLESS OTHERWISE NOTED

WATER DEPARTMENT
City of San Diego

M-415
CIP
WALL

TAP MECHANICAL JOINT BELL FOR BOLT (TYP)

BOLT HOLE, TAP FOR STUD (TYP)

DUCTILE IRON OR CAST IRON THIMBLE WITH INTEGRALLY CAST SEEP RING, LINING SAME AS PIPELINE

FLANGE TO SET FLUSH WITH WALL UNLESS OTHERWISE NOTED

DUCTILE IRON OR CAST IRON PIPE

FOLLOWER GLAND

GASKET

FLANGE AND MECHANICAL JOINT DUCTILE IRON OR CAST IRON THIMBLE

M-416

CIP

WATER DEPARTMENT
City of San Diego

FLANGE AND MECHANICAL JOINT DUCTILE IRON OR CAST IRON THIMBLE

M-416
<table>
<thead>
<tr>
<th>PIPE DIA</th>
<th>A</th>
<th>B</th>
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<td>3/16 x 1-1/4</td>
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<tr>
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<td>1-1/4 x 1-1/4</td>
<td>500</td>
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<td>9-1/8</td>
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</table>

*Safety Factor of 5

**NOTES:**

1. WHERE SUBMERGED, BURIED, OR IN HYDRAULIC STRUCTURES PIPE CLAMP, ANCHOR, SHIELD, NUTS AND LOCK WASHER TO BE TYPE 316 STAINLESS STEEL

2. WHEN USED WITH PVC OR FIBERGLASS PIPE, PROVIDE STEEL SHIELD AROUND PIPE AT CLAMP, WITH LOOSE FIT, WRAP COPPER TUBES WITH 2" STRIP OF RUBBER FABRIC

3. FOR FLANGED PIPING, INCREASE 'B' DIMENSION AS REQUIRED
NOTE: USE THIS DETAIL FOR PIPES 6 INCHES AND SMALLER IN DIAMETER

NOTE: USE THIS DETAIL FOR PIPES 6 INCHES AND SMALLER IN DIAMETER

NOTE: USE THIS DETAIL FOR PIPES 6 INCHES AND SMALLER IN DIAMETER

NOTE: USE THIS DETAIL FOR PIPES 6 INCHES AND SMALLER IN DIAMETER

NOTE: USE THIS DETAIL FOR PIPES 6 INCHES AND SMALLER IN DIAMETER
DRAINAGE SUMP WITH DUPLEX PUMPS

NOTE:
COMPLETE TABLE FOR ALL DUPLEX SUMPS ON THE PROJECT
MOLDED FIBERGLASS HOOD SEE SPECS

PLASTIC COATED GALVANIZED STEEL BIRD SCREEN

ONE PIECE, MOLDED CURB AND FLASHING TO MATCH VENTILATOR BASE

LOW SILHOUETTE

SEE NOTE 1

ROOF

ALUMINUM GRILLE OR DUCT SEE NOTE 2

SQUARE ROOF OPENING

NOTES:
1. MINIMUM 12” IF USED AS AIR INTAKE.
   MINIMUM 6” IF USED AS RELIEF VENT
2. WITH SUSPENDED CEILING INSTALL FULL-SIZE DUCT FROM ROOF OPENING TO CEILING GRILLE

AIR INTAKE OR RELIEF VENT

M-420

CIP
MOLDED FIBERGLASS VENT HOOD SEE SPECS

NON-SPARKING, NON-OVER-LOADING FAN

PLASTIC COATED GALVANIZED STEEL BIRD SCREEN AND BACKDRAFT DAMPER

ONE PIECE MOLDED CURB AND FLASHING TO MATCH VENTILATOR BASE

ALUMINUM GRILLE OR DUCT. SEE NOTE

SQUARE ROOF OPENING

NOTE:
WITH SUSPENDED CEILING INSTALL FULL-SIZE DUCT FROM ROOF OPENING TO CEILING GRILLE

POWER ROOF VENTILATOR

WATER DEPARTMENT
City of San Diego

POWER ROOF VENTILATOR

M-421 CIP
AIR DUCT DETAILS

SPLITTER DAMPER

GALVANIZED STEEL OR ALUMINUM DUCT

SLOPE 1" IN 7"

DOUBLE THICKNESS TURNING VANES

TYPICAL SUPPLY AIR DUCT BRANCH

¥/4D (THROAT RADIUS)

GALVANIZED STEEL OR ALUMINUM DUCT

AIR FLOW

DAMPER ROD HANDLE

TYPICAL SHARP TURN WITH TURNING VANES

AIR FLOW

WATER DEPARTMENT
City of San Diego

AIR DUCT DETAILS

M-422
CIP

REVISION BY APPROVED DATE

WATER DEPARTMENT
City of San Diego

AIR DUCT DETAILS

M-422
CIP

REVIEWED BY INITIALS DATE

WATER DEPARTMENT
City of San Diego

AIR DUCT DETAILS

M-422
CIP
PRESSURE GAUGE (MIN 3/2" DIA, CALIBRATED IN APPLICABLE UNITS) WITH SNUBBER

1/2" x 1/4" 316 SS BUSHING OR REDUCING ELBOW

1/2" 316 SS SCHED 80 PIPE AND FITTING

1/2" 316 SS BUSHING, THREADOLITE WELD TO PIPE OR USE TAPPING SADDLE

1/2" x 1/4" 316 SS BUSHING, THREADOLITE WELD TO PIPE OR USE TAPPING SADDLE

3/16 (TYP)

COAT WITH EPOXY

PRESSURE GAUGE AND PRESSURE SWITCH WITH SNUBBER

FOR STANDARD APPLICATIONS ON WATER, AIR AND GAS LINES.
WHERE PIPE VIBRATION OR PULSATION IS EXPECTED, MAKE SUITABLE PROVISION WITH FLEXIBLE CONNECTORS AND INDEPENDENT GAUGE SUPPORT
PRESSURE SWITCH OR PRESSURE GAUGE (MIN 3\(\frac{1}{2}\)" DIA CALIBRATED IN APPLICABLE UNITS) WITH SNUBBER

\(\frac{1}{2} \times \frac{1}{4}\) 316 SS BUSHING

\(\frac{1}{2}\) 316 SS BALL VALVE

\(1\frac{1}{4}\) 3000 LB SS HALF COUPLING WELD TO PIPE OR TAPPING SADDLE

COAT WITH EPOXY

\(\frac{1}{6}\) TYP
EMBEDDED CONDUIT FITTING TYPE "VXF" BY CROUSE-HINDS OR EQUAL

FLEXIBLE VAPOR-TIGHT HANGER ARB67 BY CROUSE-HINDS OR EQUAL

CONDUIT FITTING TYPE "GFR" WITH FLEXIBLE VAPOR-TIGHT HANGER"ARB62" BY CROUSE-HINDS OR EQUAL

LIGHTING FIXTURE

FOR CONCEALED CONDUIT

EXPANSION ANCHORS

USE GRID STEM WHEN MOUNTING LESS THAN 12" FROM HORIZONTAL SURFACE (TYPICAL)

CROUSE-HINDS "UNH" HOOK OR APPLETON "EFHE" HOOK OR EQUAL

1/2" CONDUIT (TYPICAL)

LIGHTING FIXTURE

FOR EXPOSED CONDUIT

FIXTURE MOUNTING DETAILS

E-501

CIP
FINISHED GRADE

TRAFFIC DUTY COVER AND FRAME UNLESS OTHERWISE SPECIFIED

INSCRIBE IDENTIFICATION HERE. SEE SPECS

FEATHERED TO NON-PAVED FINISHED GRADE

CABLE SUPPORTS
SEE SPECS

GROUT SMOOTH

DUCT BANK
SEE SPECS

PULLING IRONS AS REQUIRED

1. AT PAVED AREAS
2. NON-PAVED AREAS

NOTES:
1. COVER AND CONDUIT PENETRATIONS SHALL BE WATERTIGHT AFTER INSTALLATION
2. BOX SIZES AS INDICATED ON DRAWINGS
3. WIRING SHALL NOT ENCROACH IN TOP 6" OF BOX

TYPICAL PULLBOX
NOTES:
1. CONCRETE SHALL CONTAIN AN INTEGRAL RED OXIDE COLORING PIGMENT
2. ENCASE A NO. 4/0 BARE STRANDED COPPER GROUND WIRE THROUGHOUT THE ENTIRE LENGTH OF DUCT BANK

TYPICAL DUCT BANK
NOTES:
1. LOCATE NEW DUCT AT SIDE OF EXISTING DUCT BANK IF 12" MIN DEPTH CANNOT BE ATTAINED AT TOP LOCATION
2. PROVIDE TRENCH MARKER TAPE 6" TO 12" BELOW GRADE
3. COLOR CONCRETE WITH INTEGRAL RED OXIDE PIGMENT

DUCT BANK EXPANSION
CONDUIT PLACEMENT

6'' MINIMUM FINISH SLAB

CAPPED NIPPLE
FLUSH COUPLING, JACKETED

DUCT BANK OR SLAB ON GRADE

RIGID STEEL NIPPLE & COUPLING WITH FACTORY 40 MIL PVC COATING

RIGID STEEL FACTORY ELBOW WITH FACTORY 40 MIL PVC COATING

1'-0'' MIN

1'' CLEAR MIN
1'' COVER MIN

THICKENED SLAB

MAX 1-1/2'' CONDUIT

REBAR
GRADE SLAB

CONCRETE ENCASMENT 3'' MIN ALL SIDES FOR SLAB ON GRADE

NOTE: 40 MIL PVC LINED AND COATED METALLIC CONDUIT (SEE SPECS)

1'' NON-METALLIC CONDUIT

WATER DEPARTMENT
City of San Diego

CONDUIT PLACEMENT
E-505
CIP
PEDESTAL MOUNTED DISCONNECT

1/2" EPOXY ANCHOR BOLTS, 1/2" SLAB PENETRATION, MIN

6" X 3" CHANNEL

10" X 6" X 1/2" PLATE

PLAN

(PEDESTAL ONLY)

NAMEPLATE

DISCONNECT SWITCH, NON-FUSIBLE, 30 460V, 3 PHASE, 10 HP MAX (NEMA 4 OR 4X)

ELECTRICAL BOX

WELD ALL AROUND

CONCRETE FLR OR FIN GRADE

3/4" CONDUIT

3/4" FLEXIBLE LIQUID TIGHT CONDUIT (TYP) TO CONTROL DEVICE TERMINAL BOX

PVC COATED RIGID STEEL CONDUIT

U-BOLT OR CONDUIT CLAMP

COPPER GROUND WIRE

NOTES:
1. PVC COATED CONDUIT AT SLAB PENETRATION
2. MATERIAL TO BE GALVANIZED STEEL (SEE SPECIFICATIONS)
3. IF FOOTING REQ'D SEE S-315 AND S-316

PEDESTAL MOUNTED DISCONNECT

E-506

REVISION BY APPROVED DATE

WATER DEPARTMENT
City of San Diego

REVIEWED BY INITIALS DATE

E-506

STANDARD DETAIL
CIP
NOTE:
PROVIDE EXTERNAL BONDING JUMPER WHEN COUPLING HAS NO INTERIOR JUMPER

EXPANSION COUPLING

RIGID STEEL CONDUIT

EXPANSION JOINT

NEOPRENE SLEEVE

EXPANSION COUPLING
O-Z ELECTRICAL MFG
TYPE "DX" OR EQUAL
NOTES
1. 1½" CONDUIT MAX IN SLAB ABOVE GRADE.
2. CONDUITS LARGER THAN 1½".

CONDUIT TERMINATION FOR EQUIPMENT
9" MINIMUM DIAMETER X 2" THICK COVER

PRECAST VALVE BOX (SET TOP FLUSH WITH FINISH GRADE OR PAVING) BROOKS ISP OR EQUAL

PICK HOLES

3/4" X 10' GROUND ROD

GROUND CLAMP

GRAVEL (3" THK LAYER)

GROUND CABLES

CONDUIT (WHERE REQUIRED)

BUSHING (SEAL AROUND CABLE WITH COMPOUND)

GROUND ROD AND WELL INSTALLATION E-509

E-509 CIP

WATER DEPARTMENT
City of San Diego

GROUND ROD
AND WELL INSTALLATION
NOTES:
1. PROVIDE CAST OUTLET BOX
2. SET BOX OUT FROM WALL AS SHOWN
3. PROVIDE GASKET BETWEEN BOX AND FIXTURE
4. INSTALLATION SHALL BE WATER-TIGHT
SWITCHGEAR/MCC/PANEL GROUNDING

- Ground Bus Bar
- Durium Bolt
- Finished Floor
- 3/4" PVC Sleeve
- Switchgear/MCC
- Cable Landing Lug
- Ground Cable
- Equipment Rack/Electrical Panel
- Durium Bolt, Nut & Split Washer
- Cable Landing Lug
- Ground Cable
- 3/4" PVC Sleeve

Not to Scale
3/4" GROUND ROD

GROUND CABLE

ROD TYPE CONNECTOR
90° CABLE CONNECTION
TO ROD OR PIPE. BURNDY
TYPE "GP" GROUND
CONNECTOR (OR EQUAL)

CABLE TO ROD CONNECTION

E-513
CIP
NOTE:
PROVIDE SEISMIC BRACING PER UBC

SWITCHBOARD MCC MOUNTING
CONCRETE WALL OR COLUMN

EXPANSION ANCHOR

FINISH FLOOR

3'-9"

CONDUIT AS INDICATED ON DRAWINGS

SEAL (IF REQUIRED)

UNION

600V, 30A, 3W, 4P, WEATHERPROOF RECEPTACLE WITH SPRING DOOR. BRYANT CAT. 7223FR OR EQUAL. PROVIDE MATCHING PLUG FURNISHED LOOSE

UNION

SEAL

CONDUIT AS INDICATED ON DRAWINGS

COUPLING

GROUT

SLAB PENETRATION PVC-COATED RIGID STEEL CONDUIT

NOTE:
HOLD TO CL OF KNOCK-OUT ON BOX

RECEPTACLE INSTALLATION ON CONCRETE

WATER DEPARTMENT
City of San Diego

REVISION BY APPROVED DATE

REVIEWED BY INITIALS DATE

E-515 CIP
NOTES:

1. Beam should not detect bin bottom. Use range extension parameters to omit false echoes if this occurs. The transducer should be centered as much as possible (without interference from inlet) for optimum reading range.

2. Sound beam must be perpendicular to liquid surface.

3. Echo has missed improperly leveled transducer.

4. Tank must be at normal temperature and contain its normal vapor when performing empty or full calibration.

ULTRASONIC LEVEL TRANSMITTER
TANK INSTALLATION

WATER DEPARTMENT
City of San Diego
ULTRASONIC LEVEL INDICATION
TANK INSTALLATION
FLEXIBLE ELECTRICAL CONDUIT
1" NPT BUSHING
316 SS BRACKET
316 SS BOLT (TYP)
OPEN CHANNEL

1" NPT COUPLING
LEVEL TRANSDUCER
4" BLIND FLANGE
INSIDE TANK OR RESERVOIR

4" BLIND FLANGE
LEVEL TRANSDUCER
1" NPT NIPPLE WELD TO FLANGE
FLEXIBLE ELECTRICAL CONDUIT
TRANSUCER WITH FACTORY BONDED CPVC FLANGE
GASKET
TANK NOZZLE
TANK FLANGE
OUTSIDE TANK

SCALE: NO SCALE
**LIST OF MATERIALS**

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**NOTES:**
1. AIR BLEED VALVE IS INTEGRAL WITH THE TRANSMITTER.
LIST OF MATERIALS

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FLOW TRANSMITTER-LINE MOUNTED
LIQUID SERVICE
### LIST OF MATERIALS

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**PRESSURE TRANSMITTER-LINE MOUNTED**

**LIQUID SERVICE**

---

**STANDARD DETAIL**

---

**PRESSURE TRANSMITTER-LINE MOUNTED**

**LIQUID SERVICE**

---

**WATER DEPARTMENT**

City of San Diego

---

**CIP**

---

**I-605**
### List of Materials

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**Alternate Orientation**

**PRESSURE TRANSMITTER-REMOTE MOUNTED**

**LIQUID SERVICE**

---

**WATER DEPARTMENT**

City of San Diego

---

**REVISION BY APPROVED DATE**

**REVIEWED BY INITIALS DATE**

**STANDARD DETAIL**

CIP

**PRESSURE TRANSMITTER-REMOTE MOUNTED**

**LIQUID SERVICE**

**REVISION BY APPROVED DATE**

**REVIEWED BY INITIALS DATE**

**STANDARD DETAIL**

CIP

**PRESSURE TRANSMITTER-REMOTE MOUNTED**

**LIQUID SERVICE**
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PRESSESURE SWITCH-REMOTE MOUNTED
LIQUID SERVICE

WATER DEPARTMENT
City of San Diego

STANDARD DETAIL

CIP

REVISION BY APPROVED DATE

WATER DEPARTMENT
City of San Diego

CIP
I-607
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**ALTERTED ORONATION**

---

**PRESSURE SWITCH W/ GAUGE**

**LIQUID SERVICE**
**LIST OF MATERIALS**

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**D/P TRANSMITTER-REMOTE MOUNTED**

**LIQUID SERVICE**

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**WATER DEPARTMENT**

*City of San Diego*

**CIP**

---

**D/P TRANSMITTER-REMOTE MOUNTED**

**LIQUID SERVICE**

---
### List of Materials

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**D/P TRANSMITTER W/ GAUGE**

**LIQUID SERVICE**

---

**WATER DEPARTMENT**

City of San Diego

**STANDARD DETAIL**

**REVISION**

**APPROVED**

**DATE**

**REVIEWED BY**

**INITIALS**

**DATE**

**CIP**

**D/P TRANSMITTER W/ GAUGE**

**LIQUID SERVICE**

1-610
ALTERNATE ORIENTATION

LIST OF MATERIALS

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INSTRUMENT INSTALLATION DETAIL
D/P INDICATOR-REMOTE MOUNTED
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**FLOW TRANSMITTER-REMOTE MOUNTED**

**LIQUID SERVICE**
LIST OF MATERIALS

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FLOW TRANSMITTER-REMOTE MTD.
LIQUID SERVICE-ABOVE TAPS

WATER DEPARTMENT
City of San Diego

FLOW TRANSMITTER-REMOTE MOUNTED
LIQUID SERVICE-ABOVE TAPS

CIP
I-613
NOTE: The TEE, REDUCING TEE when required, shall be sized according to the location plan drawing.

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INSTRUMENT AIR SUPPLY TAKEOFF
W/ FILTER REGULATOR
EXPLOSION PROOF SPLICE BOX
CONDUIT SEAL
4-2/0 CABLE
316 SS MOUNTING BRACKET FOR FLOAT SUPPORT PIPE PER MANUFACTURER
CABLE TIES AS REQD
SCHD 40 PVC FLOAT SUPPORT PIPE
FLOAT SWITCH (TYP), ELEVATION AS INDICATED

BALL FLOAT SWITCH
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FLOAT SWITCH

BY PIPING
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PAVED AREA

INSIDE PLATFORM MOUNTING

OUTSIDE PLATFORM MOUNTING

WELD TO I-BEAM PLATFORM GRATING

WELD TO PLATFORM SUPPORT

INSTRUMENT SUPPORT
SINGLE MOUNTING
**LIST OF MATERIALS**

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**INSTRUMENT SUPPORT**

**DOUBLE MOUNTING**

**PAVED AREA**

**OUTSIDE PLATFORM MOUNTING**

**DETAIL**

**INSTRUMENT SUPPORT**

**DOUBLE MOUNTING**

---

**WATER DEPARTMENT**

City of San Diego

**STANDARD DETAIL**

CIP

**INSTRUMENT SUPPORT**

**DOUBLE MOUNTING**

1-619
LIST OF MATERIALS

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INSTRUMENT SUPPORT
SINGLE COLUMN MOUNTING
I. Clamp to be used for line sizes of 2".

All exposed ends of pipe to be capped.

Clamp to be used for 2" lines only.

LIST OF MATERIALS

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INSTRUMENT SUPPORT
2" LINE MOUNT ABOVE-CLAMP
ALL EXPOSED ENDS OF PIPE TO BE CAPPED

STAINLESS STEEL CABLE (TYP) (SEE NOTE I)

NOTES:
1. CABLE CLAMP TO BE USED FOR LINE SIZES 3" THROUGH 14"

LIST OF MATERIALS

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INSTRUMENT SUPPORT
3"-14" LINE MOUNT
INSULATION PIPE
FREE OF VIBRATION

I-BEAM (TYP.)

FREE OF VIBRATION I-BEAM

PIECE

WELD

WHEN WELDING IS NOT ALLOWED, USE STRUT BEAM CLAMPS & CLIPS TO ATTACH TO STRUCTURAL MEMBER IN FIELD) TYP

LIST OF MATERIALS

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NOTES:

1. INSTRUMENT PIPING/TUBING SHALL BE SUPPORTED FROM PIPE, PIPE SUPPORTS, & OTHER TYPES OF PERMANENT STRUCTURES AS SHOWN ABOVE ROUTING OF INSTRUMENT PIPING/TUBING TO BE DETERMINED IN FIELD.

2. MAXIMUM SPACING BETWEEN SUPPORTS IS TO BE 5'-0". PIPING/TUBING RUNS OF LESS THAN 5'-0" NEED NOT BE SUPPORTED.
Max. No. of tubes in raceway

Raceway width (depth *)

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<th>3/8&quot;</th>
<th>1/2&quot;</th>
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*All raceway channel to be 3/4" deep

List of Materials

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Typical pneumatic tubing support

TYPICAL PNEUMATIC TUBING SUPPORT
**DETAIL "A"**
DETAIL FOR SUPPORT OF 1 TO 3 TUBING LEADS.

**DETAIL "B"**
DETAIL FOR SUPPORT OF 4 OR MORE TUBING LEADS WITH 1-1/2" & LARGER RACEWAY DOUBLE LAYER IS PERMITTED.

**NOTES:**
1. SUPPORT RACEWAY EVERY 6'-0".
2. SECURE TUBING IN RACEWAY EVERY 2'-0".
3. RACEWAY FITTINGS COME WITH DRIVE RIVETS AND ARE PRE-DRILLED. USE THEM FOR TEMPLATES ON RACEWAY.
4. SHORT RUNS OF TUBING 2'-0" IN LENGTH OR LESS DO NOT REQUIRE SUPPORT.

**LIST OF MATERIALS**

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VENTILATED TELEMETRY CABINET

NOTE: NEMA 4X CAB SHOWN WITH HINGED DOOR REMOVED

VENTILATED TELEMETRY CABINET

I-626
CIP
RIGHT ANGLE CONNECTOR
FLEXIBLE ANTENNA TERMINATION CABLE (LENGTH APPROX 15")
WEATHERPROOF SEAL BETWEEN CABLE AND ANTENNA SUPPORT EXTENSION
ANTENNA MOUNTING HARDWARE
PROVIDE CABLE GRIP TO SUPPORT CABLE WEIGHT
LIGHT STANDARD/PIPE
GROUND LUG
BUSHING (TYP)
FIN GRADE
RIGID STEEL PVC COATED CONDUIT TO GROUND ROD
PLASTIC TO STEEL ADAPTER (TYP)
SCHD 40 PVC CONDUIT
ANCHOR BOLTS WITH DOUBLE LOCKNUTS
CONCRETE BASE

POLE MOUNTED DIRECTIONAL ANTENNA

POLE HGT  d  D
50'  30''  8'-0"
40'  28''  7'-0"
30'  24''  6'-0"
20'  20''  5'-6"
12'  20''  4'-6"

NOTE:
ALL ANTENNA CABLE CONNECTIONS TO BE WEATHERPROOFED
MAGNETIC FLOWMETER, TRANSMITTER, AND ULTRASONIC GENERATOR

SEE SPECS SECTION 13300

\( \frac{3}{4}'' \ W/2 \ #2 \) AND W/2 VENDOR FURNISHED CABLES

\( \frac{3}{4}''-2C/S \) 4-20 MA FLOW SIGNAL

BONDING JUMPER USE WHERE CONNECTING PIPE IS CONDUCTIVE

ULTRASONIC GENERATOR

GROUNDING RING, USE WHERE CONNECTING PIPE IS NON-CONDUCTIVE OR LINED

POWER SUPPLY BRANCH CIRCUIT

BONDING JUMPER

* 8 GROUNDING CONDUCTOR TO GROUND BUS, REQUIRED WHERE CONNECTING PIPE IS NON-CONDUCTIVE OR LINED, OR WHERE CONDUCTIVE CONNECTING PIPE IS ISOLATED FROM GROUND

MAGNETIC FLOWMETER, TRANSMITTER, AND ULTRASONIC GENERATOR

CIP
MAGNETIC FLOWMETER, TRANSMITTER
ULTRASONIC GENERATOR AND
ZERO RETURN UNIT

NOTE:
ALL VENDOR-FURNISHED CABLE SHALL BE
CUT TO LENGTH AND TERMINATED PER
MANUFACTURER'S RECOMMENDATIONS
PIPEDLINE TERMINALS

REFERENCE ELECTRODE TERMINAL

WIRE DIAGRAM

TERMINAL BLOCK

COUPON TERMINALS

TEST STATION HOUSING

SEE DETAIL C-705

PERMANENT REFERENCE ELECTRODE ASSEMBLY

WIRE WITH YELLOW INSULATION

PIPE

NOTES:

1. COUPON SHALL BE INSTALLED 6" TO 12" FROM PIPE

2. REFERENCE ELECTRODE SHALL BE INSTALLED IN NATIVE SOIL WITH 2" MIN COVER

2'-10 AWG COPPER WIRES WITH WHITE INSULATION

WIRE CONNECTIONS TYP SEE C-706

COUPON WIRES

COUPON, SEE NOTE 1 AND C-703

8'-MIN 12'-MAX

REFERENCE ELECTRODE

SEE NOTE 2

FLUSH MOUNTED COUPON TEST STATION

C-701

CIP
POST MOUNTED COUPON TEST STATION

Notes:
1. Coupon shall be installed 6" to 12" from pipe.
2. Reference electrode shall be installed in native soil with 2" min cover.
3. Coat buried portion of channel w/ coal tar mastic to 6" above grade.

Scale: NTS

WATER DEPARTMENT
City of San Diego

POST MOUNTED COUPON TEST STATION

C-701

CIP
NO. 10 AWG WIRES WITH ORANGE INSULATION, LENGTH TO REACH TEST STATION

SECURE WIRE IN DRILLED HOLE AND SOLDER, THEN COAT CONNECTION WITH EPOXY, TYP OF 2

COUPON MADE FROM SAME TYPE OF STEEL AS PIPE, 1/2" THICK (MIN)

NOTES:

1. ABRASIVE BLAST COUPON AND COAT WITH RICH CEMENT MORTAR IN SHOP.

2. INSTALL COUPON IN ORIENTATION SHOWN.

COUPON DETAIL

SCALE: NO SCALE
POLARIZATION CELL

CONNECT NEGATIVE TERMINAL OF POLARIZATION CELL TO CATHODICALLY PROTECTED PIPE SIDE OF INSULATING FLANGE

COPPER BUS BAR, TYP OF 2
SEE NOTES 1 AND 3

SST LOCK WASHER

$\frac{1}{2}'' \times \frac{3}{4}''$ SILICON BRONZE BOLT, TYP OF 4 (2 EA SIDE)

DRILL AND TAP HOLES,
$\frac{1}{2}''$ DIA X 1'' DEEP, TYP OF 4 (2 EA SIDE)

STEEL FLANGE (TOP)

INSULATING GASKET

NOTES:
1. DRILL HOLES IN COPPER BUS BAR TO CONNECT DIRECTLY TO POLARIZATION CELL CONNECTORS. DRILL HOLES APPROX $\frac{1}{2}''$ OC AND 1'' FROM BOTTOM OF BUS BAR FOR CONN TO FLANGE
2. COAT SURFACES OF COPPER BAR AS SPECIFIED
3. ATTACH BUS BARS PRIOR TO COATING FLANGE
4. NOT READ FOR INSULATING FLEX COUPLINGS ON DI PIPE

POLARIZATION CELL

WATER DEPARTMENT
City of San Diego

C-704
CIP
NOTE: 8" MIN THROAT DIA

CAST IRON COVER
CAST IRON FRAME
CONCRETE COLLAR

#4 REBARS AROUND TEST STATION HOUSING

TRAFFIC VALVE BOX

4" SCHD 40 PVC PIPE

GRAVEL

LEAD WIRES AS INDICATED

NATIVE SOIL

TEST STATION HOUSING

C-705

CIP
1) FILE TO BARE METAL AND CLEAN SURFACE

2) STRIP INSULATION FROM WIRE AND ATTACH SLEEVE

3) HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR. IGNITE WITH FLINT GUN

4) REMOVE SLAG FROM CONNECTION WITH CHIP HAMMER

5) COVER CONNECTION WITH COMPATIBLE COATING OVER ALL EXPOSED METAL

NOTE: CERAMIC MOLDS WILL NOT BE ALLOWED

EXOTHERMIC WELD

C-706

CIP

WATER DEPARTMENT
City of San Diego

EXOTHERMIC WELD

CIP

C-706
NOTES:
1. CONDUIT IN VAULTS NOT SHOWN FOR CLARITY. WIRES TO BE INSTALLED IN GALVANIZED STEEL CONDUIT FROM VAULT PENETRATION TO CONNECTION ON PIPELINE. ANCHOR CONDUIT ON VAULT WALLS AS SPECIFIED.
2. COAT BURIED PORTIONS OF STEEL BEAM W/COAL TAR MASTIC TO 6" ABOVE GRADE.
TEST STATION FOR INSULATING JOINT
DIRECT BURIAL

CAP
3" DIA x 6' ORANGE POLYCARBONATE PIPE SET IN 12" DIA CONCRETE COLLAR.

TEST LEADS WITH AT LEAST 18" SLACK INSIDE

EMBOSSED GRAPHIC LETTERS (BLACK)

12" DIA CONCRETE COLLAR

I-#8 AND 1-#10 AWG (RED) TEST LEADS

EXOTHERMIC WELD (TYP)

(GROUND (NEW/UNPROTECTED))

INSULATING FLANGE KIT

POST MOUNTED TEST STATION (ALTERNATE POST CONFIGURATION)

TEST STATION HOUSING SEE C-705

1-#8 AND 1-#10 AWG (WHITE) TEST LEADS

EXOTHERMIC WELD (TYP)

(EXISTING/PROTECTED)

INSULATING FLANGE KIT

GROUND LEVEL TEST STATION
POST MOUNTED TEST STATION
(ALTERNATE POST CONFIGURATION)

3" DIA x 6' ORANGE POLYCARBONATE PIPE SET IN 12" DIA CONCRETE COLLAR.

3" DIA x 6' ORANGE POLYCARBONATE PIPE SET IN 12" DIA CONCRETE COLLAR.

TEST LEADS WITH AT LEAST 18" SLACK INSIDE

EMBOSSED GRAPHIC LETTERS (BLACK)

1-1/8 AND 1-1/0 AWG (RED) TEST LEADS

EXOTHERMIC WELD (TYP)

TEST STATION HOUSING SEE C-705

1-1/8 AND 1-1/0 AWG (WHITE) TEST LEADS

EXOTHERMIC WELD (TYP)

PROTECTED PIPE

FOREIGN PIPELINE

GROUND LEVEL TEST STATION

TEST STATION FOR FOREIGN PIPELINE CROSSING

C-709

WATER DEPARTMENT
City of San Diego

STANDARD DETAIL
CIP

TEST STATION FOR FOREIGN PIPELINE CROSSING

C-709

WATER DEPARTMENT
City of San Diego

STANDARD DETAIL
CIP

TEST STATION FOR FOREIGN PIPELINE CROSSING

C-709
GALVANIZED STEEL
CHANNEL AS SPECIFIED
COAT BURIED PORTION W/COAL TAR MASTIC
FOR ANODE LEADS TO DRAIN CABLE CONNECTION, SEE DETAIL C-705
CHANNEL AS SPECIFIED
GALVANIZED STEEL
1/4" ANODE LEADS TO DRAIN CABLE CONNECTION
COAT BURIED PORTION
SEE DETAIL C-712 OR C-716
#B AWG DRAIN CABLE W/COAL TAR MASTIC (BLUE)
WITH TYPE 316 STAINLESS STEEL CONDUIT STRAP (TYP)
W/STEEL CONDUIT STRAP ITYP) #8 AWG ANODE LEAD 10'-0" MIN
#10 AWG TEST LEAD CTYP) (WHITE)
EXOTHERMIC WELD ITYP) SEE DETAIL C-706
TEST STATION HOUSING FOR ANODE LEADS TO DRAIN CABLE CONNECTION, SEE DETAIL C-705
#B AWG DRAIN CABLE (BLUE)
#10 AWG TEST LEAD (WHITE)
TRENCH MARKER TAPE
10'-0" MIN
GALVANIC ANODE (TYP) TEST STATION C-710
GALVANIC ANODE LEAD (BLACK) (TYP)
GALVANIC ANODE LEAD (BLACK) ITYP)
GALVANIC ANODE (TYP)
EXOTHERMIC WELD (TYP) SEE DETAIL C-706
TRENCH MARKER TAPE
10'-0" MIN
GALVANIC ANODE (TYP)
GALVANIC ANODE TEST STATION
ABOVE GRADE INSTALLATION
GROUND LEVEL INSTALLATION
WATER DEPARTMENT
City of San Diego
GALVANIC ANODE TEST STATION
C-710
CIP
REVISION BY APPROVED DATE
STANDARD DETAIL
CIP
REVIEWED BY INITIALS DATE
GALVANIC ANODE TEST STATION C-710
0.01 OHM SHUNT

SPLIT BOLT CONNECTION (TYP)

**10 AWG THW (WHITE) TEST LEAD

**8 AWG THW (BLUE) DRAIN CABLE

CABLE IDENTIFIER (TYP)
SEE DETAIL C-723

**10 AWG (BLACK) ANODE LEAD NUMBER AS REQUIRED

GALVANIC ANODE LEAD TO DRAIN CABLE CONNECTION

GALVANIC ANODE LEAD TO DRAIN CABLE CONNECTION C-711 CIP
NEMA 3R JUNCTION BOX AS SPECIFIED
0.01 OHM SHUNT
SPLIT BOLT CONNECTION (TYP)
#8 AWG DRAIN CABLE (BLUE)
#10 AWG TEST LEAD (WHITE)
#12 AWG COPPER WIRE (YELLOW) TO REFERENCE ELECTRODE
CABLE IDENTIFIER (TYP)
SEE DETAIL C-723
#8 OR #10AWG ANODE LEAD (BLACK) NUMBER AS REOD
SCHD 80 PVC CONDUIT

ABOVE GRADE GALVANIC ANODE
JUNCTION BOX

WATER DEPARTMENT
City of San Diego

ABOVE GRADE GALVANIC ANODE
JUNCTION BOX C-712
NOTE:

FOR USE IN PEDESTRIAN TRAFFIC AREAS

ALTERNATIVE ANODE VENT PIPE

WATER DEPARTMENT
City of San Diego

ALTERNATIVE ANODE VENT PIPE C-713

CAST IRON COVER

TOP VIEW

PVC END PLUG

ELEVATION

PVC VENT PIPE EXTENSION

COUPLING

PVC VENT PIPE

FILL WITH SAND

3T CONCRETE TRAFFIC BOX

GRAVEL, 3’’ DEEP MIN

DRILL THREE 1/8’’ DIA HOLES AT 120° APART

2’’ DIA HOLE

NOTE:

FOR USE IN PEDESTRIAN TRAFFIC AREAS
1-#8 AWG COPPER TEST WIRE (GREEN). WELD END TO PIPE 200' DOWNSTREAM OF TEST STATION. TAPE WIRE TO TOP OF PIPE.

PERMANENT REFERENCE ELECTRODE ASSEMBLY WIRE WITH YELLOW INSULATION

NOTES:
1. COAT BURIED PORTION OF STEEL CHANNEL W/COAL TAR MASTIC TO 6' ABOVE GRADE
2. REFERENCE ELECTRODE SHALL BE INSTALLED IN NATIVE SOIL WITH 2" MIN COVER

GALVANIC RIBBON ANODE TEST STATION POST MOUNTED

SCALE: NTS
ONE INSULATING WASHER FOR EACH NUT
FULL LENGTH INSULATING SLEEVE FOR EACH BOLT
STEEL WASHER FOR EACH NUT
STEEL NUT
1/8" THICK INSULATING GASKET
(NEW/PROTECTED)
(EXISTING/UNPROTECTED)
FLANGE
DIELECTRIC INSULATING GASKET
DIELECTRIC INSULATING SLEEVE
DIELECTRIC INSULATING FLANGE
AND UNION

WATER DEPARTMENT
City of San Diego
DIELECTRIC INSULATING FLANGE
AND UNION
C-715
CIP
NEMA 3R JUNCTION BOX AS SPECIFIED
COPPER SOLDERLESS LUG CONNECTION (TYP)
CABLE IDENTIFIER (TYP) SEE DETAIL C-723
COPPER BUS BAR
0.01 OHM SHUNT (TYP)
**8 OR **10 AWG COPPER WIRES (BLACK) FROM ANODES
1/4" THICK MICARTA BOARD
*12 AWG COPPER WIRE (YELLOW) TO REF ELECTRODE
*8 AWG COPPER TEST WIRE (GREEN) TO PIPE 200' DOWNSTREAM
*8 AWG COPPER TEST WIRE (WHITE) TO PIPE
SCHD 80 PVC CONDUIT

NOTE: NUMBER OF ANODES AS REQUIRED

TERMINAL BOX FOR GALVANIC ANODES, POST MOUNTED

WATER DEPARTMENT
City of San Diego

TERMINAL BOX FOR GALVANIC ANODES, POST MOUNTED
Tape wrap
See note

THERMITE WELD CONNECTION
See note

GALVANIC RIBBON ANODE
OR PIPE CONNECTING WIRE

INLINE SPLICE

THERMITE WELD CONNECTION
See note

WIRE TO PIPE
OR TEST STATION
AS APPLICABLE

GALVANIC RIBBON ANODE (TYP)

TAPE WRAP
See note

TAP SPLICE

NOTES:
1. WRAP ENTIRE CONNECTION W/ 3 LAYERS HIGH VOLTAGE RUBBER TAPE, THEN W/ 3 LAYERS VINYL ELEC. TAPE

GALVANIC RIBBON ANODE
AND WIRE SPLICES

C-717
CIP
I'DIA RIGID GALVANIZED STEEL CONDUIT
~--
ANODE JUNCTION BOX
SEE DETAIL C-721
4" SCHD 40 GALVANIZED PIPE. FILL WITH CONCRETE
'I" DIA RIGID GALVANIZED STEEL CONDUIT W/ 1-82 AWG RECTIFIER NEGATIVE AND
1-88 AWG TEST LEAD (WHITE) TO STRUCTURE

1-"2 AWG RECTIFIER NEGATIVE AND
I-"S AWG TEST LEAD (WHITE) TO STRUCTURE
ELECTRICAL METER
PAD MOUNTED
AIR-COOLED
RECTIFIER
CONCRETE BASE

I" DIA RIGID GALVANIZED STEEL CONDUIT WITH 2-10 AWG WIRES TO ELECTRICAL SPLICE BOX
1-" DIA SCHD 80 PVC VENT PIPE FROM DEEP WELL ANODES
ELECTRICAL SPLICE BOX
SEE DETAIL C-724

DEEP WELL ANODE BED
SEE DETAIL CP-722

I-1/2" DIA RIGID GALVANIZED STEEL CONDUIT WITH 1-82 AWG RECTIFIER POSITIVE AND 1-88 AWG (WHITE) TEST LEAD TO ANODE JUNCTION BOX

RECTIFIER AND ANODE JUNCTION BOX
INSTALLATION DETAIL

WATER DEPARTMENT
City of San Diego

RECTIFIER AND ANODE JUNCTION BOX INSTALLATION DETAIL
C-718
DEEP WELL ANODE BED

WELLHEAD ASSEMBLY SEE C-720
RIGID GALVANIZED STEEL CONDUIT WITH INDIVIDUAL ANODE LEAD CABLES TO FIBERGLASS JUNCTION BOX
TO PVC VENT PIPE TERMINATION
BENTONITE CEMENT GROUT SEAL
1" DIA VENT PIPE
#8 AWG ANODE LEAD WIRES
TOP OF CARBONACEOUS BACKFILL
CAST IRON ANODE (TYP)
ANODE CENTRALIZERS (TYP)
CARBONACEOUS COLUMN
IMPRESSED CURRENT ANODE (A) (TYP)
PVC VENT PIPE CAP
VENT PIPE:
1" ID W/ 0.006" WIDE, 1.5" LONG SLOTS 6" APART 90° AROUND PIPE (ALL VENT PIPE)
10" DIA

DEEP WELL ANODE BED C-719
CIP

WATER DEPARTMENT
City of San Diego

DEEP WELL ANODE BED
CAST IRON COVER

CAST IRON FRAME AS SPECIFIED (TYP)

BOXOUT AS REQD TO FIT CAST IRON FRAME

PLASTIC INSULATING BUSHING, SEAL W/ DUXSEAL

ROUT TO RECTIFIER SEE C-718

2" HOT DIP GALV RIGID CONDUIT

3" DIA (MIN) ANODE SUPPORT PIPE

VENT PIPE

SEAL W/BENTONITE CEMENT GROUT FOLLOWING ANODE AND VENT PIPE INSTALLATION

ANODE LEAD WIRES ONE PER ANODE

ANODE WELLHEAD ASSEMBLY DETAIL C-720 CIP
COPPER BOLT, NUTS, WASHERS AND LOCKWASHERS (TYP)

COPPER SOLDERLESS LUG CONNECTION (TYP)

0.001 OHM - 25 AMP SHUNT (TYP)

SLEEVE NYLON WIRE MARKER (TYP)

#8 AWG ANODE LEADS (BLACK) NUMBER AS REQUIRED

RIGID GALVANIZED STEEL CONDUIT WITH ANODE LEAD WIRE FROM DEEP WELL ANODE BED

SEAL TYPE CONDUIT FITTING (TYP) WITH COMPOUND AS INDICATED

NOTE:
MOUNT JUNCTION BOX AS INDICATED SEE C-7/18

LABELS ON TERMINAL BOARD AS INDICATED

1" x 1/4" COPPER BUS BAR

RECTIFIER POSITIVE CABLE (BLACK)

1/4" THICK MICARTA TERMINAL BOARD

NEMA 3R JUNCTION BOX ENCLOSURE AS SPECIFIED

1-1/8" DIA RIGID GALVANIZED STEEL CONDUIT

IMPRESSED CURRENT DEEP WELL ANODE JUNCTION BOX

WATER DEPARTMENT
City of San Diego

IMPRESSED CURRENT DEEP WELL ANODE JUNCTION BOX

C-721
CIP
CONCRETE TRAFFIC BOX

TRENCH MARKER TAPE

FROM OTHER SURFACE ANODE BEDS

PVC CONDUIT (SIZE AS REQUIRED)

TO ANODE JUNCTION BOX

NATIVE BACKFILL

*8 AWG COPPER ANODE LEAD WIRE

CAST IRON ANODE

COKE BREEZE

IMPRESSIONED CURRENT ANODE SURFACE BED

C-722

WATER DEPARTMENT
City of San Diego

IMPRESSED CURRENT ANODE SURFACE BED

C-722
NYLON WIRE MARKER

PIPE IDENTIFICATION

FOR USE IN JUNCTION BOXES
AND ABOVE GRADE ENCLOSURES

CABLE

FOR USE IN GRADE LEVEL TEST
AND BOND STATION ENCLOSURES

NOTE:
IDENTIFIER SHOULD BE WITHIN
4" OF END OF WIRE

WRAP AND TWIST
CONNECTING WIRE
TO ATTACH BRASS
TAG TO CABLE

3/16" MIN STAMPED PIPE
IDENTIFICATION

1" DIA BRASS TAG

CABLE IDENTIFIER

C-723
CIP
AC ELECTRICAL SPLICE BOX

DETAIL A

REVISION BY APPROVED DATE

WATER DEPARTMENT
City of San Diego

STANDARD DETAIL
CIP

AC ELECTRICAL SPLICE BOX

C-724 CIP
NOTES:

1. All concrete collars shall be 10" thick when located in unpaved or unimproved areas.

2. Attach anode to anode lead wire by soldering. Seal connection with aquaral and electrical tape or equal.

3. Each pipeline ground consists of two ground anodes spaced 50' apart. Each ground anode consists of two zinc ribbons connected in parallel as shown in detail.

4. At each insulating flange, install one pipeline ground (two ground anodes) on each side of insulating flange.

5. Record resistance of each ground anode and resistance of pipeline grounds (ground anodes connected together).