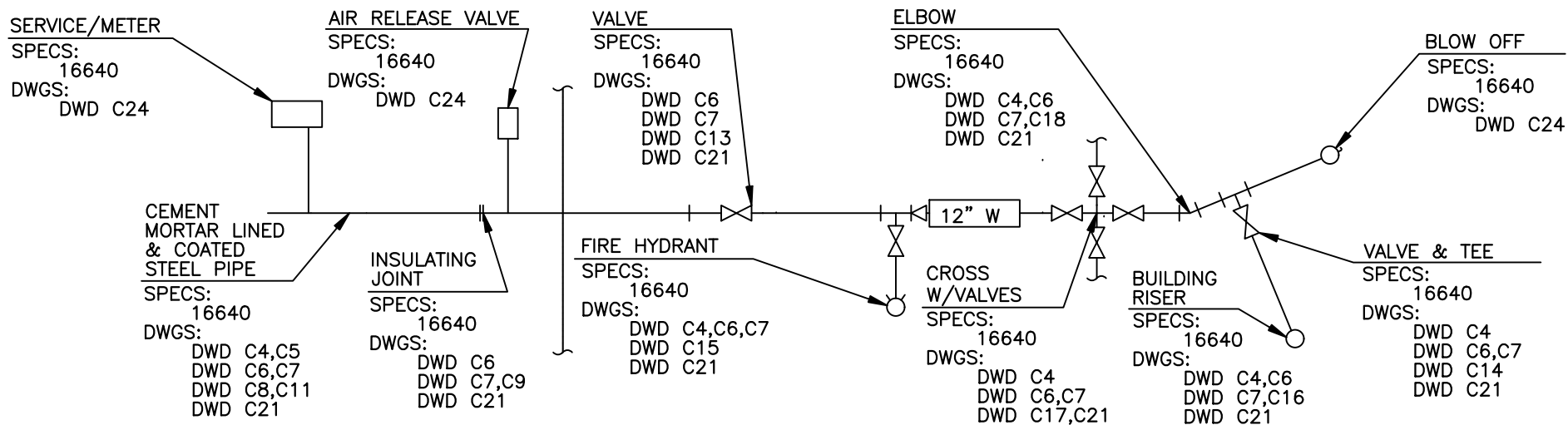


## **7. Cathodic Protection System Drawings**

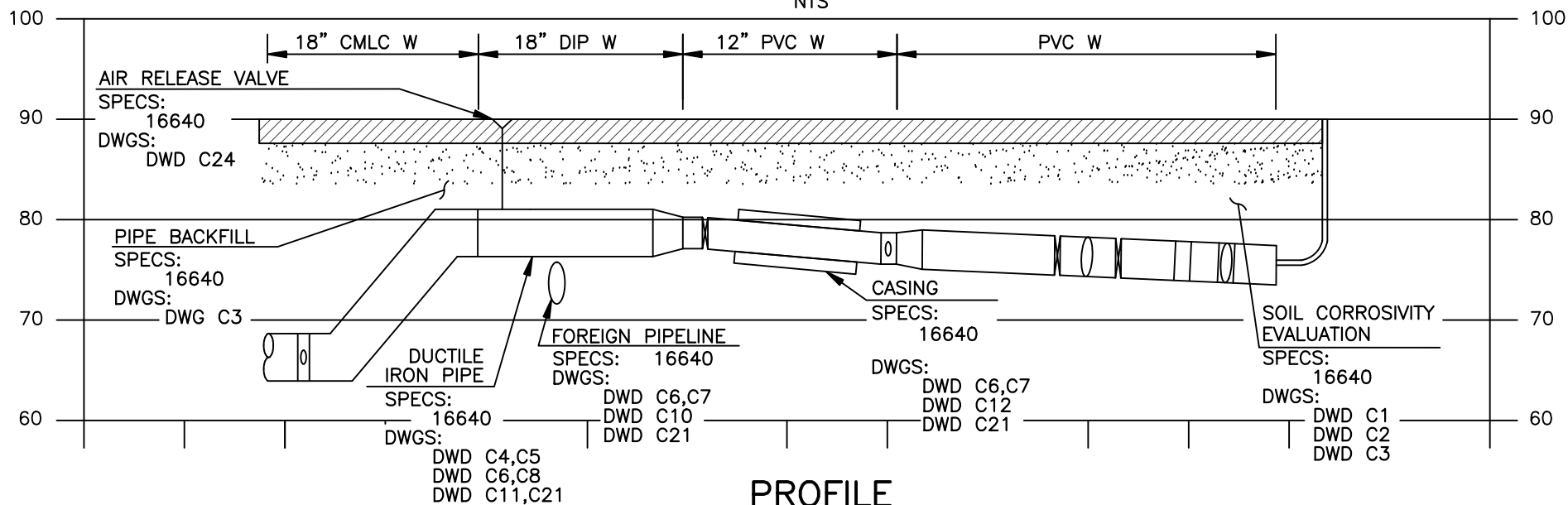
**DIABLO WATER DISTRICT  
STANDARD SPECIFICATIONS AND DRAWINGS**

**CATHODIC PROTECTION SYSTEM DRAWINGS**

|         |  |
|---------|--|
| DWD C0  | Quick Reference Guide – Cathodic Protection  |
| DWD C1  | Wenner Four Pin Resistivity Test   |
| DWD C2  | Barnes Layer Resistivity Calculations  |
| DWD C3  | Soil Box Resistivity Test  |
| DWD C4  | Bond Cables – Metallic Pipe Joints Sacrificial Anode Systems                                       |
| DWD C5  | Bond Cables – Across Fittings on Metallic Pipe   |
| DWD C6  | Exothermic Weld  |
| DWD C7  | Pin Brazed Connection  |
| DWD C8  | Flush Grade Test Station   |
| DWD C9  | CTS – Corrosion Test Station   |
| DWD C10 | IJTS – Insulating Joint Test Station   |
| DWD C11 | FPTS – Foreign Pipeline Test Station   |
| DWD C12 | ATS – Anode Test Station   |
| DWD C13 | CATS – Casing Anode Test Station   |
| DWD C14 | VATS – Valve Anode Test Station  |
| DWD C15 | VATS – Valve and Tee Anode Test Station  |
| DWD C16 | FHATS – Fire Hydrant Anode Test Station  |
| DWD C17 | Metallic Riser Anode Test Station  |
| DWD C18 | Cross and Valves Anode Test Station  |
| DWD C19 | Elbow Anode Test Station   |
| DWD C20 | Double Detector Check Assembly Preventer or Reduced Pressure Backflow Preventer Anode Test Station |
| DWD C21 | Double Offset Anode Test Station   |
| DWD C22 | Tapping Saddle Anode Test Station  |
| DWD C23 | Cable Identification   |
| DWD C24 | Anode at Leak Repair Clamp   |
| DWD C25 | Insulating Flange Assembly   |
| DWD C26 | Copper Water Laterals Anode Installation   |
| DWD C27 | 2" Blow Off Anode Installation   |
| DWD C28 | Thrust Restraint Harness Anode Installation  |
| DWD C29 | Cable Splice Detail  |
| DWD C30 | Anode at Tapping Saddle  |
| DWD C31 | Galvanic Cathodic Protection System Checkout   |
| DWD C32 | Impressed Current Cathodic Protection System Checkout (page 1)                                     |
| DWD C33 | Impressed Current Cathodic Protection System Checkout (page 2)                                     |
| DWD C34 | Leak Repair Report   |



**PLAN**  
 NTS

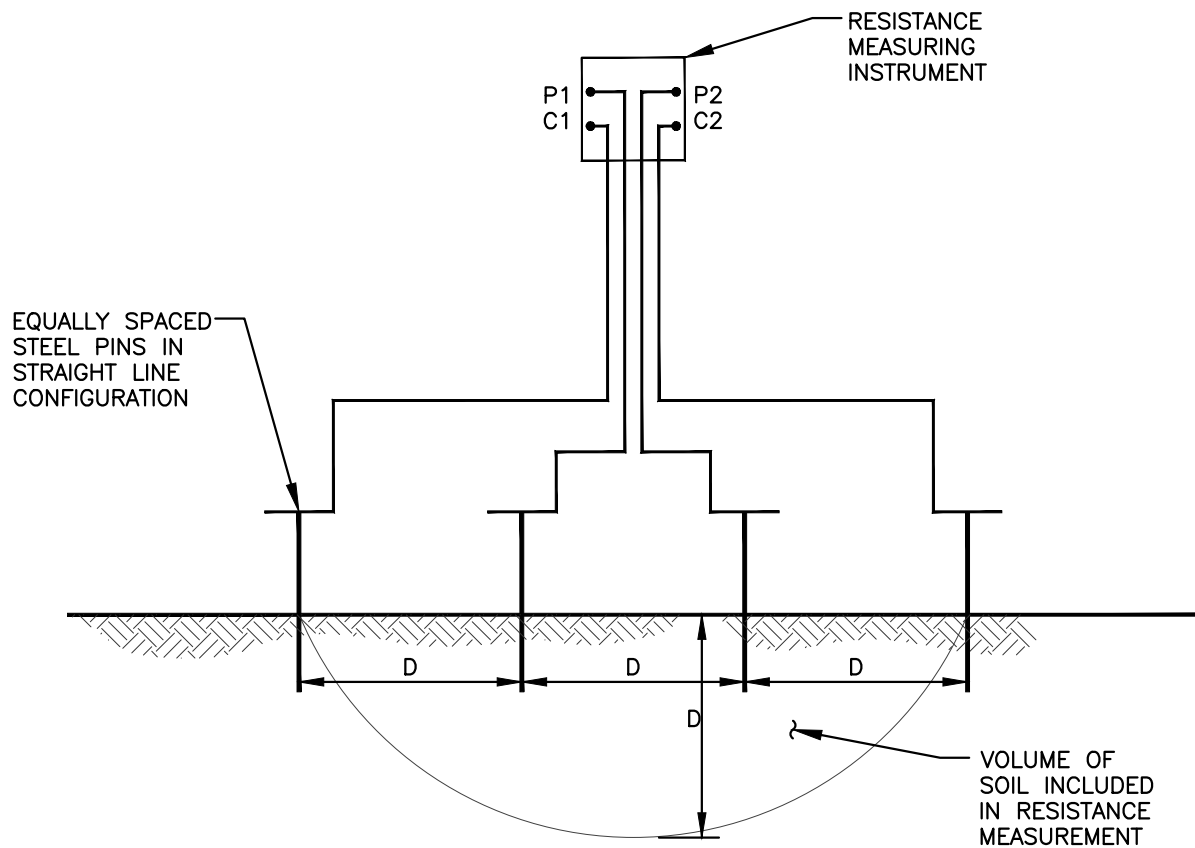


**PROFILE**  
 NTS

DIABLO WATER DISTRICT

STANDARD DRAWING  
 QUICK REFERENCE GUIDE – CATHODIC PROTECTION

DESIGNED MA DRAWN TH/JAW APPROVED WW DATE OCTOBER, 2022 DWG. NO. DWD CO



DIABLO WATER DISTRICT

STANDARD DRAWING  
WENNER FOUR PIN RESISTIVITY TEST

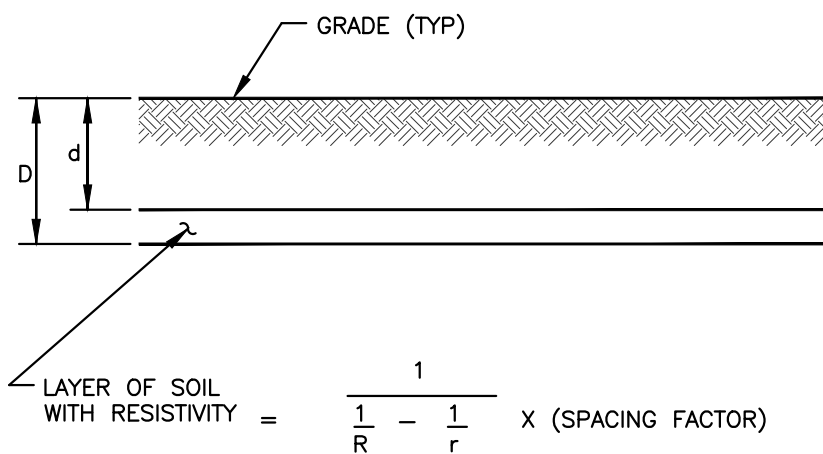
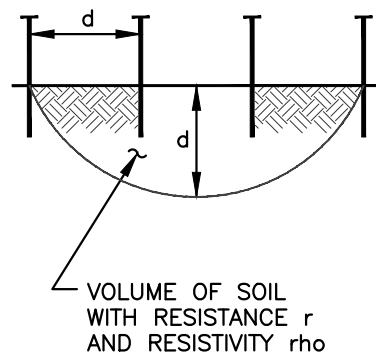
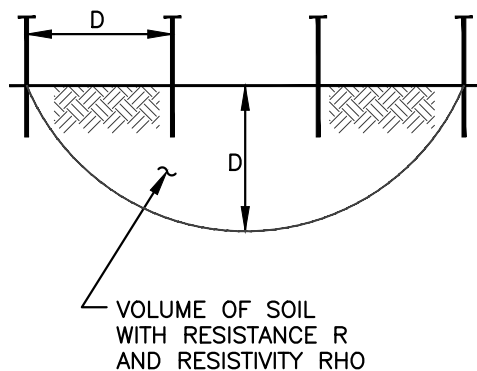
DESIGNED MA

DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

DWG. NO. **DWD C1**



DIABLO WATER DISTRICT

STANDARD DRAWING  
BARNES LAYER RESISTIVITY CALCULATIONS

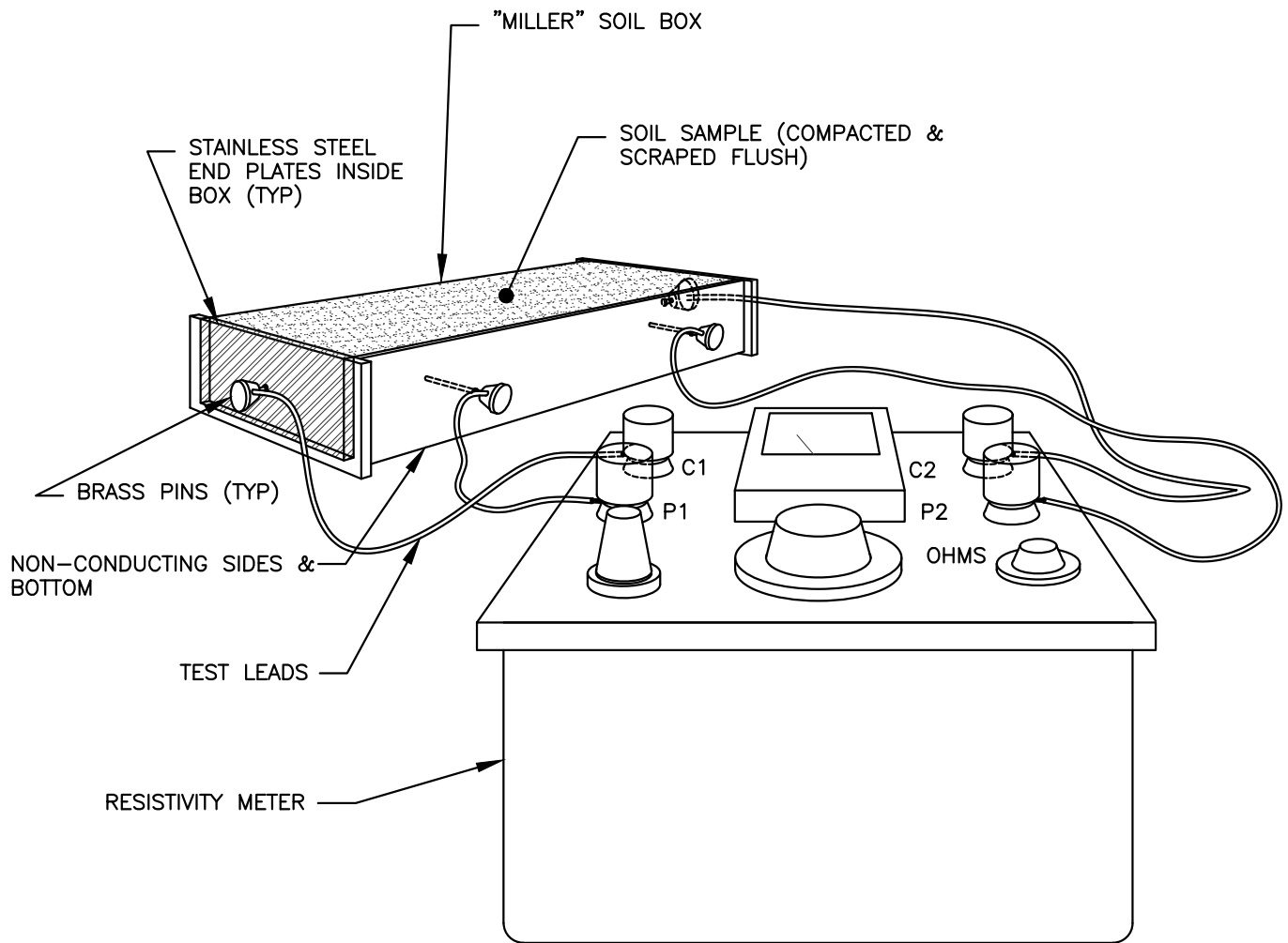
DESIGNED MA

DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

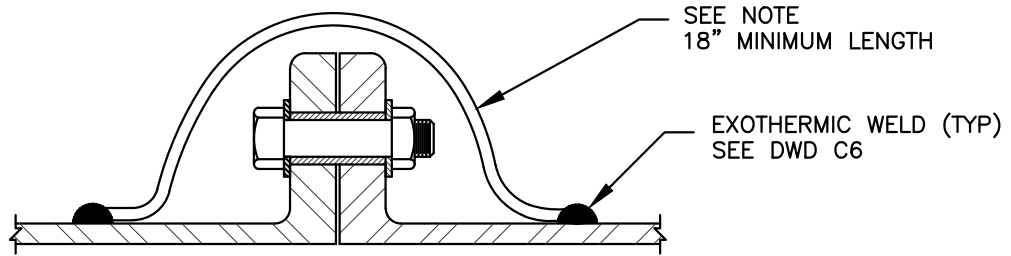
DWG. NO. DWD C2



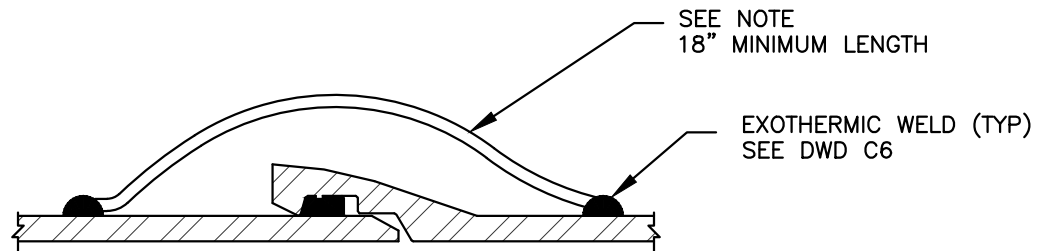
DIABLO WATER DISTRICT

STANDARD DRAWING  
SOIL BOX RESISTIVITY TEST

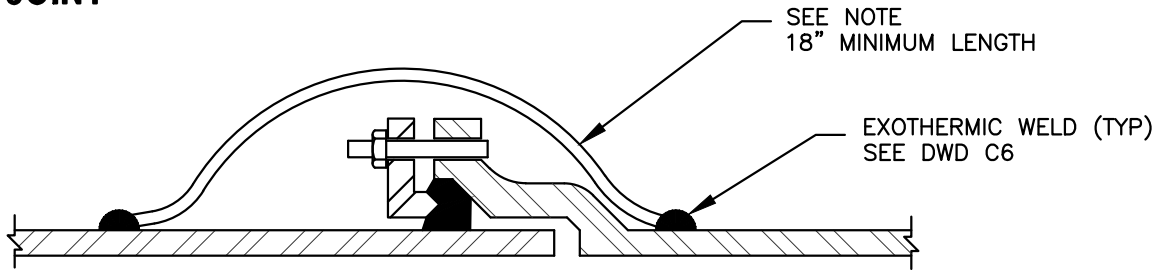
|             |          |              |                   |                 |
|-------------|----------|--------------|-------------------|-----------------|
| DESIGNED MA | DRAWN SC | APPROVED JDH | DATE OCTOBER 2022 | DWG. NO. DWD C3 |
|-------------|----------|--------------|-------------------|-----------------|



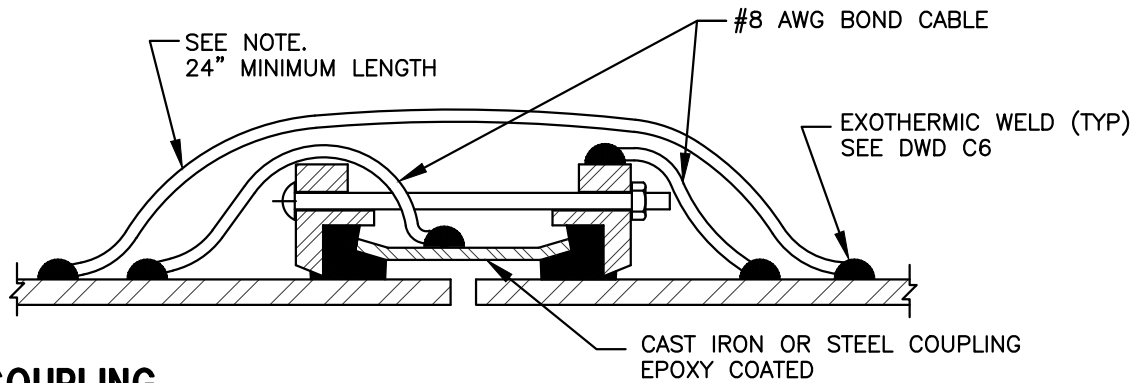
## FLANGED JOINT



## PUSH-ON JOINT



## MECHANICAL JOINT



## FLEXIBLE COUPLING

### NOTES:

1. USE #8 AWG/HMWPE BOND CABLES FOR BONDING METALLIC FITTINGS ON NONMETALLIC PIPING SYSTEMS.
2. USE #4 AWG/HMWPE BOND CABLES FOR BONDING PIPE JOINTS ON METALLIC PIPING SYSTEMS PER SPECIFICATIONS.

DIABLO WATER DISTRICT

STANDARD DRAWING  
BOND CABLES - METALLIC PIPE JOINTS  
SACRIFICIAL ANODE SYSTEMS

DESIGNED MA

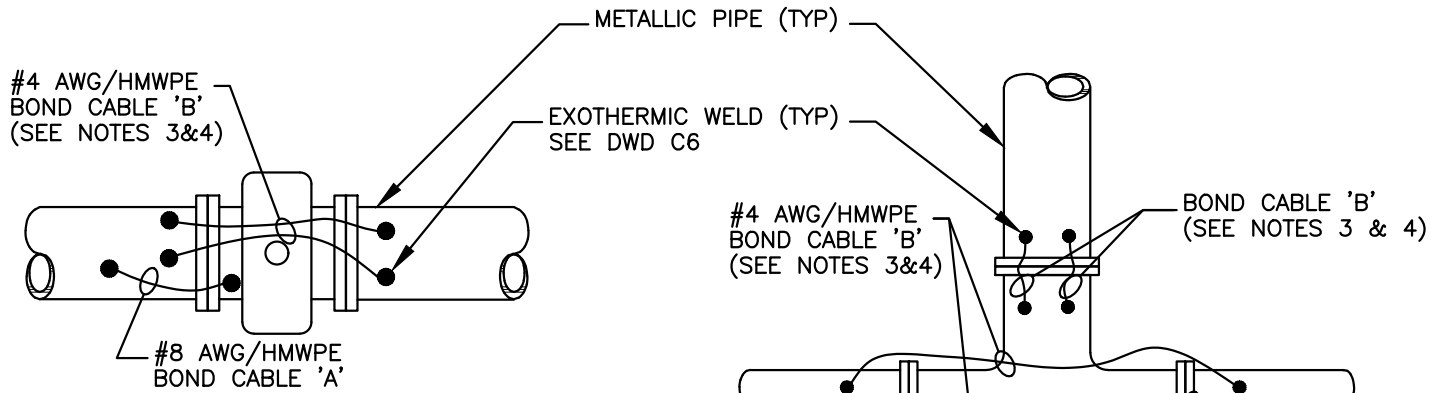
DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

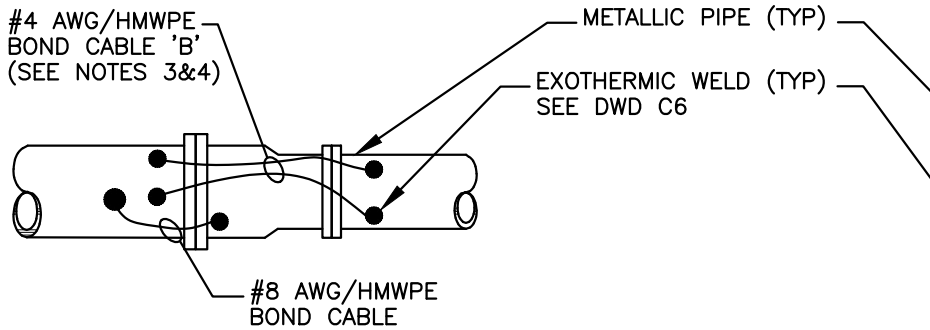
DWG. NO.

DWD C4

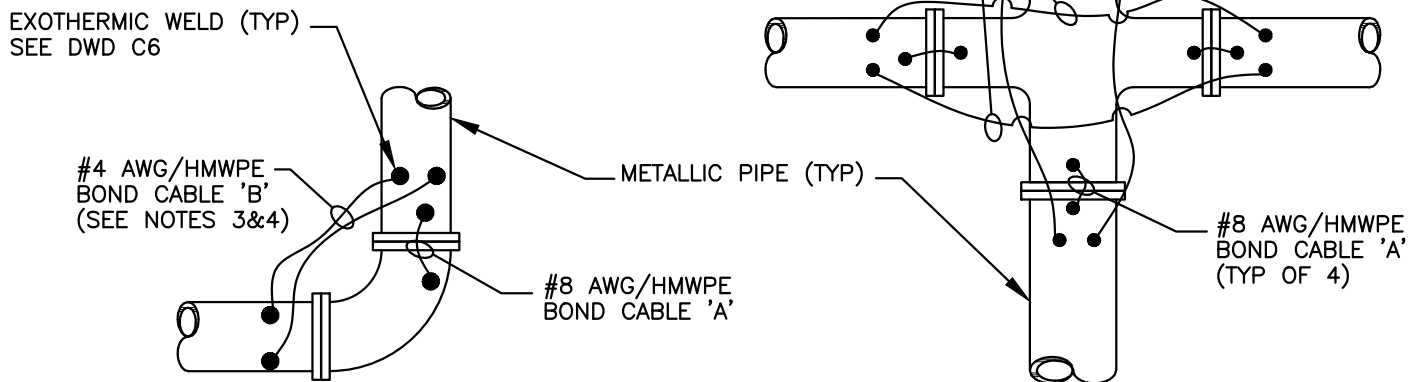


**VALVE**

**TEE**



**ADAPTER**



**ELBOW**

**CROSS**

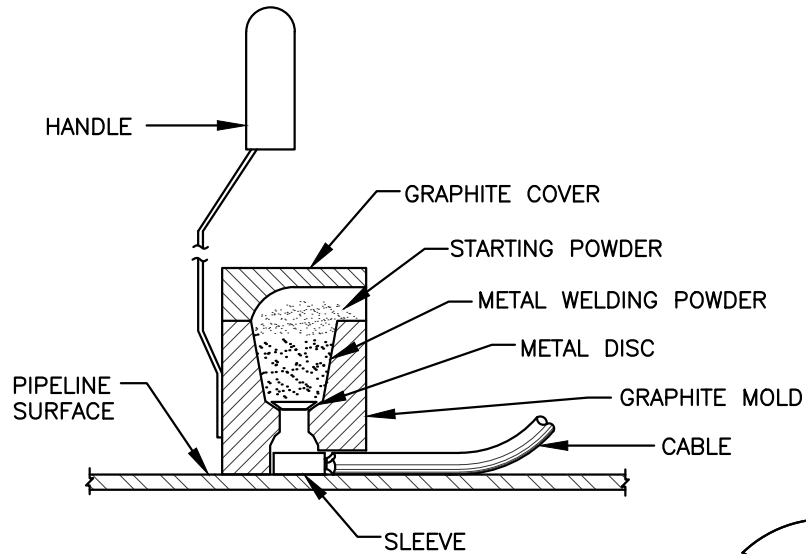
**NOTES:**

1. ALL BOND 'B' WIRES SHALL BE #4 AWG/HMWPE STRANDED COPPER WIRE.
2. ALL FITTING BOND WIRES 'A' SHALL BE #8 AWG/HMWPE STRANDED COPPER WIRE.
3. USE ONE (1) BOND CABLE 'B' ACROSS EACH FITTING FOR PIPE SIZES 18" IN DIAMETER OR SMALLER.
4. USE TWO (2) BOND CABLES 'B' ACROSS EACH FITTING FOR PIPE SIZES 20" IN DIAMETER OR LARGER.

**DIABLO WATER DISTRICT**

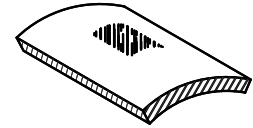
**STANDARD DRAWING  
BOND CABLES - ACROSS FITTINGS  
ON METALLIC PIPE**

|                    |                 |                     |                          |                        |
|--------------------|-----------------|---------------------|--------------------------|------------------------|
| DESIGNED <u>MA</u> | DRAWN <u>SC</u> | APPROVED <u>JDH</u> | DATE <u>OCTOBER 2022</u> | DWG. NO. <b>DWD C5</b> |
|--------------------|-----------------|---------------------|--------------------------|------------------------|



### STEP 1.

FILE STRUCTURE CONNECTION AREA TO BARE SHINY METAL AND CLEAN.



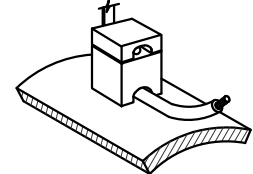
### STEP 2.

STRIP INSULATION FROM WIRE. ATTACH SLEEVE REQUIRED ON #6 AWG WIRE OR SMALLER



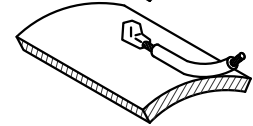
### STEP 3.

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



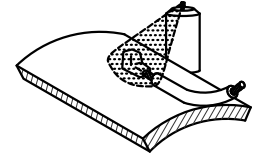
### STEP 4.

REMOVE SLAG FROM CONNECTION AND PEEN WELD FOR SOUNDNESS.



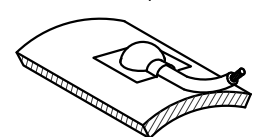
### STEP 5.

SPRAY PRIMER ON BARE METAL.



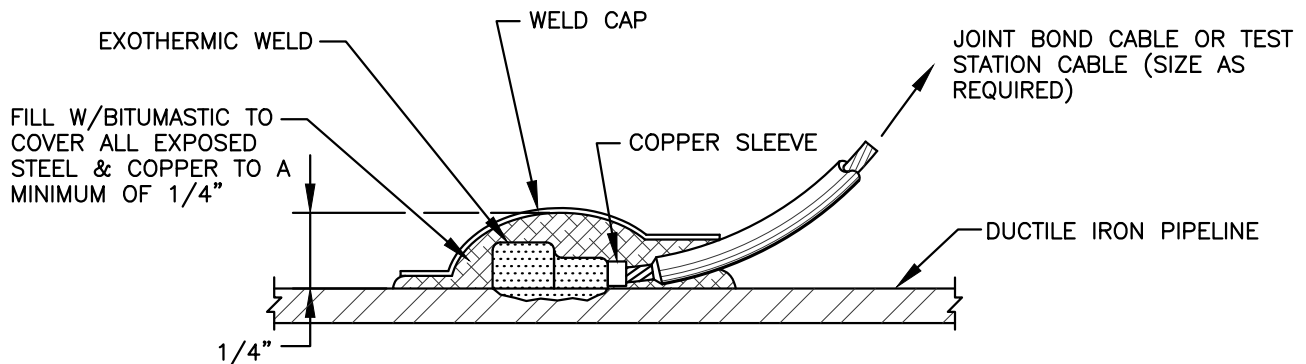
### STEP 6.

COVER CONNECTION AND EXPOSED STRUCTURE SURFACE WITH PLASTIC CAP & BITUMASTIC



#### NOTE:

PROCEDURE SHOWN ABOVE IS TO BE USED AS A GENERAL GUIDE ONLY. CONSULT MANUFACTURER'S LITERATURE FOR SPECIFIC INSTALLATION INSTRUCTIONS.



DIABLO WATER DISTRICT

STANDARD DRAWING  
EXOTHERMIC WELD

DESIGNED MA

DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

DWG. NO.

DWD C6

**STEP 1.**

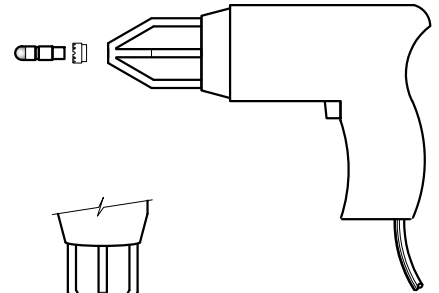
FILE STRUCTURE CONNECTION AREA  
TO BARE SHINY METAL AND CLEAN.

**STEP 2.**

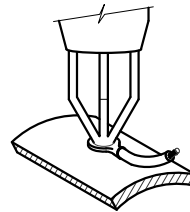
STRIP INSULATION FROM WIRE.  
ATTACH LUG TO CABLE BY CRIMPING.

**STEP 3.**

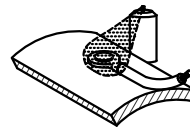
LOAD GUN WITH THE BRAZING PIN AND FERRULE.

**STEP 4.**

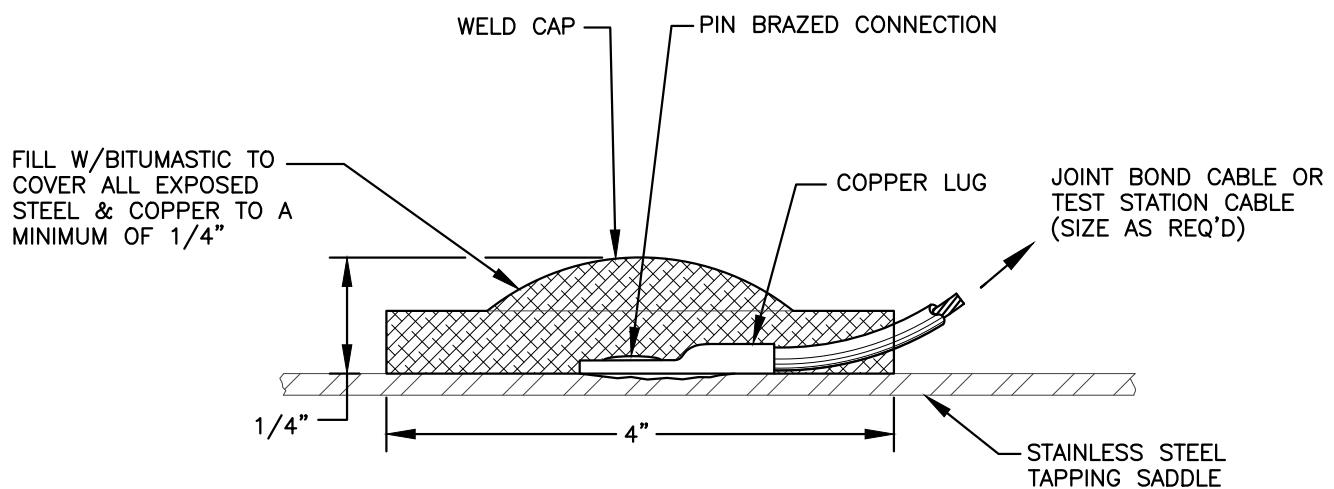
ADJUST AS NECESSARY. BRAZE THE CABLE  
& LUG TO THE PIPE.

**STEP 5.**

PEEN CONNECTION WITH A HAMMER TO TEST  
CONNECTION FOR SOUNDNESS.

**STEP 6.**

COVER CONNECTION AND EXPOSED STRUCTURE  
SURFACE WITH EPOXY COATING COMPOUND  
WITH PLASTIC CAP & BITUMASTIC



DIABLO WATER DISTRICT

STANDARD DRAWING  
PIN BRAZED CONNECTION

DESIGNED MA

DRAWN SC

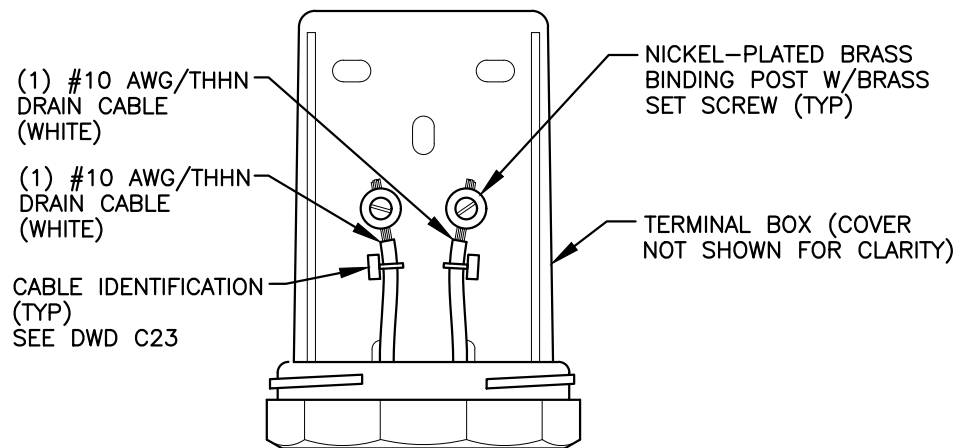
APPROVED JDH

DATE OCTOBER 2022

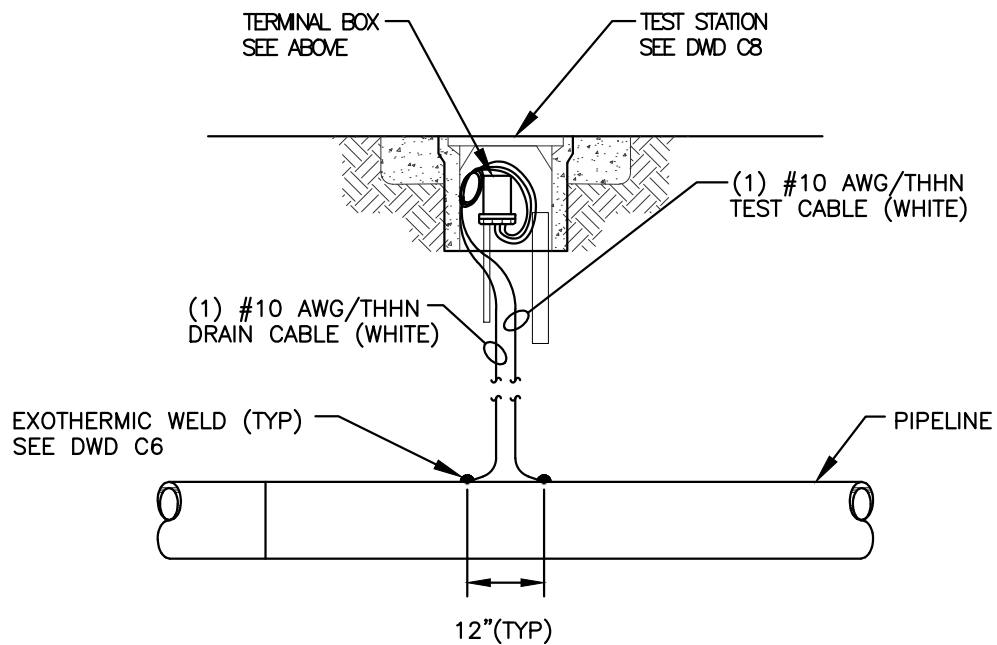
DWG. NO.

DWD C7

DWD C8



## CTS TERMINAL BOX



DIABLO WATER DISTRICT

STANDARD DRAWING  
CTS - CORROSION TEST STATION

DESIGNED MA

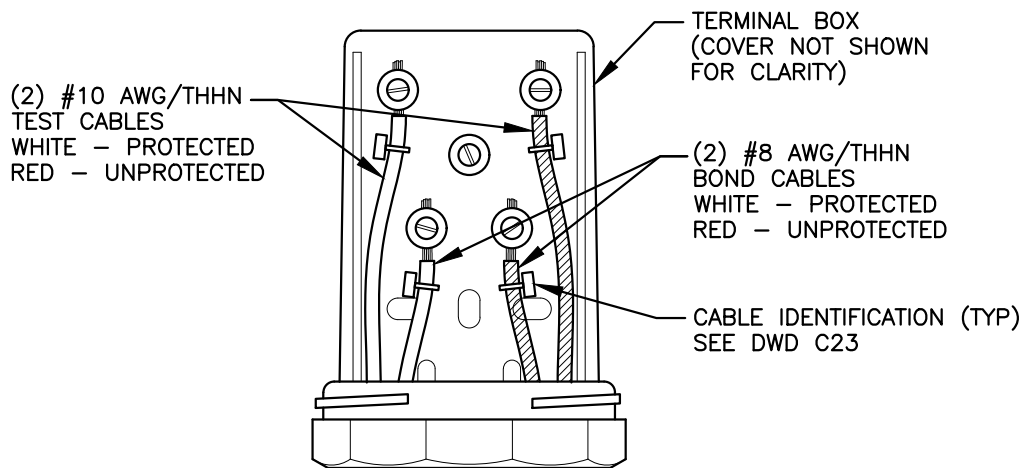
DRAWN SC

APPROVED JDH

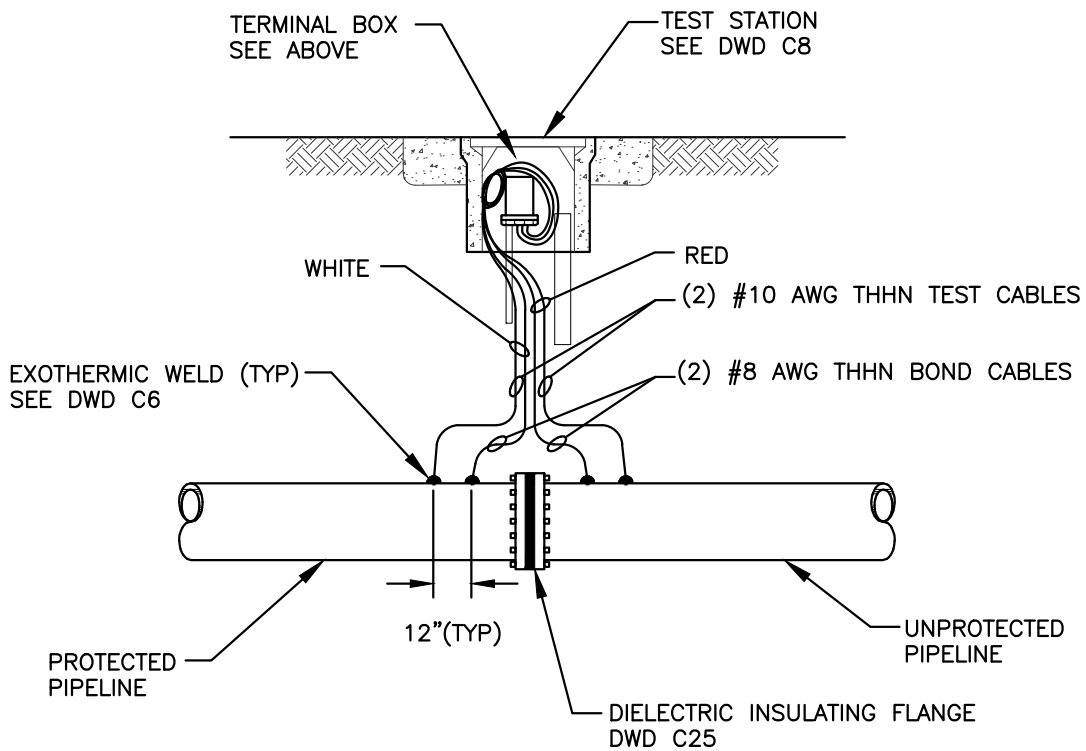
DATE OCTOBER 2022

DWG. NO.

DWD C9



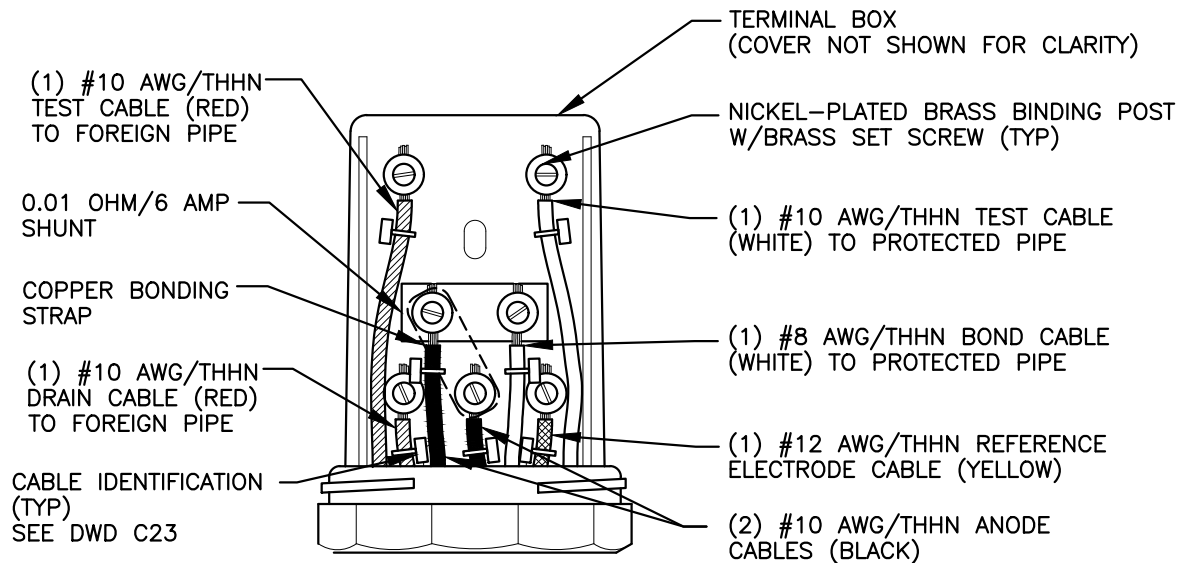
## IJTS TERMINAL BOX



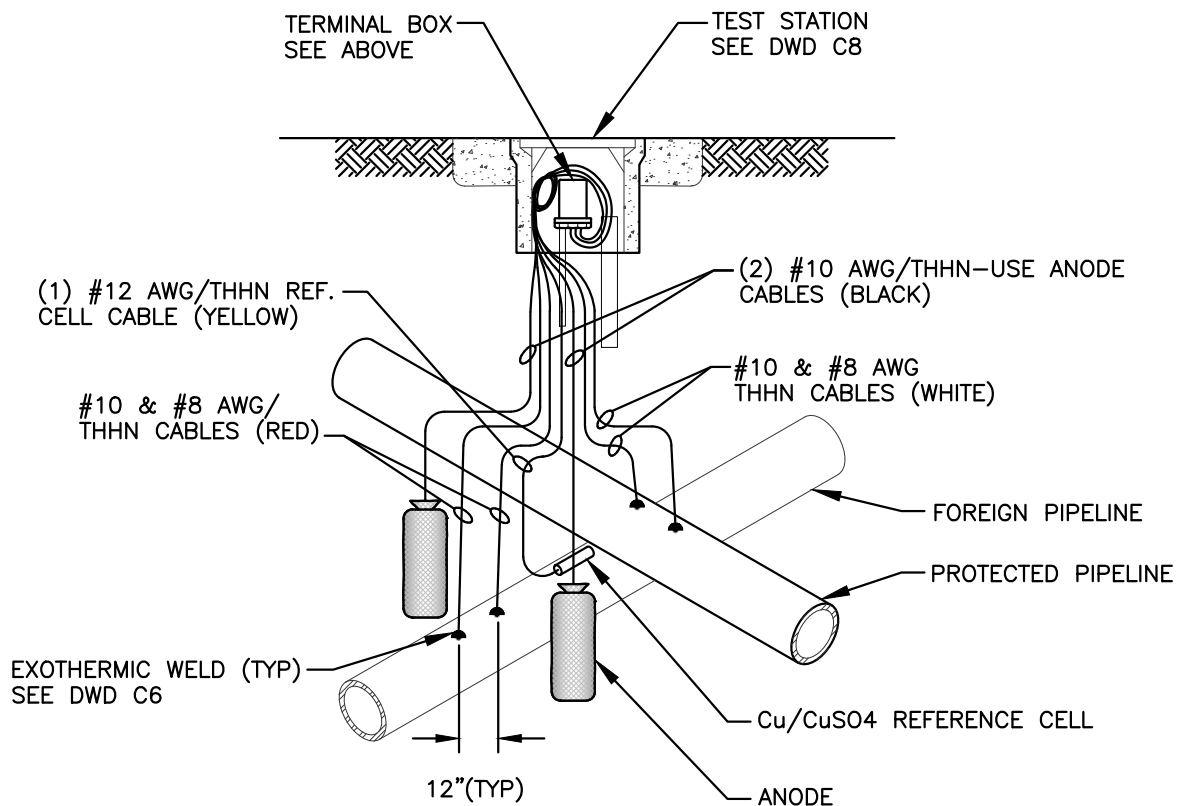
DIABLO WATER DISTRICT

STANDARD DRAWING  
IJTS - INSULATING JOINT TEST STATION

|             |          |              |                   |                  |
|-------------|----------|--------------|-------------------|------------------|
| DESIGNED MA | DRAWN SC | APPROVED JDH | DATE OCTOBER 2022 | DWG. NO. DWD C10 |
|-------------|----------|--------------|-------------------|------------------|



## FPTS TERMINAL BOX



### NOTES:

1. INSTALL THE REFERENCE CELL BETWEEN THE TWO PIPELINES.
2. PERMISSION MUST BE OBTAINED FROM THE FOREIGN PIPELINE OWNER PRIOR TO ATTACHMENT OF TEST WIRES TO FOREIGN PIPE.

DIABLO WATER DISTRICT

STANDARD DRAWING  
FPTS - FOREIGN PIPELINE TEST STATION

DESIGNED MA

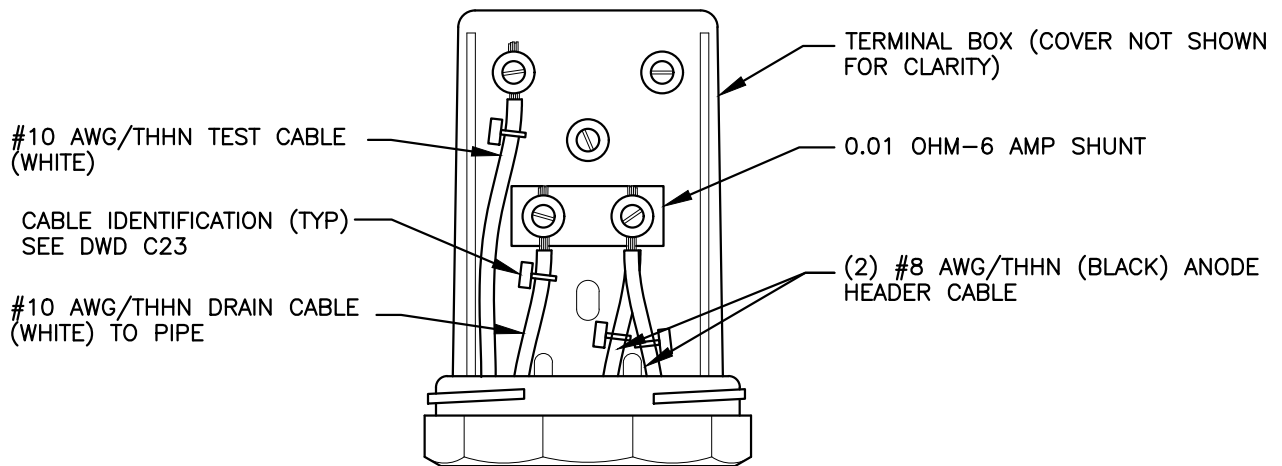
DRAWN SC

APPROVED JDH

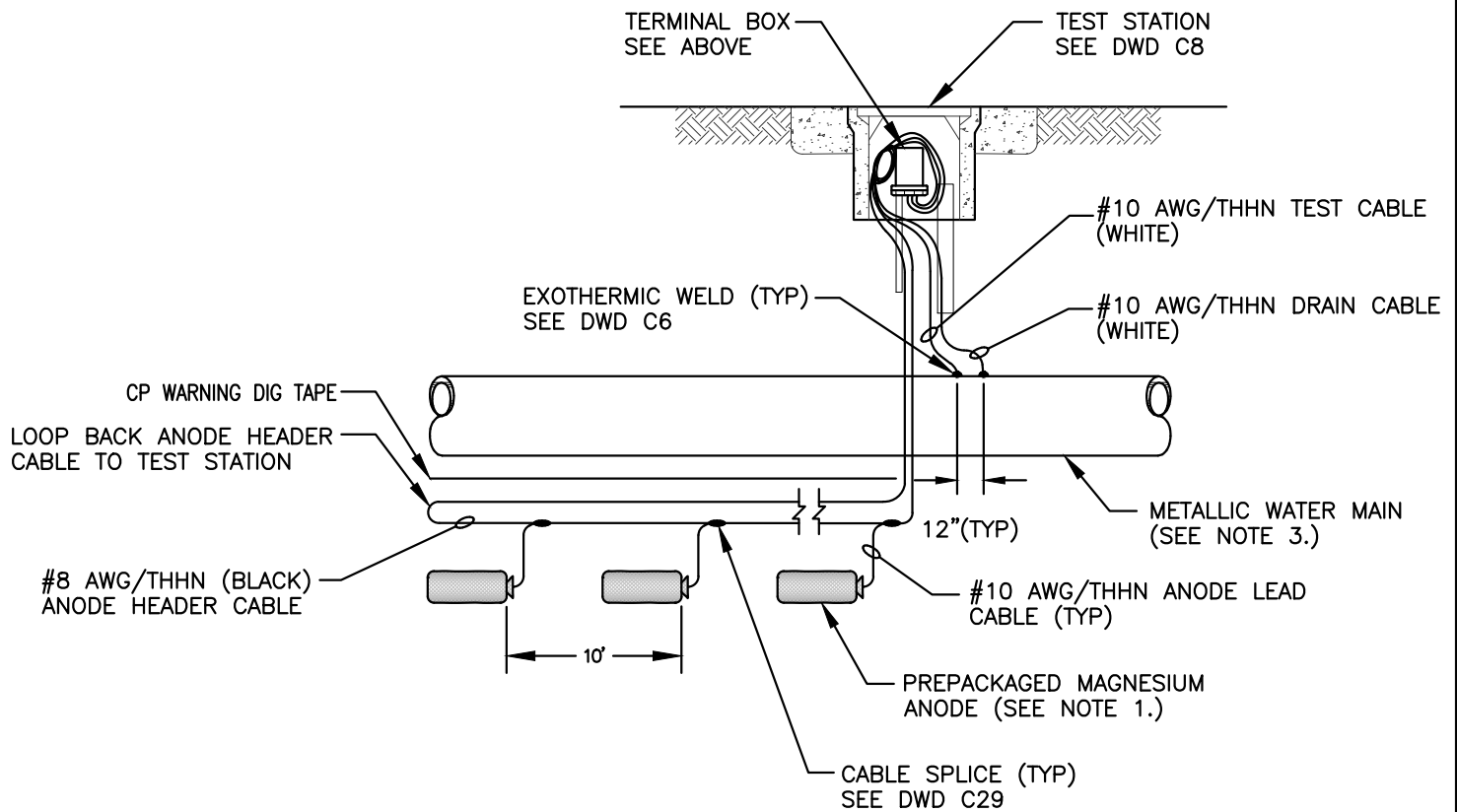
DATE OCTOBER 2022

DWG. NO.

DWD C11



## ATS TERMINAL BOX



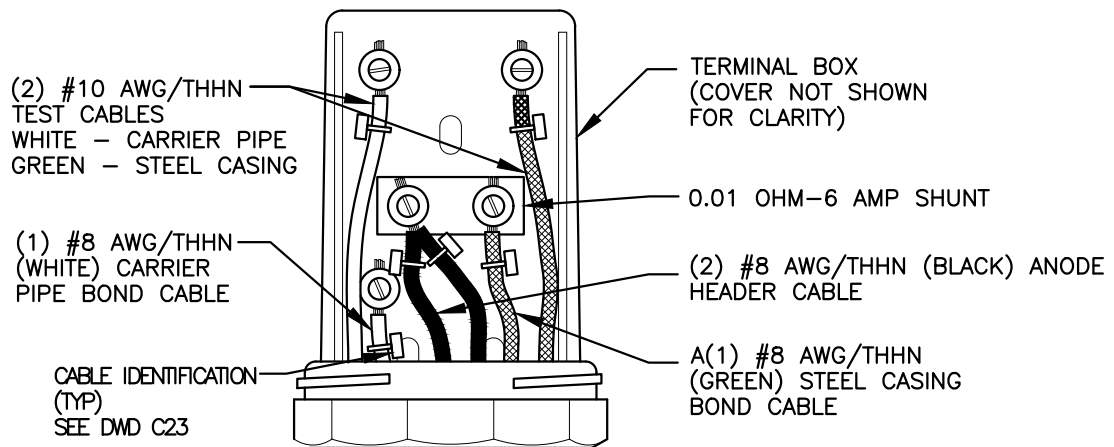
### NOTES:

1. NUMBER AND SIZE OF ANODES SHALL BE DETERMINED BY THE PROJECT CORROSION ENGINEER.
2. THE ANODES SHALL BE INSTALLED A MINIMUM OF 3 FT. OFF THE WALL OF THE WATER PIPE.
3. BOND ALL PIPE JOINTS PER DRAWING DWD C4.

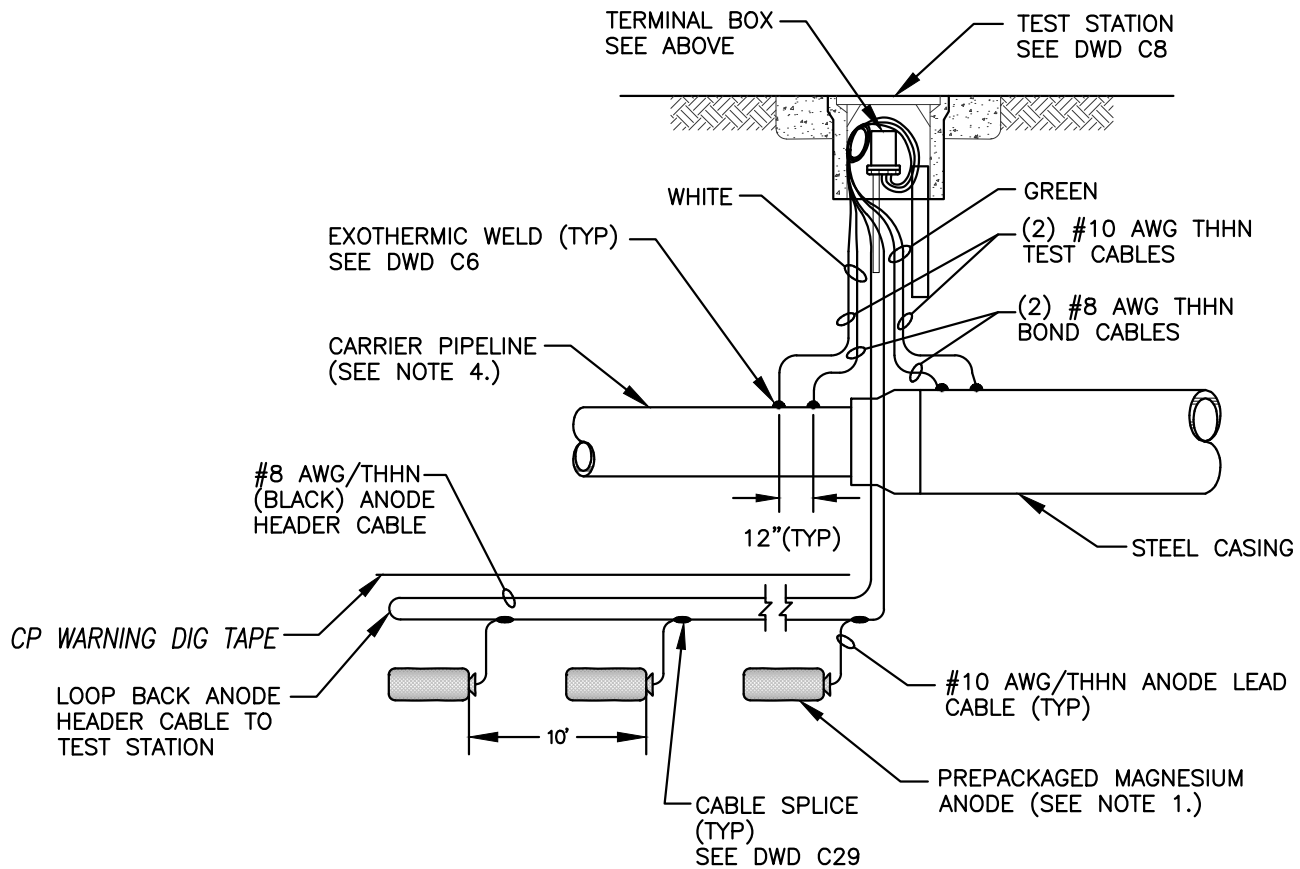
DIABLO WATER DISTRICT

STANDARD DRAWING  
ATS - ANODE TEST STATION

|                    |                 |                     |                          |                         |
|--------------------|-----------------|---------------------|--------------------------|-------------------------|
| DESIGNED <u>MA</u> | DRAWN <u>SC</u> | APPROVED <u>JDH</u> | DATE <u>OCTOBER 2022</u> | DWG. NO. <b>DWD C12</b> |
|--------------------|-----------------|---------------------|--------------------------|-------------------------|



## CATS TERMINAL BOX



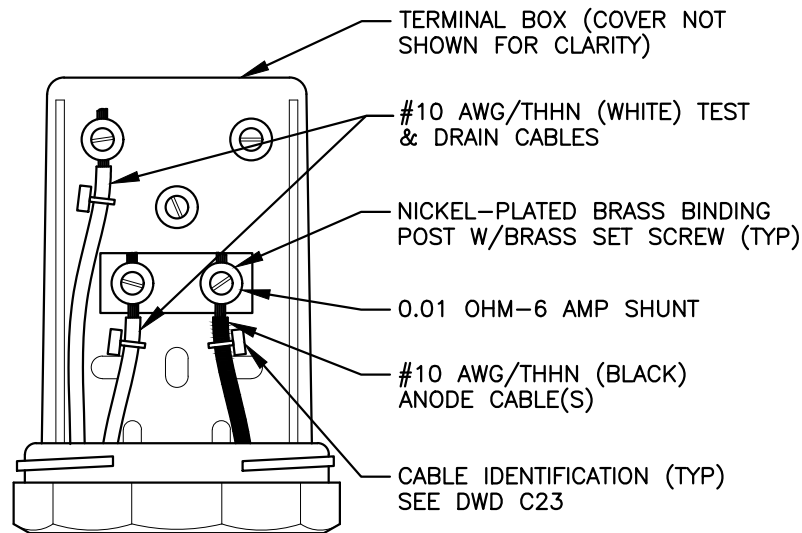
### NOTES:

1. NUMBER AND SIZE OF ANODES SHALL BE DETERMINED BY THE PROJECT CORROSION ENGINEER.
2. CARRIER PIPE & CASING ARE TO BE ELECTRICALLY ISOLATED VIA CASING INSULATORS.
3. IF CARRIER PIPE IS NON-METALLIC DELETE WHITE CABLES AND EXOTHERMIC WELDS.
4. BOND ALL PIPE JOINTS PER DRAWING DWD C4.

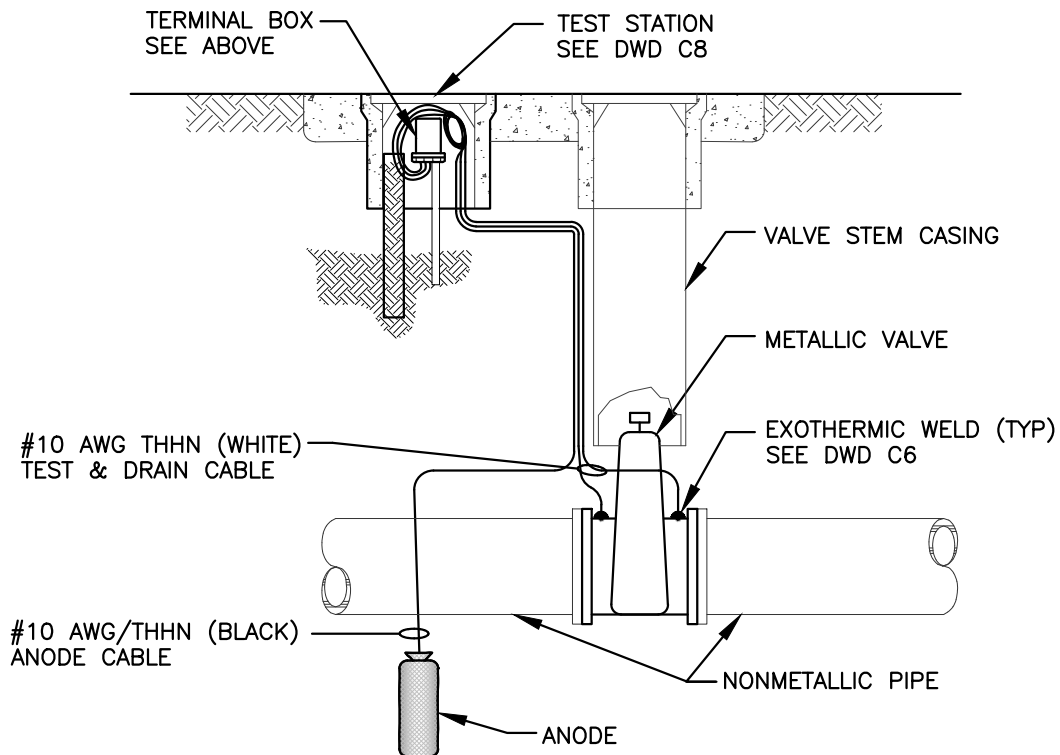
DIABLO WATER DISTRICT

STANDARD DRAWING  
CATS - CASING ANODE TEST STATION

|             |          |              |                   |                  |
|-------------|----------|--------------|-------------------|------------------|
| DESIGNED MA | DRAWN SC | APPROVED JDH | DATE OCTOBER 2022 | DWG. NO. DWD C13 |
|-------------|----------|--------------|-------------------|------------------|



## VATS TERMINAL BOX



**NOTE:**

1. INSTALL ANODE A MINIMUM OF 3-FEET FROM VALVE.

**DIABLO WATER DISTRICT**

STANDARD DRAWING  
**VATS - VALVE ANODE TEST STATION**

DESIGNED MA

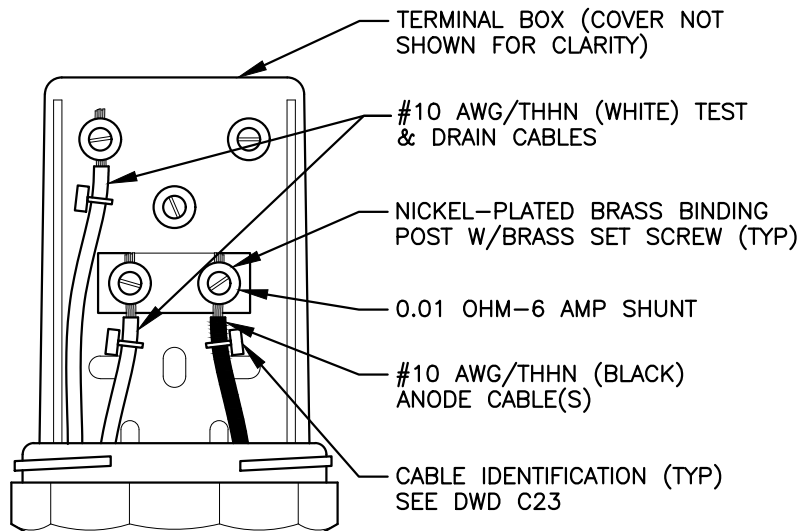
DRAWN SC

APPROVED JDH

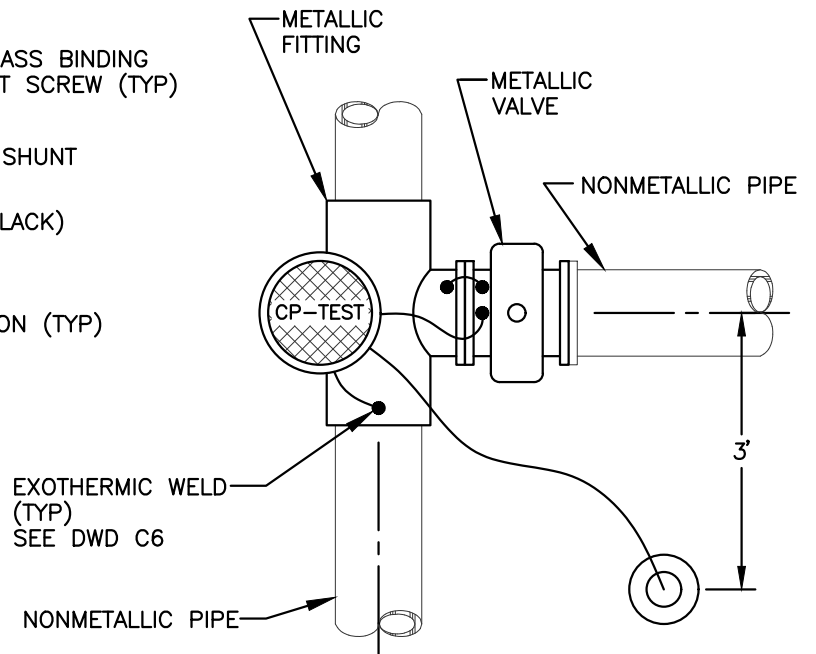
DATE OCTOBER 2022

DWG. NO.

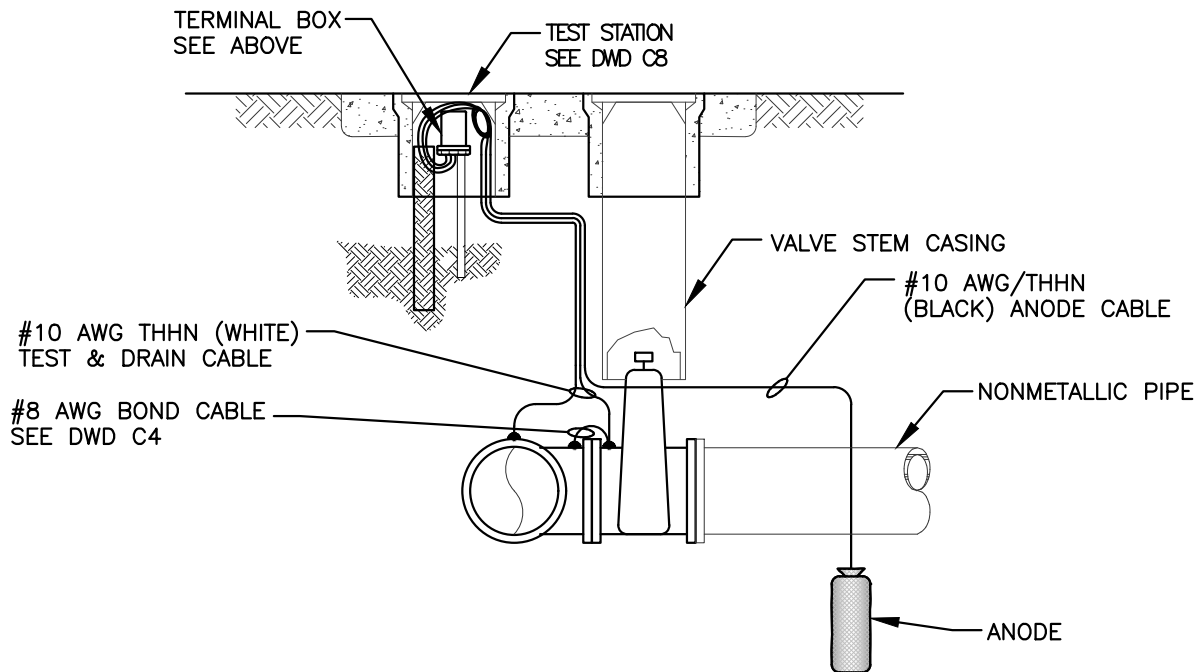
**DWD C14**



## VATS TERMINAL BOX



## PLAN



## PROFILE

NOTE:  
1. INSTALL ANODE A MINIMUM OF 3-FEET FROM THE VALVE & TEE.

DIABLO WATER DISTRICT

STANDARD DRAWING  
VATS - VALVE AND TEE ANODE TEST STATION

DESIGNED MA

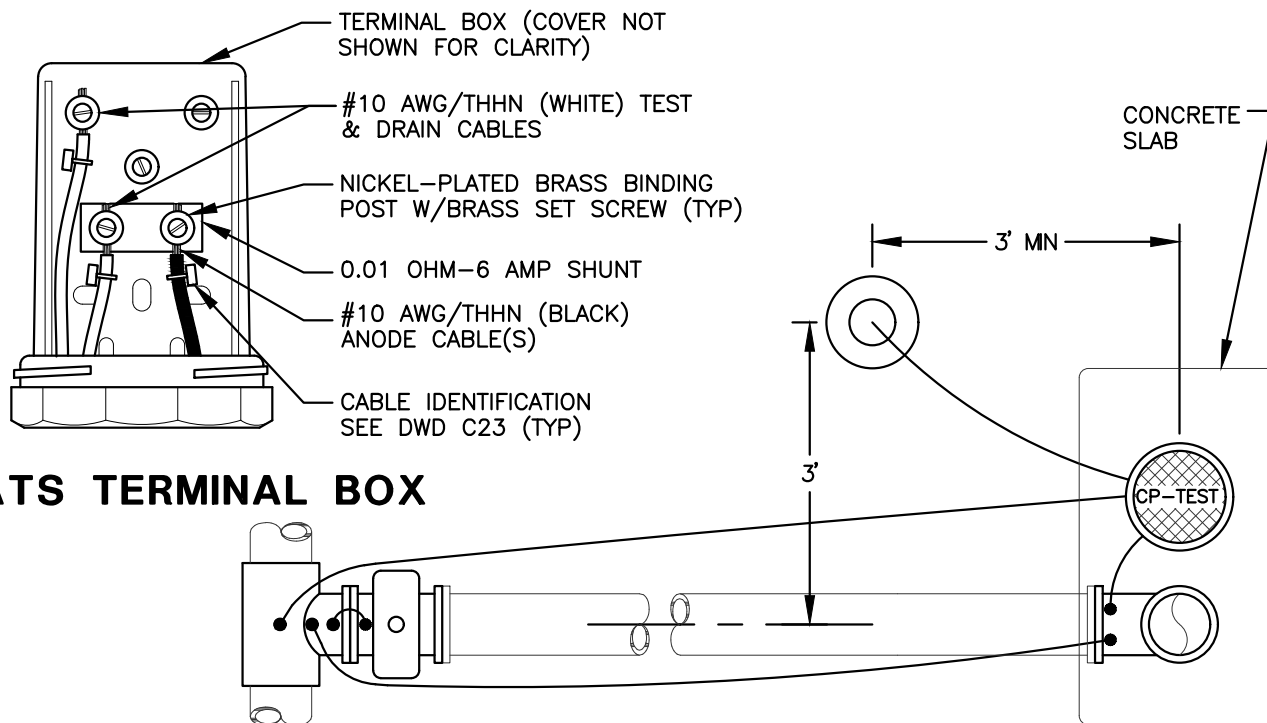
DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

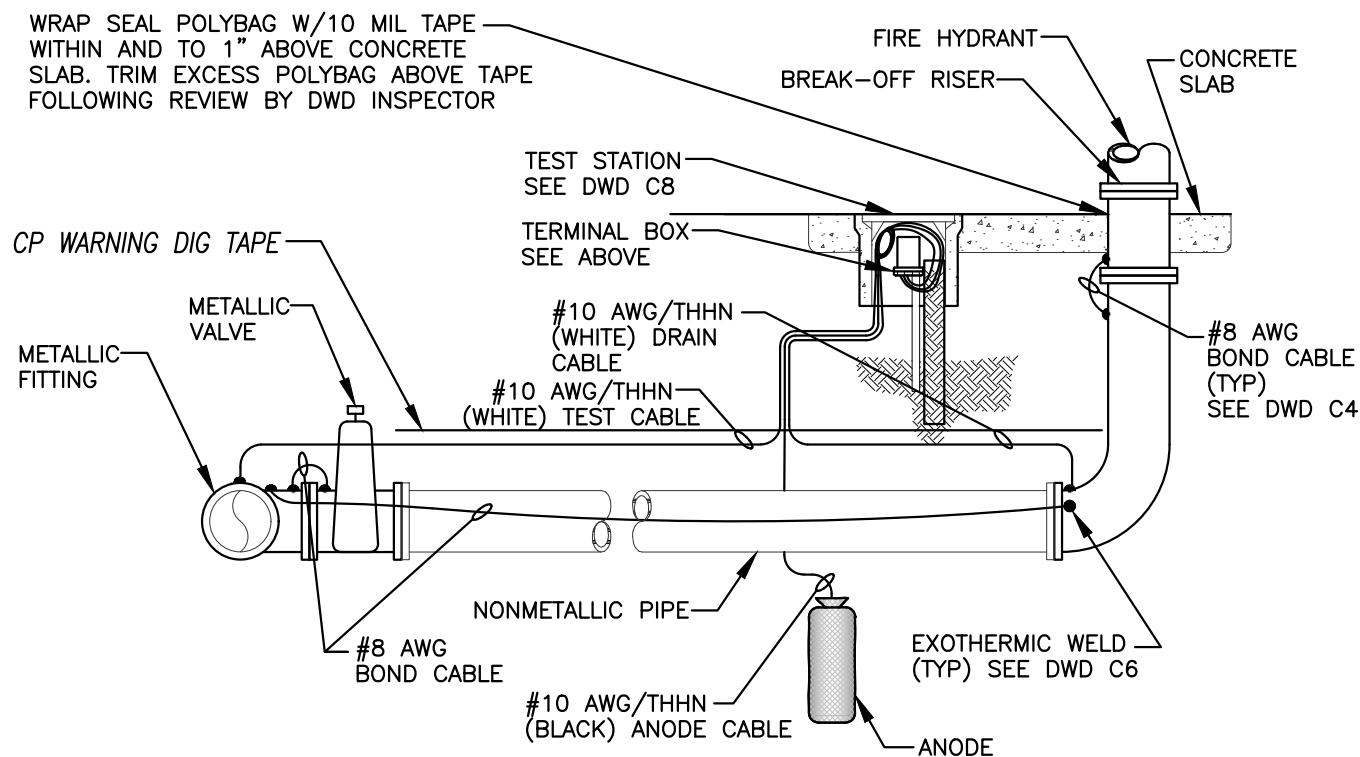
DWG. NO.

DWD C15



## ATS TERMINAL BOX

## PLAN



## PROFILE

### NOTE:

1. INSTALL TEST STATION IN COMMON CONCRETE SLAB WITH F.H. RISER.
2. INSTALL ANODE A MINIMUM OF 3 FEET AWAY FROM THE PIPE.

DIABLO WATER DISTRICT

STANDARD DRAWING  
FHATS - FIRE HYDRANT ANODE TEST STATION

DESIGNED MA

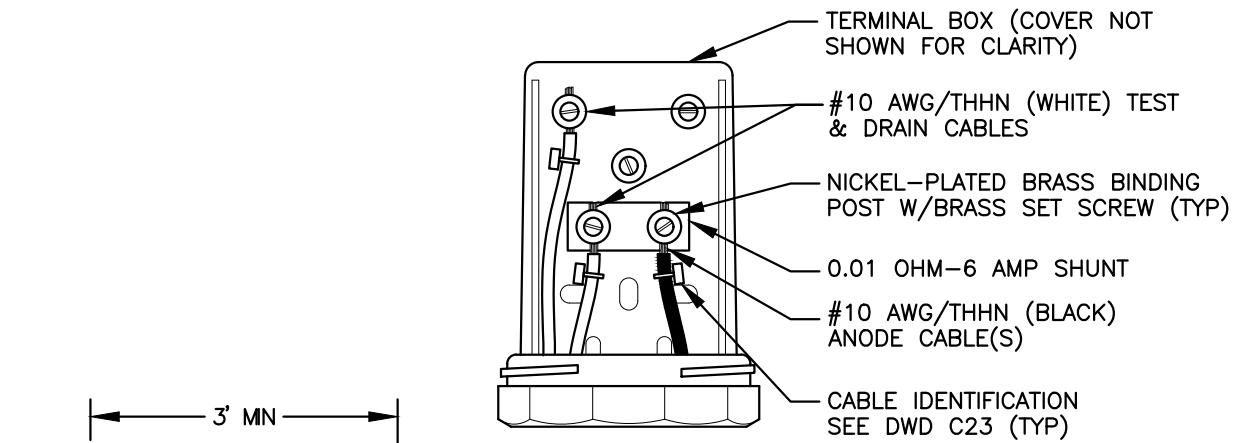
DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

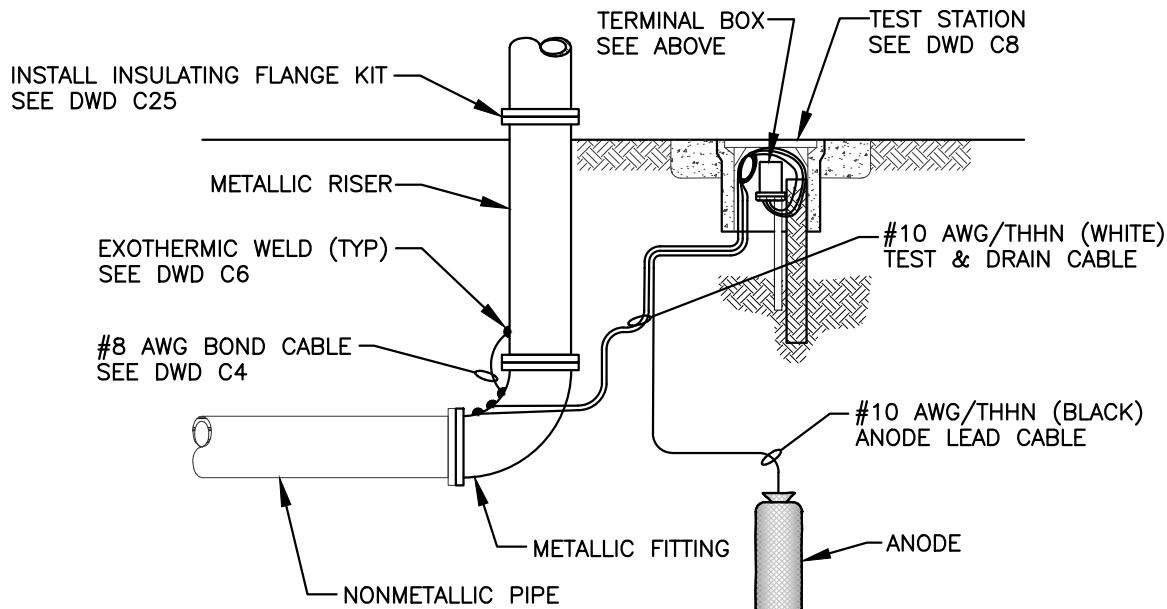
DWG. NO.

DWD C16



## ATS TERMINAL BOX

## PLAN



## PROFILE

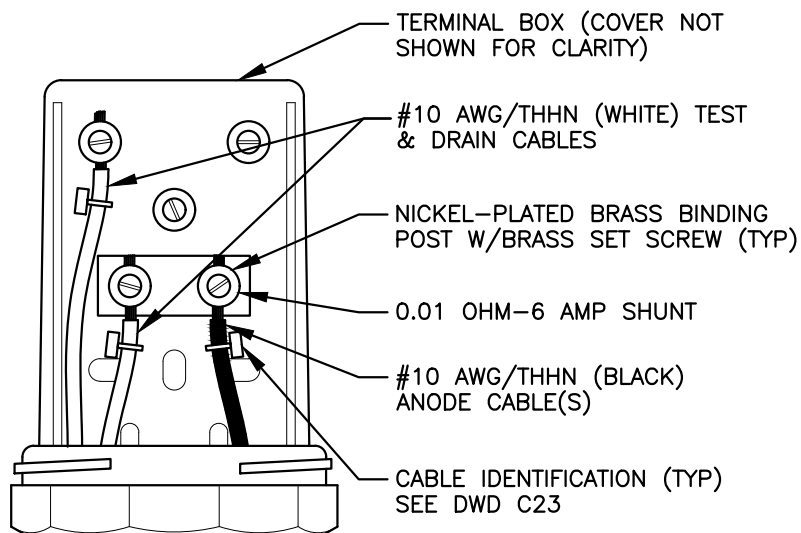
### NOTE:

1. INSTALL ANODE A MINIMUM OF 3 FEET AWAY FROM THE PIPE.

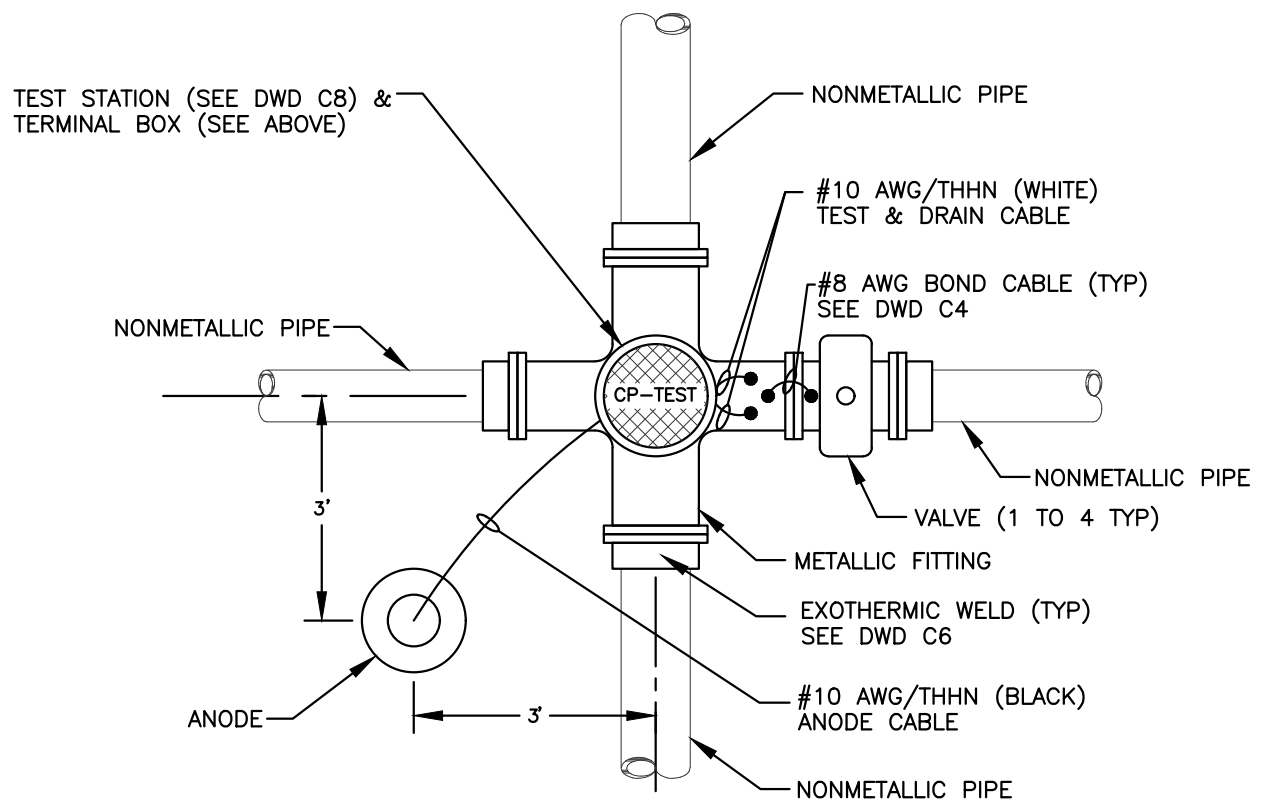
DIABLO WATER DISTRICT

STANDARD DRAWING  
METALLIC RISER ANODE TEST STATION

|             |          |              |                   |                  |
|-------------|----------|--------------|-------------------|------------------|
| DESIGNED MA | DRAWN SC | APPROVED JDH | DATE OCTOBER 2022 | DWG. NO. DWD C17 |
|-------------|----------|--------------|-------------------|------------------|



## ATS TERMINAL BOX



## PLAN

### NOTE:

1. INSTALL ANODE A MINIMUM OF 3 FEET AWAY FROM THE VALVE/FITTING.

DIABLO WATER DISTRICT

STANDARD DRAWING  
CROSS AND VALVES ANODE TEST STATION

DESIGNED MA

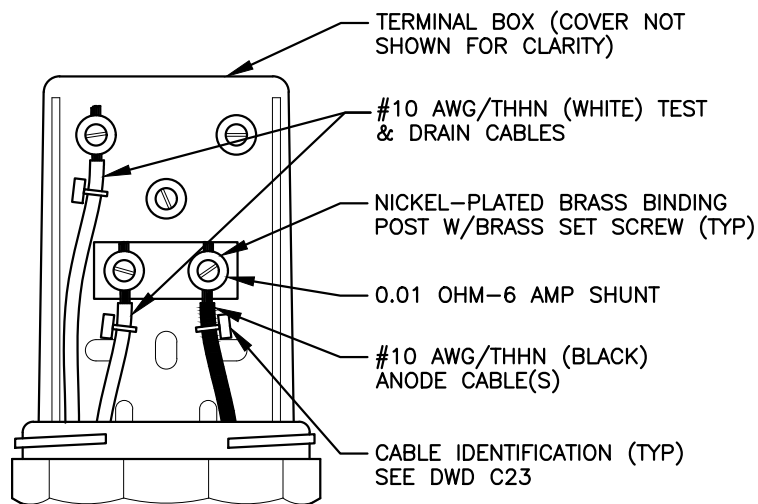
DRAWN SC

APPROVED JDH

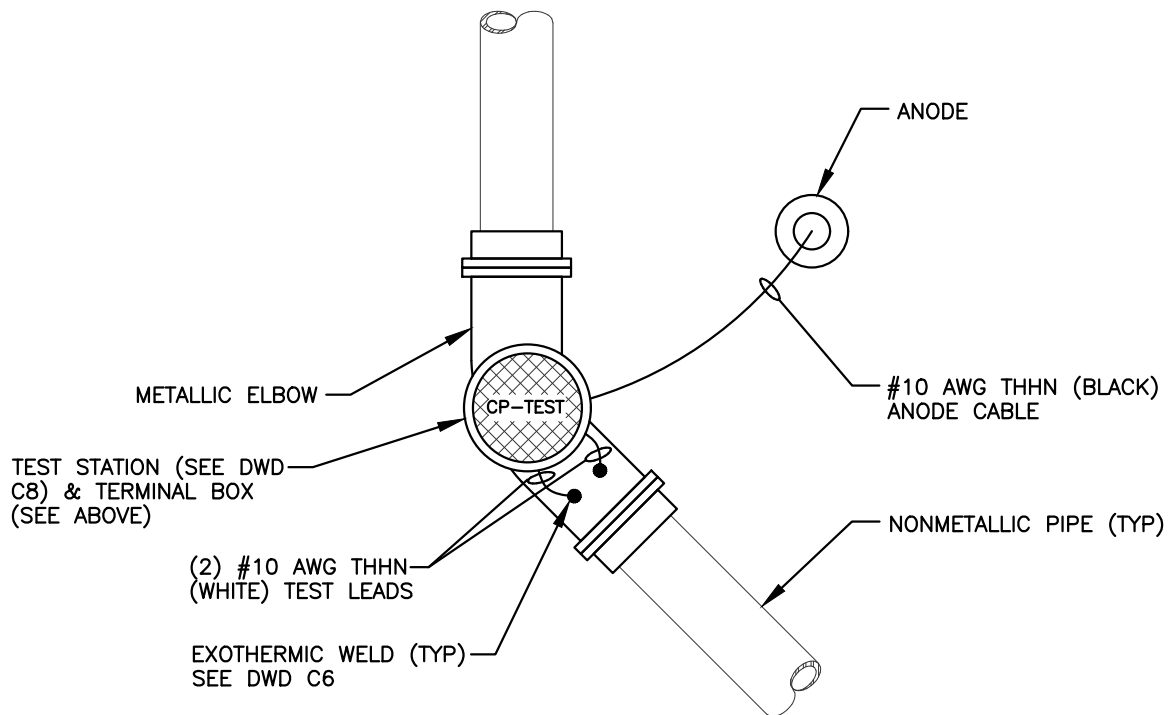
DATE OCTOBER 2022

DWG. NO.

DWD C18



## ATS TERMINAL BOX



## PLAN

### NOTE:

1. INSTALL ANODE A MINIMUM OF 3 FEET AWAY FROM THE ELBOW.

DIABLO WATER DISTRICT

STANDARD DRAWING  
ELBOW ANODE TEST STATION

DESIGNED MA

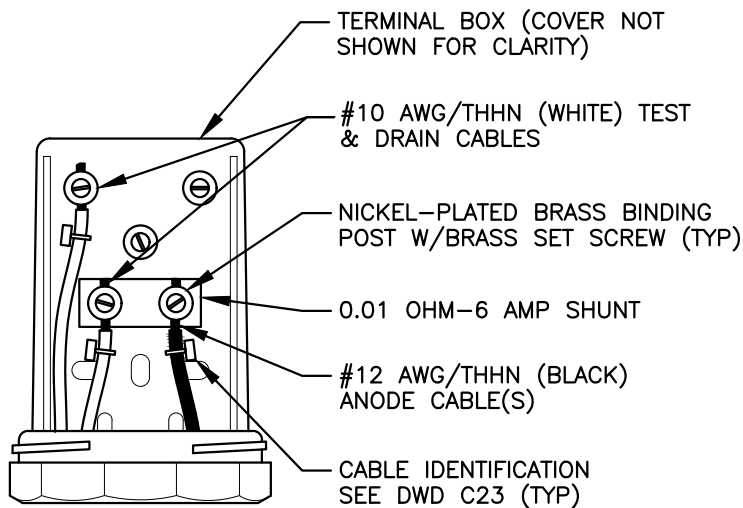
DRAWN SC

APPROVED JDH

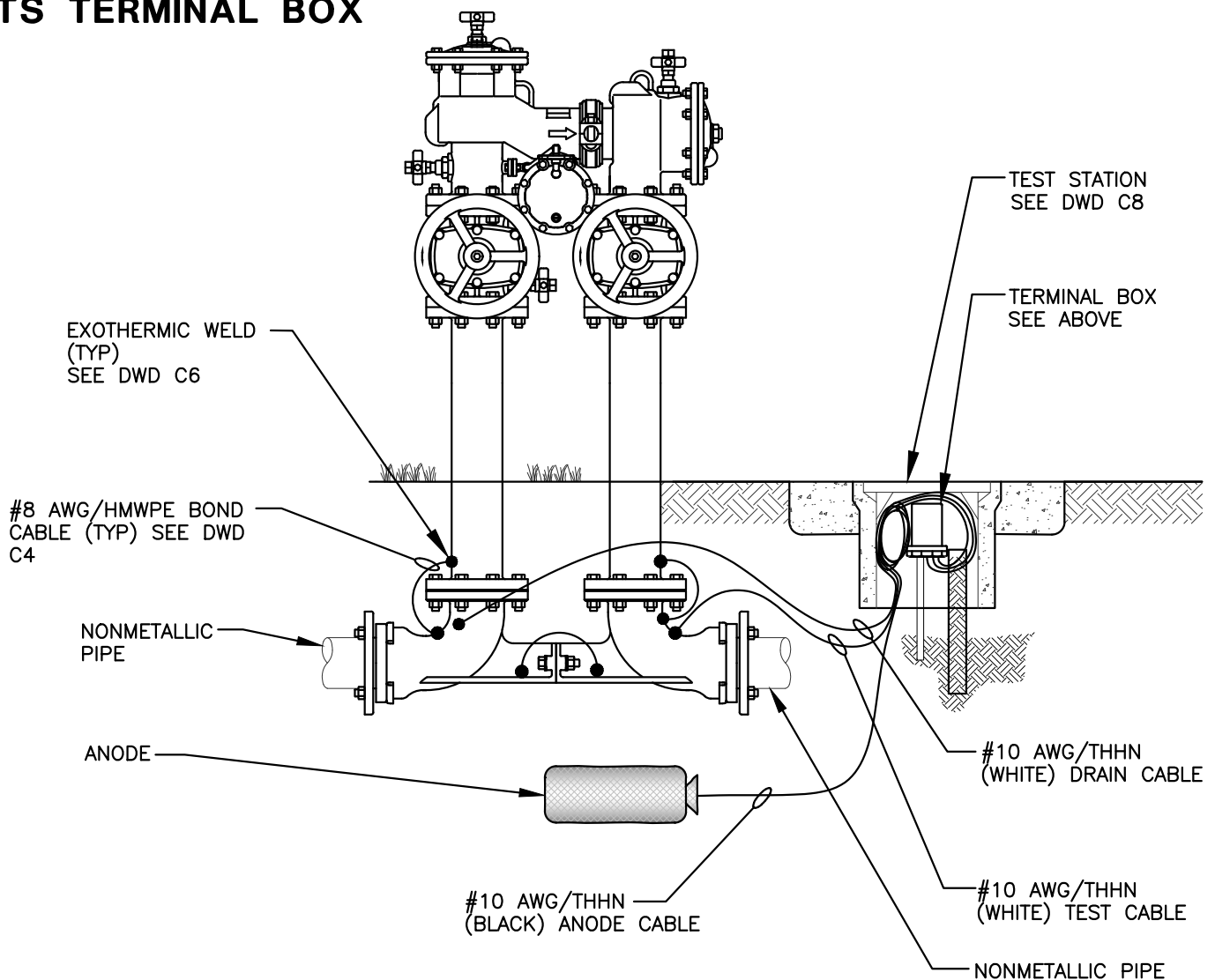
DATE OCTOBER 2022

DWG. NO.

DWD C19



## ATS TERMINAL BOX



NOTE:

1. INSTALL ANODE A MINIMUM OF 3- FEET FROM RISER.

DIABLO WATER DISTRICT

STANDARD DRAWING  
DOUBLE DETECTOR CHECK ASSEMBLY PREVENTER  
OR RBPB ANODE TEST STATION

DESIGNED MA

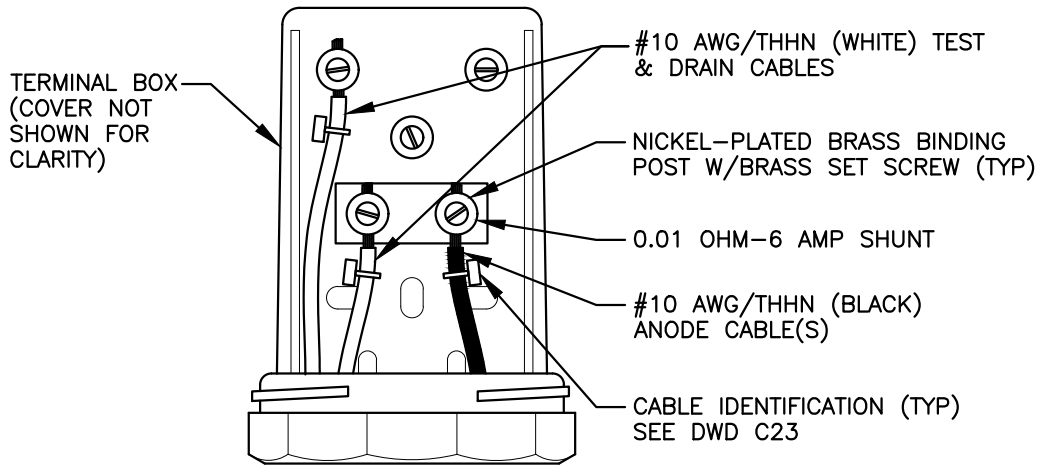
DRAWN SC

APPROVED JDH

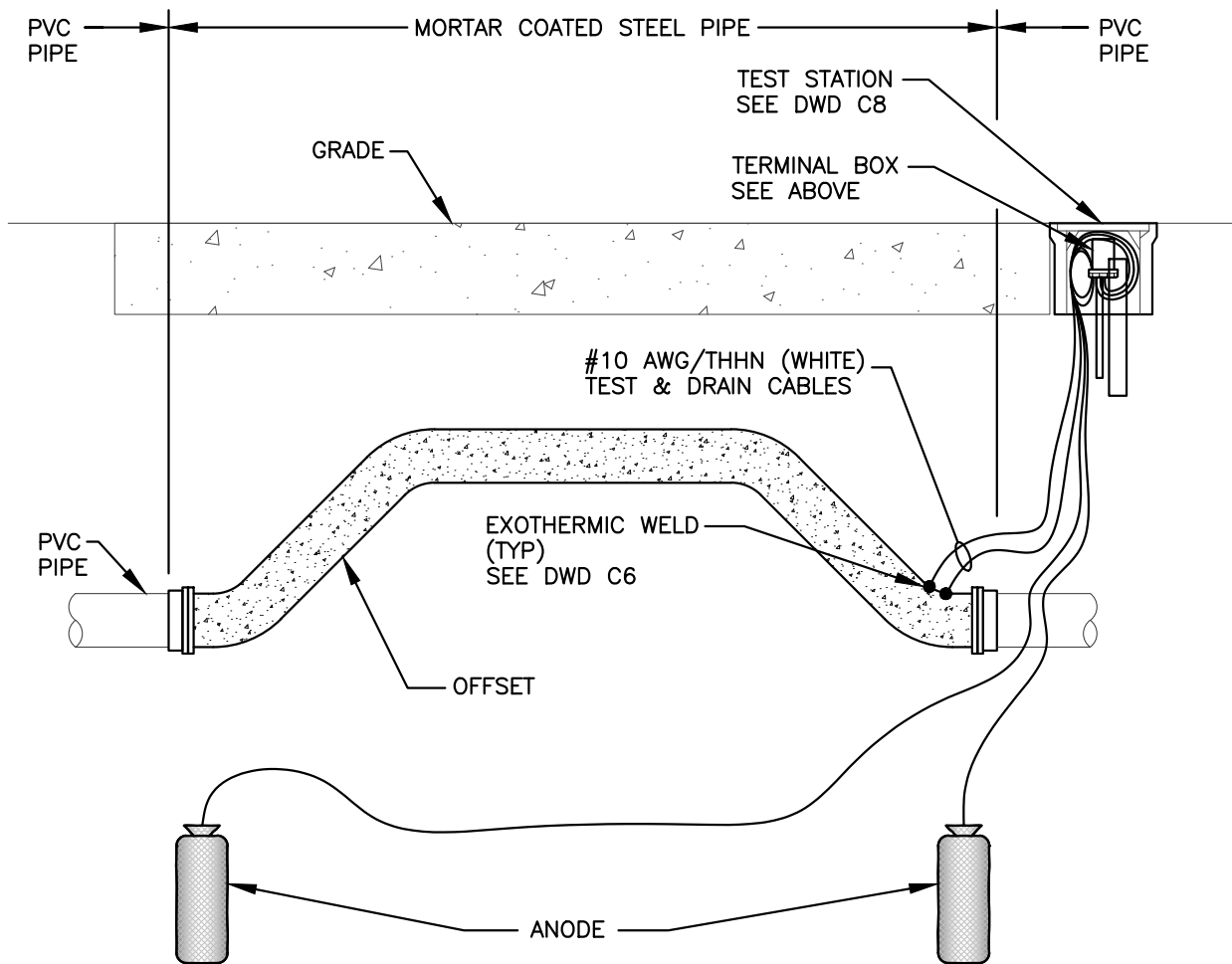
DATE OCTOBER 2022

DWG. NO.

DWD C20



## ATS TERMINAL BOX



### NOTE:

1. THE ANODE SHALL BE INSTALLED VERTICALLY OR HORIZONTALLY WITH THE TOP OF THE ANODE 5 FEET BELOW GRADE AND 3 FEET BELOW PIPE.

DIABLO WATER DISTRICT

STANDARD DRAWING  
DOUBLE OFFSET ANODE TEST STATION

DESIGNED MA

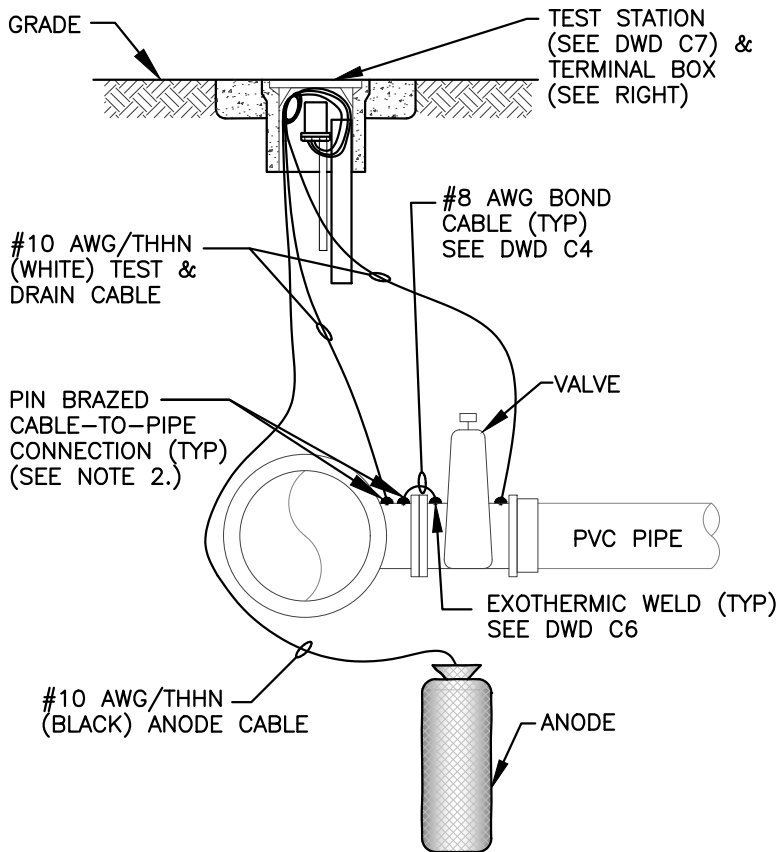
DRAWN SC

APPROVED JDH

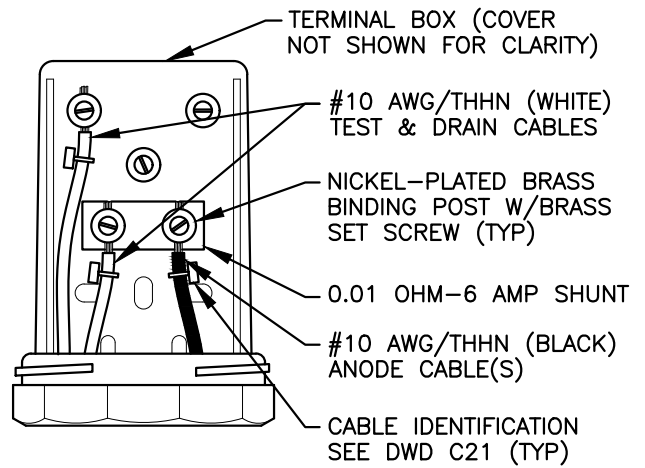
DATE OCTOBER 2022

DWG. NO.

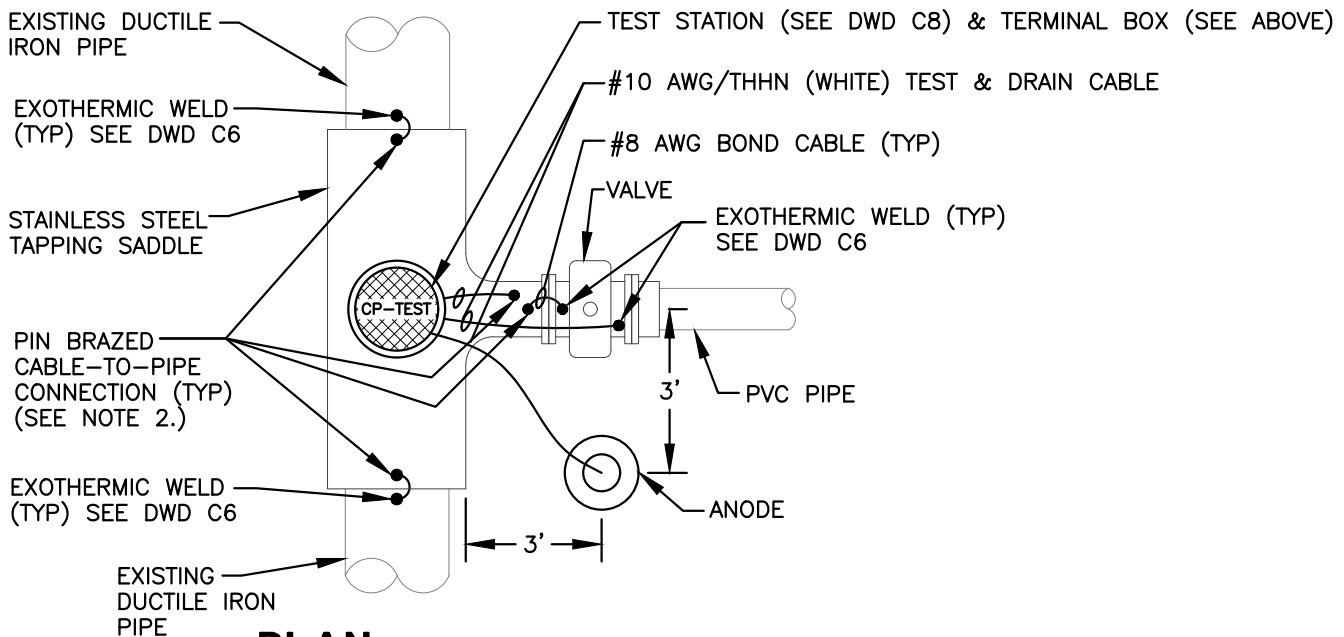
DWD C21



**PROFILE**



**ATS TERMINAL BOX**



**PLAN**

**NOTE:**

1. CABLE-TO-PIPE CONNECTIONS TO STAINLESS STEEL FITTINGS SHALL BE MADE BY PIN BRAZING.

**DIABLO WATER DISTRICT**

STANDARD DRAWING  
**TAPPING SADDLE ANODE TEST STATION**

DESIGNED MA

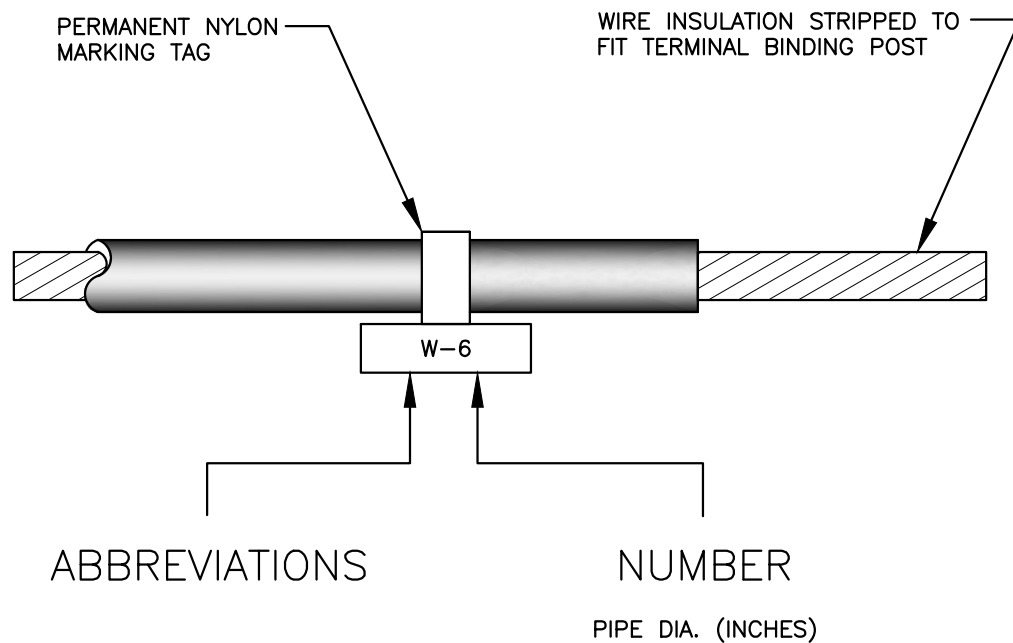
DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

DWG. NO.

**DWD C22**

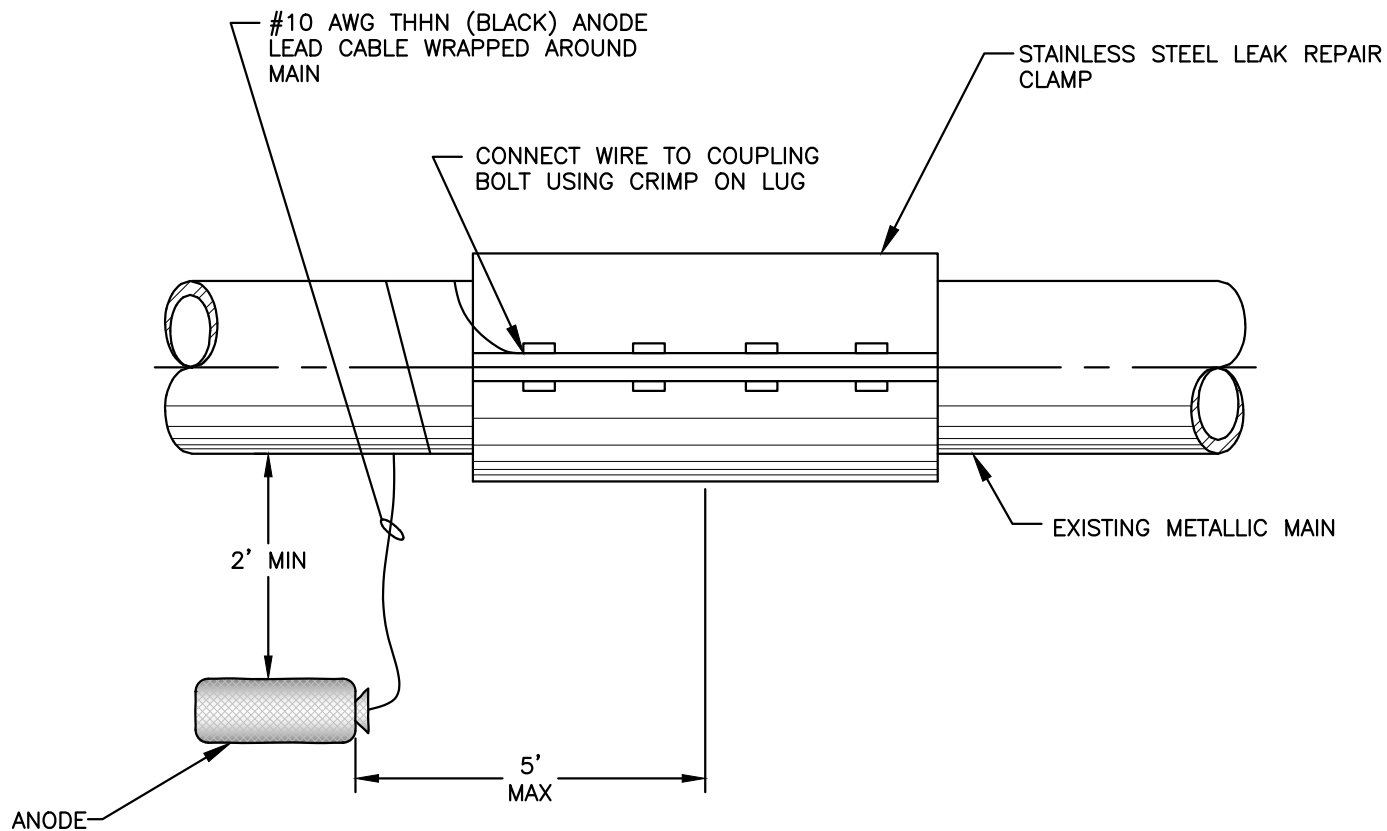


AN - ANODE  
 BO - BLOW OFF  
 CA - CASING  
 DR - DRAIN CABLE  
 DW - DOMESTIC WATER  
 EL - ELBOW  
 FH - FIRE HYDRANT  
 FP - FOREIGN PIPELINE  
 RE - REFERENCE ELECTRODE  
 RW - RAW WATER  
 TT - TEST CABLE

DIABLO WATER DISTRICT

STANDARD DRAWING  
 CABLE IDENTIFICATION

|                    |                 |                     |                          |                         |
|--------------------|-----------------|---------------------|--------------------------|-------------------------|
| DESIGNED <u>MA</u> | DRAWN <u>SC</u> | APPROVED <u>JDH</u> | DATE <u>OCTOBER 2022</u> | DWG. NO. <b>DWD C23</b> |
|--------------------|-----------------|---------------------|--------------------------|-------------------------|



NOTES:

1. INSTALL ANODE A MINIMUM OF 2- FEET BELOW PIPE DEPTH IN NATIVE SOIL.
2. MAXIMUM HORIZONTAL DISTANCE FROM ANODE TO LEAK REPAIR CLAMP IS 5- FEET.

DIABLO WATER DISTRICT

STANDARD DRAWING  
ANODE AT LEAK REPAIR CLAMP

DESIGNED MA

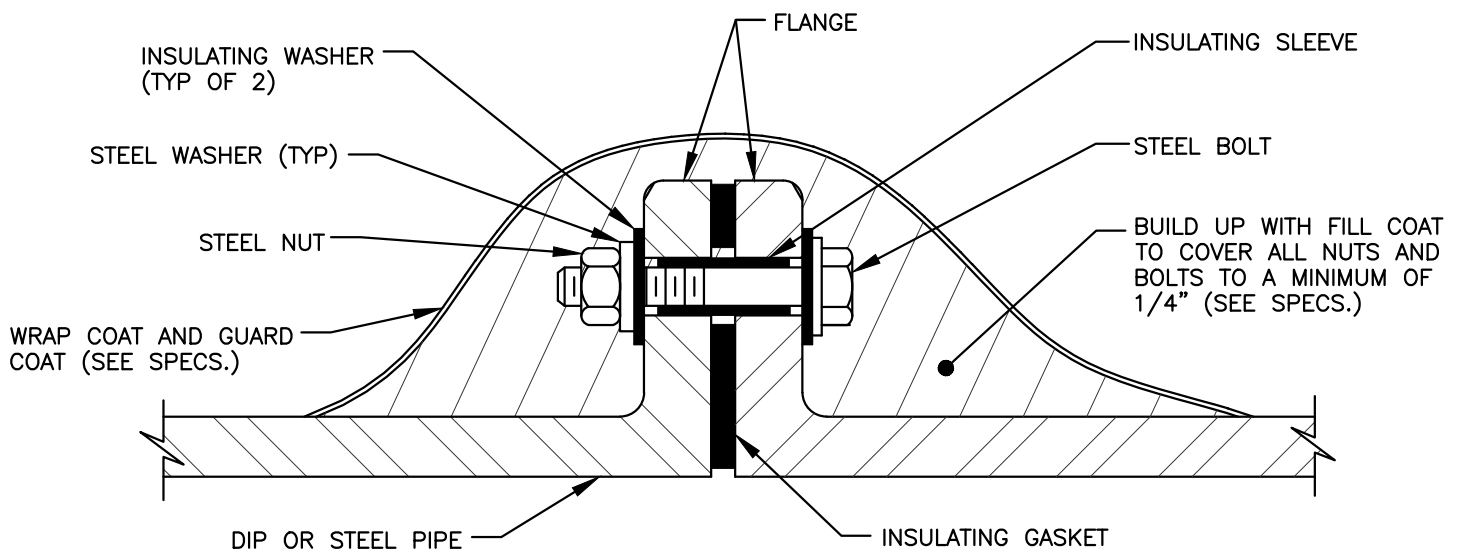
DRAWN SC

APPROVED JDH

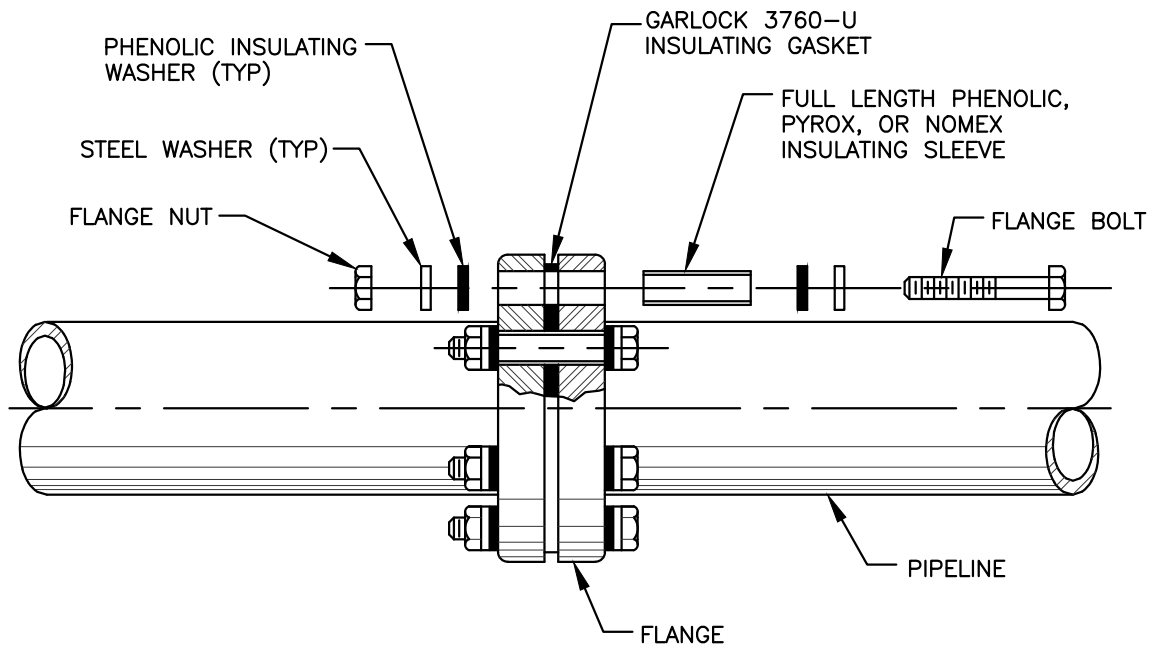
DATE OCTOBER 2022

DWG. NO.

DWD C24



## BELOW GRADE INSULATING JOINT COATING



## ABOVE GRADE INSULATING JOINT COATING

**NOTE:**

1. GASKET SHALL BE FOR WATER SERVICE AND BE OF THE SAME PRESSURE RATING AS THE FLANGE.

DIABLO WATER DISTRICT

STANDARD DRAWING  
INSULATING FLANGE ASSEMBLY

DESIGNED MA

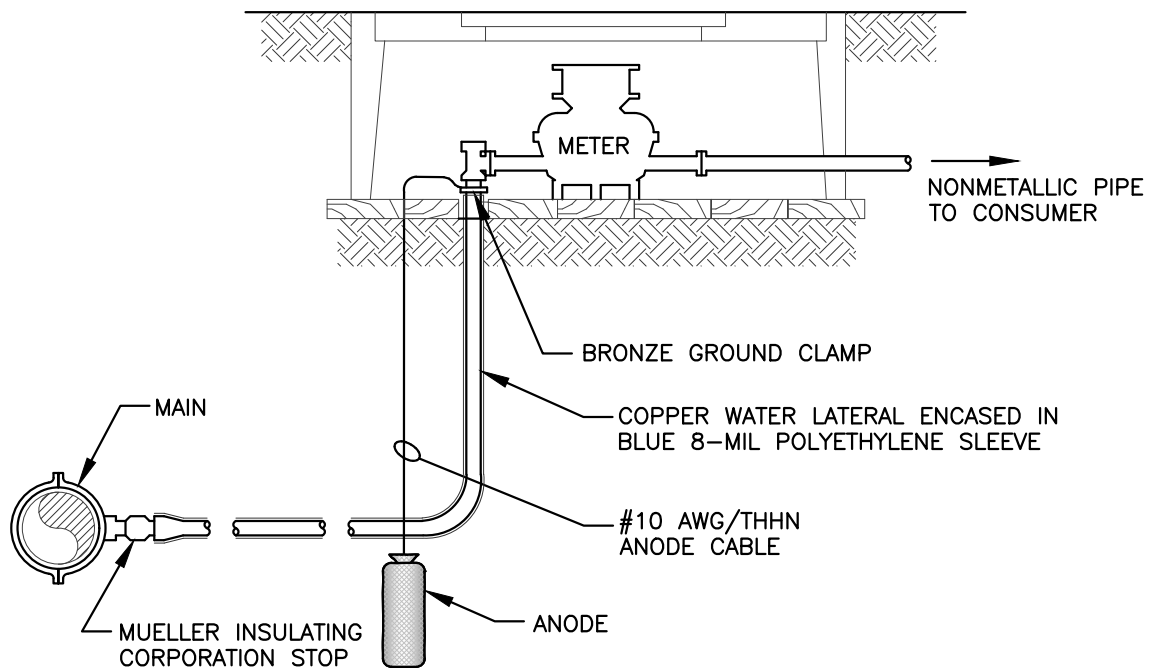
DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

DWG. NO.

DWD C25



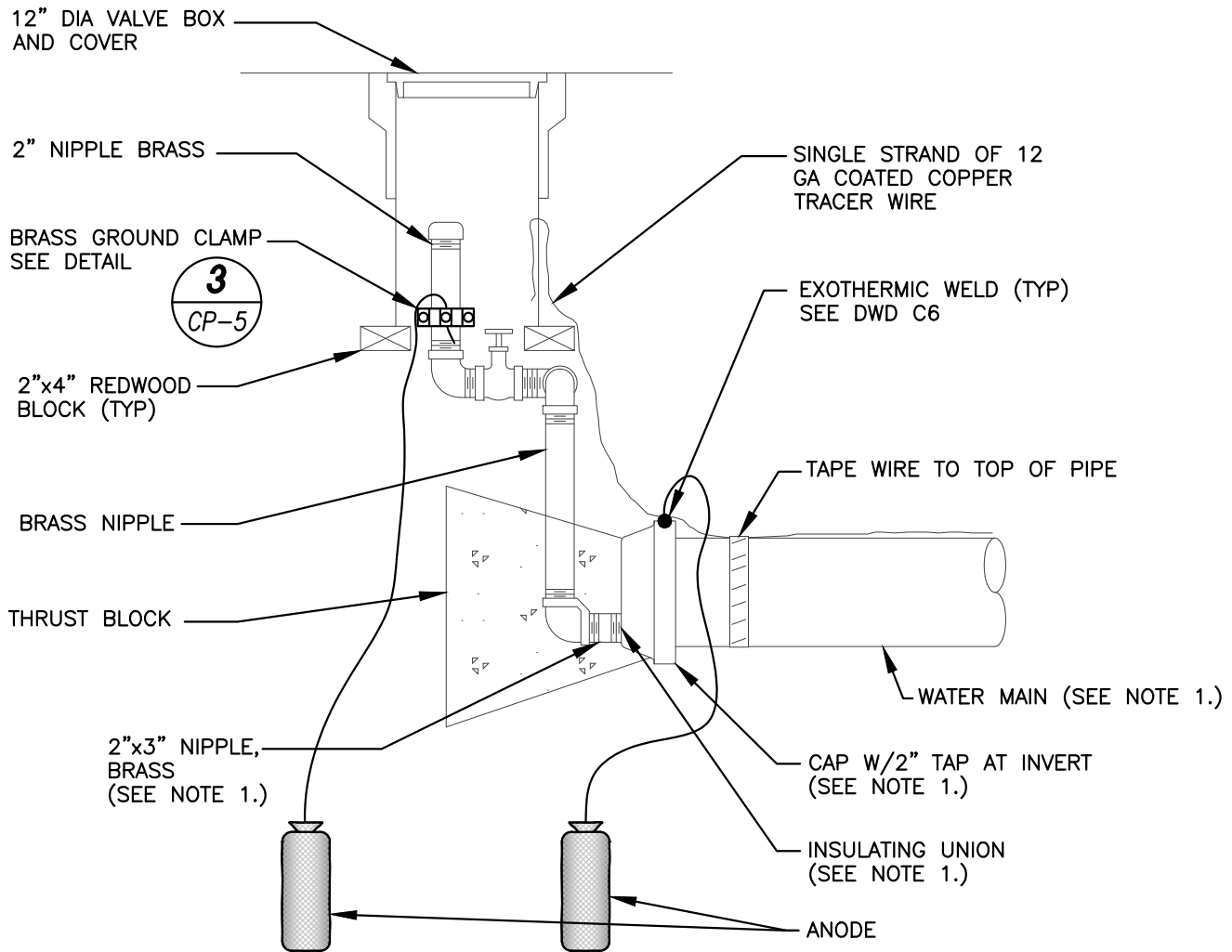
NOTES:

1. IF WATER MAIN IS METALLIC, PLACE INSULATING COUPLING BETWEEN COPPER WATER LATERAL AND WATER MAIN.
2. MAINTAIN A MINIMUM CLEARANCE OF 2 FEET BETWEEN THE ANODE AND THE LATERAL.
3. TOP OF ANODE SHALL BE 5 FEET MINIMUM FROM THE GROUND SURFACE.
4. SAME DETAIL APPLIES TO AIR RELEASE VALVES.

DIABLO WATER DISTRICT

STANDARD DRAWING  
COPPER WATER LATERALS ANODE INSTALLATION

DESIGNED MA DRAWN SC APPROVED JDH DATE OCTOBER 2022 DWG. NO. **DWD C26**



NOTE:

1. WHEN INSTALLING A COPPER BLOW OFF PER DWD STANDARD DRAWING DWD21, PRIOR TO INSTALLING THRUST BLOCK, COAT WITH BITUMASTIC TO COMPLETELY COVER THE DUCTILE IRON CAP. ENCASE ALL BURIED BRASS TUBING IN POLYETHYLENE SLEEVE. INSTALL INSULATING UNION BETWEEN COPPER PIPE AND END CAP, AND COAT THE INSULATING UNION WITH BITUMASTIC.

DIABLO WATER DISTRICT

STANDARD DRAWING  
2" BLOW OFF ANODE INSTALLATION

DESIGNED MA

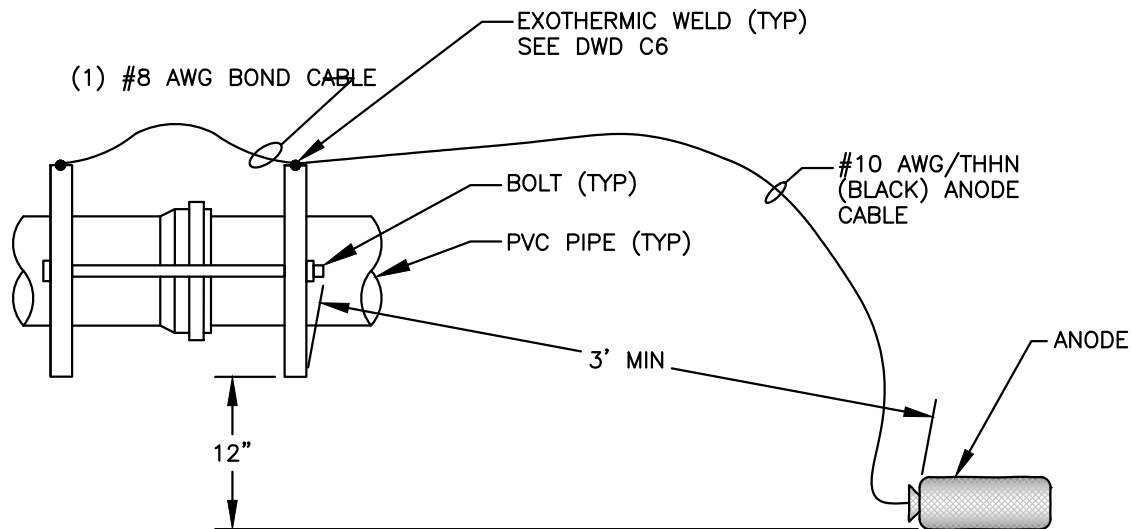
DRAWN SC

APPROVED JDH

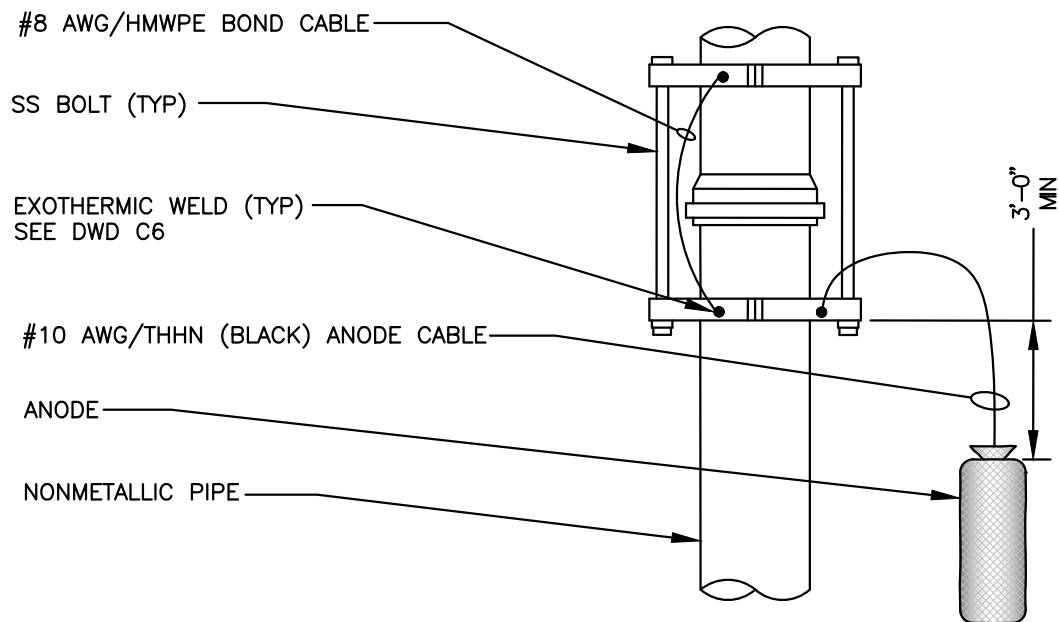
DATE OCTOBER 2022

DWG. NO.

DWD C27



## PROFILE



## PLAN

### NOTE:

1. INSTALL THE ANODE 1'-0" BELOW BOTTOM OF TRENCH IN 1 FOOT OF NATIVE BACKFILL. ATTACH ANODE CABLE DIRECTLY TO THRUST RESTRAINT FITTING.

DIABLO WATER DISTRICT

STANDARD DRAWING  
THRUST RESTRAINT HARNESS ANODE INSTALLATION

DESIGNED MA

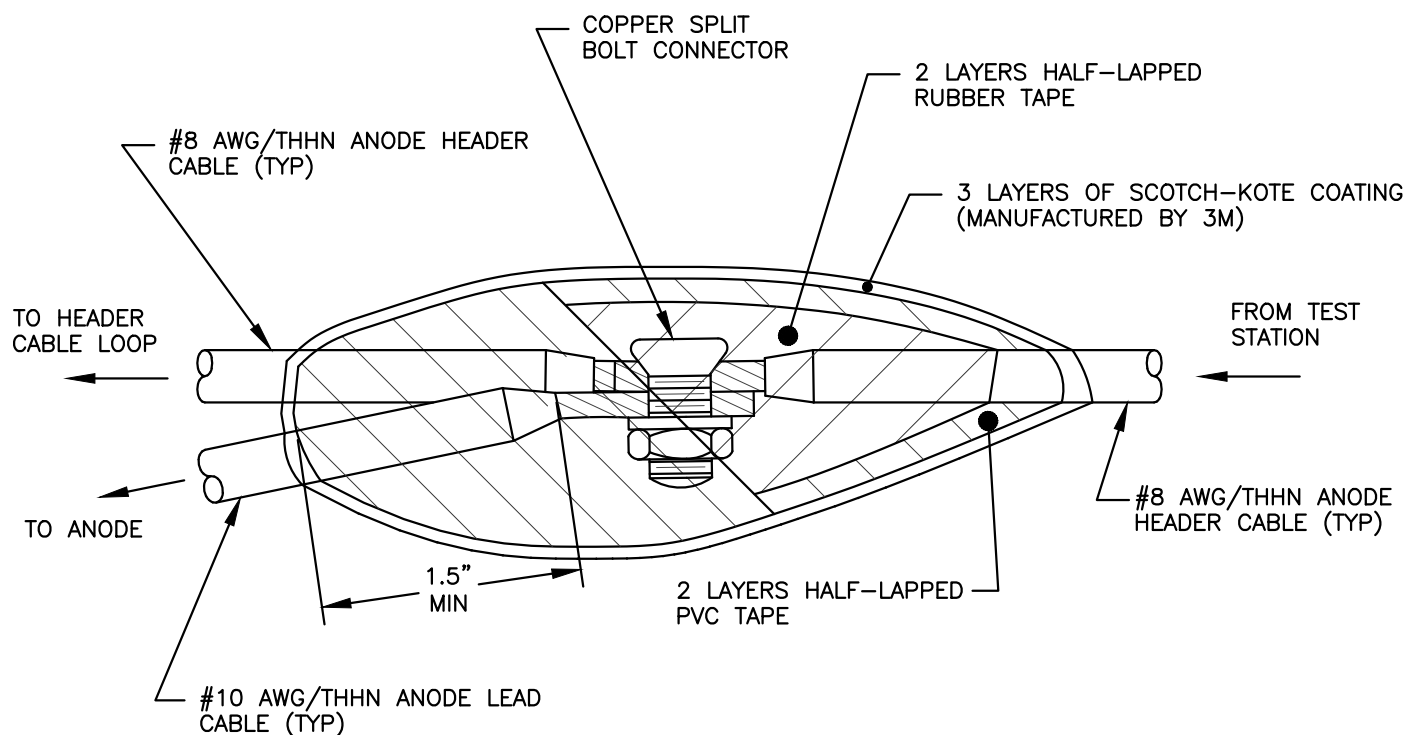
DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

DWG. NO.

DWD C28



DIABLO WATER DISTRICT

STANDARD DRAWING  
CABLE SPLICE DETAIL

DESIGNED MA

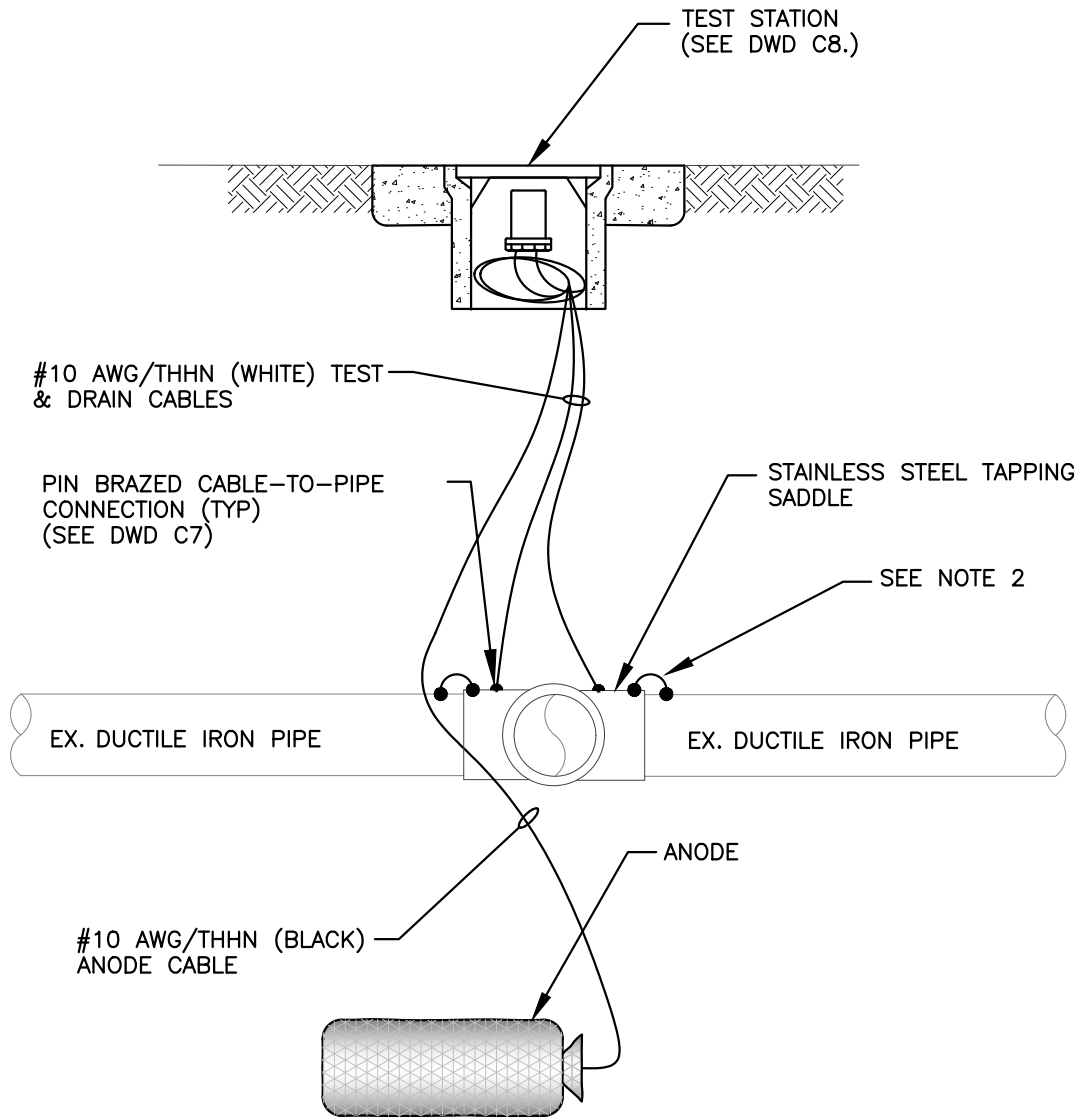
DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

DWG. NO.

DWD C29



## ELEVATION VIEW

### NOTES:

1. COAT ALL NUTS AND BOLTS WITH BITUMASTIC AND ENCASE ALL DUCTILE IRON PIPE & FITTINGS IN POLYETHYLENE. DO NOT POLYETHYLENE ENCASE THE STAINLESS STEEL SADDLE.
2. NO BONDING REQUIRED FOR PVC PIPE

DIABLO WATER DISTRICT

STANDARD DRAWING  
ANODE AT TAPPING SADDLE

DESIGNED MA

DRAWN SC

APPROVED JDH

DATE OCTOBER 2022

DWG. NO.

DWD C30