


	<b>Laying, Installation, Testing and Commissioning of 8” dia. Steel gas pipeline connectivity in PATAN GA</b>	
<b>TENDER DOCUMENT NO REPL/SGL/STPL/009/22</b>		<b>Date: -28/11/2022</b>

## **C O N T E N T S**

### **VOLUME-III OF III**

#### **LIST OF DRAWINGS**

<b>Sl. No.</b>	<b>Description</b>	<b>Drawing Number</b>
<b>A) <u>Standard Drawings</u></b>		
1)	Trench Cross Section Details.	REPL/Q7AU/05/25/ M/001/010(2 Sheets)
2)	Barricading	REPL /Q7AU/05/25/M/001/011
3)	Caution Boards	R/Q7AU/05/25/M/001/012
4)	Typical ROW Boundary Markers	REPL /Q7AU/05/25/M/001/013
5)	K.M. Post	REPL /Q7AU/05/25/M/001/014
6)	Pipeline Warning Sign	REPL /Q7AU/05/25/M/001/015
7)	Navigable Waterway Pipeline Crossing Watering Sign	REPL /Q7AU/05/25/M/001/016
8)	Aerial Marker	V/Q7AU/05/25/M/001/017
9)	Directional Markers	REPL /Q7AU/05/25/M/001/018
10)	Temprory Barricade	REPL /Q7AU/05/25/M/001/029
11)	Typical Trench Dimensions For Two Or More Pipelines Aln Common Trench	REPL/Q7AU/05/21/001A/003
12)	Minimum Elastic Bend Radius For Pipe	REPL /TYP/05/21/001A/009
13)	Details Of Casing Vent And Drain Off	REPL /TYP/05/21/001A/010

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14)	Pipeline Symbols	REPL /TYP/05/21/M/001A/011
15)	Typical Stream Crossings	REPL /TYP/05/21/04/001
16)	Pipeline Road / Highway Cased Crossing	REPL /TYP/05/21/05/001
17)	Typical Details Of Railways Crossings	REPL /TYP/05/21/05/002
18)	Typical Lined Canal Crossing (Uncased)	REPL /TYP/05/21/05/003
19)	Typical Lined Canal Cased Crossing Detail	REPL /TYP/05/21/05/004
20)	Existing Pipeline on Sleeper Crossing	REPL /TYP/05/21/05/005
21)	Low Support Fixed For Bare & Insulated Pipe Size 2” Thru 24” Type L3 & L3A	REPL /TYP/05/21/06/002
22)	Adjustable Low Support Sliding For Pipe Size 2” Thru 36” Type L10 & L10A	REPL /TYP/05/21/06/009
23)	Jack Screw For Spectacle Blind (150#,300#,600#)	REPL /TYP/05/21/06/033
24)	Butt Weld Details	REPL /TYP/05/21/06/034
25)	Welding Of Pipe With Different Thickness	REPL /TYP/05/21/06/035
26)	Fillet Weld Details	REPL /TYP/05/21/06/036
27)	Gasket Thickness	REPL /TYP/05/21/06/037
28)	Stud Bolts RF 150# Dimensions (ASME B16.5)	REPL /TYP/05/21/06/038
29)	Stud Bolts RF 300# Dimensions (ASME B16.5)	REPL /TYP/05/21/06/039
30)	Stud Bolts RF 600# Dimensions (ASME B16.5)	REPL /TYP/05/21/06/040

**C) Cathodic Protection Drawing**

1)	Pre-packed Zinc Anode	REPL /SD/05/E9/E/CP/1601,R-1
2)	Pre-packed Magnesium Anode	REPL /SD/05/E9/E/CP/1602,R-1
3)	Magnesium Ribbon Anode For Grounding	REPL /SD/05/E9/E/CP/1603,R-1
4)	Test Station With Foundation Details	REPL SD/05/E9/E/CP/1604,R-1 (2 Sheets)



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TENDER DOCUMENT NO  
REPL/SGL/STPL/009/22

Date: -28/11/2022

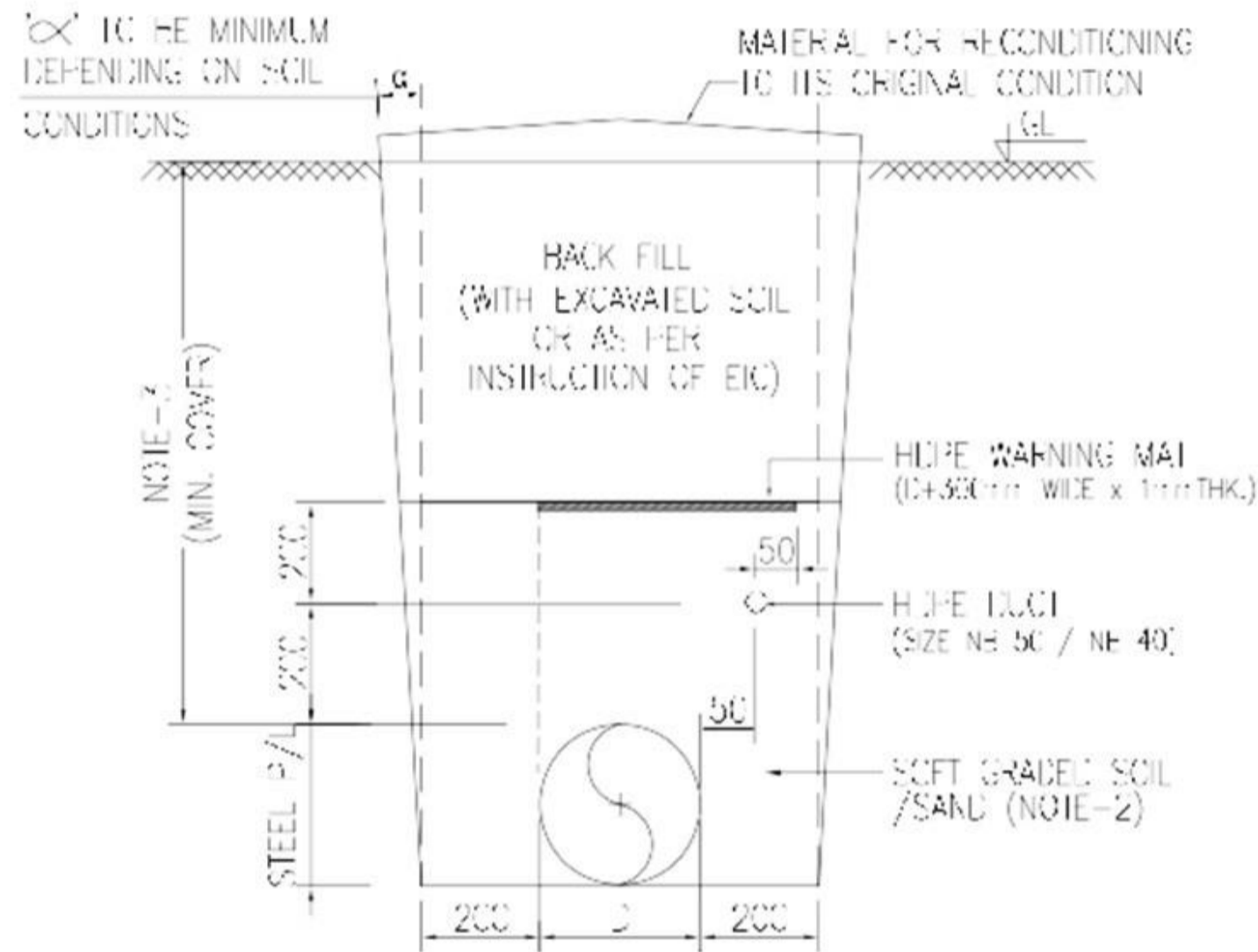
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| 5)  | Test Station Connection Schemes                                   | REPL/SD/05/E9/E/CP/1605,R-1(4 Sheets)  |
| 6)  | Galvanic Anode Installation                                       | REPL /SD/05/E9/E/CP/1606,R-1           |
| 7)  | Zinc Ribbon Anode For Cased Crossings With 1Coated Casings        | REPL /SD/05/E9/E/CP/1607,R-            |
| 8)  | Pipeline Grounding Through Polarisation 1Cells and Galvanic Anode | REPL /SD/05/E9/E/CP/1608,R-(2 SHEETS)  |
| 9)  | Detail Of Zinc Grounding Cell                                     | REPL /SD/05/E9/E/CP/1609,R-1           |
| 10) | Pre-packed Permanent Reference Electrode 0Installations Details   | REPL /SD/05/62/16/10,R-                |
| 11) | Shallow Anode Ground Bed (PCP) With 1Canistered Anode             | REPL /SD/05/E9/E/CP/1611,R-(3 Sheets)  |
| 12) | Anode Lead Junction Box   | REPL /SD/05/E9/E/CP/1612,R-1(2 Sheets) |
| 13) | Casing Pipe Details   | REPL /SD/05/E9/E/CP/1613,R-1           |
| 14) | Details Of Test Station For Polarization Cell                     | REPL /SD/05/E9/E/CP/1614,R-1(2 Sheets) |
| 15) | Deep Well Anode Bed   | REPL /SD/05/E9/E/CP/1615,R-1           |
| 16) | Connection Scheme For Hooking Through CJB / 1Test Station         | REPL /SD/05/E9/E/CP/1616,R-            |
| 17) | Details of Thermit Weld For Cable To Pipe Joint                   | REPL /SD/05/E9/E/CP/1618,R-1           |
| 18) | Electrode For Earthing System                                     | REPL /SD/05/26/23/01,R-0               |
| 19) | Earth Electrode In Test Pit                                       | REPL /SD/05/26/23/02,R-0               |

**D) Civil Drawings**

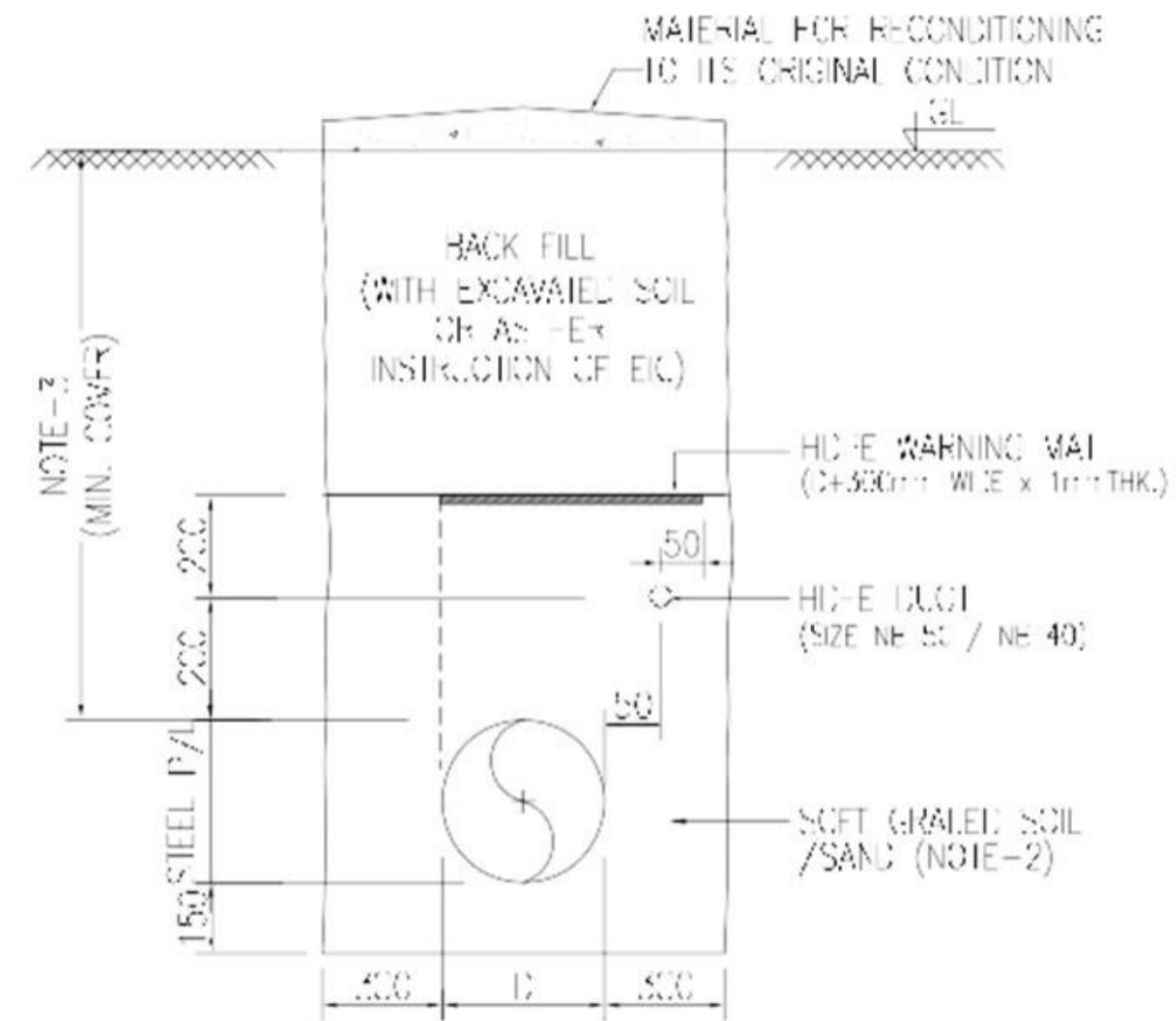
- |    |   |                              |
|----|---|------------------------------|
| 1) | Typical Details of RCC Pavement & Pedestals | REPL /05/11/STD/TERMINAL/002 |
| 2) | Detail of Valve Pit (V.P.-I)                | REPL /05/11/C/STD/001        |

# **STANDARD DRAWINGS**

**TRENCH CROSS-SECTION FOR CITY CONDITION  
(FOR SOFT SOIL TRENCH BOTTOM)**




**TRENCH CROSS-SECTION FOR CITY CONDITION  
(FOR ROCKY/HARD SOIL TRENCH BOTTOM)**



**FOR TENDER PURPOSE**

**NOTES:-**

1. ALL DIMENSIONS ARE IN MM
2. PAVING SHALL BE DONE ONLY AFTER CLEARANCE FROM EIC FOR SOIL QUALITY
3. PIPELINE COVER SHALL BE AS PER DISL 223 OR AS PER LOCAL AUTHORITY.

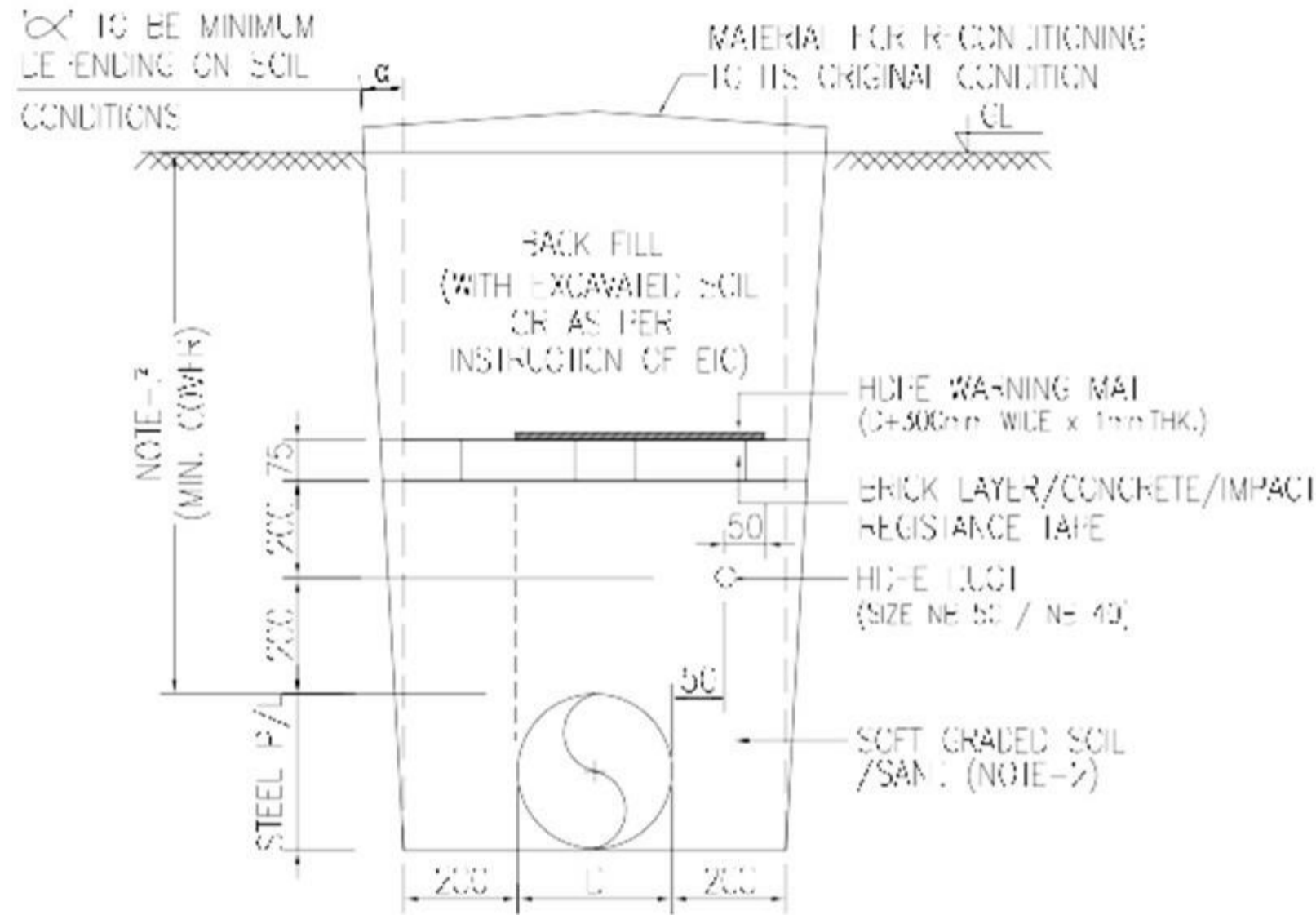
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ALL I/P LOCATION AREA/NO TRENCH CHECKED BY VERIFIED BY APPROVED		OIL & GAS A.T.V. TELHE KRISHNA D.M.L. SHALINI SSG (SUNE SUNKAR) DATE: 08.12.2016	
CNG & CITY GAS DISTRIBUTION PROJECT TRENCH CROSS SECTION TYPICAL FOR CITY CONDITION SINGLE STEEL PIPELINE ALONGWITH HDPE DUCT LAYING		SCALE: 1:1 SHEET: 2 OF 2 REV: 0 L-NO. MEC/Q7AU/05/25/M/001/010	

REVNO	DATE	ZONE	DESCRIPTION	BY	VERIFIED

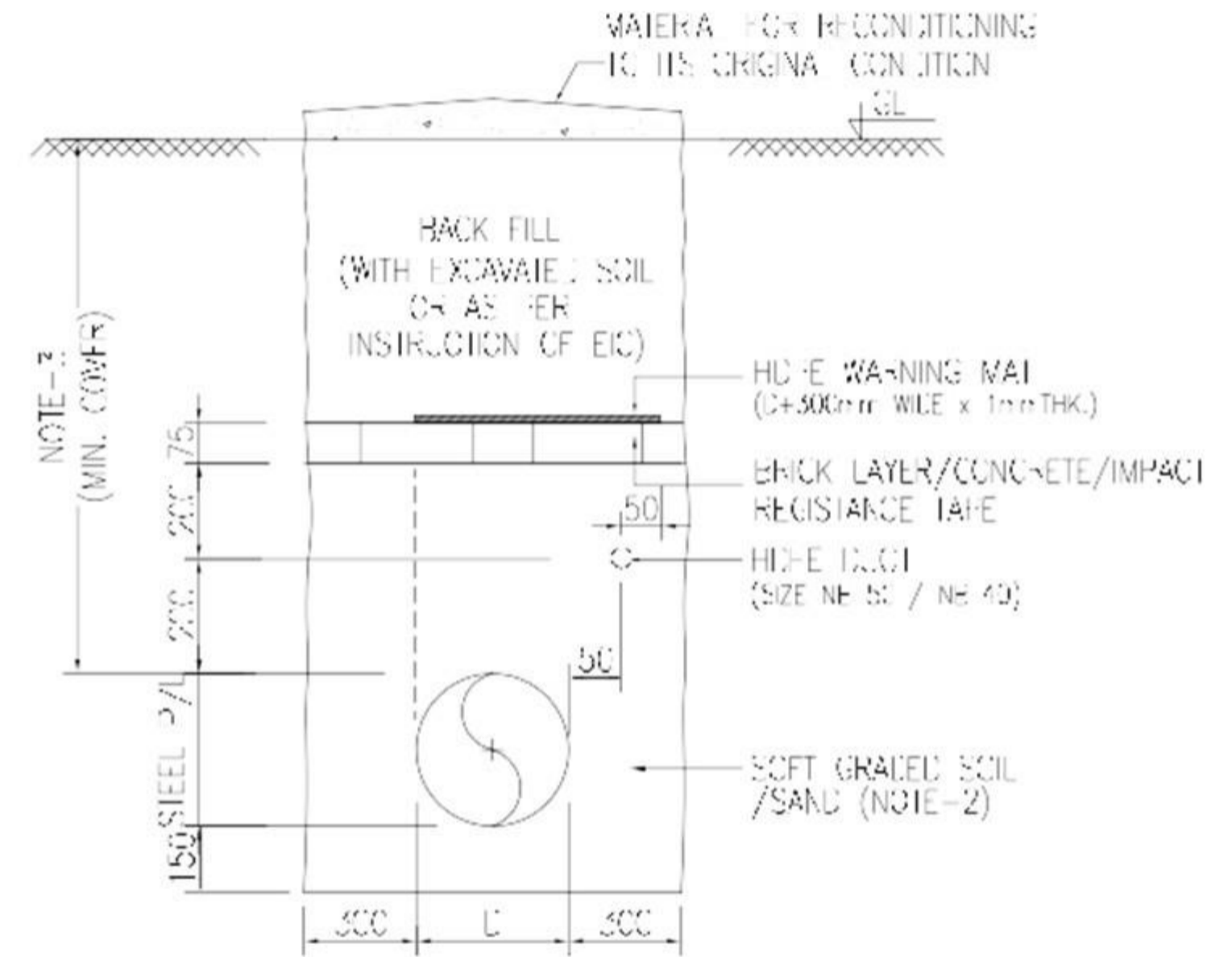
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**TRENCH CROSS-SECTION FOR CITY CONDITION  
(FOR SOFT SOIL TRENCH BOTTOM)**




**TRENCH CROSS-SECTION FOR CITY CONDITION  
(FOR ROCKY/HARD SOIL TRENCH BOTTOM)**



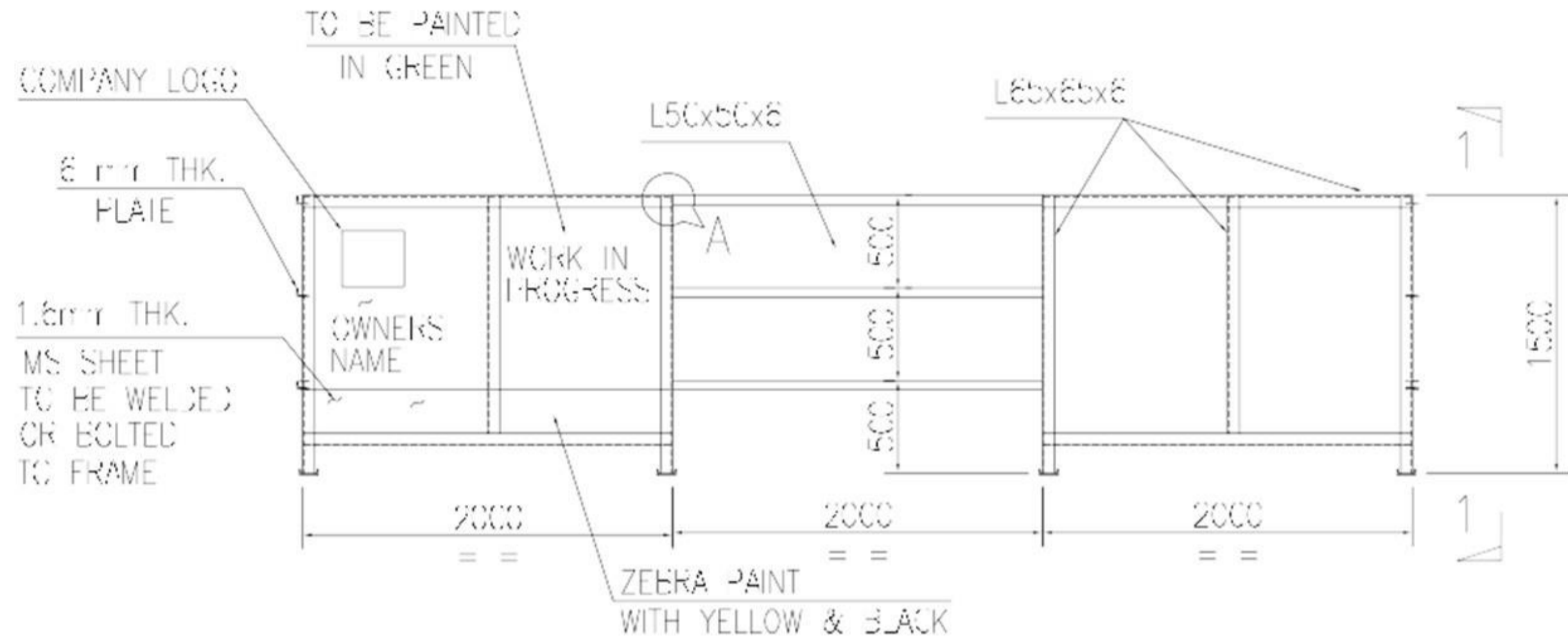
FOR TENDER PURPOSE

**NOTES:-**

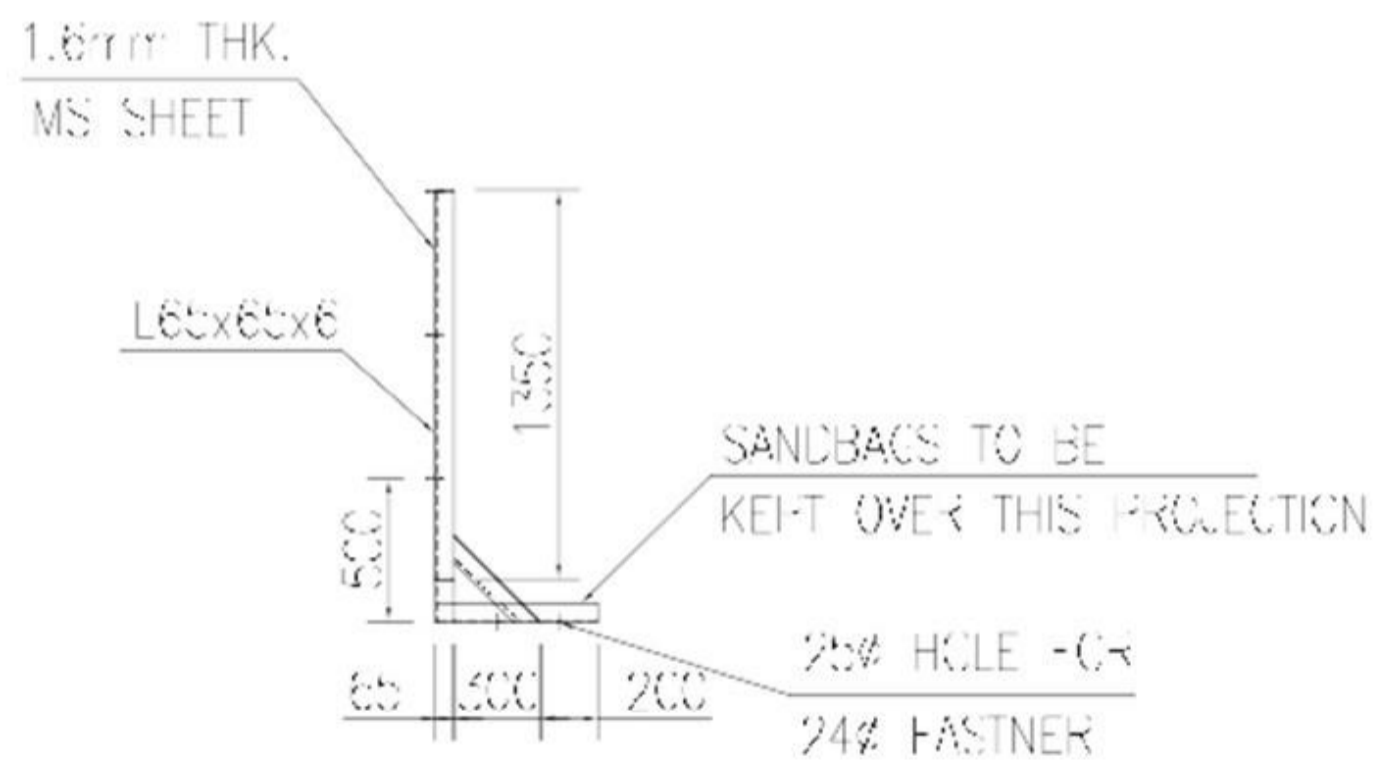
1. ALL DIMENSIONS ARE IN MM
2. WARNING SHALL BE DONE ONLY AFTER CLEARANCE FROM HR FOR SOIL QUALITY
3. PIPELINE COVER SHALL BE AS PER DISU 229 OR AS PER LOCAL AUTHORITY.

		REPL/Q7AU/05/25/M/001/010	
Resonance Energy Pvt. Ltd.		UNG & CITY GAS DISTRIBUTION PROJECT	
BILL & GAS LOCATION ZONE DRAWN CHECKED AND VERIFIED APPROVED	KAV TELUGU KRISHNA S.J.SL SHALINI SUDHAKAR	LEGAL CONSULTANTS (TYPICAL FOR CITY CONDITION) SINGLE STEEL PIPELINE ALONGWITH HDPE DUCT LAYING	SCALE: 1:50 SHEET: 1 OF 2 REV: 0
REV NO DATE ZONE DESCRIPTION BY VERIFIED	REV NO DATE ZONE DESCRIPTION BY VERIFIED	REFERENCES DISU Copyright © 2010 by Resonance Energy Pvt. Ltd. All rights reserved. THE COMPANY, ITS PROPERTY OR NAME AND DESIGN FOR THE PRODUCT ARE REGISTERED TRADEMARKS AND NOT TO BE COPIED OR USED FOR OTHER PROJECTS UNLESS EXPRESSLY PERMITTED BY RESONANCE ENERGY.	DATE: 08.12.2016

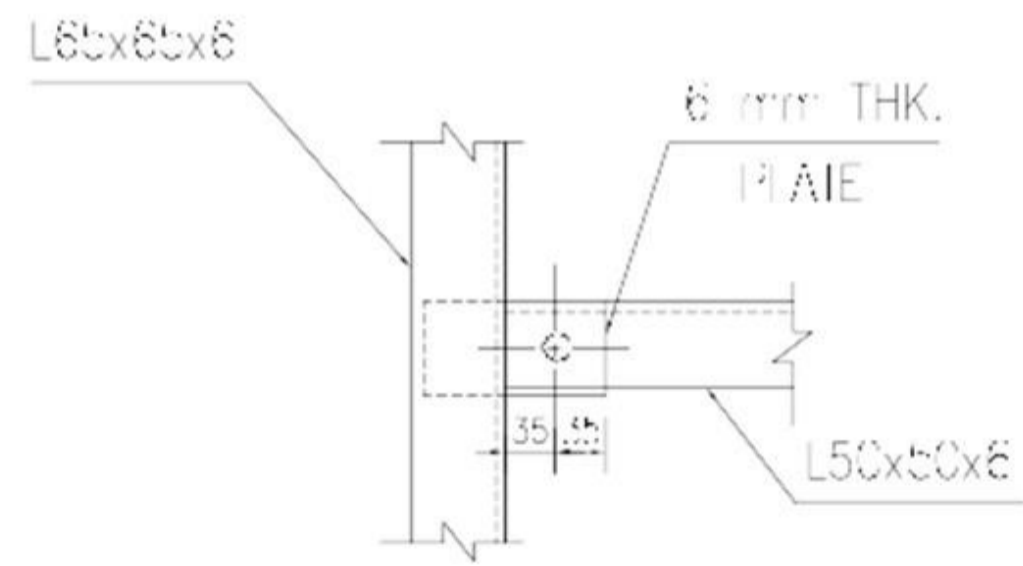
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**LAYOUT PLAN OF BARRICADE**



**SECTION 1-1**



**DETAIL-A**

FOR TENDER PURPOSE

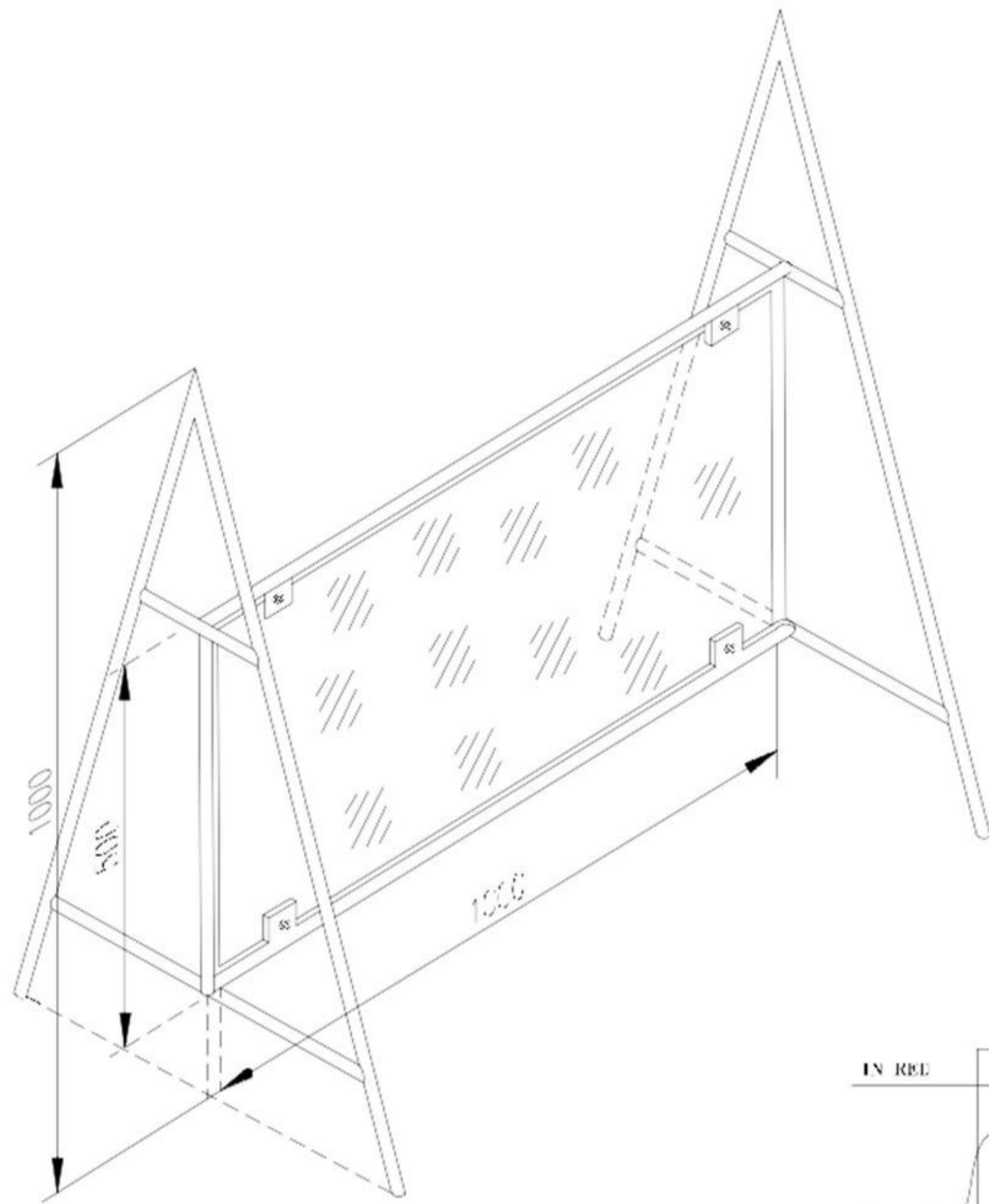
	REPL/Q7AU/05/25/M/001/011
	RESONANCE ENERGY PVT.LTD
CNG & CITY GAS DISTRIBUTION PROJECT BARRICADING	SCALE: 1/20 SHEET 1 OF 1 REV 0

NOTES:-  
1. ALL DIMENSIONS ARE IN mm

REV	DATE	BY	DESCRIPTION

REV NO	DATE	ZONE	DESCRIPTION	BY	VERIFIED

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IN REL ← CAUTION ← CLIENT'S LOGO

WORK IN PROGRESS

LAYING OF NATURAL GAS PIPELINE

CLIENT : OWNER'S NAME

CONTRACTOR NAME :

DATE OF COMMENCEMENT :

DATE OF COMPLETION :

EMERGENCY PHONE NOS:

IN BLACK

FOR TENDER PURPOSE ONLY



Resonance Energy

REPL/Q7AU/05/25/M/001/012

RESONANCE ENERGY PVT. LTD

CNG & CITY GAS DISTRIBUTION PROJECT

CAUTION BOARDS

SECTION OIL & GAS  
LOCATION DELHI  
DESIGNED KRISHNA  
DRAWN SUNL  
CHECKED AND VERIFIED SHALINI  
APPROVED SK DATE

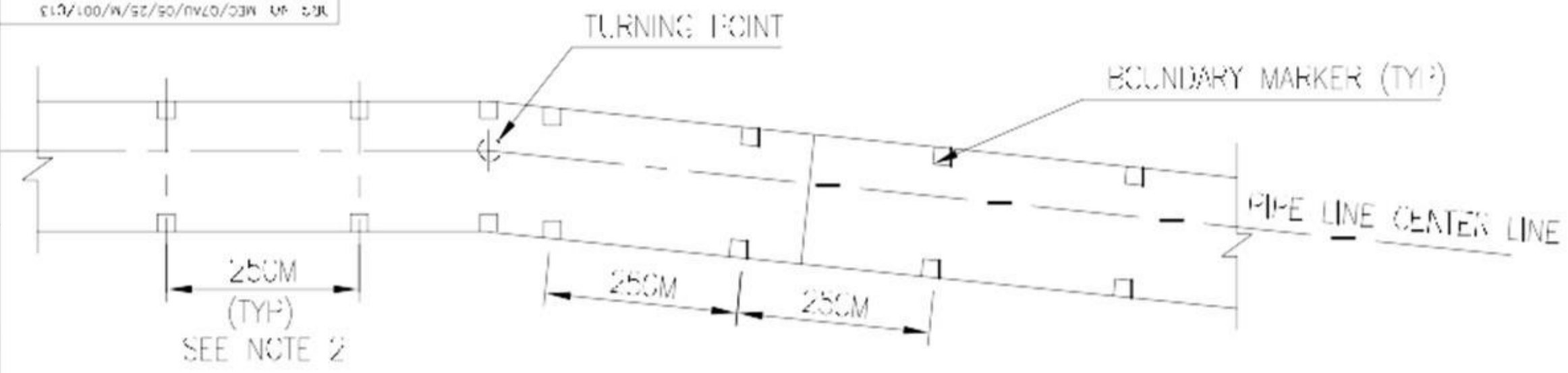
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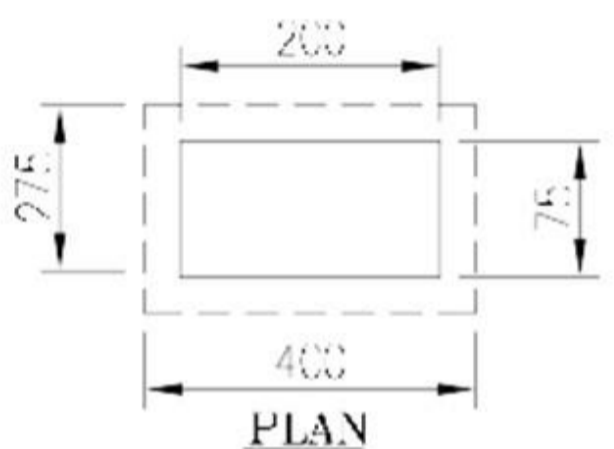
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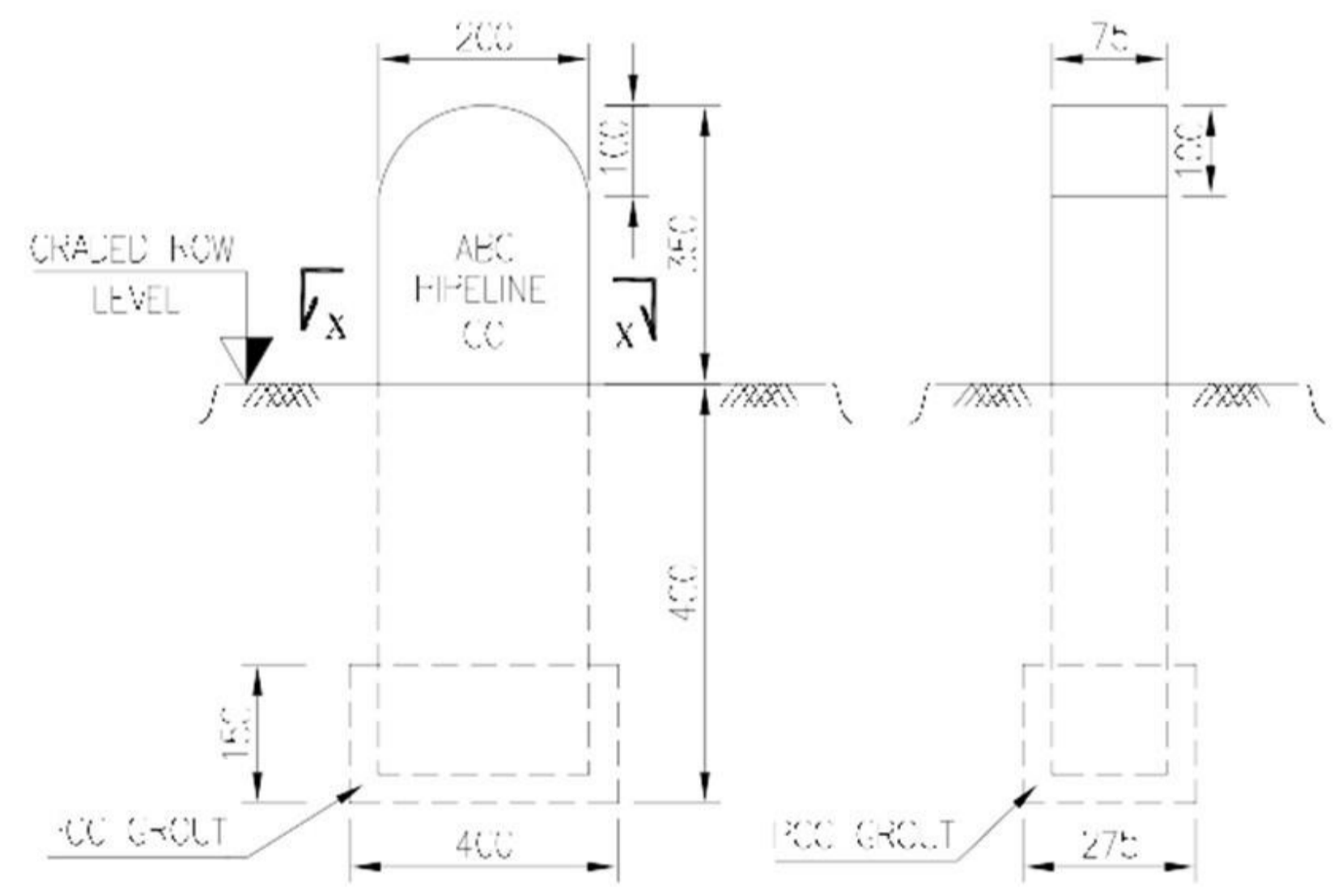




LOCATION PLAN OF BOUNDARY MARKER

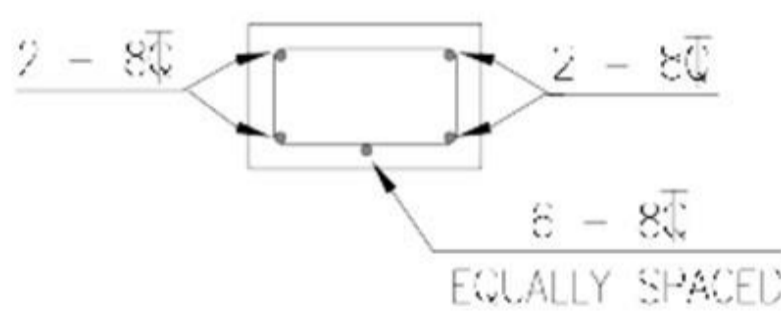


PLAN



ELEVATION

SIDE VIEW



SECTION X-X

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. BOUNDARY MARKERS SHALL BE INSTALLED AT THE ROW LIMITS ON EITHER SIDE AT 250M INTERVALS AND ALSO AT ALL TURNING POINTS, AS PER SPECIFICATIONS AND AS DIRECTED BY COMPANY BOUNDARY MARKERS SHALL PREFERABLY BE PLACED ON FIELD BUNDS/ UNCULTIVABLE PATCHES
3. ALL BOUNDARY MARKERS SHALL BE PRECAST AND INSCRIPTIONS SHALL BE ENGRAVED CENTRALLY IN THE MOULD ON ONE FACE.
4. LETTERS SHALL BE 60 mm. HIGH AND 5 mm. DEEP.
5. INSCRIPTIONS SHALL FACE THE PIPELINE.
6. CONCRETE FOR BOUNDARY MARKER SHALL BE M20.
7. ABOVE GROUND PART OF BOUNDARY MARKERS SHALL BE PAINTED YELLOW WITH MINIMUM THREE COATS OF APPROVED QUALITY PAINT. INSCRIPTIONS SHALL BE PAINTED BLACK. (25 MICRONS/COAT)

FOR TENDER PURPOSE



REPL/Q7AU/05/25/M/001/013

RESONANCE ENERGY PVT. LTD.

CNG & CITY GAS DISTRIBUTION PROJECT

TYPICAL ROW BOUNDARY MARKER

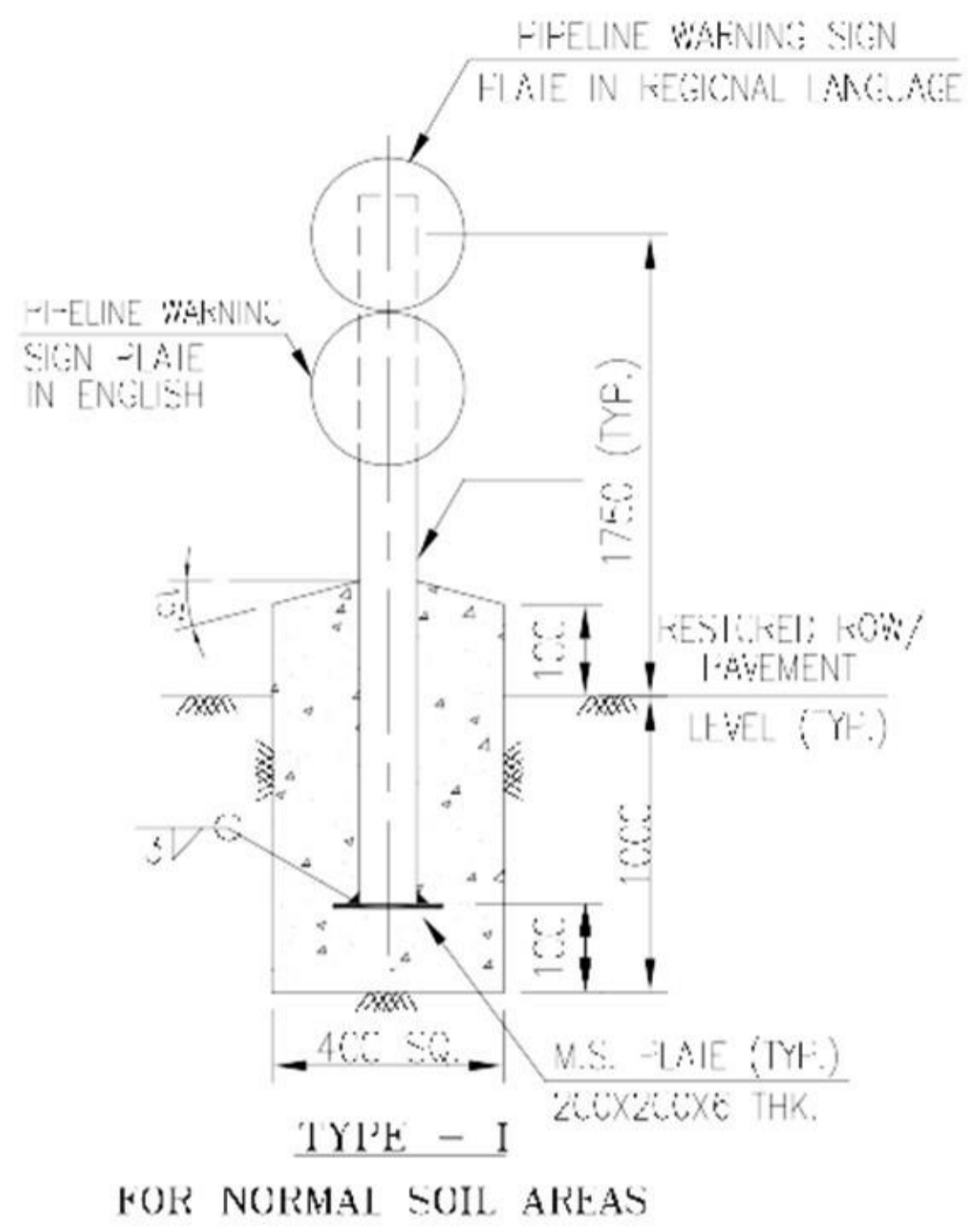
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SEC		

REVNO	DATE	ZONE	DESCRIPTION	BY	VERIFIED

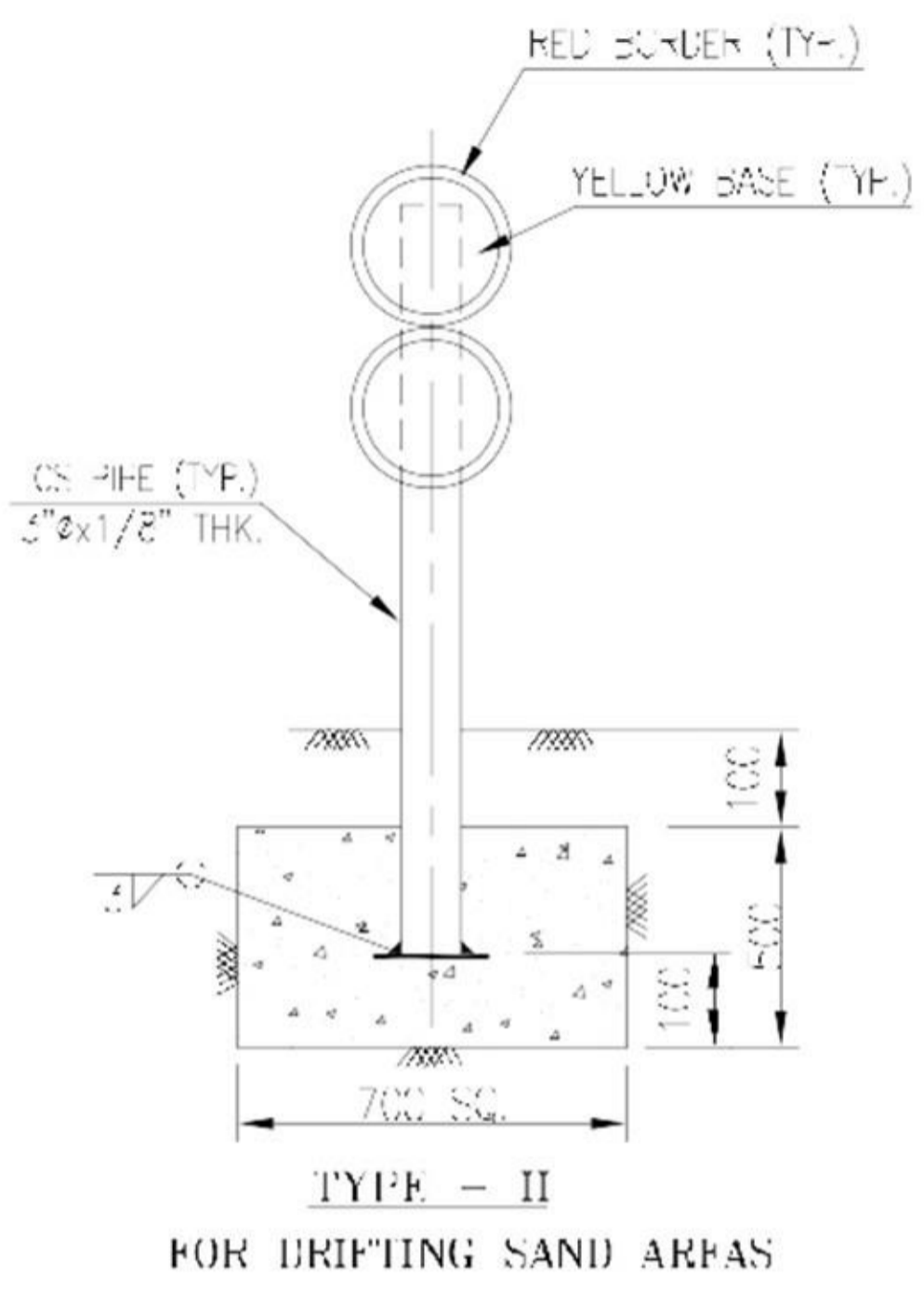
CHECKED BY	SHALINI
APPROVED BY	SUNIL KUMAR
DATE	08.12.2016

SCALE: 1:10	DATE: 08.12.2016
JK-0 NO. MEC/Q7AU/05/25/M/001/013	0

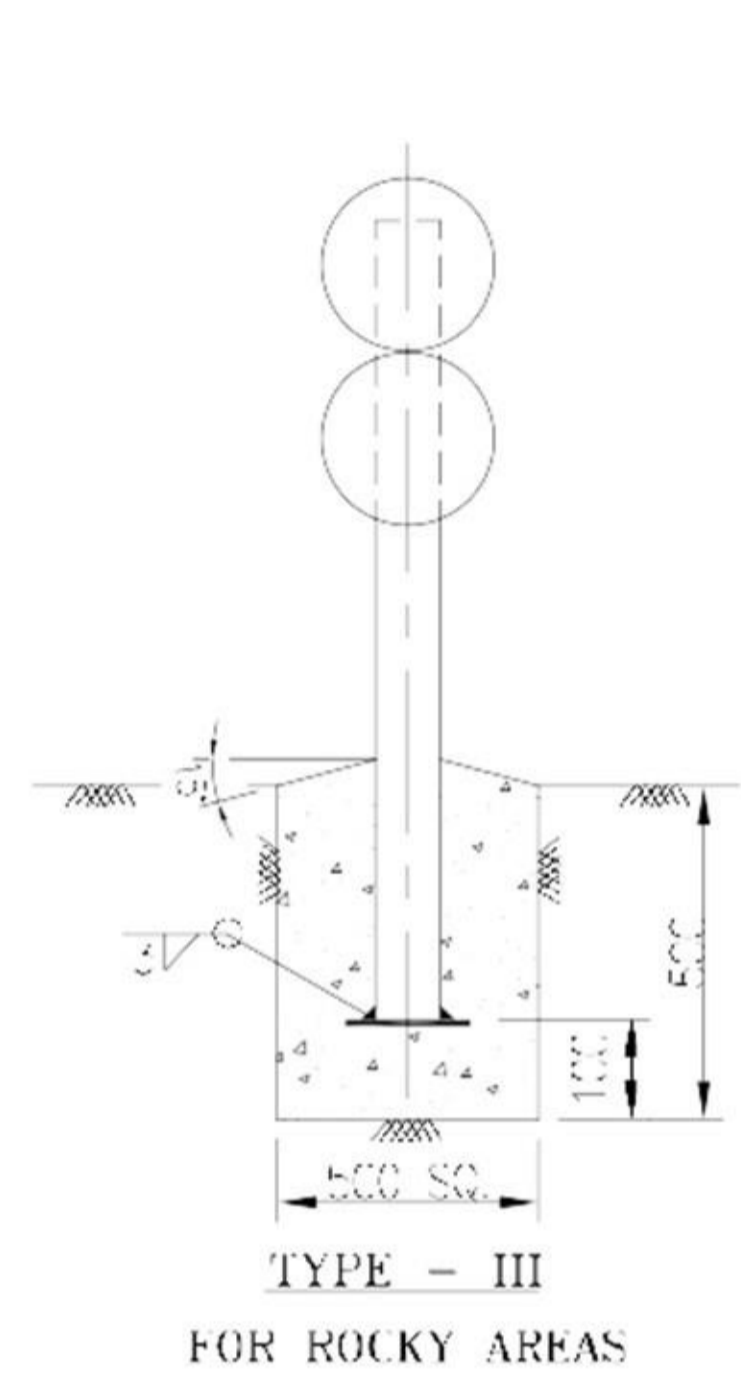




TYPE - I  
FOR NORMAL SOIL AREAS



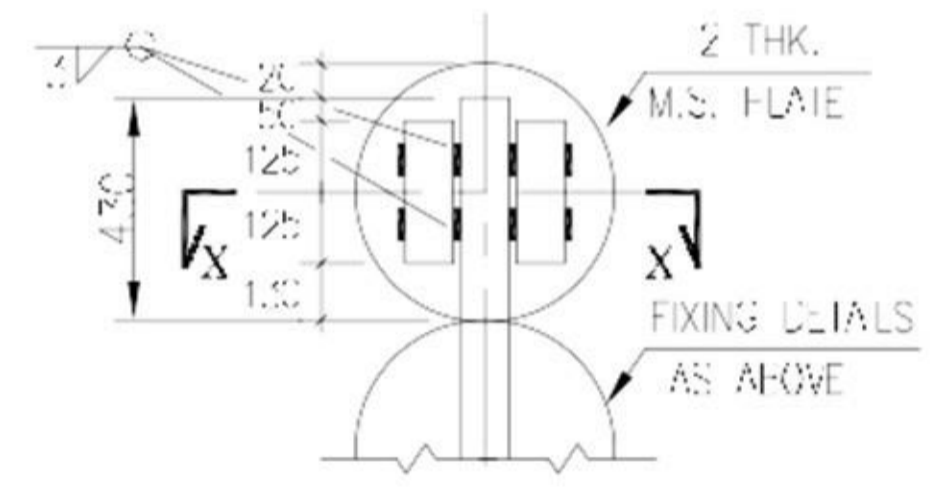
TYPE - II  
FOR DRIFTING SAND AREAS



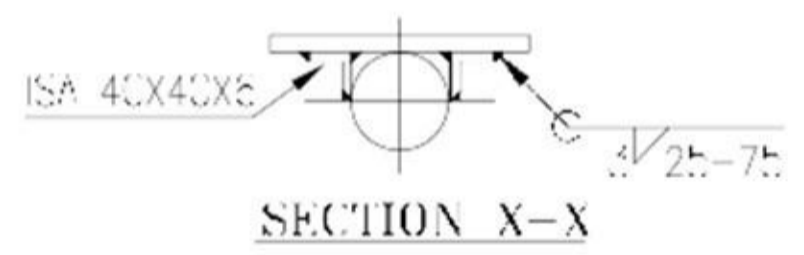
TYPE - III  
FOR ROCKY AREAS

NOTES:-

1. SCHEME OF PAINTING AND COLOURING.
  - a) UNDERGROUND STEEL STRUCTURE (EXCEPT THAT EMBEDDED IN CONCRETT) COAT (A) EPOXY MIN 300 MICRON THK.
  - b) OVERGROUND STEEL STRUCTURE - ONE COAT OF PRIMER & TWO COAT OF SPECIFIED COLOUR PAINT (35 MICRONS/COAT).
  - c) EXCEPT ALL LETTERS 'WARNING' SHALL BE PAINTED IN RED.
  - d) COLOUR SCHEME FOR PIPELINE CO MONOGRAM SHALL BE AS DIRECTED BY COMPANY.
  - e) ALL LETTERS EXCEPT WARNING SHALL BE PAINTED BLACK.
  - f) POST SHALL BE PAINTED WITH 250 WIDE ALTERNATE BANDS OF BLACK AND WHITE PAINT.
  - g) ALL OTHER ABOVE GROUND STEEL SHALL BE PAINTED YELLOW.
2. LOCATION
  - a) THE PIPELINE WARNING SIGN SHALL BE INSTALLED IN ACCORDANCE WITH CONTRACT REQUIREMENTS AND AS DIRECTED BY CLIENT/CONSULTANT. IT SHALL BE INSTALLED TO THE LEFT OF THE PIPE CENTER LINE VIEWING IN THE DIRECTION OF FLOW AT 500 MM FROM PIPELINE CG AND THE WARNING SIGN PLATE SHALL FACE THE UTILITY BEING CROSSED.
  - b) THE WARNING SIGN PLATE MAY BE MOUNTED OFF VERTICALLY OR HORIZONTALLY AS DIRECTED BY COMPANY.
3. FOR FLUIDS COVERED BY CODE ANSI B 31.4 USE WORD PETROLEUM AS INDICATED FOR FLUIDS COVERED BY CODE ANSI B 31.8 USE WORD GAS IN PLACE OF PETROLEUM FOR ANY OTHER FLUIDS, MIN ON THE FLAG IN PLACE OF THE WORD PETROLEUM.
4. IN CASE THE WARNING SIGN TO BE USED WHERE THE PIPELINE CROSSES A HAZARDOUS FACILITY LIKE A HT CABLE OR ANOTHER PETROLEUM PIPELINE, IN PLACE OF WORDS HIGH PRESSURE PETROLEUM PIPELINE WRITE HIGH PRESSURE PETROLEUM CROSSING, HT CABLE OR THE CONCERNED FACILITY ON LETTERS OF SIZE WHICH ARE TO BE DECIDED AT SITE.
5. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED.
6. THE FOUNDATION SHALL BE MADE OF CONCRETE M20.
7. SIGN PLATE IN REGIONAL LANGUAGE SHALL BE PREPARED BY CONTRACTOR ON SIMILAR LINES AND APPROVED BY COMPANY.



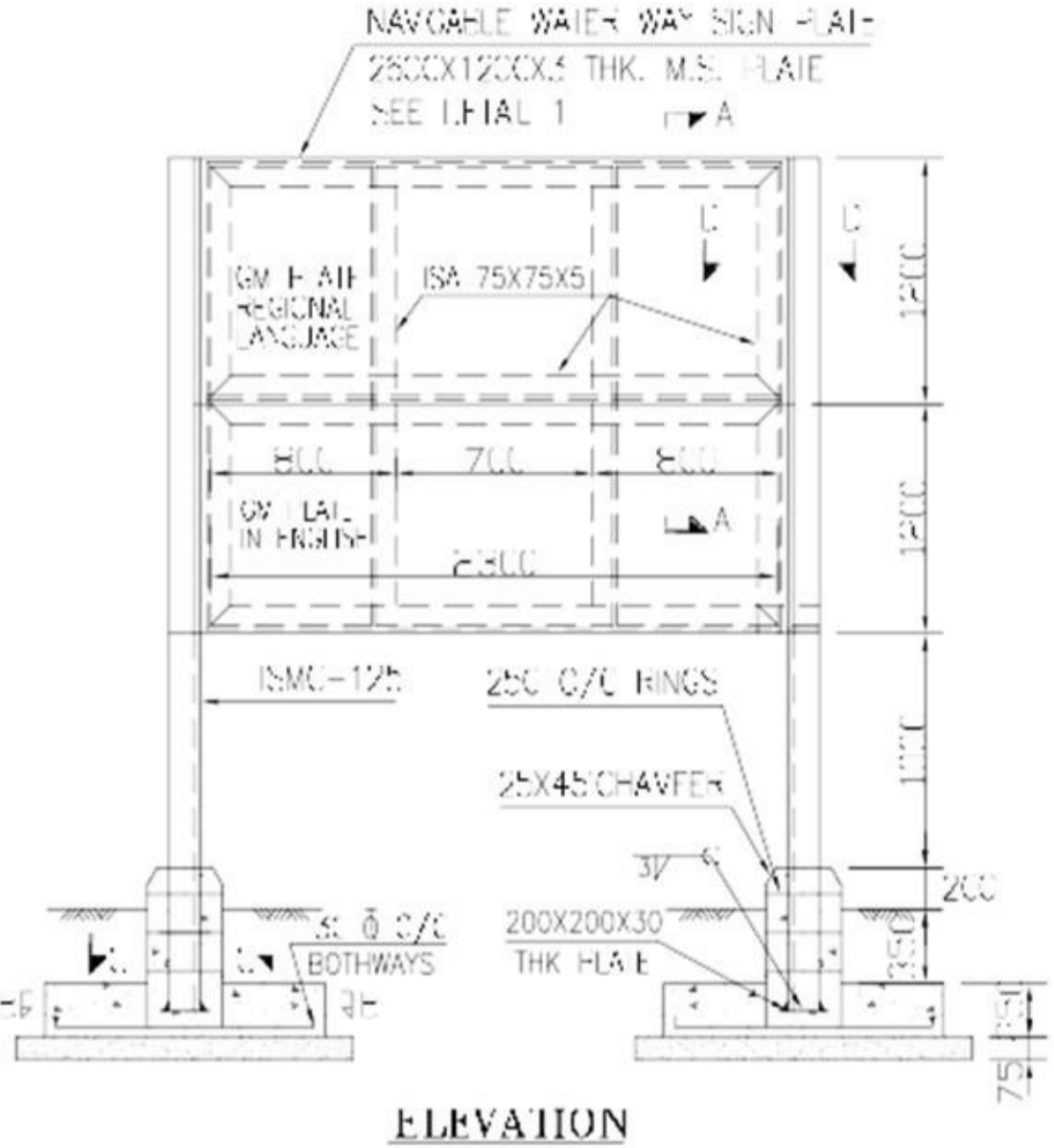
WARNING SIGN PLATE FIXING DETAILS



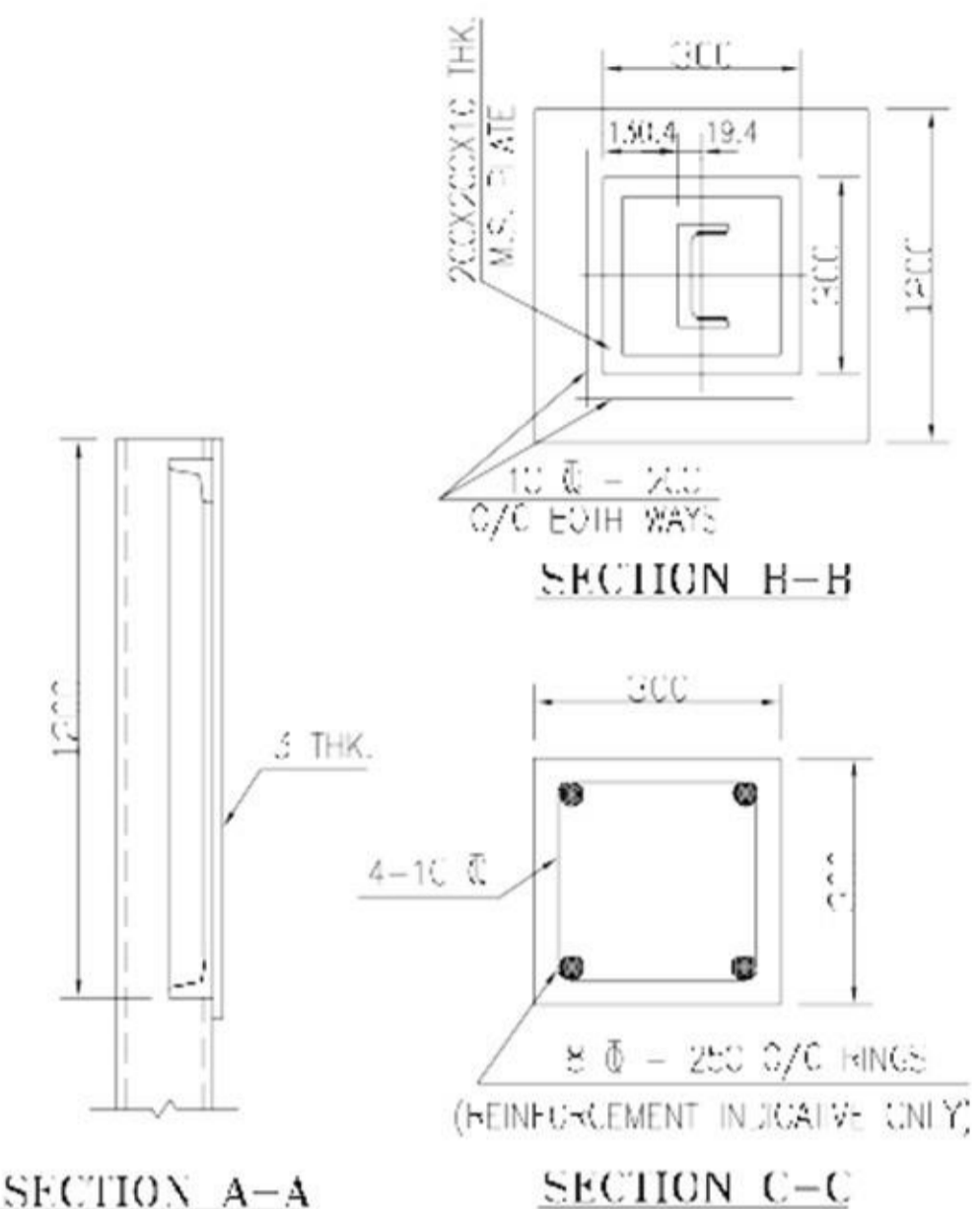
FOR TENDER PURPOSE

		REPL/Q7AU/05/25/M/001/015 RESONANCE ENERGY PVT. LTD.	
SHEET NO. 05/25/M/001/015 LOCATION: ATV TELHI AREA: ANDHRA PROJECT: DUNE CHECKED BY: SHALINI APPROVED BY: SURE KJWAR DATE: 08.12.2016	CNG & CITY GAS DISTRIBUTION PROJECT PIPELINE WARNING SIGN (TYP.) SCALE: 1:1 U.NO: NO MEC/Q7AU/05/25/M/001/015	SHEET NO. 05/25/M/001/015 OF 05	REV. 0

REVNO	DATE	ZONE	DESCRIPTION	BY	VERIFY

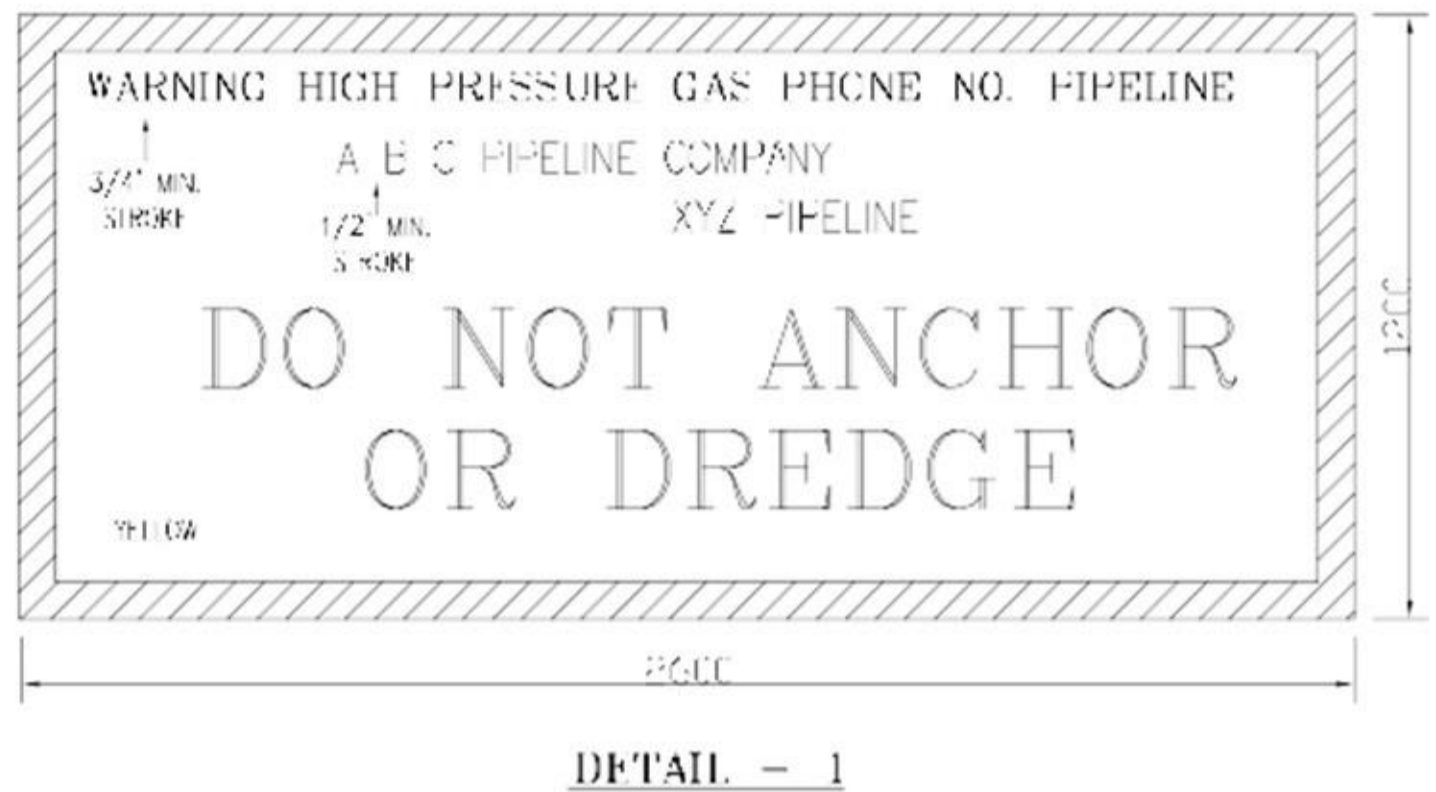



ELEVATION

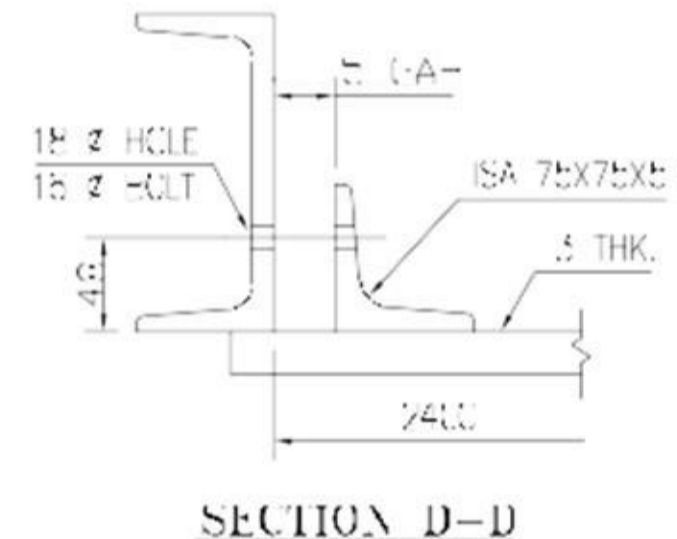


SECTION A-A

SECTION C-C




DETAIL - 1



SECTION D-D

- NOTES:-**
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
  2. SCHEME OF PAINTING AND COLOURING.
    - a) UNDERGROUND STEEL STRUCTURE - ONE COAT OF PRIMER & TWO COATS OF SPECIFIED COLOUR PAINT (35 MICRONS/COAT).
    - b) LETTERS SHOWN AS ■ ARE TO BE PAINTED BLACK.
    - ARE TO BE PAINTED RED.
    - c) POST SHALL BE PAINTED WITH 250 WIDE ALTERNATE BANDS OF BLACK AND WHITE PAINT.
    - d) ALL OTHER ABOVE GROUND STEEL SHALL BE PAINTED YELLOW.
  3. LOCATION :- THE NAVIGABLE WATER WAY WARNING SIGN SHALL BE INSTALLED.
    - a) ON BOTH THE BANKS & FACING THE WATER WAY AS CLOSE TO THE BANKS AS POSSIBLE.
    - b) STRADDLING THE PIPE CENTER LINE FOR PIPELINES UP TO 300 DIA, 500 MM TO THE LEFT OF PIPELINE C/D. VIEWING IN THE DIRECTION OF FLOW FOR PIPELINE ABOVE 300 DIA AS INDICATED IN LOCATION SKETCH BELOW.
  4. FOR FLUIDS COVERED BY CODE ANSI B 31.8 USE WORD "GAS" AS INDICATED. FOR FLUIDS COVERED BY CODE ANSI B 31.4 USE WORD "FUELS" IN PLACE OF GAS FOR ANY OTHER FLUIDS, MENTION THE FLUID IN PLACE OF THE WORD "GAS".
  5. THE FOUNDATION SHALL BE MADE OF CONCRETE M20 CONFORMING TO IS:454 LATEST EDITION.
  6. STRUCTURAL STEEL SHALL CONFORM TO IS:2062 LATEST EDITION.
  7. M.S. PLATE 3 MM THK. SHALL HAVE A SICH WELD WITH THE ANGLE FRAME AT 100 MM C/C.
  8. SIGN PLATE IN REGIONAL LANGUAGE SHALL BE PREPARED BY CONTRACTOR ON SIMILAR LINES AND APPROVED BY COMPANY

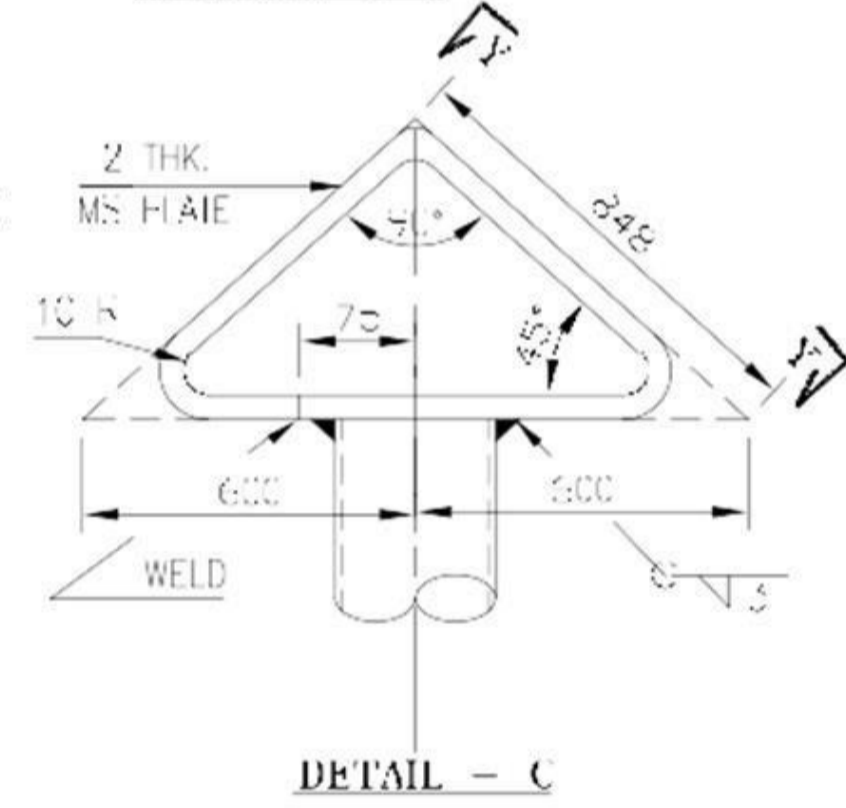
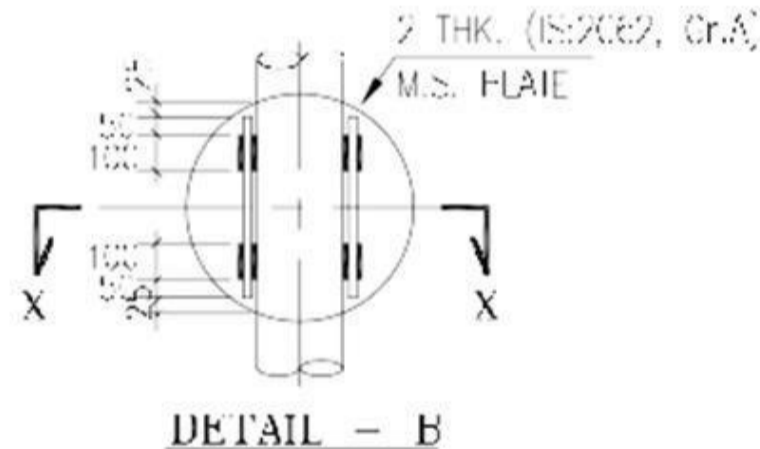
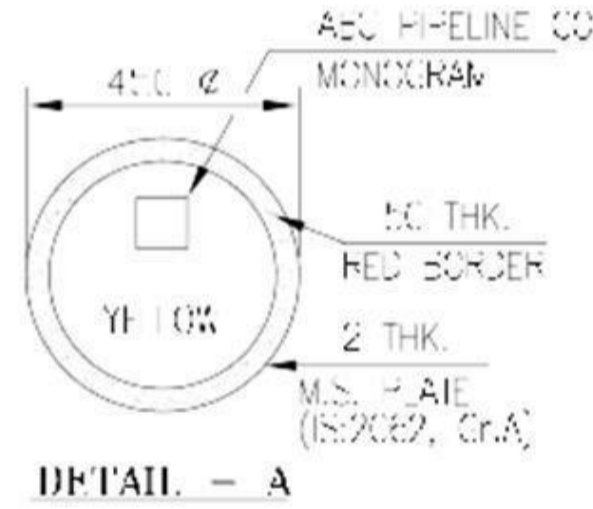
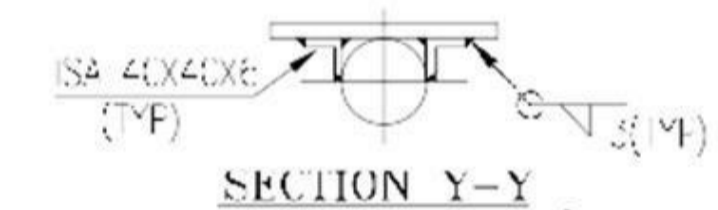
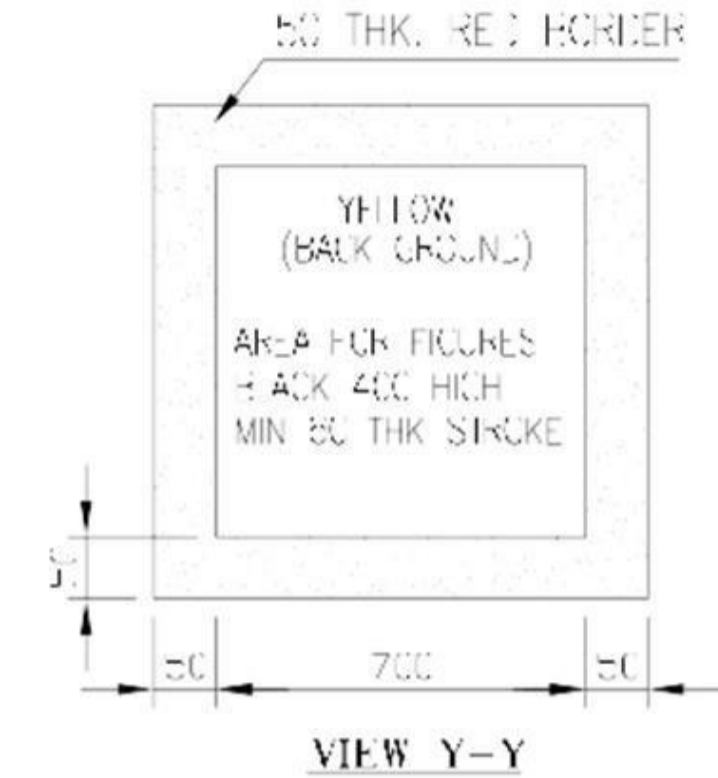
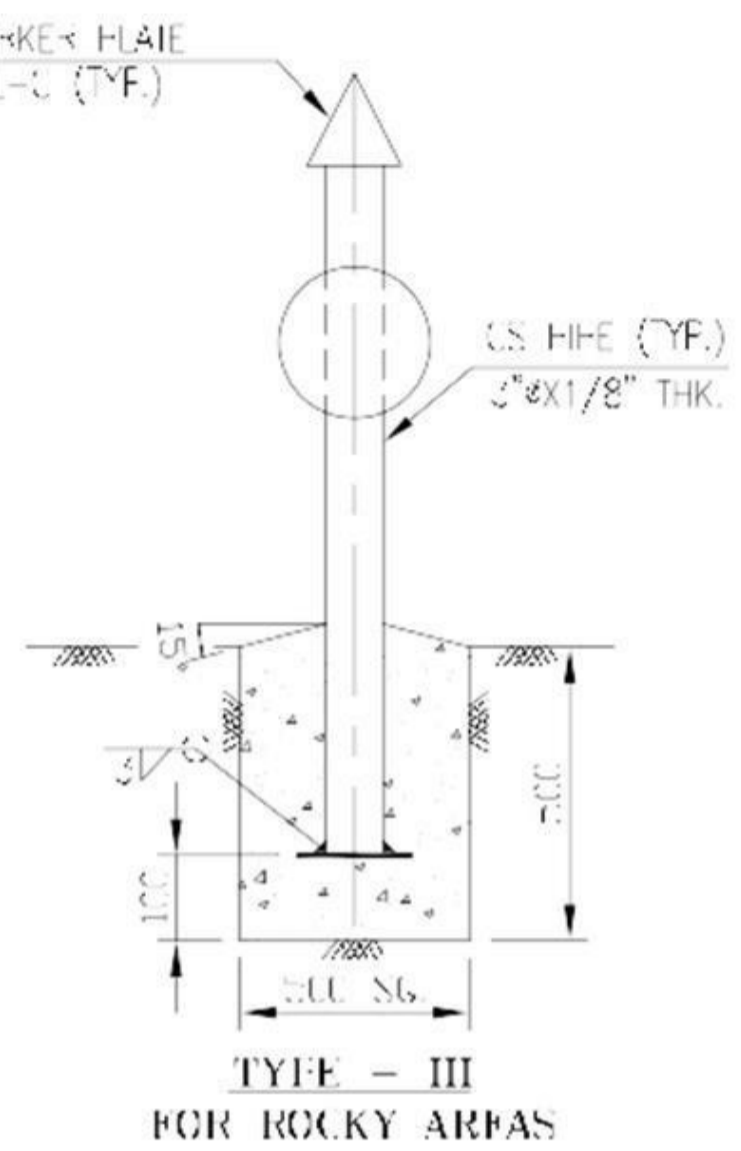
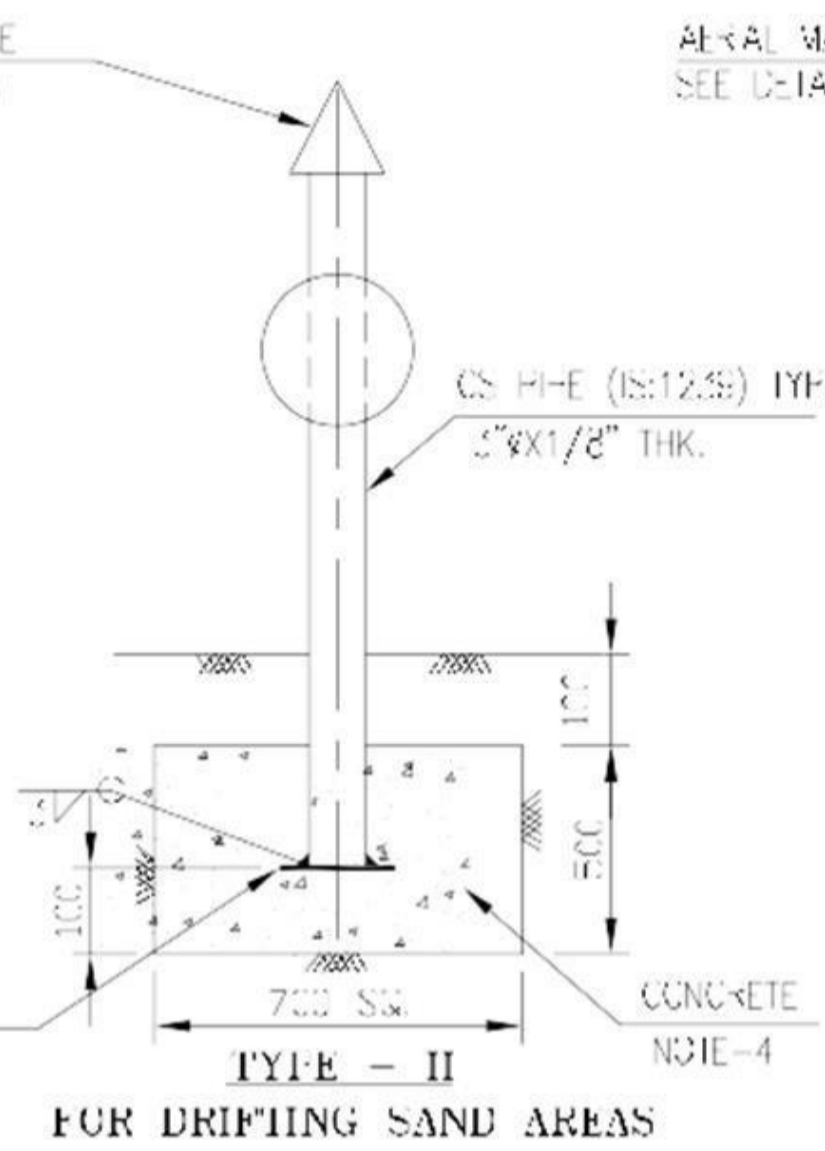
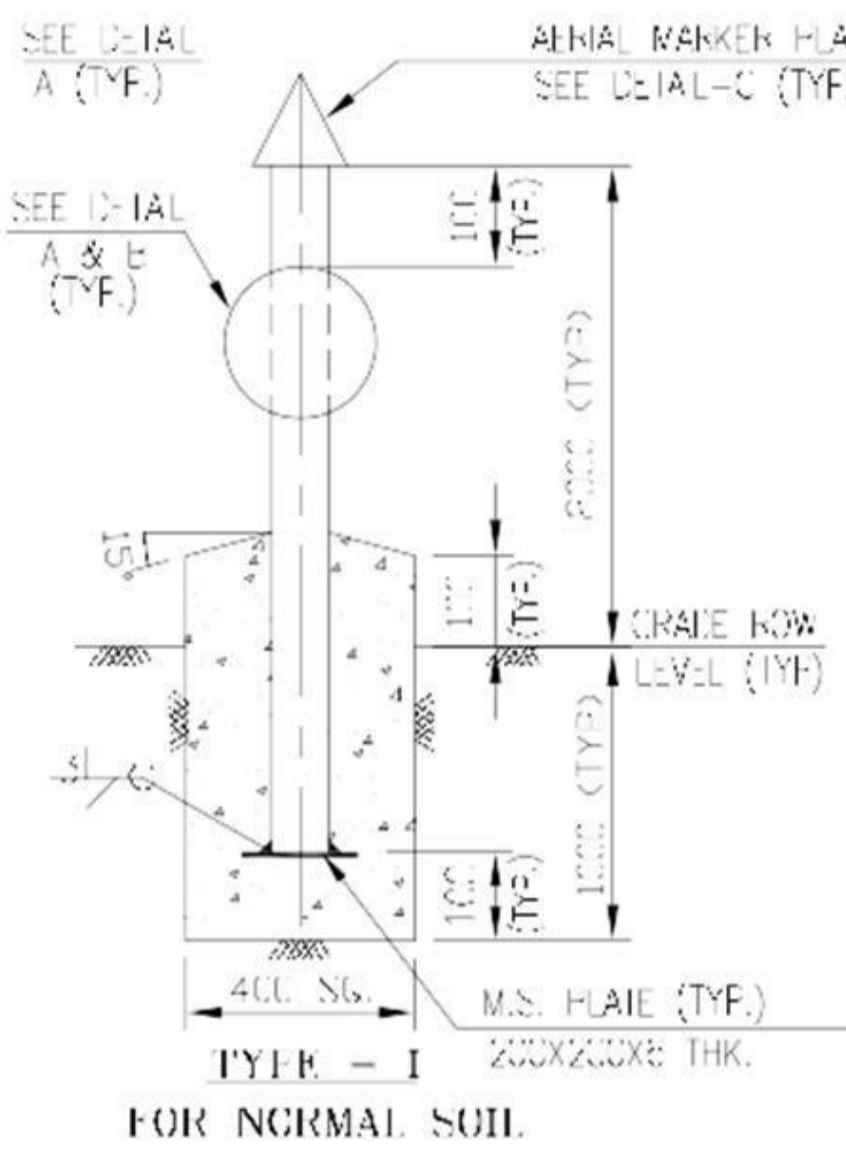
FOR TENDER PURPOSE

		REPL/Q7AU/0525/M/001/016 RESONANCE ENERGY PVT. LTD.	
SELLER LOCATION ADDRESS TRADE CHECKED VERIFIED APPROVED	OIL & GAS BTV TELHE BANGALURU DUMB SHALINI SURESH KUMAR	CNG & CITY GAS DISTRIBUTION PROJECT NAVIGABLE WAY WATER PIPELINE CROSSING WARNING SIGN.	
REVNO DATE ZONE DESCRIPTION BY VERIFIED	REVISION	SCALE : 1:1 DATE : 08.12.2016 UTM INU MEC/Q7AU/05/25/M/001/016	SHEET 1 OF 1 REV 0

REV	INSI	CONCURRED BY
SEC		


REVNO	DATE	ZONE	DESCRIPTION	BY	VERIFIED
			REVISION		

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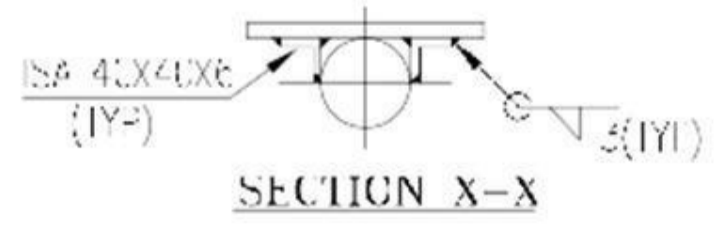
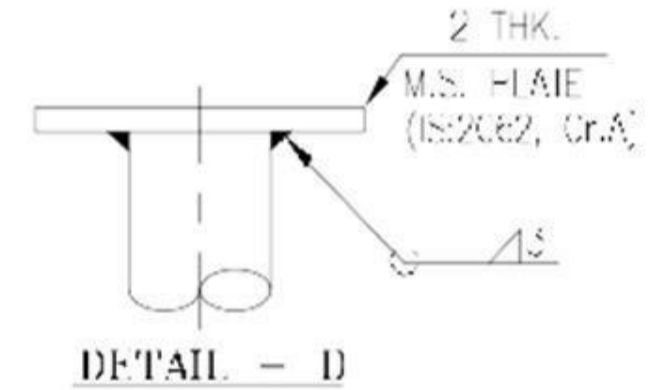
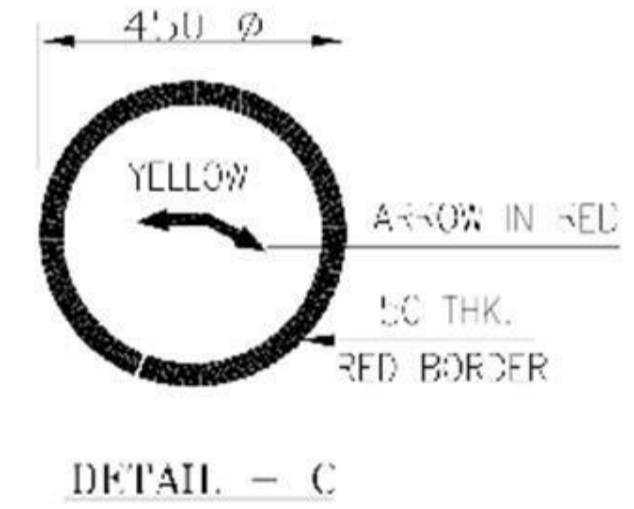
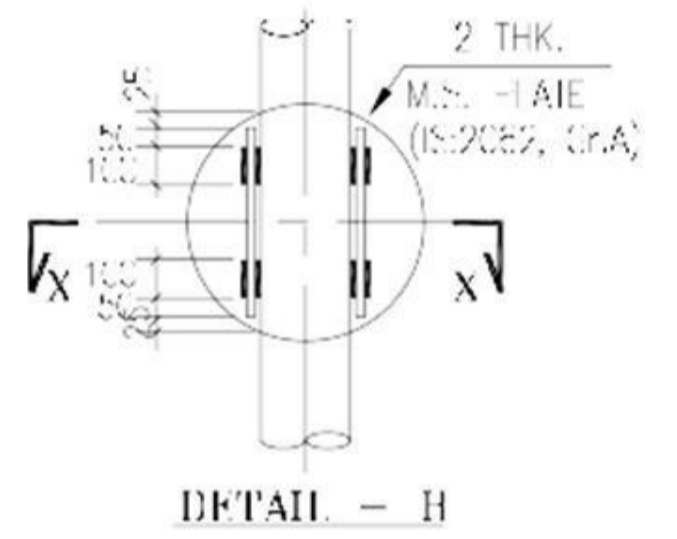
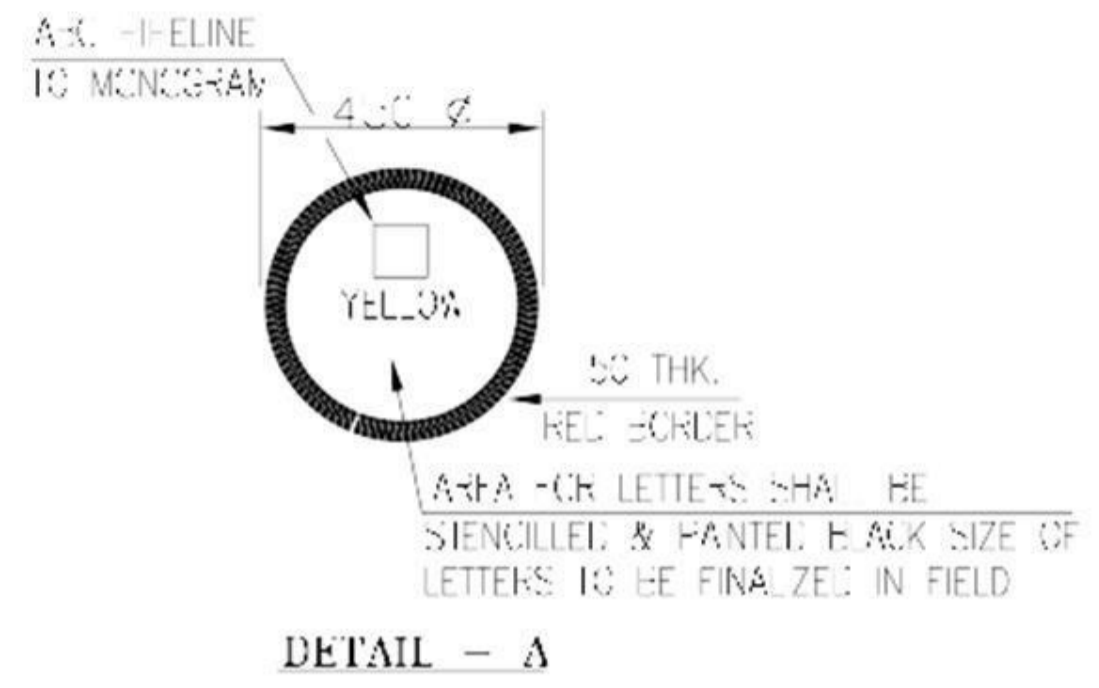
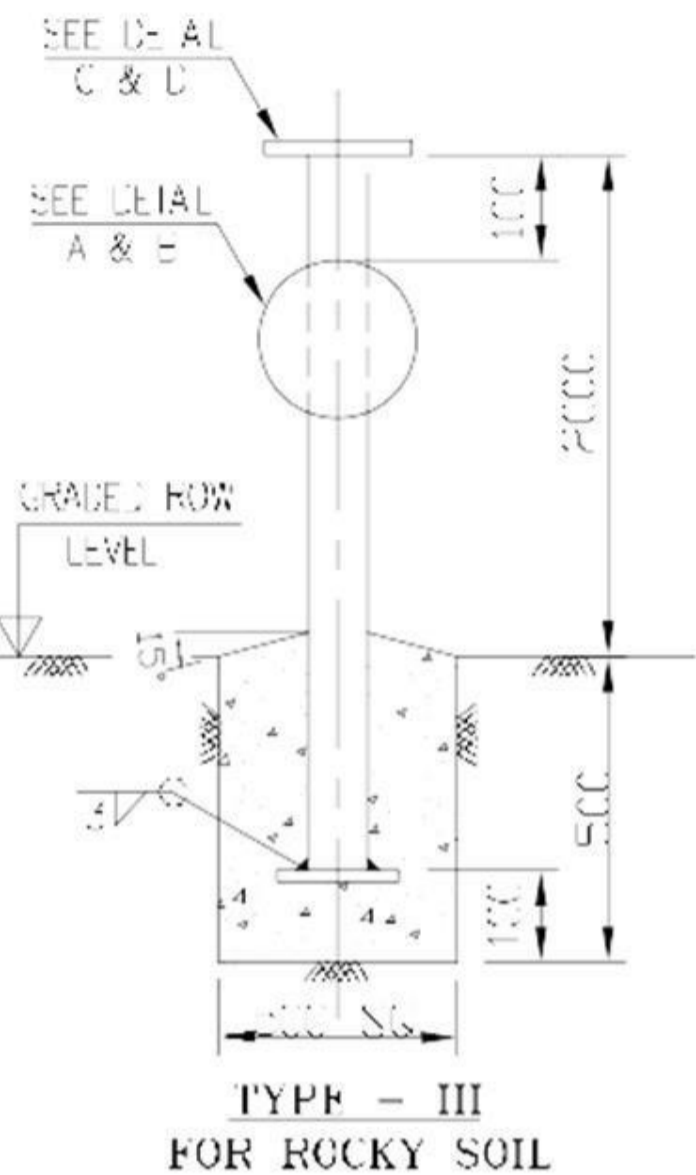
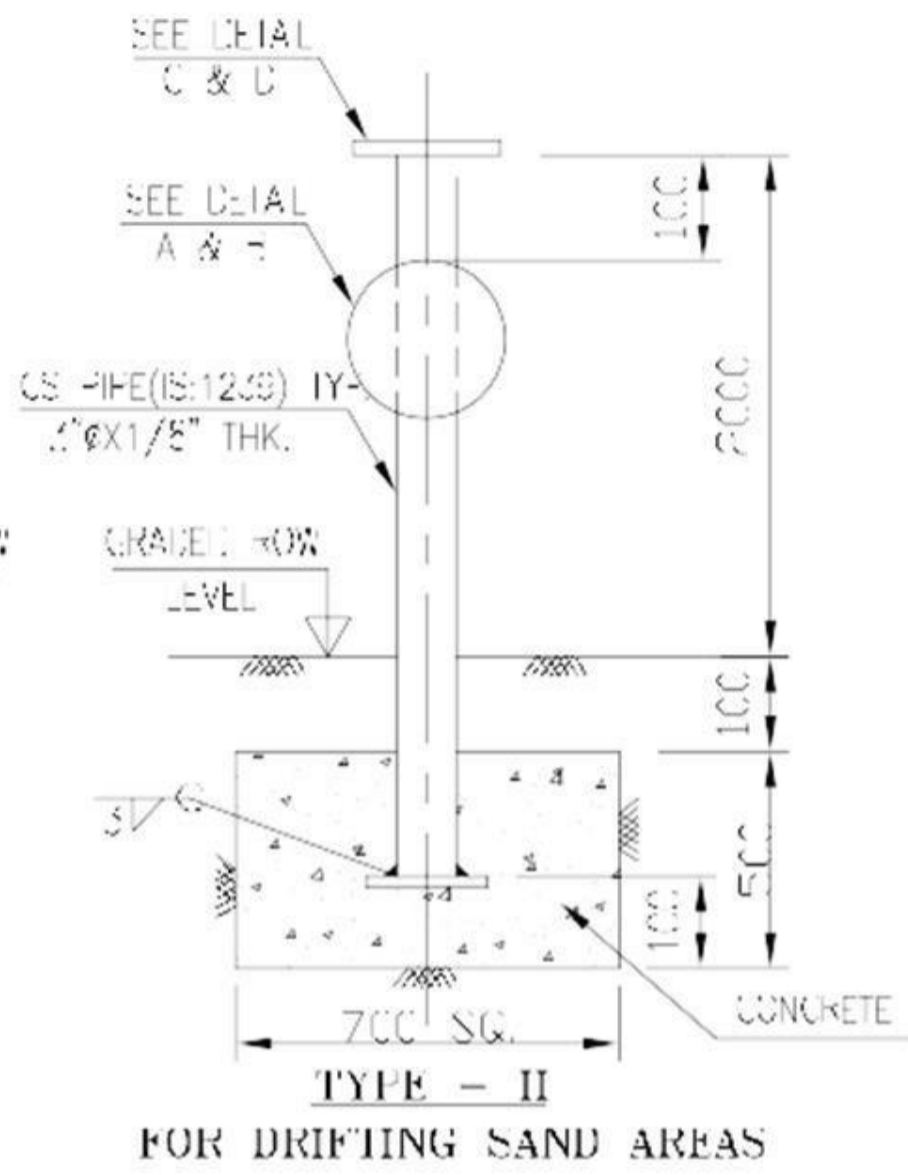
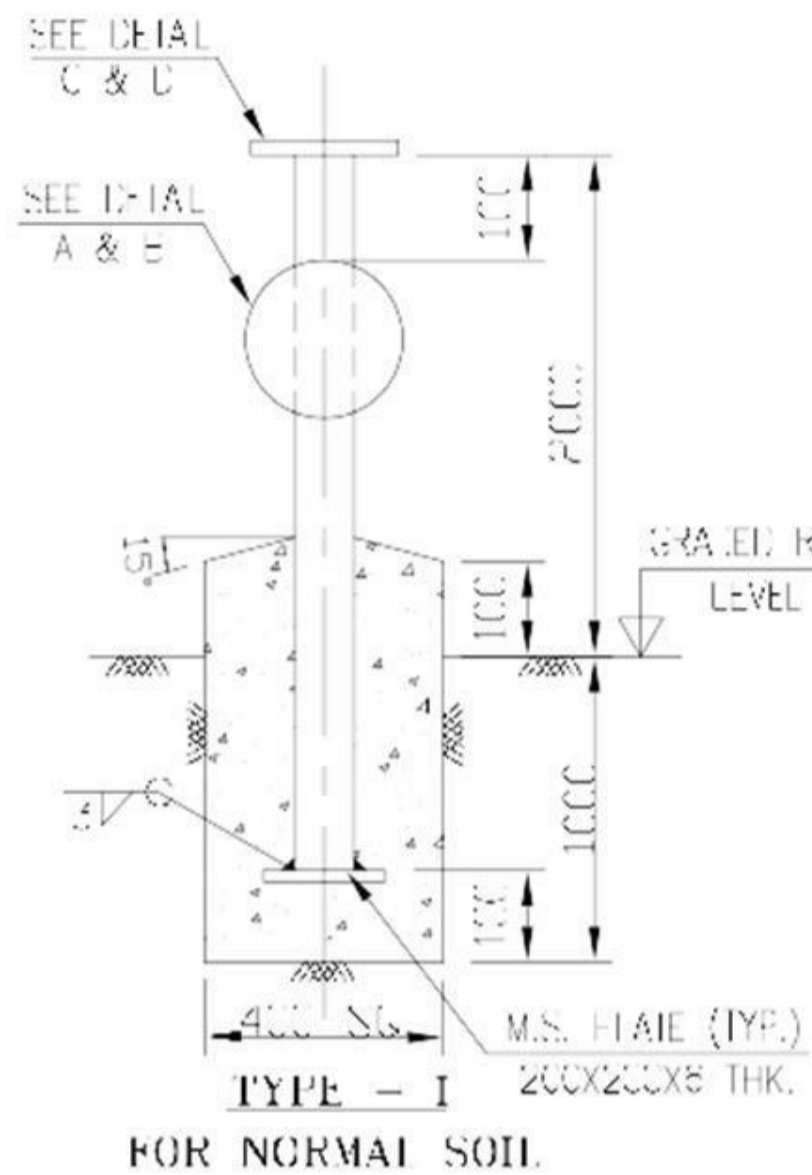


- NOTES:-**
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
  2. SCHEME OF PAINTING AND COLOURING.
    - a) UNDERGROUND STEEL STRUCTURE (EXCEPT THAT EMBEDDED IN CONCRETE) COAT (AN EPOXY MIN 300 MICRON THK.
    - b) ABOVEGROUND STEEL STRUCTURE - ONE COAT OF PRIMER & TWO COATS OF SPECIFIED COLOUR PAINT. (50 MICRONS/ COAT)
    - c) FIGURES SHALL BE STENCILLED ON BOTH SIDES OF THE POSTS IN BLACK.
    - d) COLOUR SCHEME FOR AEC PIPELINE CO MONOGRAM SHALL BE AS DIRECTED BY COMPANY.
    - e) POST SHALL BE PAINTED WITH 250 mm WIDE ALTERNATE BANDS OF BLACK AND WHITE PAINT.
    - f) ALL OTHER ABOVE GROUND STEEL SHALL BE PAINTED YELLOW.
  3. LOCATION
    - a) AERIAL MARKER SHALL BE INSTALLED AT EVERY 5 KILOMETER AS PER REQUIREMENTS OF CONTRACT AND AS DIRECTED BY COMPANY
    - b) COMPANY NAME PLATES SHALL FACE THE PIPELINE.
    - c) AERIAL MARKER SHALL BE 3000 mm TO THE LEFT OF THE PIPE CENTER LINE VIEWING TOWARDS THE DIRECTION OF FLOW.
  4. THE FOUNDATION SHALL BE MADE OF CONCRETE M20.
  5. THE HEIGHT OF AERIAL MARKER MAY BE VARIED TO SUIT FIELD REQUIREMENTS.

**FOR TENDER PURPOSE**

		REPL/Q7AU/05/25/M/001/017 <b>RESONANCE ENERGY PVT. LTD.</b>	
SECTION: OIL & GAS LOCATION: KTM TELHE AREA: KRISHNA	CNG & CITY GAS DISTRIBUTION PROJECT		
TEAM: GMR CHECKED BY: SHALINI VERIFIED:	<b>AERIAL MARKER</b>		
APPROVED:	DATE: 08/12/2016	SHEET NO: 01 SHEET OF: 1	REV: 0

REV	DATE	ZONE	DESCRIPTION	BY	VERIFIED



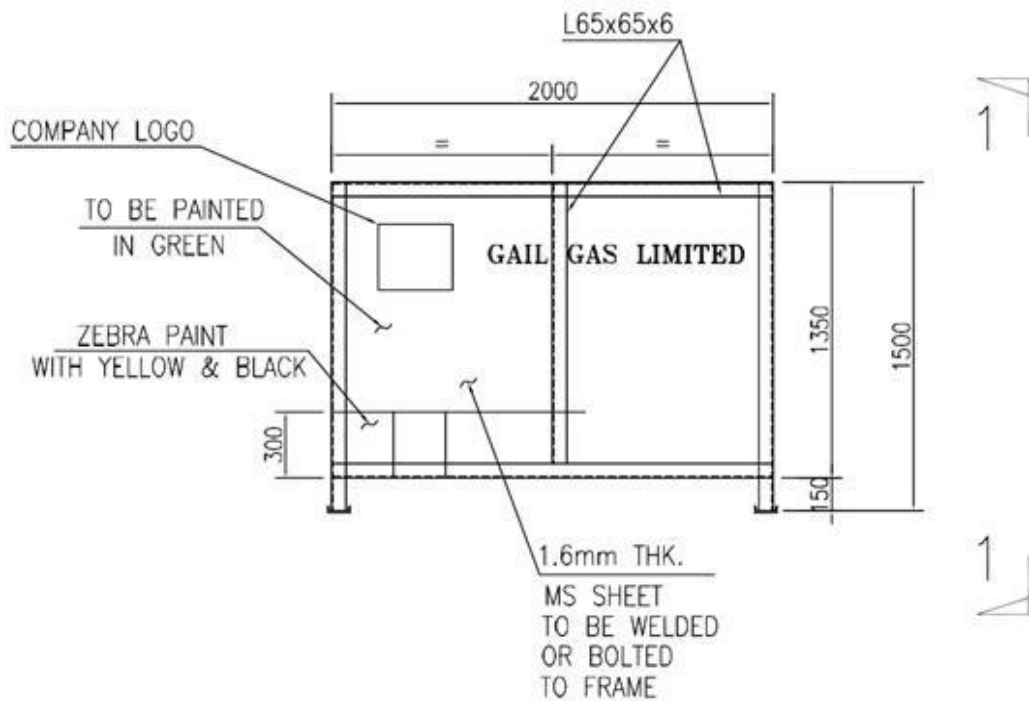
- NOTES:-**
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
  2. SCHEME OF PAINTING AND COLOURING.
    - a) UNDERGROUND STEEL STRUCTURE (EXCEPT THAT EMBEDDED IN CONCRETE) COAT WITH EPOXY MIN. 300 MICRON THK.
    - b) ABOVEGROUND STEEL STRUCTURE - ONE COAT OF PRIMER & TWO COAT OF SPECIFIED COLOUR PAINT.
    - c) COLOUR SCHEME FOR A.C. HI-ELINE TO MONOGRAM SHALL BE AS DIRECTED BY COMPANY.
    - d) POST SHALL BE PAINTED WITH 250 WIDE ALTERNATE BANDS OF BLACK AND WHITE PAINT.
    - e) ALL OTHER ABOVE GROUND STEEL SHALL BE PAINTED YELLOW.
  3. LOCATION
    - a) DIRECTION MARKERS SHALL BE INSTALLED AT LOCATION AS PER SPECIFICATION, AS INDICATED IN APPROVED DRAWING AND AS DIRECTED BY COMPANY.
    - b) COMPANY NAME PLATES SHALL FACE THE HI-ELINE.
    - c) DIRECTION MARKER SHALL BE 3000 MM TO THE LEFT OF THE PIPE CENTER LINE VIEWING TOWARDS THE DIRECTION OF FLOW AND AS DIRECTED BY COMPANY.
  4. THE FOUNDATION SHALL BE MADE OF CONCRETE MIXC.
  5. THE HEIGHT OF DIRECTION MARKER MAY BE VARIED TO SUIT FIELD REQUIREMENTS.
  6. DIRECTION MARKER SHALL SHOW THE CHANGE IN DIRECTION OF P/L ALIGNMENT.

FOR TENDER PURPOSE

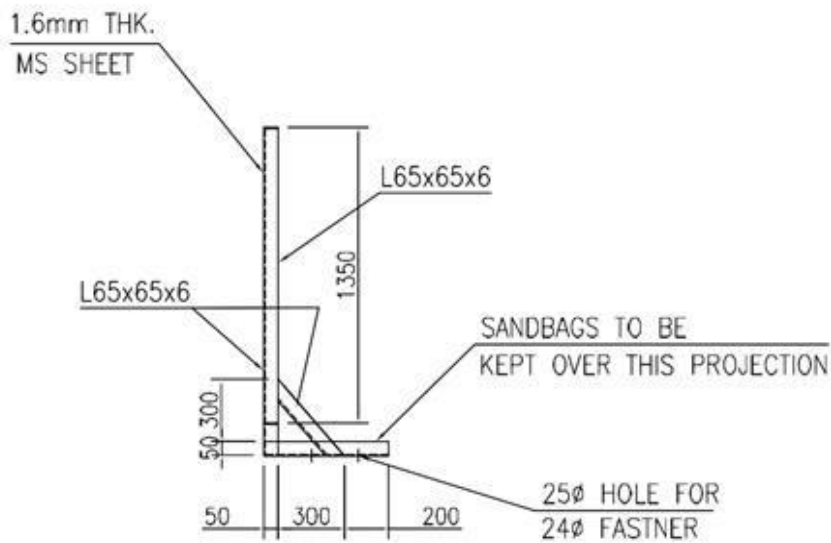
		REPL/Q7AU/05/25/M/001/018 RESONANCE ENERGY PVT. LTD.	
MULTIPLE LOCATION ADDRESS TRACH CHECKED BY VERIFIED APPROVED		OIL & GAS KRODHA GUNL SHALINI SIO DATE: 08.12.2016	
UNG & CNG GAS DISTRIBUTION PROJECT DIRECTION MARKER		SCALE: 1:10 SHEET NO. 1 OF 1 REV: 0	

REV	INSI	CONCURRED BY	REVNO	DATE	ZONE	DESCRIPTION	BY	VERIFY

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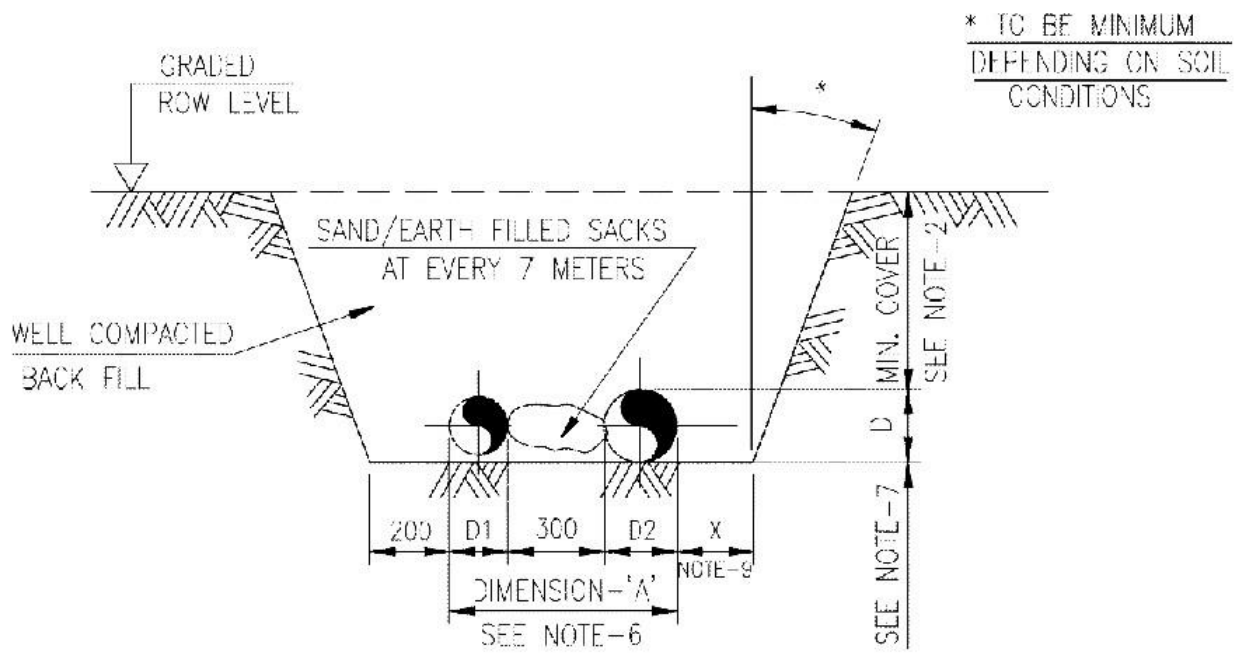


**ELEVATION SHOWING TEMPORARY BARRICADE**



**SECTION 1-1**

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
REVISIONS						REFERENCES	
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SECTION			CIVIL DELHI			CNG & CITY GAS DISTRIBUTION PROJECT	
NAME	SIG.	DATE	CNG & CITY GAS DISTRIBUTION PROJECT			REPL/Q7AU/05/25/M/001/029	
DSGN	KRISHNA		CNG & CITY GAS DISTRIBUTION PROJECT			RESONANCE ENERGY PVT. LTD.	
DRWN	SUNIL		TEMPORARY BARRICADE			SCALE :- NTS	
CHKD. & VERIFIED	SHALINI					DRG. NO. MEC/Q7AU/05/25/M/001/029	
APPROVED						REV 0	



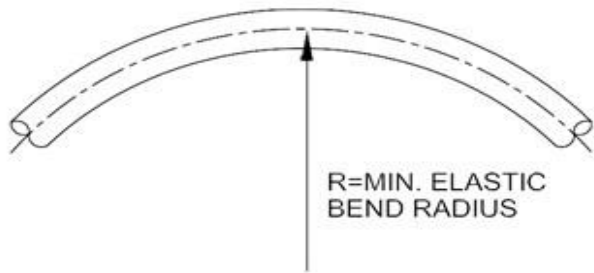
**TRENCH IN NORMAL SOIL / CONSOLIDATED ROCK**

**NOTES:-**

1. ALL DIMENSIONS ARE IN MM. UNLESS SPECIFIED OTHERWISE.
2. FOR ALL PIPELINES TO BE CONSTRUCTED IN THE LAND UNDER JURISDICTION OF GOVT. OF INDIA THE MINIMUM COVER ADOPTED SHALL BE 1000 MM. IN ACCORDANCE WITH GOVT. OF INDIA PETROLEUM PIPELINES (ACQUISITION OF ROW IN LAND) ACT NO. 50,1962 AND AMENDMENT ACT NO. 13,1977. ANY EXTRA REQUIREMENT SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.
3. THE MINIMUM COVER SHALL BE SUBJECTED TO APPROVAL OF CONCERNED AUTHORITIES.
4. THE MINIMUM COVER IS FOR STRAIGHT PIPE RUNS, EXTRA COVER REQUIREMENTS TO BE ESTABLISHED AT ALL OVER BENDS, SAG BENDS AND HORIZONTAL BENDS.
5. FOR MINIMUM COVER REQUIREMENT AT PIPELINES CROSSING ROADS, RAILWAY TRACKS, RVLRS, MARSHY AREAS ETC, REFER RELEVANT STANDARDS.
6. DIMENSION 'A' FOR MORE THAN TWO PIPELINES IN SAME TRENCH SHALL BE DETERMINED USING FORMULA  $A=(D1+D2+....Dn)+(n-1)X300$  WHERE D1,D2,....Dn ARE DIAMETER OF PIPELINES AND 'n' IS NUMBER OF PIPELINES IN SAME TRENCH
7. DIMENSION 'D' SHALL BE LARGEST OF DIMENSIONS D1, D2, ....Dn.
8. CLEAR SPACING BETWEEN PIPELINES SHOWN IS ONLY FOR STRAIGHT LENGTHS. SPACING BETWEEN PIPELINES AT BENDS, RAILWAY CROSSINGS, ROAD CROSSINGS, CHANEL CROSSING, OTHER WATER WAY CROSSING AND MARSHY LAND ETC SHALL BE AS PER APPROVED DRAWINGS/ SPECIFICATION.
9. FOR P/L LAYING-
  - a) WITH OFC : X=200
  - b) WITHOUT OFC : X=200

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	
			REVISIONS			REFERENCES
						DRG. NO.
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SECTION: OIL & GAS						
ISGN	SS	CHKD	SK			
DRWN	SUNIL					
APPROVED		(AK. SARKAR)				
			<b>TYPICAL TRENCH DIMENSIONS FOR TWO OR MORE PIPELINES IN COMMON TRENCH (CITY GAS DISTRIBUTION)</b>		 <b>REPL/Q7AU/05/21/001A/003</b> <b>RESONANCE ENERGY PVT. LTD.</b>	
			SCALE : NTS		(SHEET 1 OF 1)	
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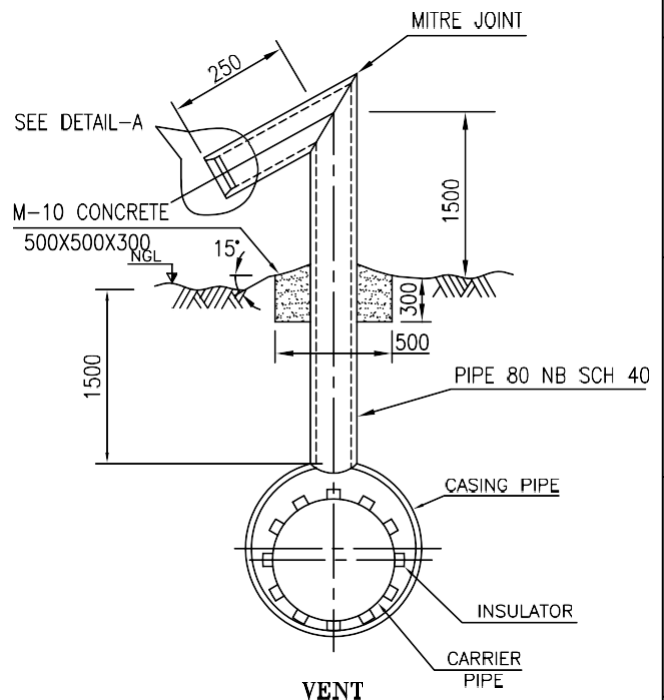
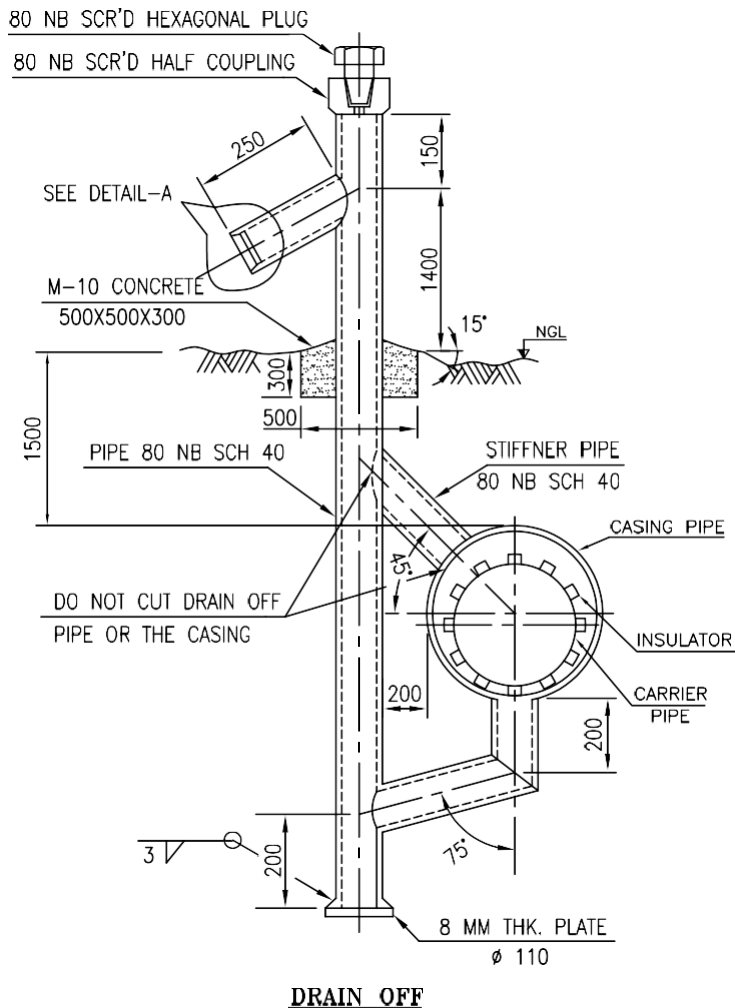
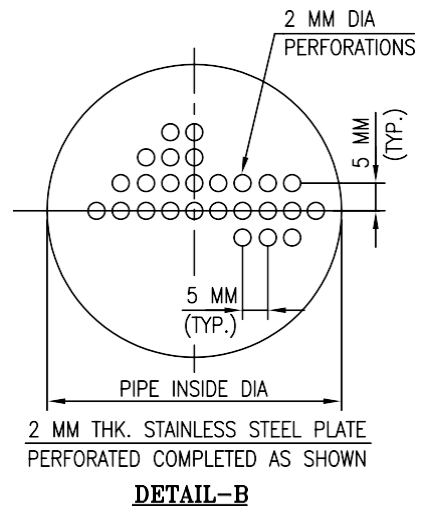
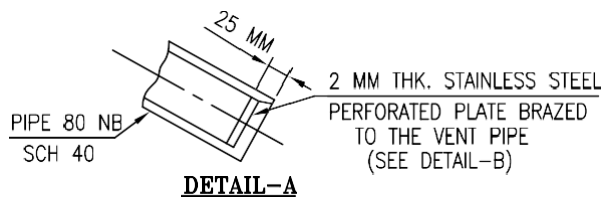


MODULUS OF ELASTICITY FOR  
PIPE MATERIAL =  $2.059 \times 10^6 \text{ Kg/cm}^2$

**TABLE FOR MINIMUM ELASTIC BEND RADIUS FOR  
DIFFERENT PIPE DIAMETER AND WALL THICKNESS**

SIZE (INCH)/ W.T. (mm)	PIPE MATERIAL	MIN. ELASTIC BEND RADIUS (m)
36"/13.2	API 5L Gr. X-70	1500
36"/15.9	API 5L Gr. X-70	1100
36"/19.1	API 5L Gr. X-70	900
20"/7.9	API 5L Gr. X-70	800
20"/8.7	API 5L Gr. X-70	700
20"/11.1	API 5L Gr. X-70	500
20"/14.3	API 5L Gr. X-70	500

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.			
REVISIONS										
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SECTION: OIL & GAS (LDP)		<b>MINIMUM ELASTIC BEND RADIUS FOR PIPE</b>			 <b>REPL/TYP/05/21/001A/009</b> <b>RESONANCE ENERGY PVT. LTD.</b>	SCALE : NTS				
DSGN	NAME					DATE	CHKD	DATE	(SHEET 1 OF 1)	REV
DRWN	SUNIL						SK			0
APPROVED						(A.K. JOHRI)				



**NOTES:-**

1. ALL DIMENSIONS ARE IN MM. UNLESS SPECIFIED OTHERWISE.
2. VENT AND DRAIN OFF TO FACE LEFT WHEN LOOKING IN DIRECTION OF FLOW AND SHALL BE PARALLEL TO CROSSING.
3. VENT AND DRAIN OFF PIPE SHALL BE API 5L Gr.B OR IS 1239.
4. PORTION OF VENT AND DRAIN OFF PIPES WHICH ARE UNDER GROUND OR WHICH MAY BE UNDER WATER TO BE COATED WITH COAL TAR EPOXY MIN. 300 MICRON THK. PAINTING FOR PORTION ABOVE GROUND/ WATER LEVEL SHALL BE AS PER STANDARD SPECIFICATION FOR SHOP AND FIELD PAINTING.
5. VENT PIPES MAY BE USED FOR MOUNTING WARNING SIGN.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
			REVISIONS				

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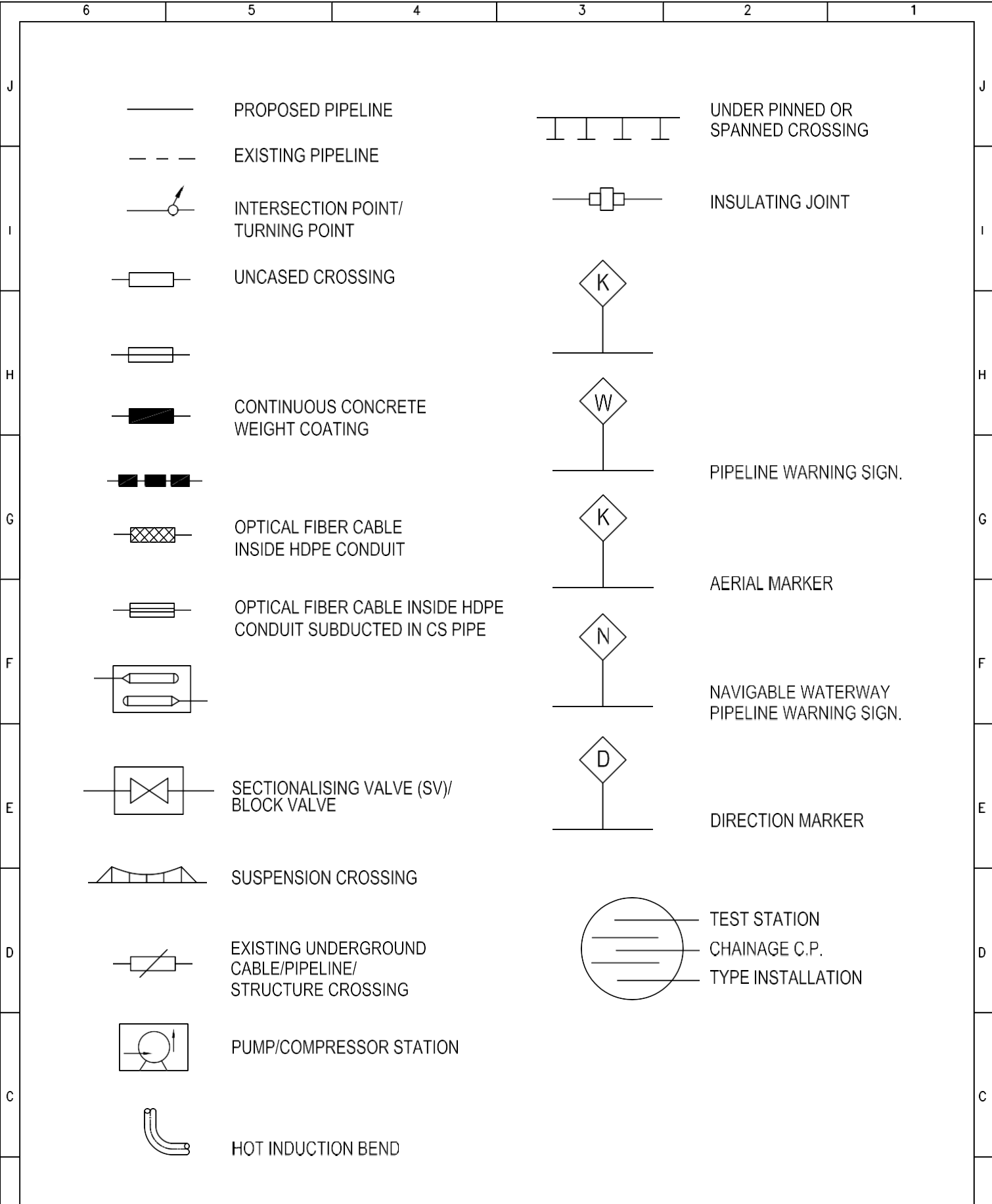
SECTION: OIL & GAS (LDP)				
NAME	DATE	CHKD	DATE	
DSGN	SS	SK		
DRWN	SUNIL			
APPROVED		(A.K. JOHRI)		


**DETAIL OF CASING VENT AND DRAIN OFF**



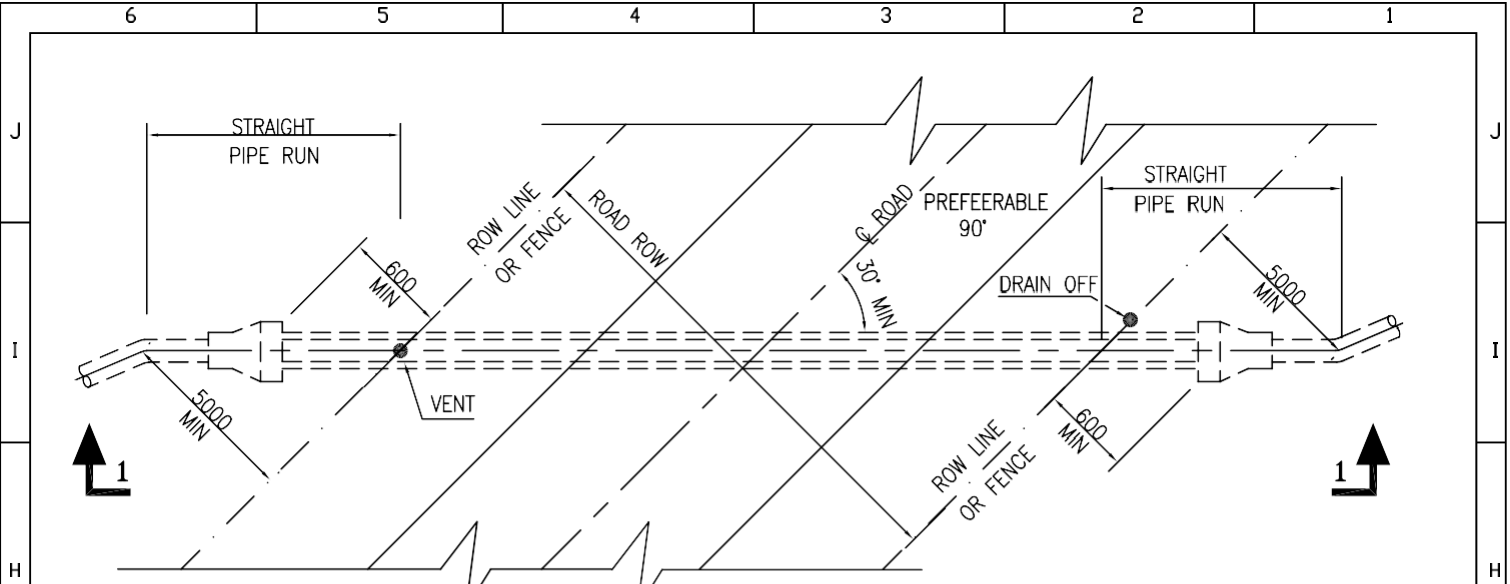
REPL/TYP/05/21/001A/010  
 RESONANCE ENERGY PVT. LTD.

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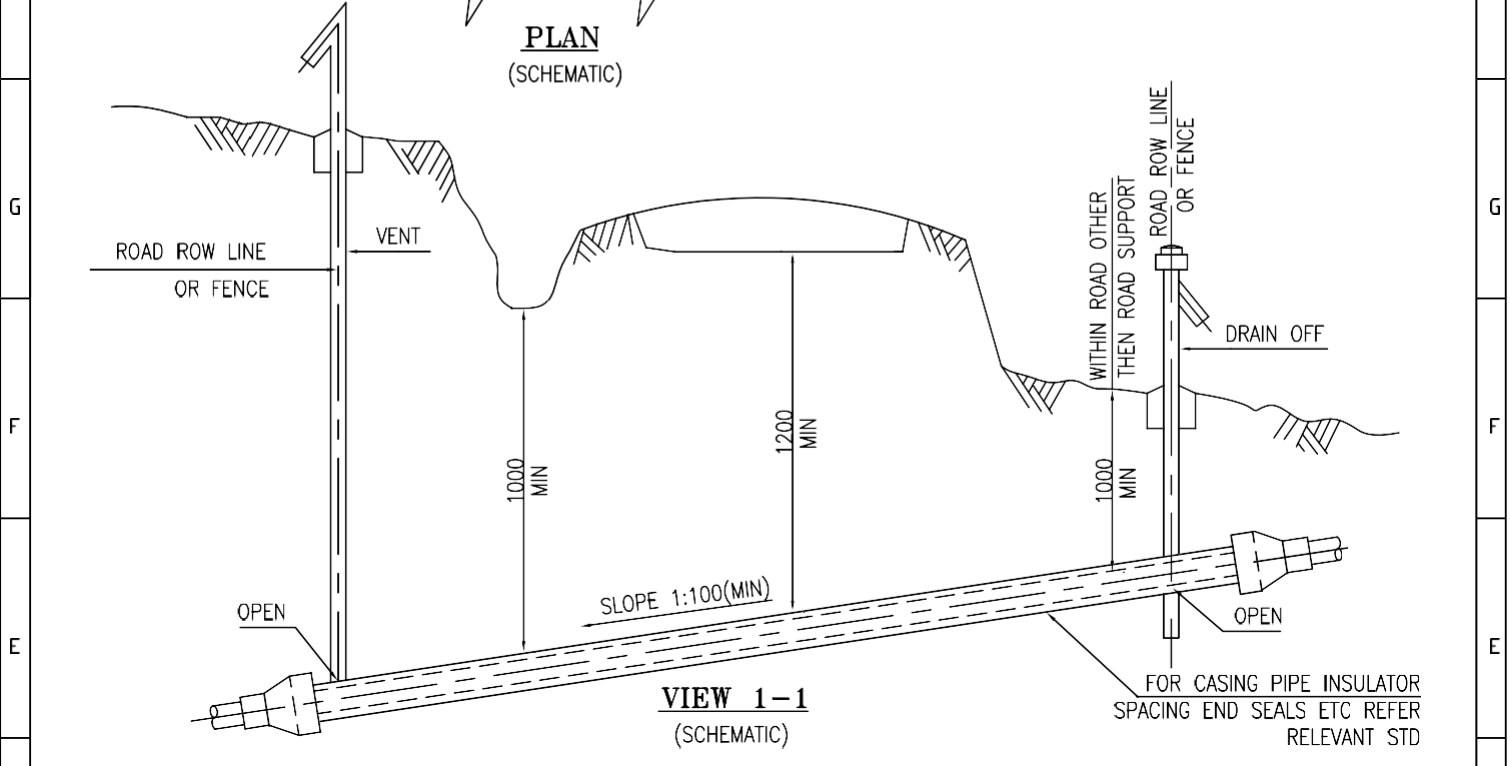


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REVISIONS						DRG. NO.			
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SECTION: OIL & GAS (LDP)		<p style="text-align: center;"><b>PIPELINE SYMBOLS</b></p>					REPL/TYP/05/21/M/001A/011		
NAME	DATE						CHKD	DATE	RESONANCE ENERGY PVT. LTD.
DSGN	SS						SK		
DRWN	SUNIL								
APPROVED		(A.K. JOHRI)				SCALE : NTS	(SHEET 1 OF 1)		
						REV	0		





**PLAN**  
(SCHEMATIC)



**VIEW 1-1**  
(SCHEMATIC)

**NOTES:-**

1. ALL DIMENSIONS ARE IN MM. UNLESS SPECIFIED OTHERWISE.
2. REFER API RP 1102 (LATEST EDITION) FOR OTHER DESIGN AND INSTALLATION REQUIREMENTS.
3. CASING PIPE DIAMETER SHALL BE MINIMUM THREE NOMINAL PIPE SIZES LARGER THAN CARRIER AS PER APPROVED DRG OF COMPETENT (RAILWAY) AUTHORITY.  
AT EACH CROSSING PIPELINE CROSSING WARNING SIGN SHALL BE INSTALLED ON EITHER SIDE OF CROSSING MAY BE USED FOR MOUNTING OF WARNING PLATE.  
CONTRACTOR SHALL VERIFY THE ACTUAL DIMENSIONS WITH RESPECT TO SURVEY DETAILS OF EACH CROSSING AND PREPARE DETAILED DRAWINGS FOR INDIVIDUAL CROSSING FOR EXECUTION AND SUBMIT TO CLIENT/CONSULTANT FOR APPROVAL BEFORE COMMENCEMENT OF CONSTRUCTION.
6. ALL PIPELINE JOINTS SHALL BE RADIOGRAPHED.
7. ELECTRICAL INSULATION BETWEEN CASING AND CARRIER PIPE SHALL BE CHECKED WITH A SUITABLE MEGGER.
8. AFTER INSTALLATION OF CASING AND CARRIER PIPES THE ROAD SHALL BE RESTORED TO THE SATISFACTION OF ROAD AUTHORITIES/ COMPANY.  
PIPELINE SECTION SHALL BE PRETESTED HYDROSTATICALLY SEPARATELY FROM THE MAIN AS REQUIRED BY ENGINEER INCHARGE OR AS PER THE DIRECTIONS OF THE CLIENT.
10. ANGLE OF INTERSECTION BETWEEN PIPELINE AND THE ROAD/ HIGHWAY SHALL BE AS BUT IN NO CASE LESS THAN 30°.

REV NO	DATE	ZON	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
REVISIONS							

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<b>SECTION:</b> OIL & GAS (LDP)				
NAME	DATE	CHKD	DATE	
DSGN	SS	SK		
DRWN	SUNIL			
APPROVED		(A.K. JOHRI)		

**PIPELINE ROAD/ HIGHWAY  
CASED CROSSING**

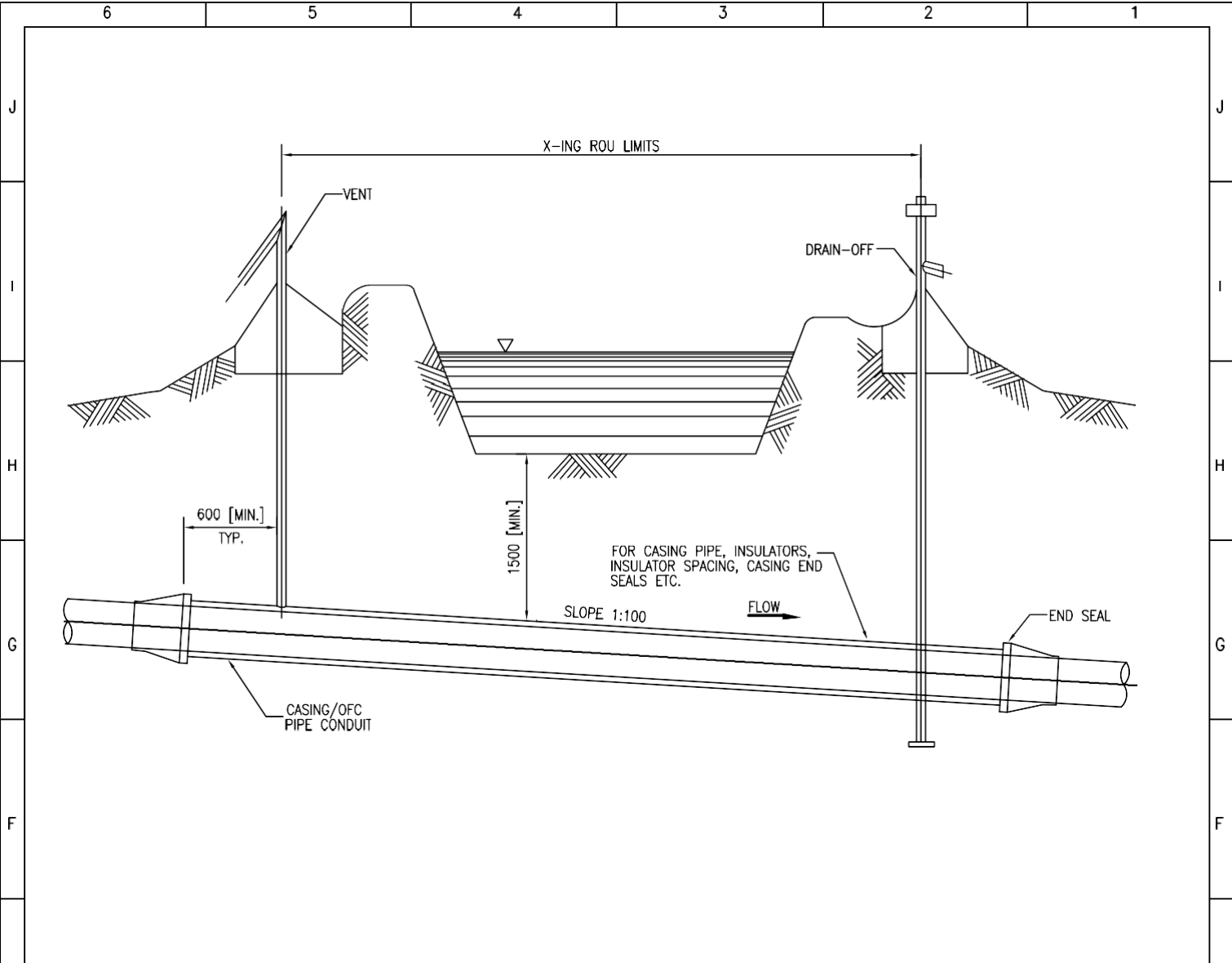


REPL/TYP/05/21/05/001  
RESONANCE ENERGY PVT. LTD.

SCALE : NTS	(SHEET 1 OF 1)	REV
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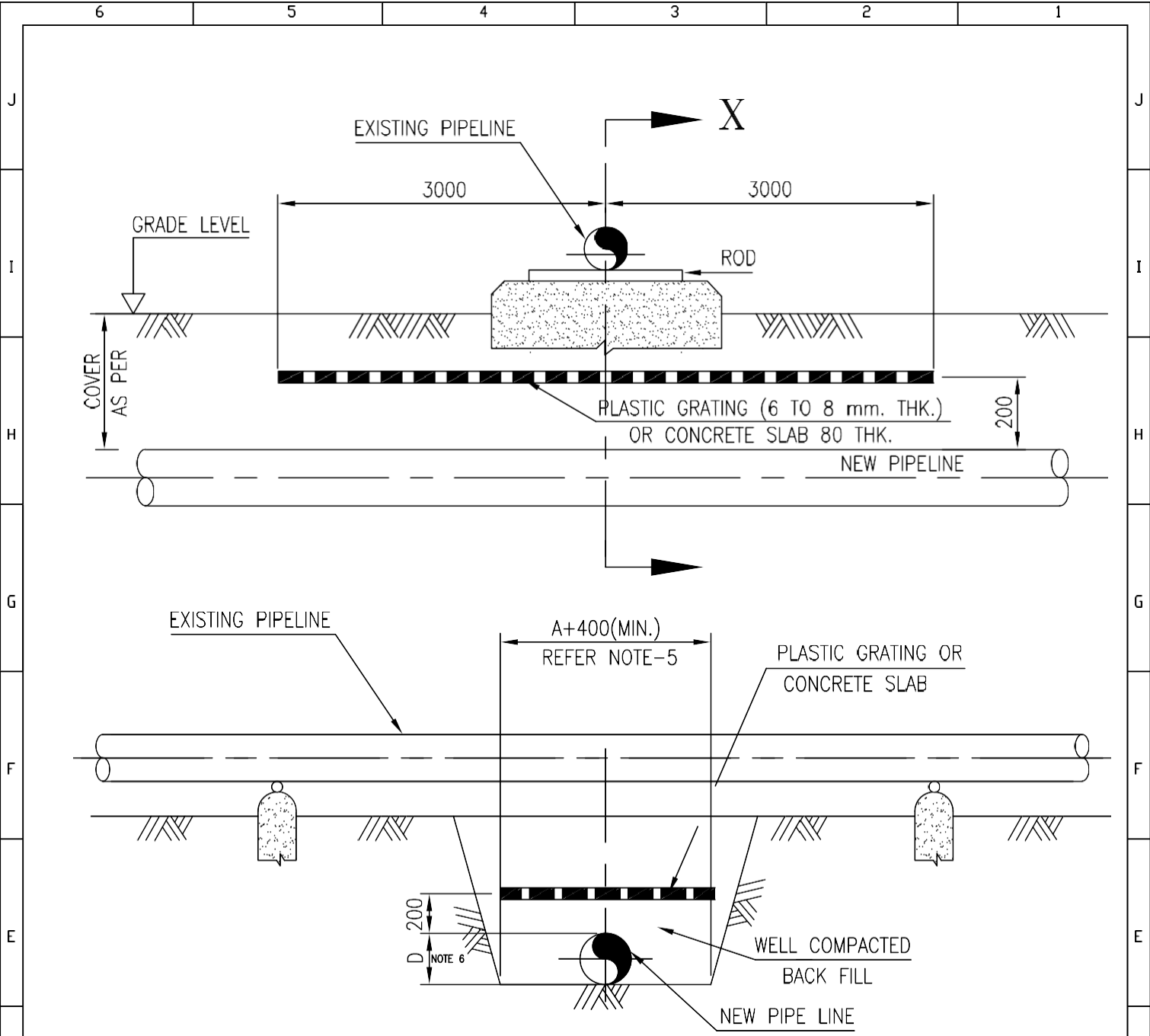


**NOTES:-**

1. ALL DIMENSIONS ARE IN MM. UNLESS SPECIFIED OTHERWISE.
2. THE NUMBER OF SIGNS SHALL BE
  - (I). 1 [ONE] FOR 15 M
  - (II). 2 [TWO] FOR CROSSING ABOVE 15 M WIDE.
3. FOR SYMBOLS, DIMENSIONS, DETAILS, ETC. REFER RELEVANT SPECIFICATION/STANDARDS. ELECTRIC INSULATION BETWEEN CASING AND CARRIER SUITABLE MEGGER.
5. AFTER INSULATION OF CASING AND CARRIER PIPES, THE CANAL SHALL BE RESTORED TO THE SATISFACTION OF THE CONCERNED AUTHORITIES/COMPANY. GRADE,
7. CONTRACTOR SHALL VERIFY THE ACTUAL DIMENSIONS WITH RESPECT TO SURVEY DETAILS OF EACH CANAL CROSSED AND PREPARE DETAILED DRAWINGS FOR COMPANY'S/CONCERNED AUTHORITY'S APPROVAL BEFORE COMMENCEMENT OF CONSTRUCTION.
8. PIPELINE SECTION SHALL BE PRE-TESTED HYDROSTATICALLY, SEPARATELY FROM THE MAIN LINE TESTING WHEN REQUIRED BY THE CONCERNED AUTHORITIES AND/ OR AS DIRECTED BY THE COMPANY REPRESENTATIVE.
9. SEPARATE CASING PIPE SHALL BE INSTALLED FOR OFC AT MINIMUM DISTANCE FROM CASING FOR CARRIER PIPE, IF SPECIFIED.
10. JACKING/BORE TECHNIQUE SHALL BE USED FOR THE CROSSING.
11. RADIOGRAPHED.
12. HIGHER THICKNESS CARRIER PIPE [IF REQUIRED] SHALL BE PROVIDED FOR THE CROSSING, EXTENDING UPTO A MINIMUM DISTANCE OF 5.0 M ON EITHER SIDE OF THE X-ING ROU LIMITS.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD			
			REVISIONS			DRG. NO.		
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SECTION: OIL & GAS (LDP)		<b>TYPICAL LINED CANAL CASED CROSSING DETAIL</b>			 <b>REPL/TYP/05/21/05/004</b> <b>RESONANCE ENERGY PVT. LTD.</b>			
NAME	DATE						CHKD	DATE
DSGN	SS						SK	
DRWN	SUNIL							
APPROVED		(A.K. JOHRI)			SCALE : NTS			
					(SHEET 1 OF 1)			
					REV	0		



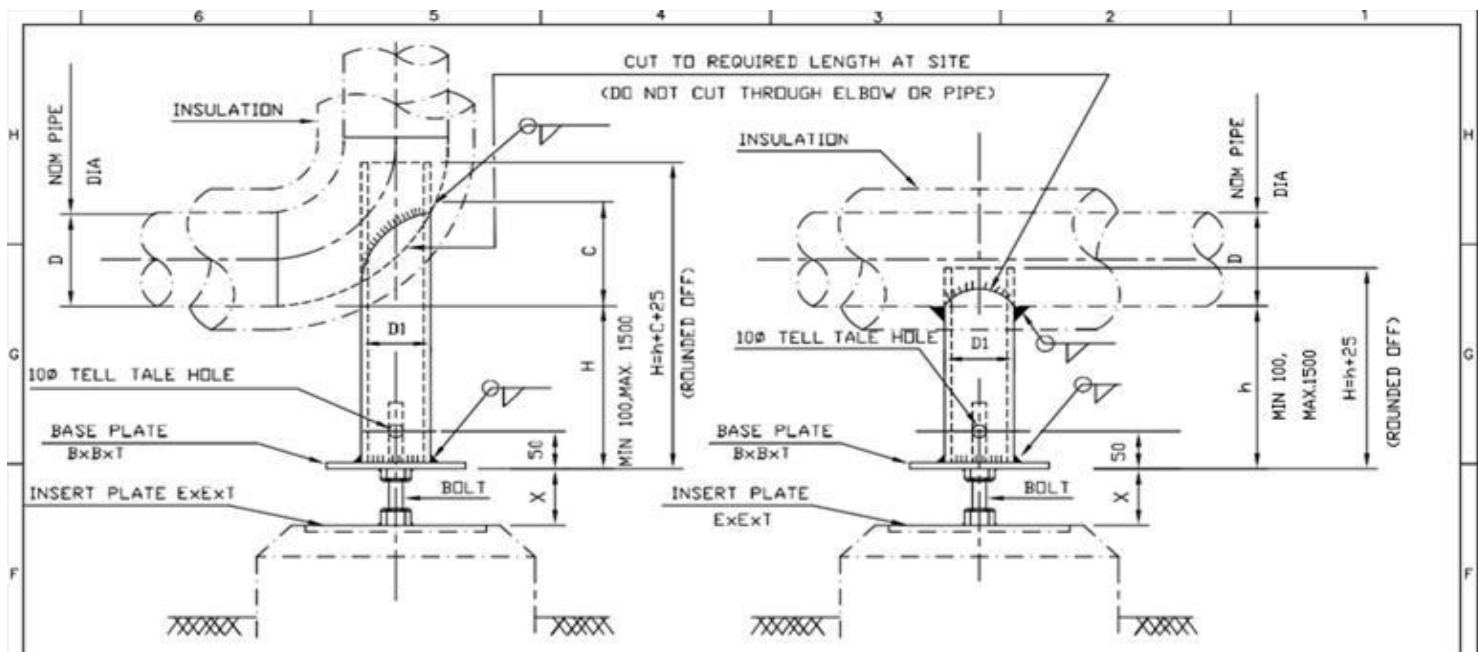


**SECTION X-X**

**NOTES:-**

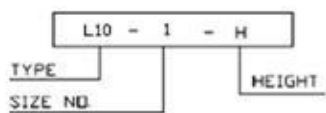
1. ALL DIMENSIONS ARE IN MM. UNLESS SPECIFIED OTHERWISE.
2. A MODIFIED PIPELINE WARNING SIGN SHALL BE INSTALLED WHERE THE PIPELINE CROSSES AN EXISTING PIPELINE CARRYING HAZARDOUS FLUID.
3. PLASTIC GRATING OR CONCRETE SLAB NEED NOT BE PROVIDED BETWEEN AN EXISTING PIPELINE AND A NEW CASSED PIPELINE.
4. APPROVAL OF THE CROSSING MAY HAVE TO BE OBTAINED FROM CONCERNED AUTHORITIES.
5. DIMENSION 'A' SHALL BE CALCULATED BY THE FORMULA  $A = (D_1 + D_2 + \dots + D_n) + (n-1) \times 300$ .  
 'D' IS THE DIAMETER IN TRENCH AND 'n' IS NUMBER OF PIPES IN SAME TRENCH.  
 THE PIPES IN TRENCH IS: 456 / PLASTIC

REV N	DATE	ZON	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.			
			REVISIONS							
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<b>SECTION:</b> OIL & GAS (LDP)					<b>REPL/TYP/05/21/05/005</b> <b>RESONANCE ENERGY PVT. LTD.</b>			<b>EXISTING PIPELINE ON SLEEPER CROSSING</b>		
	NAME	DATE	CHKD	DATE						
DSGN	SS		SK							
DRWN	SUNIL									
APPROVED	(A.K. JOHRI)									
					SCALE : NTS			(SHEET 1 OF 1)		REV
					DRG.					0

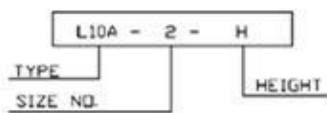


**NOTES**

1. IN CASE SIZE AND/OR SCH. OF SUPPORT PIPE (D1) LISTED IN THE TABLE IS NOT AVAILABLE, USE NEXT HIGHER SIZE AND/ OR NEAREST EQUIVALENT THICKNESS AVAILABLE.
2. MATERIAL OF SUPPORT PIPE SAME AS MAIN PIPE SPEC. ALL PLATES CARBON STEEL.



**SYMBOL**

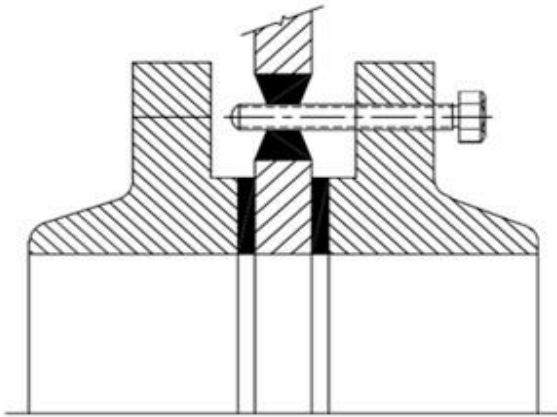


**SYMBOL**

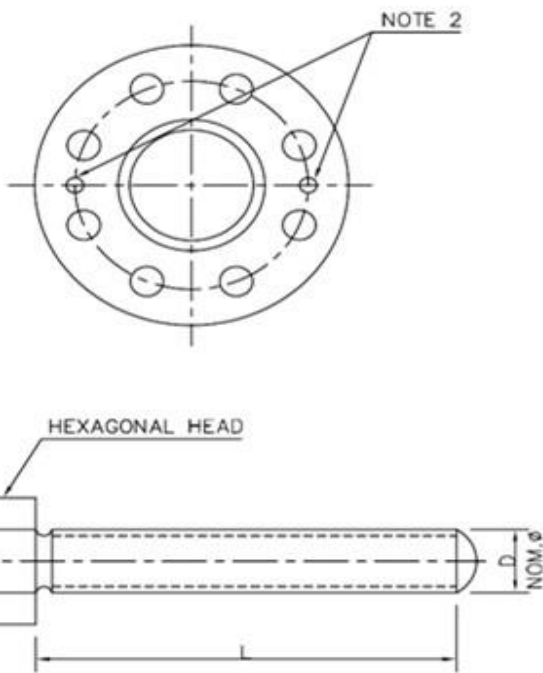
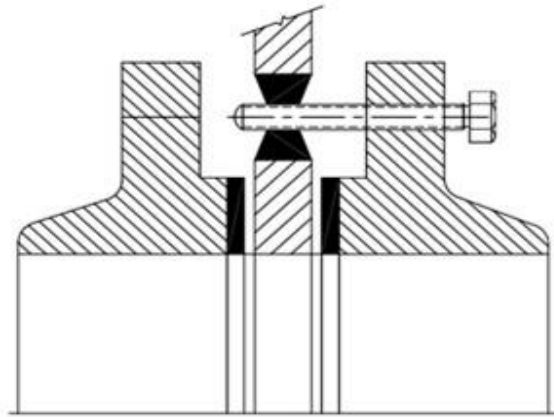
NO	D	B	T	C
1				
2	4'			
3	4'			
4				
5				
6				

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD					
			REVISIONS				REFERENCES			
						DRG. NO.				
SECTION: OIL & GAS (LDP)				<b>REPL/TYP/05/21/06/009</b> <b>RESONANCE ENERGY PVT. LTD.</b> SCALE : N.T.S. (SHEET 1 OF 1)						
DSGN	NAME	DATE	CHKD					DATE	REV 0	
DRWN	SUNIL		SK							
APPROVED (A.K. JOHRI)										

IN OPERATING POSITION




IN JACKING POSITION

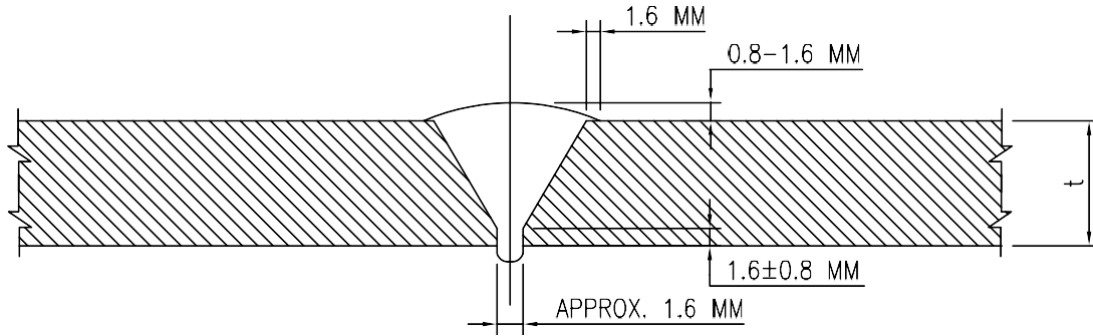


NOM. Ø	150 # RF		300 # RF		600 # RF	
	L	D	L	D	L	D
3"					100	20
4"					110	20
6"	80	20	100	20	120	20
8"	90	20	110	20	140	20
10"	90	20	120	20	150	20
12"	100	20	130	20	160	20
14"	110	20	140	20	170	20
16"	110	20	150	20	190	20
18"	120	20	160	20	200	20
20"	120	20	170	20	210	20
24"	140	20	180	20	240	20
26"	140	20	180	20	250	20
28"	140	20	190	20	250	20
30"	140	20	200	20	270	20

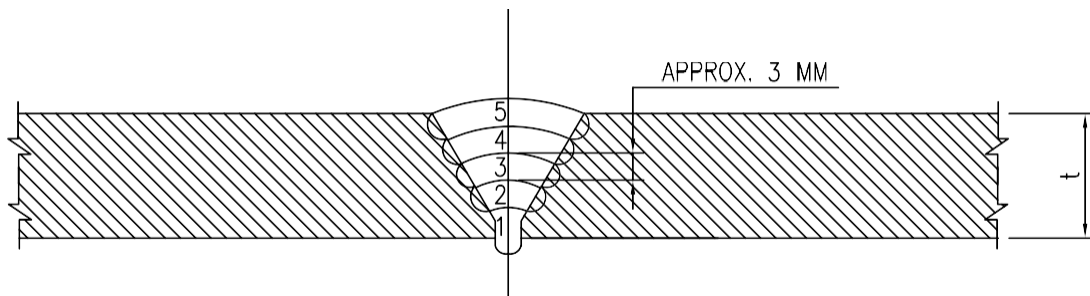
NOTES :-

1. DRILLED & TAPPED AT FIELD FOR TWO JACK SCREWS AT 180° APART SUCH THAT SPECTACLE BLIND CAN BE HANDLED WITHOUT INTERFERENCE WITH OTHER LINES OR EQUIPMENT.
2. THESE JACK SCREW DIMENSIONS ARE FOR RF FLANGES TO ANSI B 16.9 FOR SIZES UP TO 24" AND FOR SIZES ABOVE 24".
3. JACK SCREW MATERIAL SHALL BE ALLOY STEEL.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.	
SECTION: OIL & GAS (LDP)			REVISIONS		REFERENCES		DRG. NO.	
DSGN	NAME	DATE	CHKD	DATE	<p style="text-align: center;"><b>JACK SCREW FOR SPECTACLE BLIND (150 #, 300 #, 600 #)</b></p>  <p style="text-align: center;"><b>REPL/TYP/05/21/06/033</b> <b>RESONANCE ENERGY PVT. LTD.</b></p>			<p style="text-align: center;">SCALE : N.T.S. (SHEET 1 OF 1)</p>
DRWN	SUNIL		SK					
APPROVED			(A.K. JOHRI)		REV 0			



**STANDARD 'V' BEVEL  
BUTT JOINT**



**SEQUENCE OF WELDS**

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
REVISIONS							

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<b>SECTION:</b> OIL & GAS (LDP)				
NAME	DATE	CHKD	DATE	
DSGN	BINITA	SK		
DRWN	SUNIL			
APPROVED		(A.K. JOHRI)		

**BUTT WELD DETAILS**



REPL/TYP/05/21/06/034  
RESONANCE ENERGY PVT. LTD.

SCALE : NTS	(SHEET 1 OF 1)	REV
		0

6

5

4

3

2

1

J

J

I

I

H

H

G

G

F

F

E

E

D

D

C

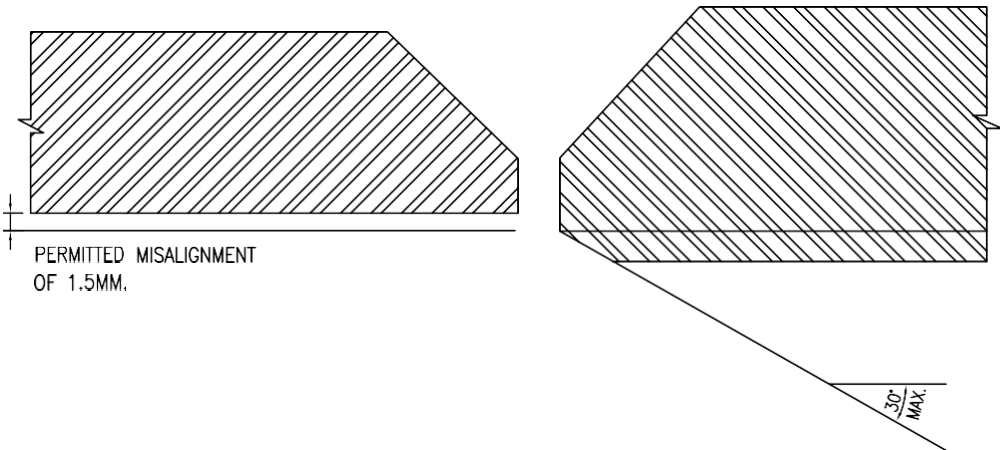
C

B

B

A

A



**THICKER PIPE TAPER BORED TO ALIGN**  
**(AS PER ASME B31.3)**

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
			REVISIONS				

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<b>SECTION:</b> OIL & GAS (LDP)				
NAME	DATE	CHKD	DATE	
DSGN	BINITA	SK		
DRWN	SUNIL			
APPROVED		(A.K. JOHRI)		

**WELDING OF PIPE WITH  
DIFFERENT THICKNESS**



REPL/TYP/05/21/06/035  
 RESONANCE ENERGY PVT. LTD.

SCALE : NTS	(SHEET 1 OF 1)	REV
		0

6

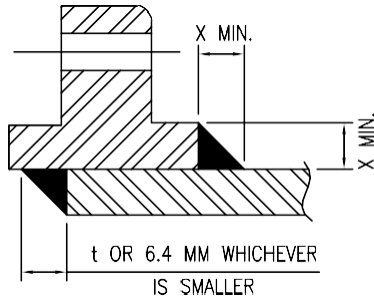
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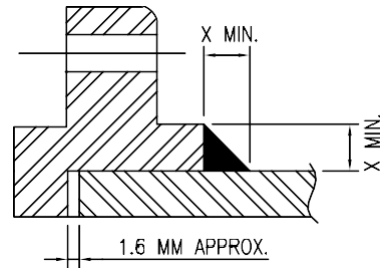
3

2

1



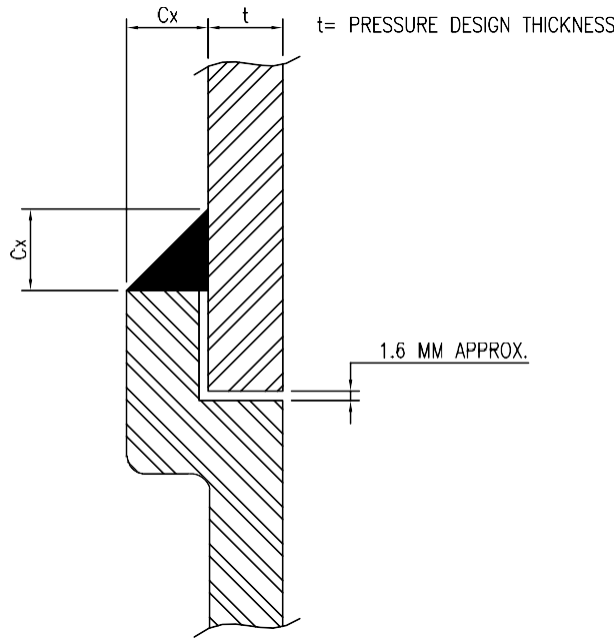
**SLIP ON FLANGE**



**SOCKET WELDED FLANGE**

X MIN. = 1.4t OR THE THICKNESS OF HUB, WHICHEVER IS SMALLER

t = PRESSURE DESIGN THICKNESS (NOT CONSIDERING CORROSION ALLOWANCE AND MANUFACTURING TOLERANCE.)



**SOCKET WELDING FITTING**

Cx (MIN.) = 1.25t BUT NOT LESS THAN 3.2MM.

**FILLET WELD DETAILS  
(AS PER ASME B31.3)**

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
REVISIONS							

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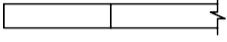
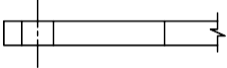



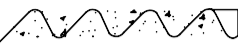
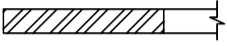
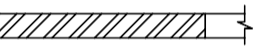
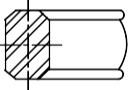
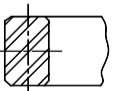

<b>SECTION:</b> OIL & GAS (LDP)				
NAME	DATE	CHKD	DATE	
DSGN	BINITA	SK		
DRWN	SUNIL			
APPROVED		(A.K. JOHRI)		

**FILLET WELD DETAILS**




REPL/TYP/05/21/06/035  
RESONANCE ENERGY PVT. LTD.

SCALE : NTS	(SHEET 1 OF 1)	REV
DRG. NO.		0

TYPICAL CROSS SECTION	DESCRIPTION		THICKNESS OF GASKET	COMPRESSED THICKNESS (NOTE-1)
	FLAT RING FOR RAISED FACE FLANGES	COMPRESSED ASBESTOS OR SYNTHETIC RUBBER.	2.0	2.0
	FULL FACE FOR FLAT FACE FLANGES			
	SPIRAL WOUND METAL FLAT RING GASKET, NON METALLIC FILLER , AND A STEEL SOLID RING TYPE CENTERING DEVICE- FOR RAISED FACE FLANGES		4.4	3.0
	FLAT METAL JACKETED GASKET , NON METALLIC FILLER COMPLETELY ENCLOSED WITHIN A FULLY ANNEALED DOUBLE METAL JACKET- FOR RAISED FACE FLANGES		3.0	2.0
	CORRUGATED METAL JACKETED GASKET, NON METALLIC FILLER, COMPLETELY ENCLOSED WITHIN A FULLY ANNEALED DOUBLE METAL CORRUGATED JACKET- FOR RAISED FACE FLANGES		3.2	1.0
	CORRUGATED METAL JACKET - FULLY ANNEALED CORRUGATED METAL WITH FILLER MATERIAL CEMENTED TO THE CORRUGATIONS ON BOTH FACES-FOR RAISED FACE FLANGES		3.2	1.0
	SOLID METAL FLAT RING FOR SMALL TONGUE AND GROOVE FLANGES		AS SPECIFIED	
	SOLID METAL FLAT RING FOR LARGE TONGUE AND GROOVE FLANGES		AS SPECIFIED	
	SOLID METAL OCTAGONAL RING FOR R.T.J. FLANGES		DIMENSIONS SHALL BE AS PER ASME B 16.20 (NOTE-2)	
	SOLID METAL OVAL RING FOR R.T.J. FLANGES		DIMENSIONS SHALL BE AS PER ASME B 16.20 (NOTE-2)	
	FULLY ANNEALED CORRUGATED METAL FOR RAISED FACE FLANGES		3.2	1.0

### NOTES:

1. COMPRESSED GASKET THICKNESS SHALL BE USED AS GAP BETWEEN FLANGES FOR CALCULATING DIMENSIONS

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
			REVISIONS				
MENTIONED THEREIN. THIS							
THICKNESS							REPL/TYP/05/21/06/035 RESONANCE ENERGY PVT.
							SCALE : NTS
						DRG. NO.	0

NOM PIPE SIZE INCHES	BOLT LENGTHS LISTED ELBOW ARE VALID FOR A COMPRESSED GASKET THK. OF UPTO 3.2mm.									
	BOLT		FLANGE TO FLANGE WITH TEMP STRAINER / REST ORIFICE	WITH FIG. 8 FLANGE	WITH DRIP RING 1" TAPPING	WITH DRIP RING 3/4" TAPPING	INLET OF S.V.			
DIA	NO.									
1/2	1/2	4	2 1/4	2 1/2	-	-	-			
3/4	1/2	4	2 1/2	2 3/4	4 1/2	4	-			
1	1/2	4	2 1/2	2 3/4	4 3/4	4 1/4	3 1/4			
1 1/4	1/2	4	2 3/4	3	4 3/4	4 1/4	-			
1 1/2	1/2	4	2 3/4	3	3 1/4	4 1/2	4 1/4			
2	5/8	4	3 1/4	3 1/2	3 3/4	5	4 1/2			
2 1/2	5/8	4	3 1/2	3 3/4	4	5 1/2	5			
3	5/8	4	3 1/2	3 3/4	4	5 3/4	5			
3 1/2	5/8	8	3 1/2	3 3/4	4	5 3/4	5			
4	5/8	8	3 1/2	3 3/4	4	5 3/4	5			
5	3/4	8	3 3/4	4	4 1/4	5 1/4	5 3/4			
6	3/4	8	4	4 1/4	4 3/4	6	5 3/4			
8	3/4	8	4 1/4	4 1/2	5	6 1/4	6			
10	7/8	12	4 1/2	4 3/4	5 1/4	6	6 1/4			
12	7/8	12	4 3/4	5	5 3/4	6 1/4	7			
14	1	12	6 1/4	6 1/2	7 1/4	8	8 1/2			
16	1	16	6 1/4	6 1/2	7 1/4	8	8 1/2			
18	1 1/8	16	6 7/8	7 1/8	8 1/8	8 5/8	9 1/8			
20	1 1/8	20	7 3/8	7 5/8	8 5/8	9 1/8	9 5/8			
22	-	-	-	-	-	-	-			
24	1 1/4	20	8	8 1/4	9 1/2	10 1/4	10 1/4			

EV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
REVISIONS							

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ACTION:				OIL & GAS (LDP)	
	NAME	DATE	CHKD	DATE	
GN	BINITA		SK		
WN	SUNIL				

**STUD BOLTS RF 150#  
DIMENSIONS  
(ASME B16.5)**



REPL/TYP/05/21/038  
Resonance Energy Pvt. Ltd.



NOM PIPE SIZE INCHES	BOLT		FLANGE TO FLANGE WITH TEMP STRAINER / REST ORIFICE (R.F.)	WITH FIG. 8 FLANGE	WITH DRIP RING 1" TAPPING	WITH DRIP RING 3/4" TAPPING	INLET OF S.V.
	DIA	NO.					
1/2	1/2	4	2 3/4	3	-	-	-
3/4	5/8	4	3 1/4	3 1/2	4 3/4	4 1/4	-
1	5/8	4	3 1/4	3 1/2	5 1/4	4 3/4	4 1/4
1 1/4	5/8	4	3 1/2	3 3/4	5 1/4	4 3/4	-
1 1/2	3/4	4	3 3/4	4	5 1/2	5	4 3/4
2	5/8	8	3 3/4	4	5 3/4	5 1/4	4 3/4
2 1/2	3/4	8	4 1/4	4 1/2	5 3/4	5 1/4	5 1/2
3	3/4	8	4 1/2	4 3/4	6 1/4	5 3/4	5 1/2
3 1/2	3/4	8	4 1/2	5	6 1/2	6	5 3/4
4	3/4	8	4 3/4	5 1/4	6 1/2	6	5 3/4
5	3/4	8	4 3/4	5 1/2	6 3/4	6 1/4	6
6	3/4	12	4 3/4	5 1/2	7	6 1/2	6
8	7/8	12	5 3/4	6 1/2	7 3/4	7 1/4	6 3/4
10	1	16	7 1/2	8 1/2	9 1/2	9	8 1/4
12	1 1/8	16	8 1/8	9 1/8	10 1/8	9 5/8	10 1/8
14	1 1/8	20	8 3/8	9 5/8	10 3/8	9 7/8	10 3/8
16	1 1/4	20	9	10 1/2	11	10 1/2	11
18	1 1/4	24	9 1/4	10 3/4	11 1/4	10 3/4	11 1/4
20	1 1/4	24	9 1/2	11 1/4	11 1/2	11	11 1/2
22	-	-	-	-	-	-	-
24	1 1/2	24	10 3/4	12 3/4	12 3/4	12 1/4	12 3/4

BOLT LENGTHS LISTED ELBOW ARE VALID FOR A COMPRESSED GASKET THK. OF UPTO 3.2mm.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	DRG. NO.
REVISIONS			REFERENCES			

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SECTION: OIL & GAS (LDP)				
NAME	DATE	CHKD	DATE	
DSGN	BINITA	SK		
DRWN	SUNIL			
APPROVED		(A.K. JOHRI)		

**STUD BOLTS RF 300#  
DIMENSIONS  
(ASME B16.5)**



REPL/TYP/05/21/06/035  
RESONANCE ENERGY PVT.

SCALE : NTS	(SHEET 1 OF 1)	REV
DRG. NO.		0

NOM PIPE SIZE INCHES	BOLT		FLANGE TO FLANGE WITH TEMP STRAINER / REST ORIFICE (R.F.)	WITH FIG. 8 FLANGE	WITH DRIP RING 1" TAPPING	WITH DRIP RING 3/4" TAPPING	INLET OF S.V.
	DIA	NO.					
1/2	1/2	4	3	3 1/2	-	-	-
3/4	5/8	4	3 1/2	4	5 3/4	5 1/4	-
1	5/8	4	3 1/2	4	5 3/4	5 1/4	-
1 1/4	5/8	4	3 3/4	4 1/4	6	5 1/2	-
1 1/2	3/4	4	4 1/4	4 3/4	6 1/2	6	5 1/2
2	5/8	8	4 1/4	4 3/4	6 1/2	6	5 1/2
2 1/2	3/4	8	4 3/4	5 1/2	7	6 1/2	6
3	3/4	8	5	5 3/4	7 1/4	6 3/4	6 1/4
3 1/2	7/8	8	5 1/2	6 1/4	7 3/4	7 1/4	7 1/4
4	7/8	8	5 3/4	6 1/2	8	7 1/2	7 1/4
5	1	8	7 1/2	8 1/2	9 3/4	9 1/4	9 1/4
6	1	12	7 3/4	8 3/4	10	9 1/2	9 1/4
8	1 1/8	12	8 5/8	9 7/8	10 7/8	10 3/8	10 7/8
10	1 1/4	16	9 3/4	11 1/4	12	11 1/2	12
12	1 1/4	20	10	11 3/4	12 1/4	11 3/4	12 1/4
14	1 3/8	20	10 5/8	12 5/8	12 7/8	12 3/8	12 7/8
16	1 1/2	20	11 1/2	13 3/4	13 3/4	13 1/4	13 3/4
18	1 5/8	20	12 3/8	14 5/8	14 5/8	14 1/8	14 5/8
20	1 5/8	24	12 7/8	15 5/8	15 3/8	14 7/8	15 3/8
22	-	-	-	-	-	-	-
24	1 7/8	24	14 7/8	17 7/8	17 1/8	16 5/8	17 1/8

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	DRG. NO.
REVISIONS					REFERENCES	

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SECTION: OIL & GAS (LDP)				
NAME	DATE	CHKD	DATE	
DSGN	BINITA	SK		
DRWN	SUNIL			
APPROVED		(A.K. JOHRI)		

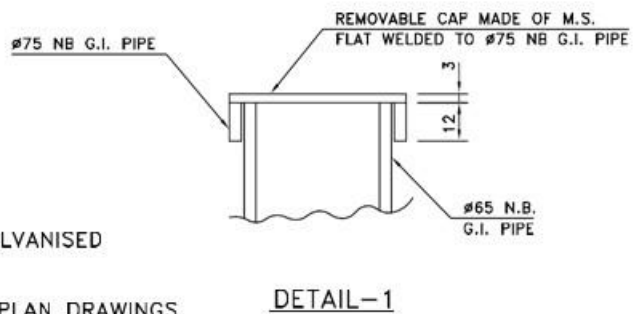
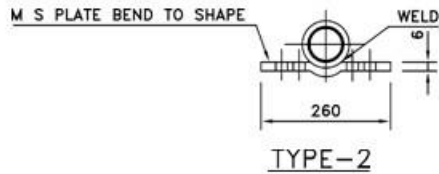
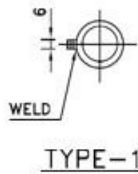
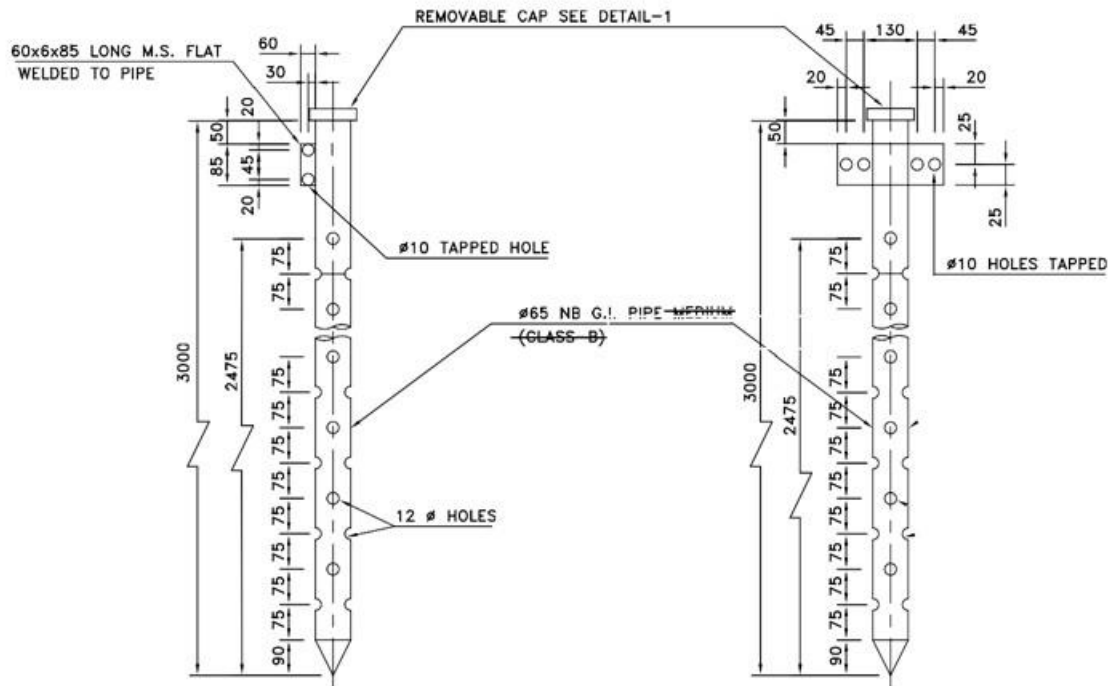
## STUD BOLTS RF 600# DIMENSIONS (ASME B16.5)



REPL/TYP/05/21/06/035  
RESONANCE ENERGY PVT.


SCALE : NTS	(SHEET 1 OF 1)	REV
DRG. NO.		0

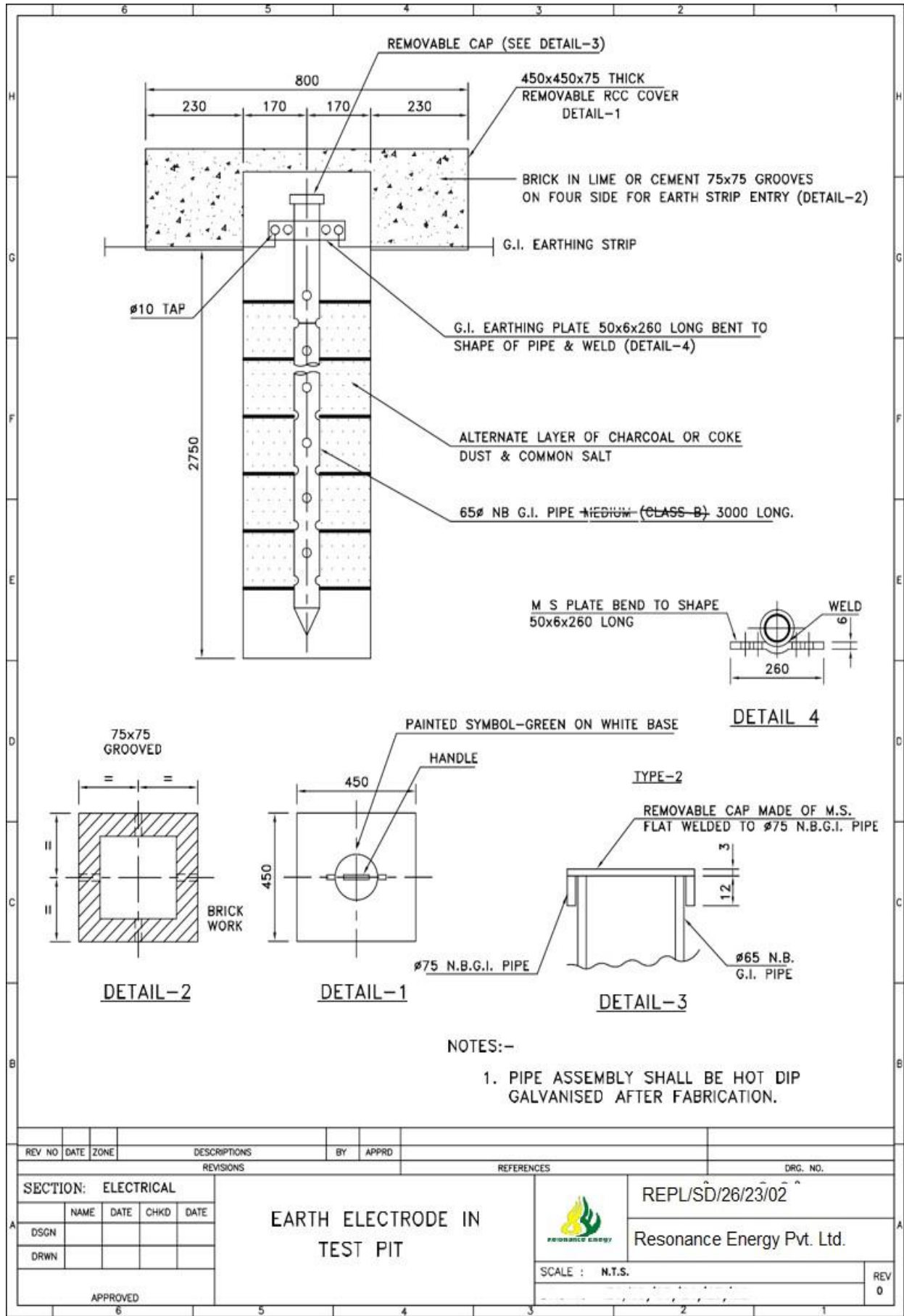
**CATHODIC PROTECTION  
DRAWINGS**



NOTES:-

1. THE PIPE SHALL BE HOT DIP GALVANISED AFTER FABRICATION
2. UNLESS STATED OTHERWISE ON PLAN DRAWINGS, ONLY TYPE 2 SHALL BE USED.

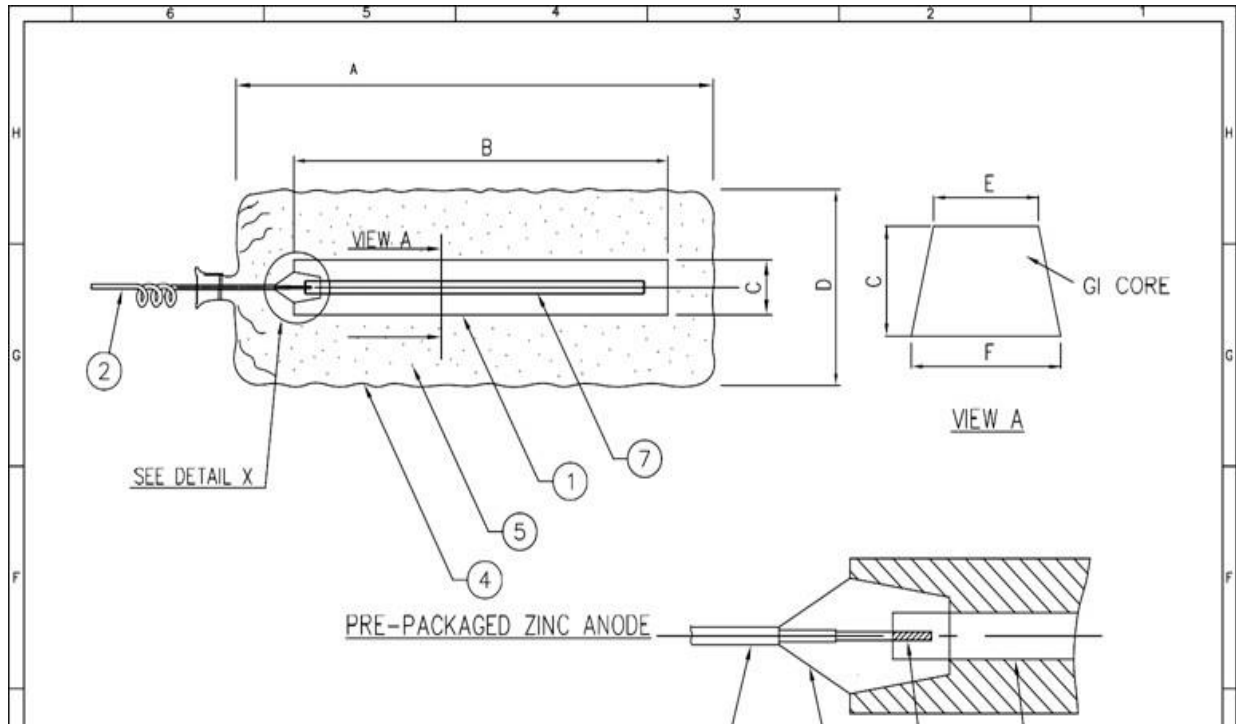
REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.		
SECTION: ELECTRICAL			<b>ELECTRODE FOR EARTHING SYSTEM</b>			 <b>REPL/SD/05/26/23/1</b> <b>Resonance Energy Pvt. Ltd.</b>	SCALE : N.T.S.		
DSGN	NAME	DATE						CHKD	DATE
DRWN									
APPROVED								REV 0	



NOTES:-

1. PIPE ASSEMBLY SHALL BE HOT DIP GALVANISED AFTER FABRICATION.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.		
SECTION: ELECTRICAL			<p style="text-align: center;"><b>EARTH ELECTRODE IN TEST PIT</b></p>		<p style="text-align: center;">REPL/SD/26/23/02 Resonance Energy Pvt. Ltd.</p>		<p>SCALE : N.T.S.</p>		
DSGN									<p style="text-align: right;">REV 0</p>
DRWN									
APPROVED									



**CHEMICAL COMPOSITION OF ANODE (% WEIGHT)**

ELEMENT	TYPE-I	TYPE-II
Al	: 0.1% - 0.5 %	0.005 %MAX
Cd	: 0.025% - 0.07%	0.003%MAX
Cu	: 0.005% MAX	0.002% MAX
Fe	: 0.005% MAX	0.0014% MAX
Pb	: 0.006% MAX	0.003% MAX
OTHERS	: 0.1%MAX	-
Zn	: REMAINDER	REMAINDER

**NOTES:-**

1. ANODE COMPOSITION, NET WEIGHT, GROSS WEIGHT DIMENSIONS SHALL BE FURNISHED BY CONTRACTOR.
2. ANODE TAIL CABLE SHALL BE HIGH CONDUCTIVITY, STRANDED, COPPER CONDUCTOR, 600/1100 V GRADE, XLPE INSULATED, PVC SHEATHED & UNARMoured.
3. THICKNESS OF BACKFILL SHALL BE ADEQUATE TO SAFEGURAD THE ANODES AGAINST THE EFFECT OF CARBONATES, BICARBONATES, NITRATES, etc. IN SOIL ANODES SHALL BE PROVIDED WITH MIN.50MM THICK BACKFILL ON ALL SIDES OF ANODE OR MIN. 20 KG NET WHICHEVER IS HIGHER. TYPE-I & TYPE-II ANODE SHALL BE USED AS PER THEIR APPLICATION DESCRIBED IN ASTM B418-09.

Anode Open Circuit Potential : (-) 1.1 Volts (min.)  
w.r.t CSE


Anode Consumption Rate : 11.2 kg/ (A year) Max.

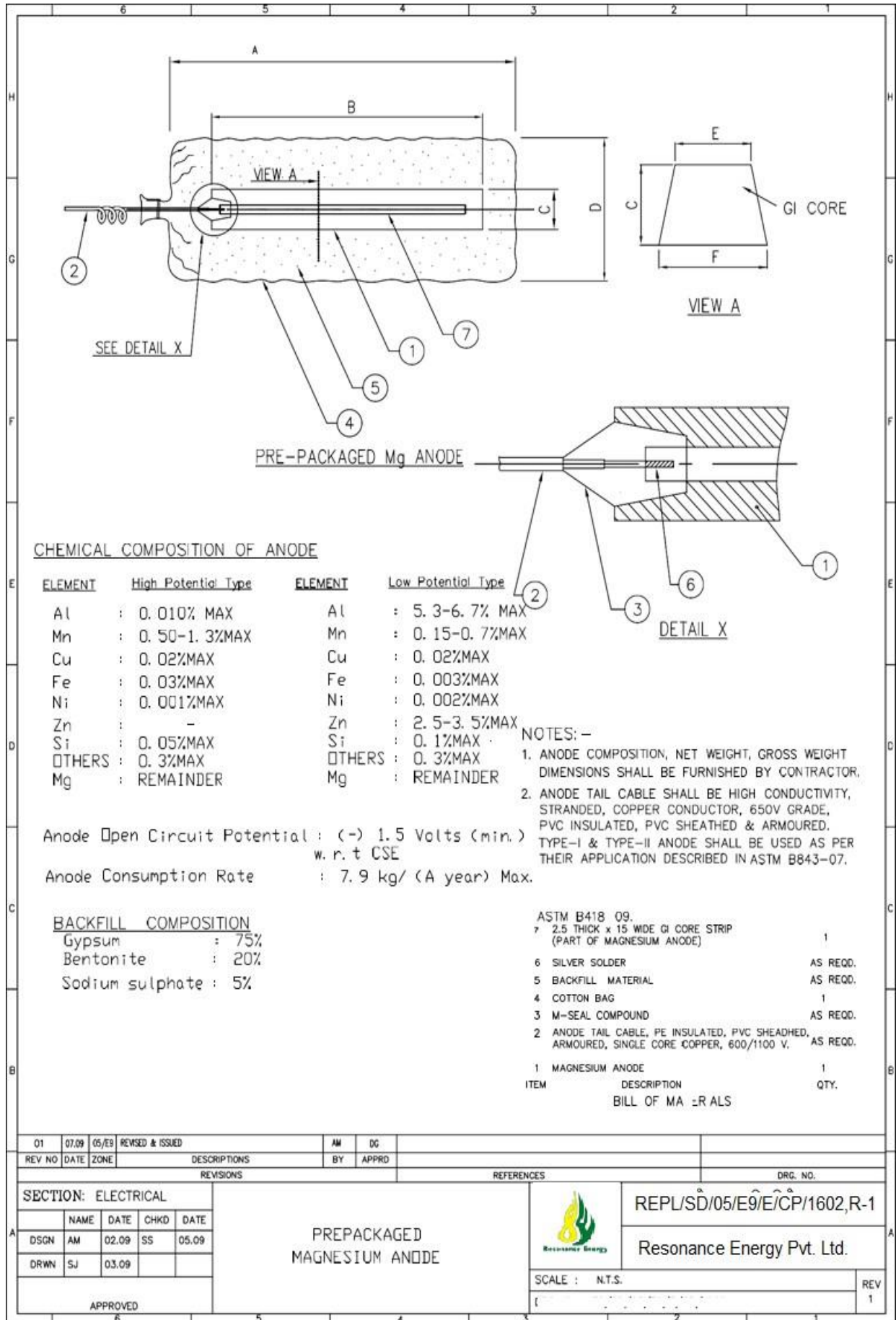
**BACKFILL COMPOSITION**

Gypsum : 75%  
Bentonite : 20%  
Sodium sulphate : 5%

ITEM	DESCRIPTION	QTY.
7	2.5 THICK x 15 WIDE GI CORE STRIP (PART OF ZINC ANODE)	1
6	SILVER SOLDER	AS REQD.
5	BACKFILL MATERIAL	AS REQD.
4	COTTON BAG	1
3	M-SEAL COMPOUND	AS REQD.
2	ANODE TAIL CABLE, PE INSULATED, PVC SHEATHED, UNARMoured, SINGLE CORE COPPER, 600/1100 V.	AS REQD.
1	ZINC ANODE	1

BILL OF MATERIALS

01	07.09	05/E9	REVISED & ISSUED	AM	DC		
REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPROD		
SECTION: ELECTRICAL			PREPACKAGED ZINC ANODE		 REPL /SD/05/E9/E/CP/1601,R-1 Resonance Energy Pvt. Ltd.		DRG. NO.
DSGN	AM	02.09	SS	05.09	SCALE : N.T.S.		REV 1
DRWN	SJ	02.09					
APPROVED							



**CHEMICAL COMPOSITION OF ANODE**

ELEMENT	High Potential Type	ELEMENT	Low Potential Type
Al	: 0.010% MAX	Al	: 5.3-6.7% MAX
Mn	: 0.50-1.3%MAX	Mn	: 0.15-0.7%MAX
Cu	: 0.02%MAX	Cu	: 0.02%MAX
Fe	: 0.03%MAX	Fe	: 0.003%MAX
Ni	: 0.001%MAX	Ni	: 0.002%MAX
Zn	: -	Zn	: 2.5-3.5%MAX
Si	: 0.05%MAX	Si	: 0.1%MAX
OTHERS	: 0.3%MAX	OTHERS	: 0.3%MAX
Mg	: REMAINDER	Mg	: REMAINDER

**NOTES: -**

1. ANODE COMPOSITION, NET WEIGHT, GROSS WEIGHT DIMENSIONS SHALL BE FURNISHED BY CONTRACTOR.
2. ANODE TAIL CABLE SHALL BE HIGH CONDUCTIVITY, STRANDED, COPPER CONDUCTOR, 650V GRADE, PVC INSULATED, PVC SHEATHED & ARMURED. TYPE-I & TYPE-II ANODE SHALL BE USED AS PER THEIR APPLICATION DESCRIBED IN ASTM B843-07.

Anode Open Circuit Potential : (-) 1.5 Volts (min.)  
w. r. t CSE  
Anode Consumption Rate : 7.9 kg/ (A year) Max.

**BACKFILL COMPOSITION**

Gypsum : 75%  
Bentonite : 20%  
Sodium sulphate : 5%

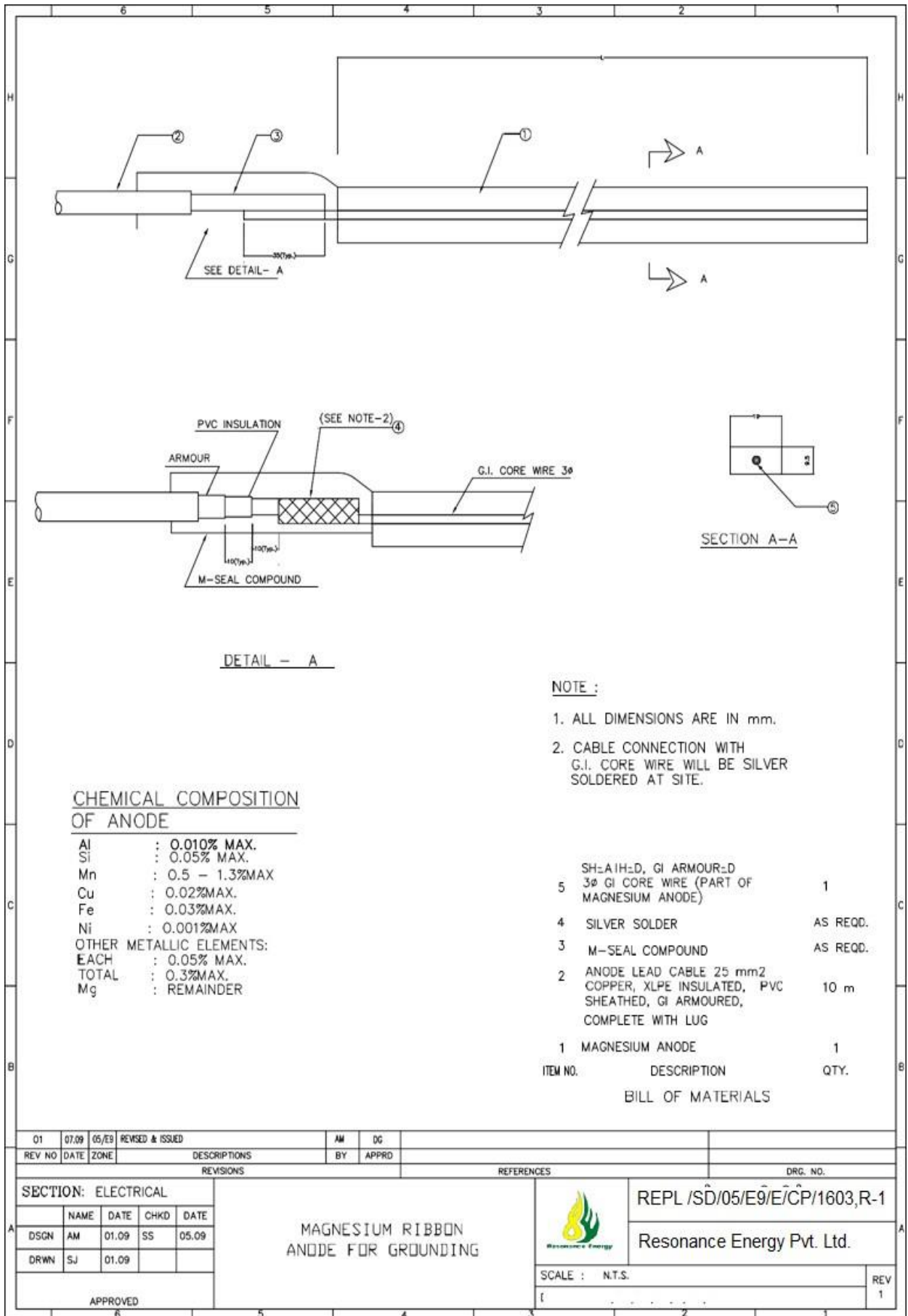
ITEM	DESCRIPTION	QTY.
7	ASTM B418 09. 2.5 THICK x 15 WIDE GI CORE STRIP (PART OF MAGNESIUM ANODE)	1
6	SILVER SOLDER	AS REQD.
5	BACKFILL MATERIAL	AS REQD.
4	COTTON BAG	1
3	M-SEAL COMPOUND	AS REQD.
2	ANODE TAIL CABLE, PE INSULATED, PVC SHEATHED, ARMURED, SINGLE CORE COPPER, 600/1100 V.	AS REQD.
1	MAGNESIUM ANODE	1

BILL OF MATERIALS

01	07.09	05/E9	REVISED & ISSUED	AM	DG		
REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD		
SECTION: ELECTRICAL			REVISIONS		REFERENCES		DRG. NO.
NAME	DATE	CHKD	DATE				REPL/SD/05/E9/E/CP/1602,R-1
DSGN	AM	02.09	SS	05.09			Resonance Energy Pvt. Ltd.
DRWN	SJ	03.09					SCALE : N.T.S.
APPROVED							REV 1



PREPACKAGED MAGNESIUM ANODE



DETAIL - A

SECTION A-A

- NOTE :**
1. ALL DIMENSIONS ARE IN mm.
  2. CABLE CONNECTION WITH G.I. CORE WIRE WILL BE SILVER SOLDERED AT SITE.

**CHEMICAL COMPOSITION OF ANODE**

Al	: 0.010% MAX.
Si	: 0.05% MAX.
Mn	: 0.5 - 1.3%MAX
Cu	: 0.02%MAX.
Fe	: 0.03%MAX.
Ni	: 0.001%MAX
OTHER METALLIC ELEMENTS:	
EACH	: 0.05% MAX.
TOTAL	: 0.3%MAX.
Mg	: REMAINDER

5	SH=AIH=D, GI ARMOUR=D 3φ GI CORE WIRE (PART OF MAGNESIUM ANODE)	1
4	SILVER SOLDER	AS REQD.
3	M-SEAL COMPOUND	AS REQD.
2	ANODE LEAD CABLE 25 mm <sup>2</sup> COPPER, XLPE INSULATED, PVC SHEATHED, GI ARMoured, COMPLETE WITH LUG	10 m
1	MAGNESIUM ANODE	1
ITEM NO.	DESCRIPTION	QTY.

BILL OF MATERIALS

01	07.09	05/E9	REVISED & ISSUED	AM	DG				
REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD				
REVISIONS			REFERENCES			DRG. NO.			
SECTION: ELECTRICAL			MAGNESIUM RIBBON ANODE FOR GROUNDING			REPL /SD/05/E9/E/CP/1603,R-1			
NAME	DATE	CHKD				DATE	Resonance Energy Pvt. Ltd.		
DSGN	AM	01.09				SS	05.09		
DRWN	SJ	01.09							
APPROVED			SCALE : N.T.S.			REV	1		




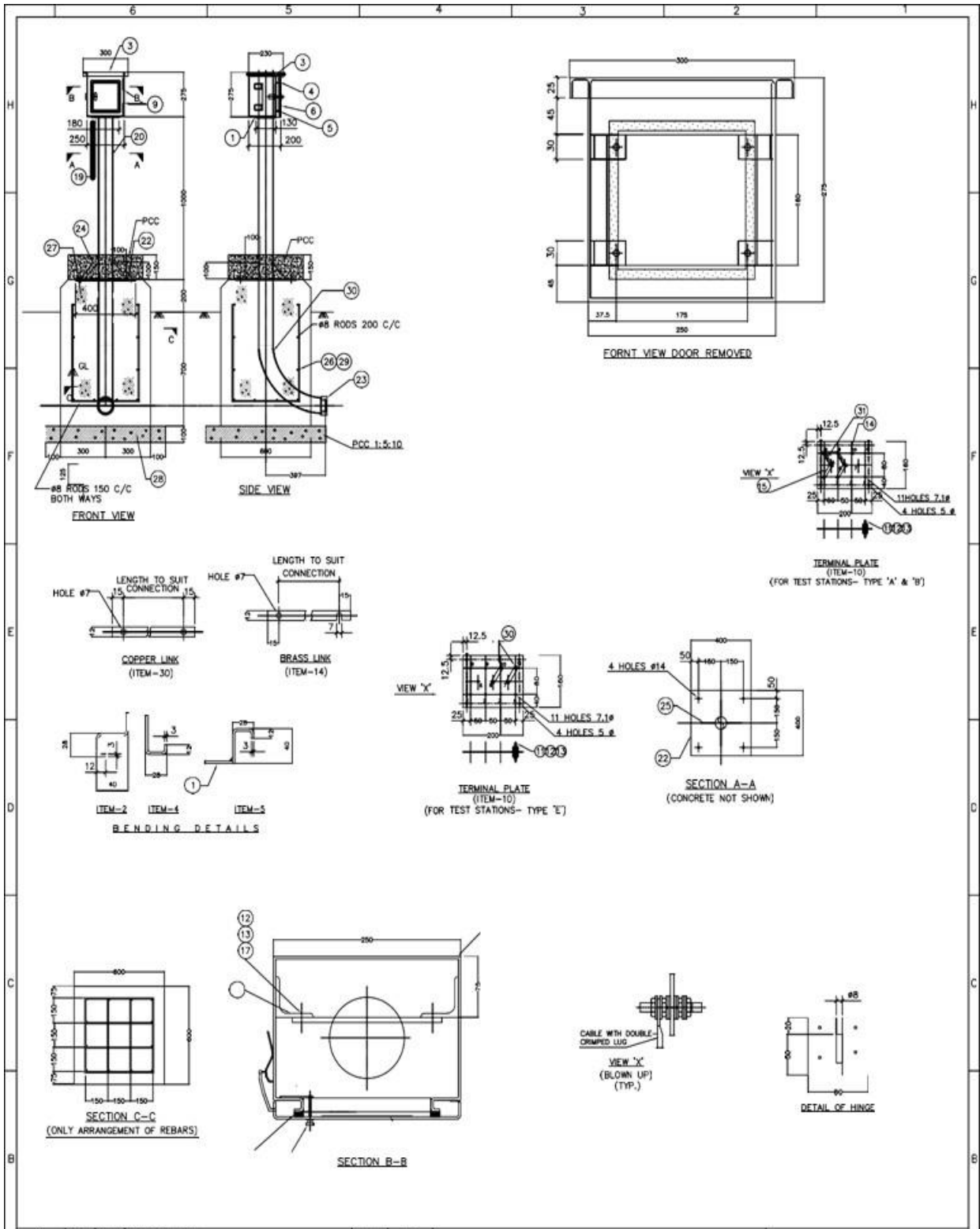
**NOTES:-**


1. TEST STATION SHALL HAVE WEATHERPROOF ENCLOSURE HAVING DEGREE OF PROTECTION IP-55, AS DEFINED IN IEC-529(1989)/ IS:2147 (1962) THE SHUTTER SHALL BE HINGED TYPE WITH CONCEALED LOCK AND SHALL HAVE DOOR GASKET.
2. THE HINGES SHALL BE WELDED TO THE SHUTTER AND THE BOX SUITABLY.
3. THE MS ANGLES SHALL BE WELDED TO THE SIDES. THE ANGLES SHALL HAVE TAPPED HOLES FOR FIXING TERMINAL PLATE.
4. THE INNER SURFACE OF THE TEST STATION SHALL BE PAINTED WITH LEAD OXIDE PRIMER GRADE.
5. THE OUTSIDE OF THE TEST STATION SHALL BE PAINTED WITH TWO COATS OF ZINC RED EPOXY PRIMER AND THREE COATS OF GREY COLOURED EPOXY PAINT COMPLETE WITH CABLE PIPE & FDN. PLATE.
6. THE NAME PLATE SHALL BE OF ANODISED ALUMINIUM WITH BLACK BACKGROUND AND WHITE LETTERS (SIZE 3mm). THE NAME PLATE SHALL BE FIXED TO INNER SIDE OF SHUTTER BY ARALDITE OR EQUIVALENT.
7. THE NAME PLATE OF EACH TEST STATION SHALL CARRY THE FOLLOWING INFORMATION.
  - A) TEST STATION CONNECTION SCHEME TYPE
  - B) RELEVANT TEST STATION CONNECTION SCHEME DIAGRAM
  - C) TEST STATION NO.
  - D) CHAINAGE IN KM
  - E) DISTANCE FROM PIPE IN m
  - F) DIRECTION OF GAS FLOW
8. WHEN ERECTED, THE TEST STATION SHALL BE IN UPRIGHT POSITION.
9. TEST STATION SHALL BE SO ERECTED AS TO SERVE ALSO AS PIPELINE MARKER. AND ANODE GROUNDBED MARKER. THEIR SHUTTERS SHALL BE PARALLEL TO THE LINE OF AXIS OF PIPELINE AND FACING IT.
10. THE NUMBER OF ALL TEST STATIONS SHALL BE WRITTEN WITH BLACK PAINT USING 40 mm STENCIL BLOCK ON THE OUTER SIDE OF THE SHUTTER IN A UNIFORM MANNER. AN ARROW SHOWING DIRECTION OF FLOW OF GAS SHALL BE MARKED TO UNDERLINE THE TEST STATION NUMBER ON SHUTTER.
11. HEIGHT OF THE TEST STATION ABOVE GROUND LEVEL SHOWN IN THE DRAWING IS TYPICAL.
12. ALL CABLES COMING TO TEST STATION SHALL BE LABELLED ON BOTH ENDS WITH IDENTIFICATION NUMBERS
13. TOTAL NUMBER OF TEST STATIONS AND THEIR TYPES ARE MENTIONED IN CONSOLIDATED B.O.M.
14. TEST BETWEEN BRASS TERMINALS AND BODY AT 2kV FOR ONE MINUTE.
15. ALL DIMENSIONS ARE APPROXIMATE AND CAN VARY SLIGHTLY.
16. ALL DIMENSIONS ARE IN mm.

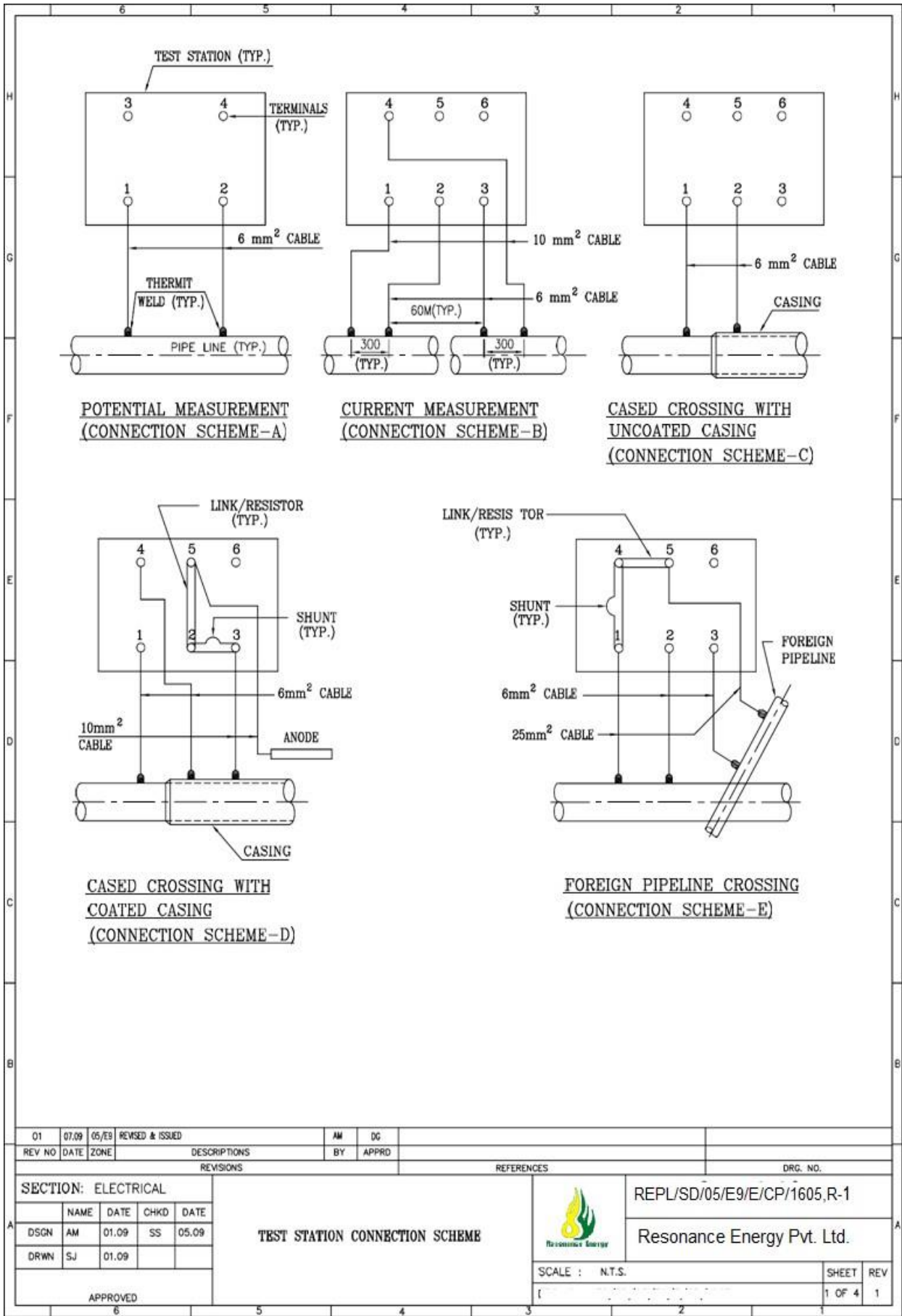
VARIABLE RESISTANCE 0-0.1  
 100 MM Ø M.S. SCH.40 90°  
 BINDING WIRE, MS  
 PCC MIX, 1:5:10  
 RCC MIX, M20  
 ROD, 8Ø MS  
 STIFFENER PLATE, 8THK.  
 FOUNDATION BOLT M12  
 RUBBER BUSH MATCHING WITH PIP-  
 FOUNDATION PLATE, 6THKx400x400 MS  
 NEOPRENE RUBBER GASKET, 6THK.  
 MS PIPE, 100 Ø, IS: 1239 P.I.(1990)-HEAVY GRADE  
 COUPLING PLATE, 5THK.x180x130 MS PLATE, 100Ø HOLE AT CENTRE  
 LATCH FOR SHUTTER  
 BRASS SCREW, M6x16  
 ANGLE, 5THK. x 50 x 50 x 30  
 SHUNT, 0.1 OHM, 0.5 A, 50 mV  
 COPPER LINK, 2.5 THK.x 12 x LENG - AS REQD.  
 BRASS WASHER  
 NUT, M6  
 BRASS STUD, M6 x 50  
 TERMINAL PLATE, 6THK.x160 x 200 P NO C LAM. SHT  
 HINGE FOR SHUTTER  
 CASTLE LOCK WITH ONE KEY PER TES  
 NAME PLATE, 0.9THK.x120x160 ANODISED ALUMINIUM  
 SHUTTER, 3 THK.x250x296 MS SHT  
 FRONT BOTTOM, 3 THK.x170x74 MS S  
 FRONT TOP, 3 THK.x170x79 MS SHT  
 TOP, 3 THK.x232x300/344 MS SHT  
 REAR & SIDES, 3 THK.x275/250x718 MS  
 BOTTOM PLATE, 5 THK.x160x244 MS PLATE, 100Ø HOLE AT CENTRE


DESCRIPTION  
**BILL OF MAT-RIALS**

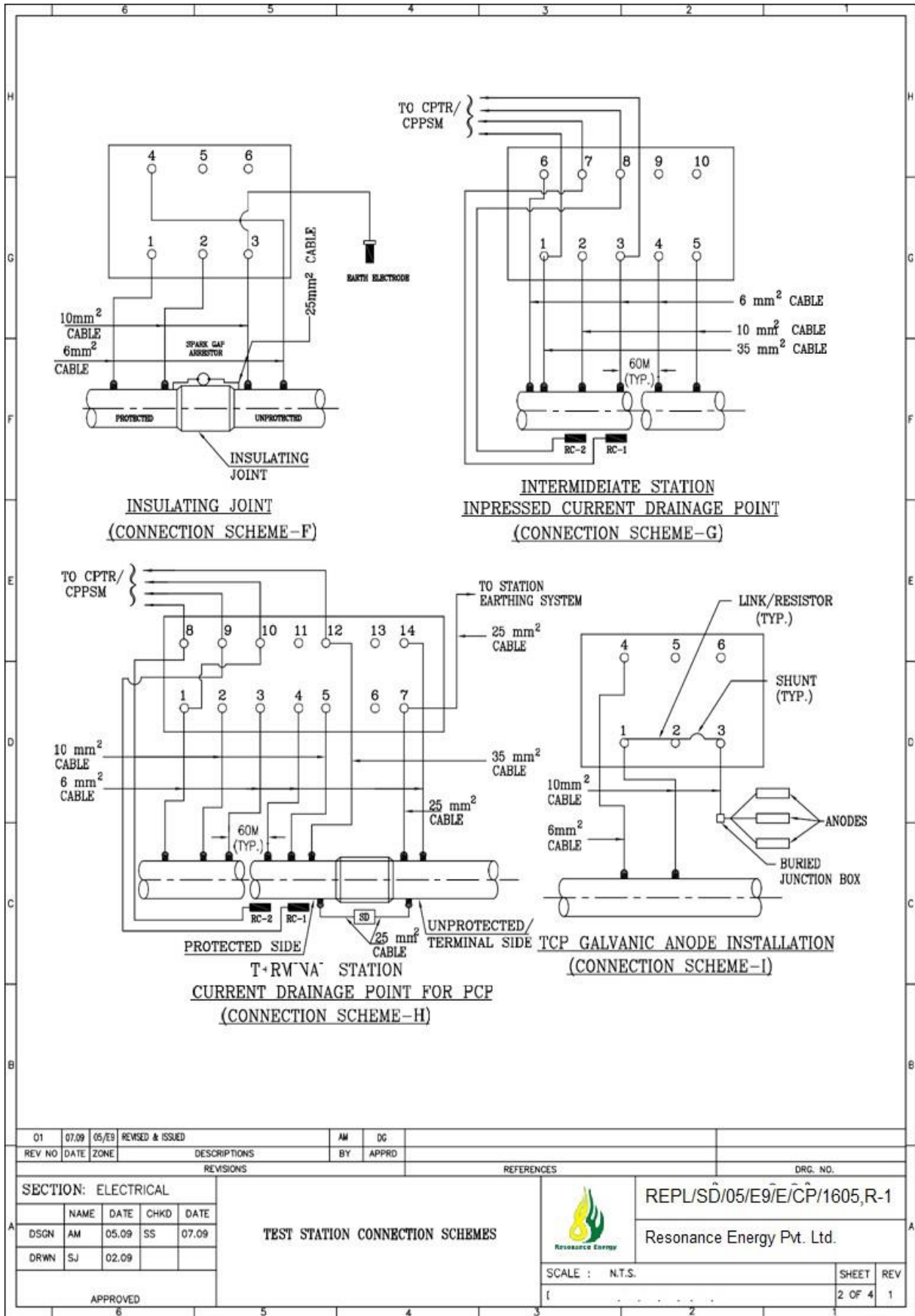
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REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD			DRG. NO.
SECTION: ELECTRICAL			DETAILS OF TEST STATION FOR CATHODIC PROTECTION SYSTEM			REPL SD/05/E9/E/CP/1604,R-1		
DSGN	AM	02.09	SS	05.09			Resonance Energy Pvt. Ltd.	
DRWN	SJ	02.09					SCALE : N.T.S.	SHEET
APPROVED						2 OF 2		1



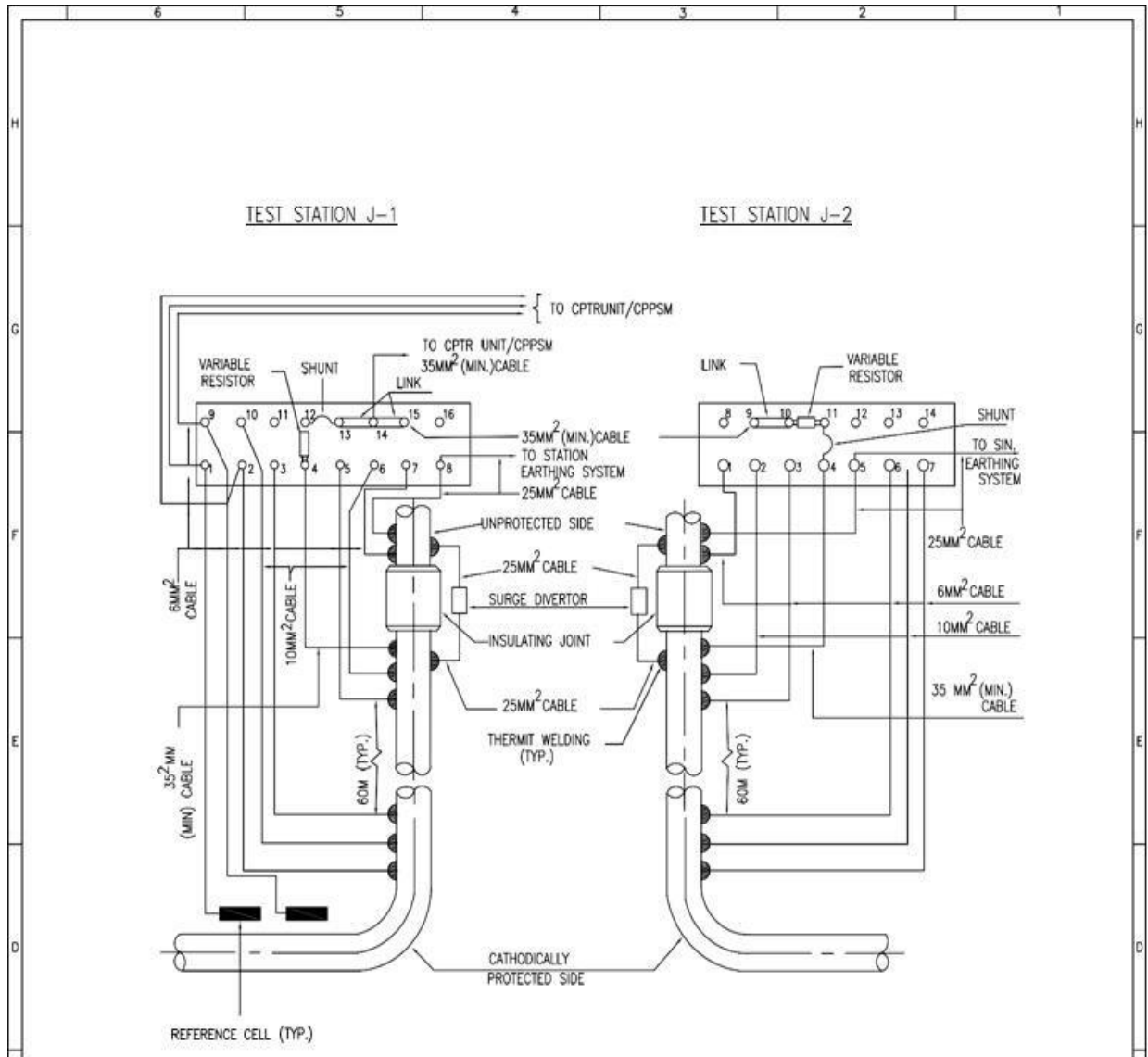
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REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD					
REVISIONS			REFERENCES			DRG. NO.				
SECTION: ELECTRICAL			DETAILS OF TEST STATION FOR TEMPORARY CATHODIC PROTECTION SYSTEM			 REPL SD/05/E9/E/CP/1604,R-1 Resonance Energy Pvt. Ltd.				
NAME	DATE	CHKD						DATE	SCALE : N.T.S.	SHEET
DSGN	AM	02.09				SS	06.09		1 OF 2	1
DRWN	SJ	02.09								
APPROVED										




01	07.09	05/E9	REVISED & ISSUED	AM	DC		
REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD		
REVISIONS			REFERENCES			DRG. NO.	
SECTION: ELECTRICAL				<b>TEST STATION CONNECTION SCHEME</b>			
NAME	DATE	CHKD	DATE				
DSGN	AM	01.09	SS 05.09				
DRWN	SJ	01.09					
APPROVED				 <b>REPL/SD/05/E9/E/CP/1605,R-1</b> <b>Resonance Energy Pvt. Ltd.</b>		SCALE : N.T.S. SHEET 1 OF 4 REV 1	

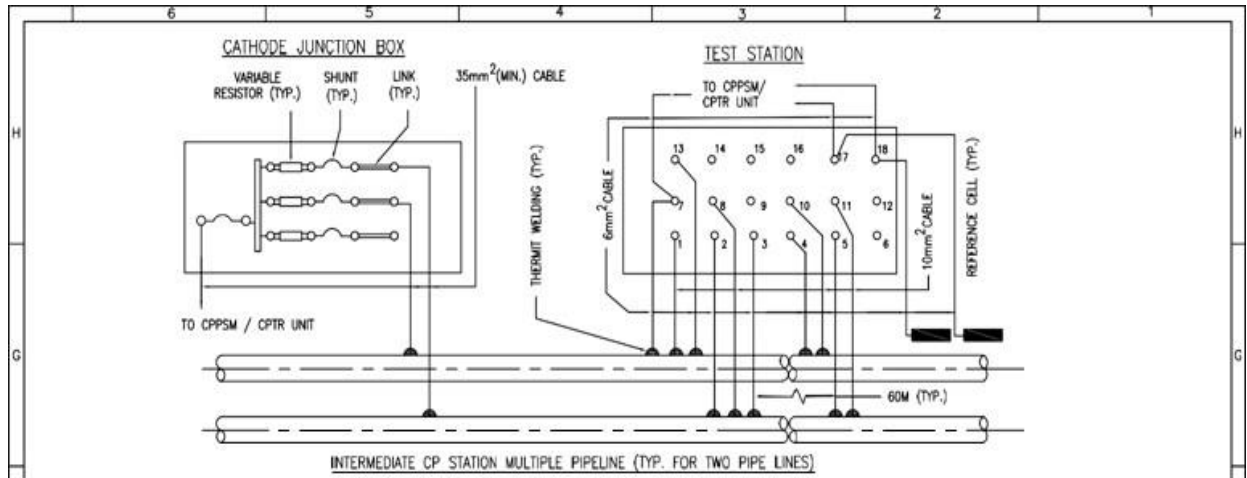


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REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPROD	REFERENCES	DRG. NO.
SECTION: ELECTRICAL							REPL/SD/05/E9/E/CP/1605,R-1
DSGN	AM	05.09	SS	07.09	TEST STATION CONNECTION SCHEMES		Resonance Energy Pvt. Ltd.
DRWN	SJ	02.09					SCALE : N.T.S.
APPROVED							SHEET REV 2 OF 4 1

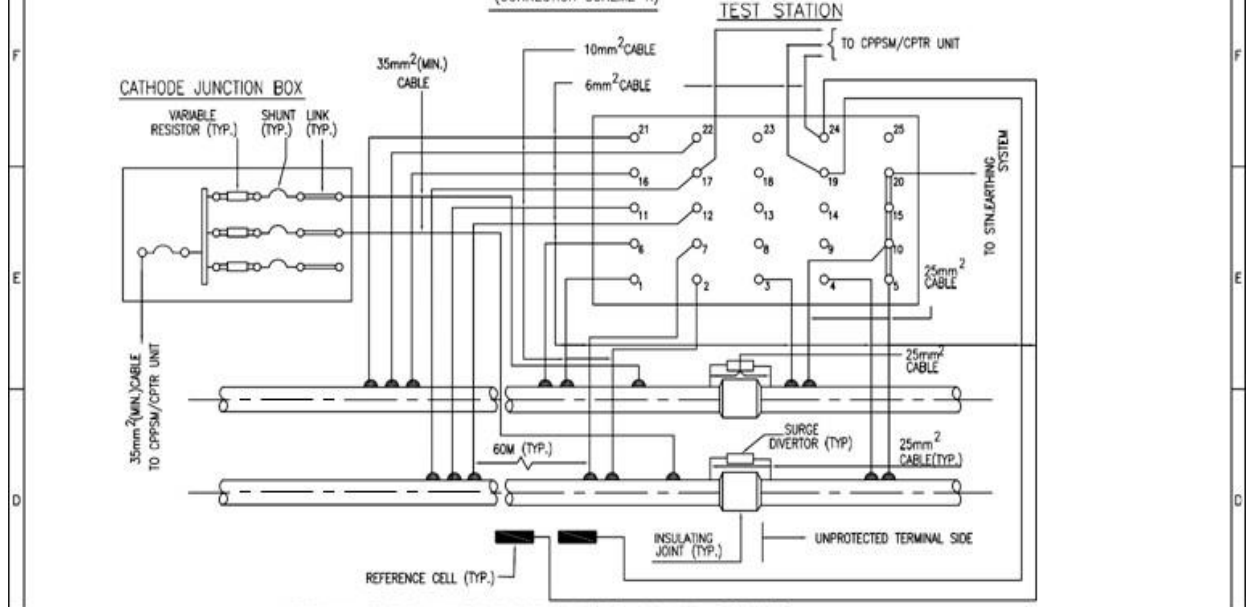


INTERMEDIATE PIGGING STATION IMPRESSED CURRENT DRAINAGE POINT  
 CONNECTION SCHEME-J

01	07.09	05/09	REVISED & ISSUED	AM	DC														
REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPROD														
REVISIONS				REFERENCES		DRG. NO.													
SECTION: ELECTRICAL						REPL/SD/05/E9/E/CP/1605,R-1													
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NAME	DATE	CHKD	DATE																
DSGN	AM	02.09	SS 05.09																
DRWN	SJ	02.09																	
APPROVED				SCALE : N.T.S.		SHEET	REV												
						3 OF 4	1												




INTERMEDIATE CP STATION MULTIPLE PIPELINE (TYP. FOR TWO PIPE LINES)  
 IMPRESSED CURRENT DRAINAGE POINT (WITHOUT IJs ON LINE PIPS AT THE STATION)  
 (CONNECTION SCHEME-K)

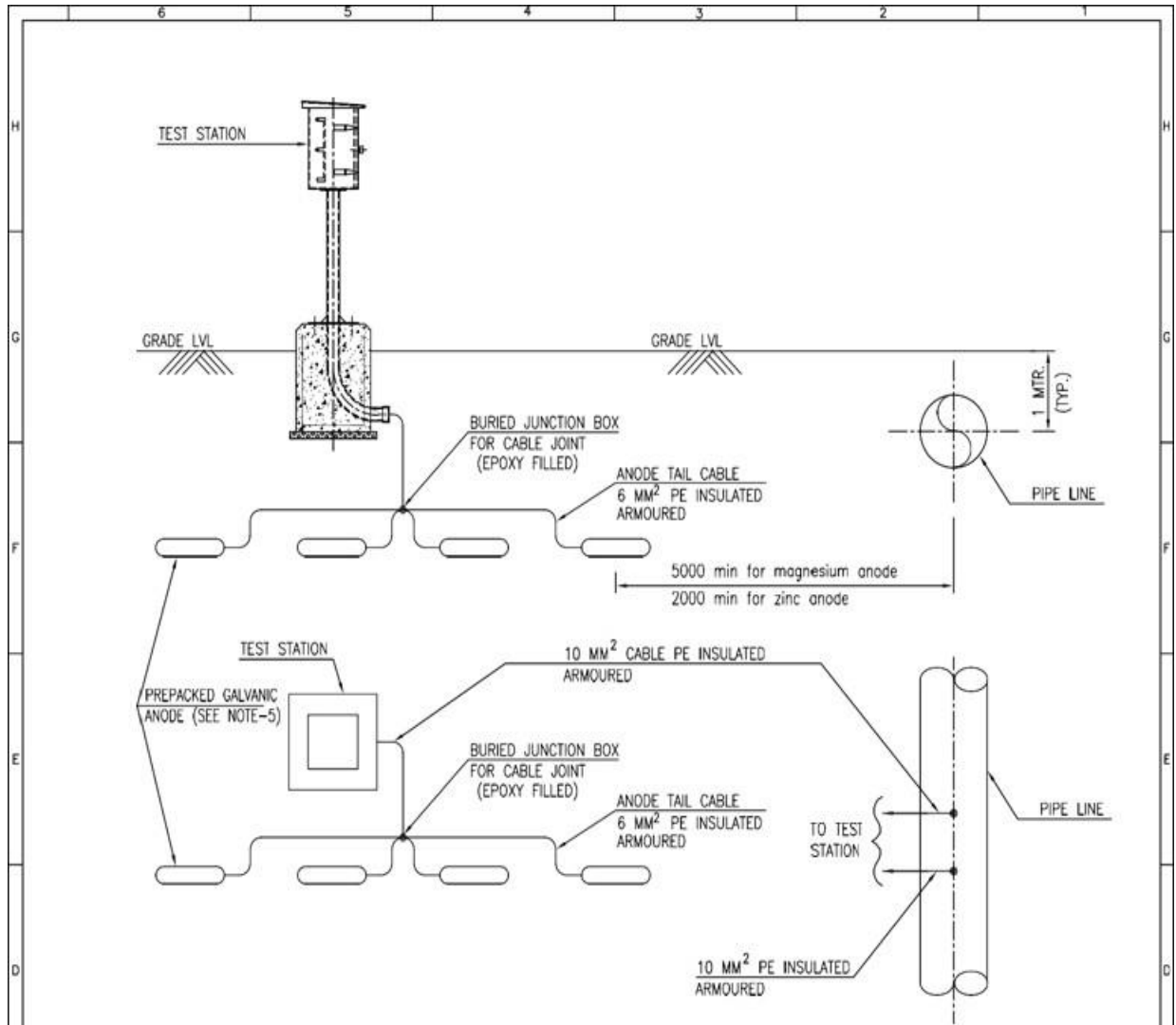


TERMINAL STATION MULTIPLE PIPELINES (TYP. FOR TWO PIPELINES)  
 IMPRESSED CURRENT DRAINAGE POINT (CONNECTION SCHEME-L)

NOTES:-

1. NUMBER OF TERMINALS FOR TEST STATION OF DIFFERENT CONNECTION SCHEME SHALL BE AS SHOWN ON THE RESPECTIVE SCHEME DRAWING. TEST STATION FOR ANY OTHER SCHEME SHALL PREFERABLY BE SIMILAR TO ANY OF THE ABOVE TYPE.
2. ELECTRICAL CONNECTIONS SHALL BE CLEAN TO BRIGHT SURFACE & TIGHTEND WITH NONOXIDE GREASE APPLIED ON MECHANICALLY MATED SURFACE.
3. FOR SACRIFICIAL ANODE GROUND BED WHICH IS INTENDED FOR PERMANENT CP SYSTEM AND/OR TO BE INTEGRATED WITH PERMANENT CP SYSTEM, THE LEADS OF ALL ANODES SHALL BE BROUGHT UP TO THE TEST STATION AND SHALL BE TERMINATED INDIVIDUALLY. ACCORDINGLY, THE NUMBER OF TERMINALS FOR TEST STATION SHALL BE DECIDED BASED ON NO OF ANODES.
4. WHWRE INSULATING JOINT (IJ) ON THE PIPELINE IS BURIED, THE SURGE DIVERTOR MOUNTED ACCROSS THE IJ SHALL BE HOUSED SUITABLY SO THAT OPERATION OF THE SAME IS NOT AFFECTED.
5. THE DISTANCE BETWEEN TWO SUCCESSIVE THERMIT WELDING POINTS SHALL BE MIN. 300 mm.

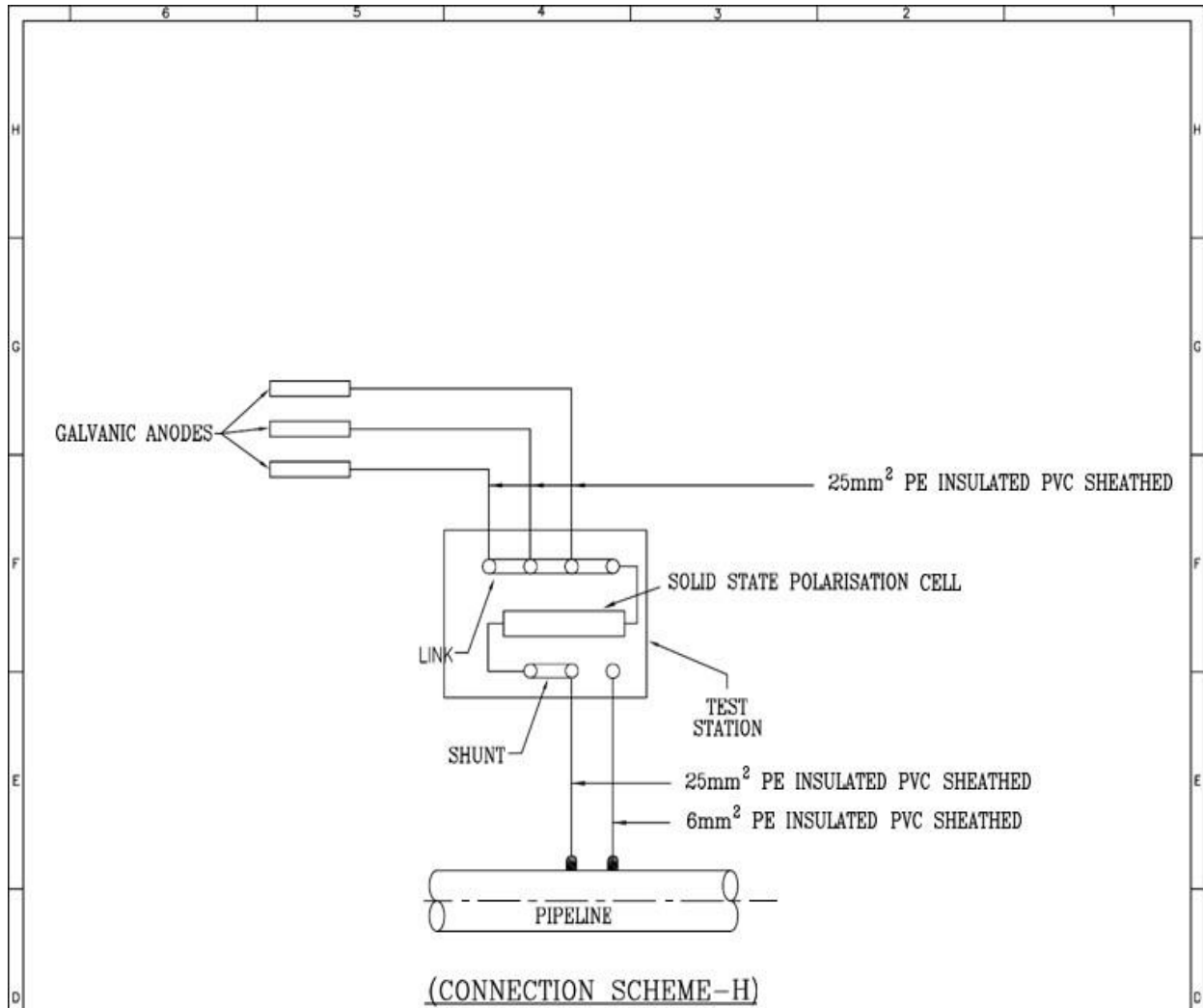
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REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD			
REVISIONS			REFERENCES			DRG. NO.		
SECTION: ELECTRICAL				 <b>TEST STATION CONNECTION SCHEMES</b>		REPL/SD/05/E9/E/CP/1605,R-1		
NAME	DATE	CHKD	DATE			Resonance Energy Pvt. Ltd.		
DSGN	AM	03.09	SS			06.09		
DRWN	SJ	03.09						
APPROVED				SCALE : N.T.S.		SHEET	REV	
				1		4 OF 4	1	



**NOTES:-**


1. THE PREPACKED GALVANIC ANODE SHALL BE INSTALLED AT MINIMUM DEPTH, EQUAL TO BOTTOM LEVEL OF THE PIPELINE.
2. ALL NATIVE BACKFILL SHALL BE FREE OF ROCKS, GARBAGE, PAPERS, ETC.
3. CABLE SHALL BE LAID WITH ENOUGH SLACKNESS TO AVOID DAMAGE TO CABLES DURING BACKFILLING ECT.
4. THE GALVANIC ANODES FOR PERMANENT CATHODIC PROTECTION SYSTEM SHALL BE INSTALLED IN A SIMILAR MANNER AS SHOWN. BUT ANODE TAIL CABLES OF EACH ANODE SHALL BE BROUGHT UPTO TEST STATION AND TERMINATED. NO BURIED JUNCTION BOX SHALL BE USED.
5. THE ANODES ARE SHOWN HORIZONTALLY LAID. ALTERNATIVELY THE ANODES MAY BE LAID VERTICALLY.
6. ANODE TAIL CABLE & CABLE FROM BURIED JUNCTION BOX TO TEST STATION OR TEMPERATURE C.P. ANODE MAY BE PVC INSULATED TYPE.

01	07.09	05/09	REVISED & ISSUED	AM	DG												
REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPROD	DRG. NO.											
SECTION: ELECTRICAL			REVISIONS		REFERENCES												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NAME</th> <th>DATE</th> <th>CHKD</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>DSGN AM</td> <td>01.09</td> <td>SS</td> <td>05.09</td> </tr> <tr> <td>DRWN SJ</td> <td>01.09</td> <td></td> <td></td> </tr> </tbody> </table>			NAME	DATE	CHKD	DATE	DSGN AM	01.09	SS	05.09	DRWN SJ	01.09			<h3 style="margin: 0;">GALVANIC ANODE INSTALLATION</h3>		 <b>REPL /SD/05/E9/E/CP/1606,R-1</b> <b>Resonance Energy Pvt. Ltd.</b>
NAME	DATE	CHKD	DATE														
DSGN AM	01.09	SS	05.09														
DRWN SJ	01.09																
APPROVED					SCALE : N.T.S.	REV 1											

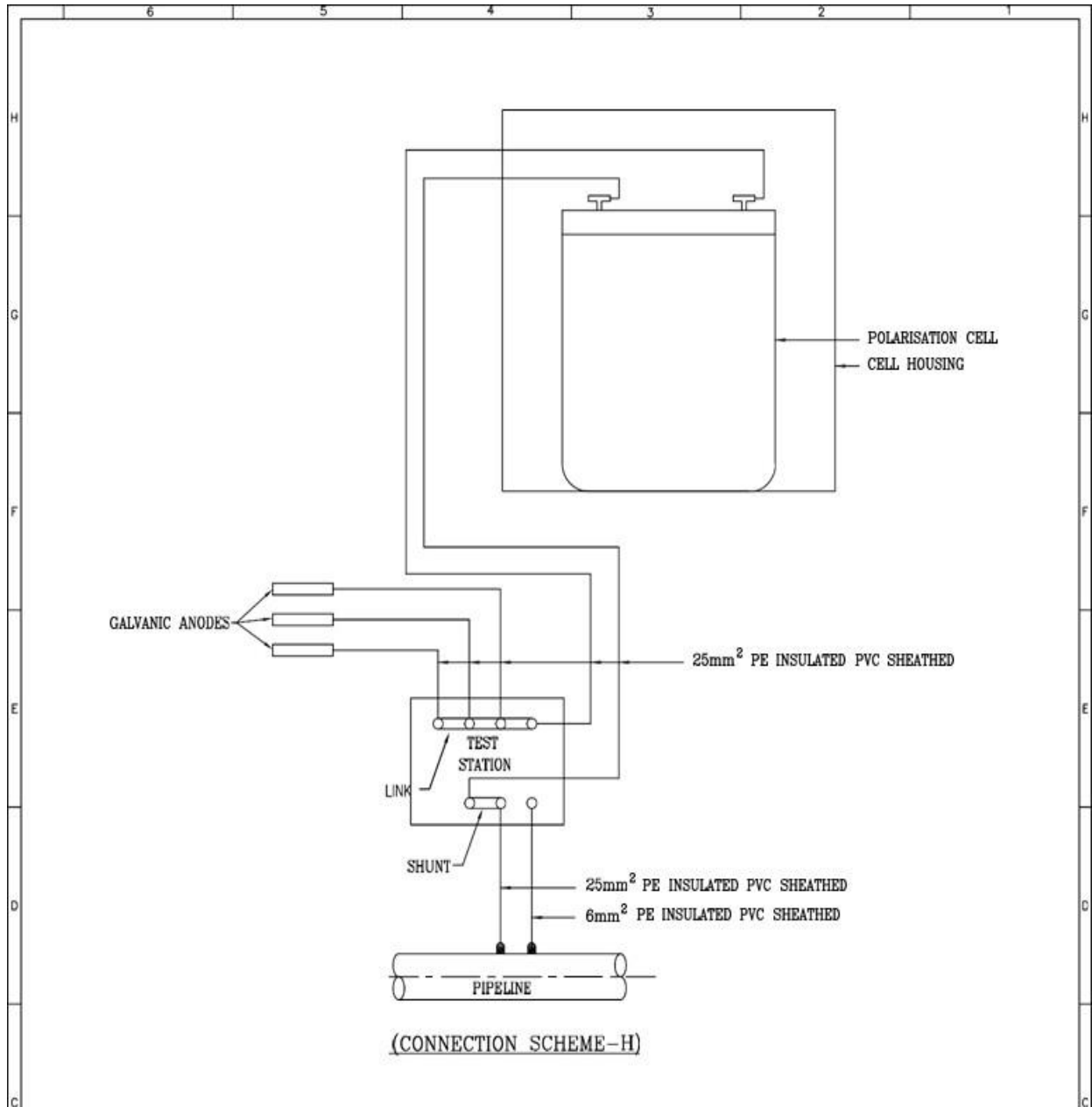


**NOTES:-**

1. THE POLARISATION CELL, ANODES, CABLE, CABLE JOINT ETC. SHALL MINIMUM BE RATED FOR THE EXPECTED FAULT CURRENT AT THE LOCATION OF THE INSTALLATION & SIZED FOR PERMANENT C.P. LIFE.
2. ANODE TAIL CABLES OF EACH ANODE SHALL BE TERMINATED INDIVIDUALLY IN TEST STATION.
3. CONTRACTOR SHALL FURNISHED DRAWING WITH ACTUAL DIMENSIONS & RATING.
4. EASY ACCESS TO CELL SHALL BE PROVIDED FOR PERIODIC INSPECTION.
4. EASY ACCESS TO CELL SHALL BE PROVIDED FOR PERIODIC INSPECTION.
5. 20% EXTRA TERMINALS SHALL BE PROVIDED.

01	07.09	05/E9	REVISED & ISSUED	AM	DG		
REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: ELECTRICAL							REPL/SD/05/E9/E/CP/1607,R-1
DSGN	AM	02.09	SS	05.09	 <b>PIPELINE GROUNDING THROUGH POLARISATION CELL &amp; GALVANIC ANODE</b>		Resonance Energy Pvt. Ltd.
DRWN	SJ	02.09					SCALE : N.T.S.
APPROVED							

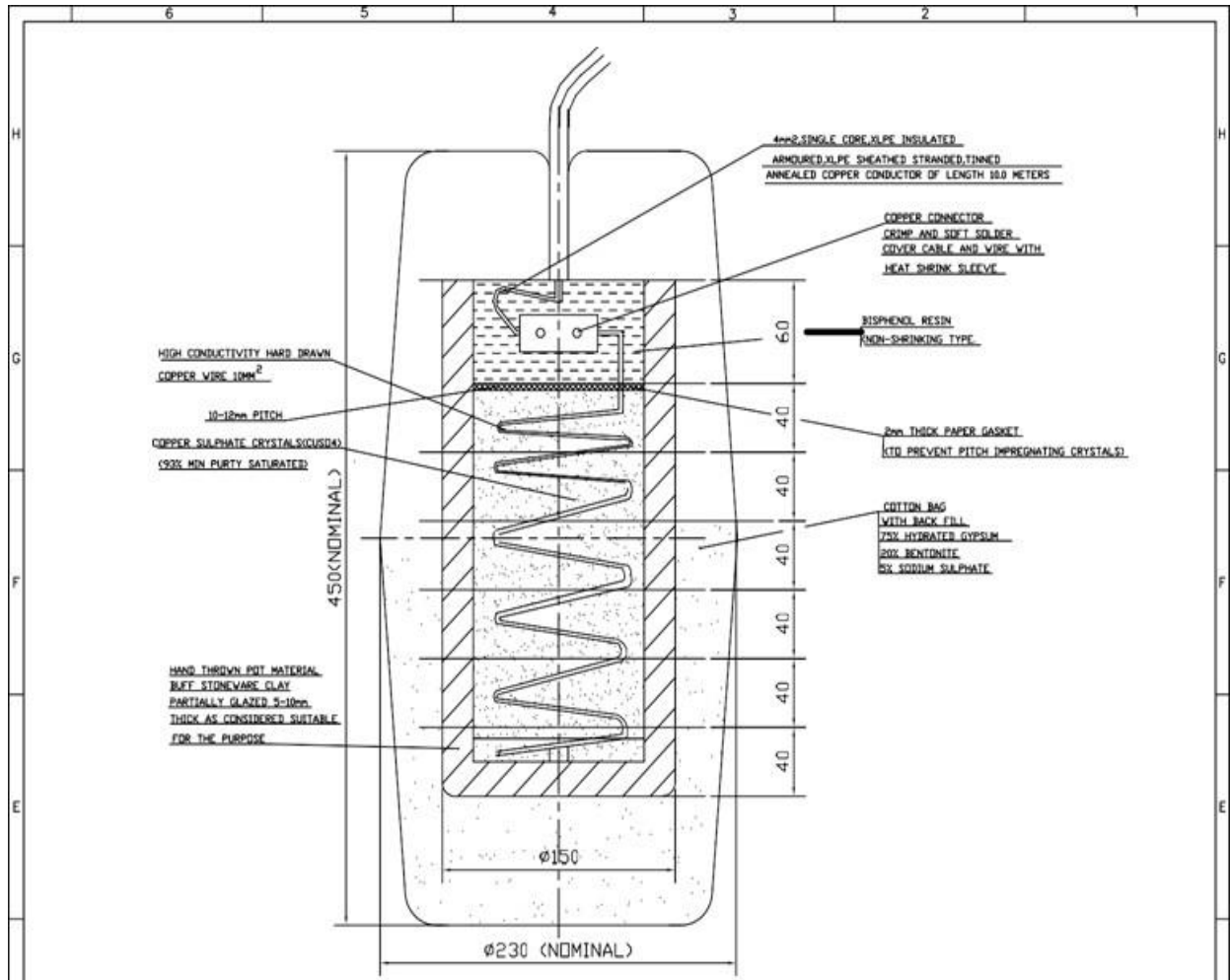




**NOTES:-**

1. THE POLARISATION CELL, ANODES, CABLE, CABLE JOINT ETC. SHALL MINIMUM BE RATED FOR THE EXPECTED FAULT CURRENT AT THE LOCATION OF THE INSTALLATION & SIZED FOR PERMANENT C.P. LIFE.
2. THE POLARISATION CELL SHALL BE HOUSED IN A VANDALLISM PROOF HOUSING.
3. CELL SHALL HAVE GOOD VENTILATION TO ATMOSPHERE & SHALL BE PROTECTED AGAINST DIRECT SUN LIGHT & RAIN/ WATER.
4. ANODE TAIL CABLES OF EACH ANODE SHALL BE TERMINATED INDIVIDUALLY IN TEST STATION.
5. CONTRACTOR SHALL FURNISHED DRAWING WITH ACTUAL DIMENSIONS & RATING.
6. EASY ACCESS TO CELL SHALL BE PROVIDED FOR PERIODIC INSPECTION.
4. 20% EXTRA TERMINALS SHALL BE PROVIDED.

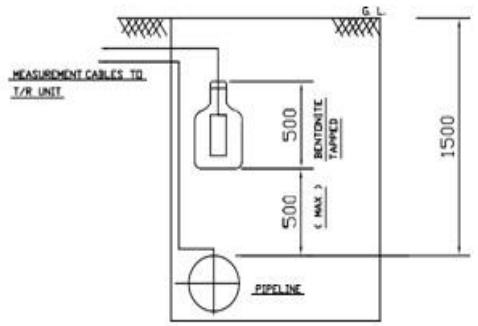
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REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD		
			REVISIONS			REFERENCES	
					DRG. NO.		
SECTION: ELECTRICAL			<b>PIPELINE GROUNDING THROUGH POLARISATION CELL &amp; GALVANIC ANODE</b>		 <b>Resonance Energy</b>	REPL /SD/05/E9/E/CP/1608	
						Resonance Energy Pvt. Ltd.	
						SCALE : N.T.S.	
APPROVED					SHEET	REV	
					1 OF 2	1	



REF. CELL WEIGHT - 9.0 kg (APPROX )  
 GROSS WEIGHT = 25.0 kg (APPROX )

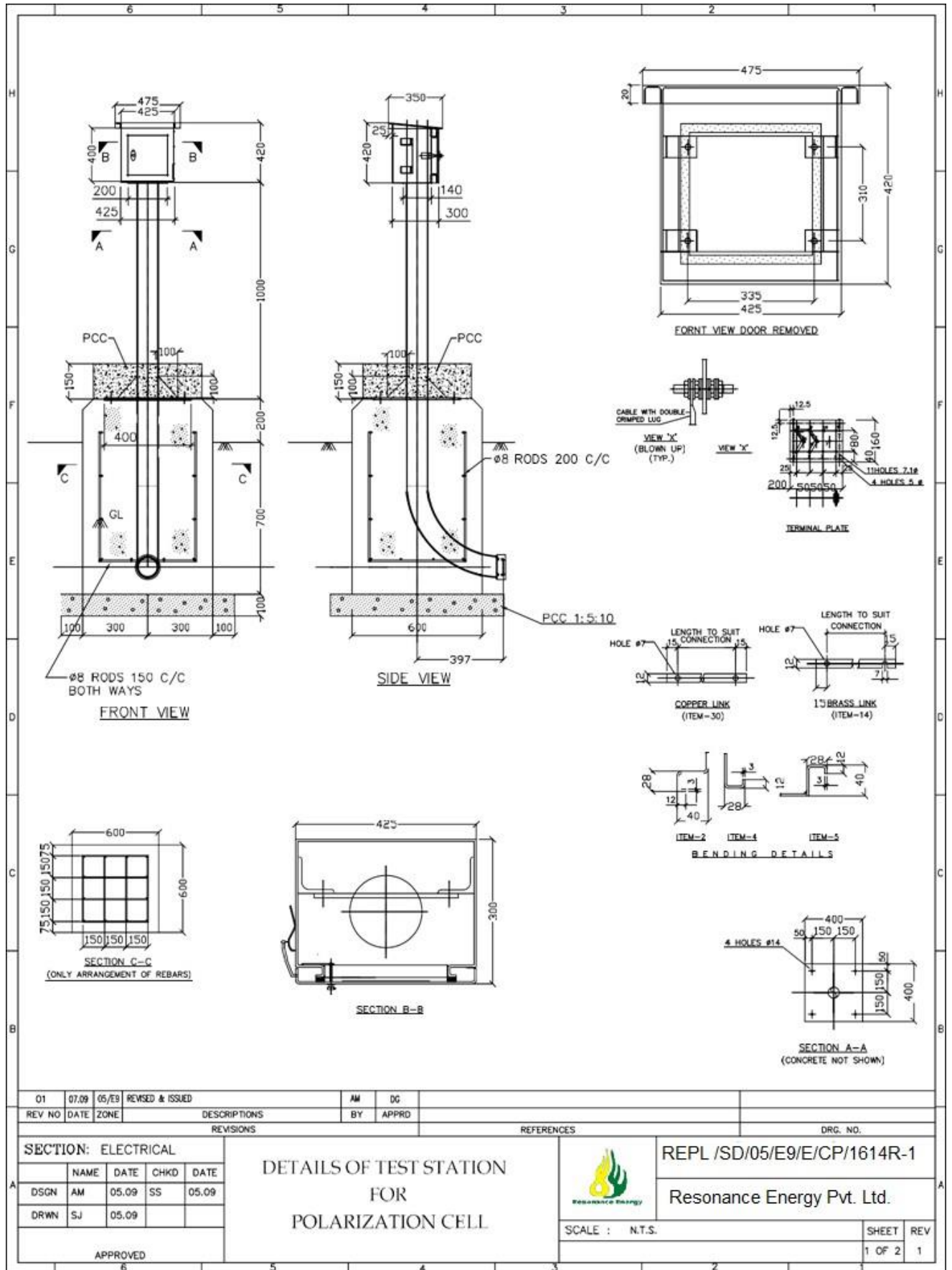
**NOTES**

- (1) THE OVERALL DIMENSIONS ARE FOR GUIDANCE ONLY
- (2) ALL DIMENSIONS ARE IN MM
- (3) REFERENCE CELL SHALL BE BACK FILLED WITH BACK FILL MATERIAL SPECIFIED
- (4) REFERENCE CELL SHALL BE INSTALLED APPROXIMATELY AT 500 mm ( MAX ) ABOVE THE TOP LEVEL OF THE PIPE LINE ALONG WITH COTTON BAG FILLED WITH BACK FILL MATERIAL.
- (5) BACK FILL REFERENCE ELECTRODE SHALL BE SOAKED IN 20 LITERS OF CLEAN FRESH WATER FOR 24 HRS PRIOR TO INSTALLATION.
- (6) REFERENCE CELL CABLE SHALL BE ROUTED ALONG THE TOP OF THE CARRIER PIPE LINE BY SECURELY STRAPPING IT WITH ADHESIVE TAPE AT APPROXIMATELY 3 M INTERVALS.
- (7) CALLIBRATION OF REFERENCE CELL w.r.t. STANDARD Cu/CuSO4 CELL TO BE MADE PRIOR TO INSTALLATION.



REFERENCE : ELECTRODE INSTALLATION.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRO	REFERENCES	DRG. NO.
SECTION: P&P/D NAME DATE CHKD DATE DSGN DRWN APPROVED							
PREPACKAGED PERMANENT REF. ELECTRODE (Cu/CuSO4 TYPE) & INSTALLATION DETAILS						REPL/SD/05/62/16/10 Resonance Energy Pvt. Ltd.	
SCALE : N.T.S.						REV 0	



01 07.09 05/E9 REVISED & ISSUED

REV NO DATE ZONE

DESCRIPTIONS

AM DG  
BY APPRD

REFERENCES

DRG. NO.

SECTION: ELECTRICAL

DETAILS OF TEST STATION  
FOR  
POLARIZATION CELL



REPL /SD/05/E9/E/CP/1614R-1

Resonance Energy Pvt. Ltd.

NAME	DATE	CHKD	DATE
DSGN AM	05.09	SS	05.09
DRWN SJ	05.09		

APPROVED


SCALE : N.T.S.

SHEET REV  
1 OF 2 1

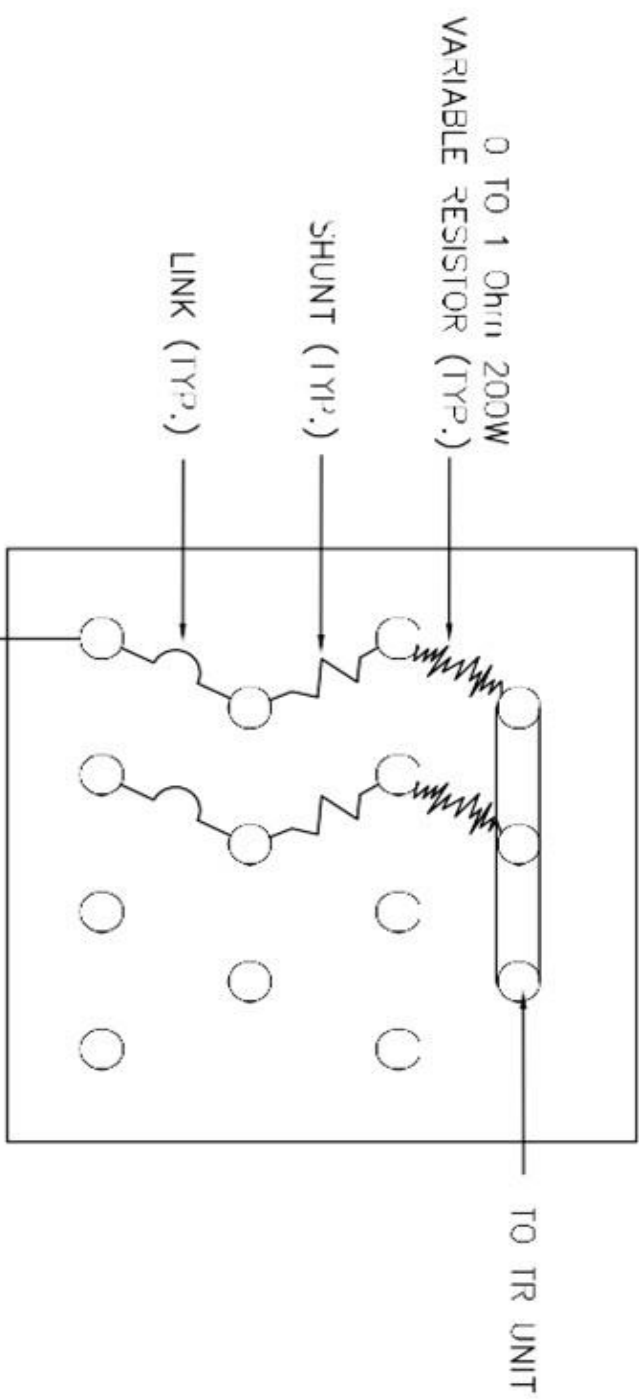
**NOTES:-**

1. TEST STATION SHALL HAVE WEATHERPROOF ENCLOSURE HAVING DEGREE OF PROTECTION IP-55, AS DEFINED IN IEC-529(1989)/ IS:2147 (1962) THE SHUTTER SHALL BE HINGED TYPE WITH CONCEALED LOCK AND SHALL HAVE DOOR GASKET.
2. THE HINGES SHALL BE WELDED TO THE SHUTTER AND THE BOX SUITABLY.
3. THE MS ANGLES SHALL BE WELDED TO THE SIDES. THE ANGLES SHALL HAVE TAPPED HOLES FOR FIXING TERMINAL PLATE.
4. THE INNER SURFACE OF THE TEST STATION SHALL BE PAINTED WITH LEAD OXIDE PRIMER GRADE.
5. THE OUTSIDE OF THE TEST STATION SHALL BE PAINTED WITH TWO COATS OF ZINC RED EPOXY PRIMER AND THREE COATS OF GREY COLOURED EPOXY PAINT COMPLETE WITH CABLE PIPE & FDN. PLATE.
6. THE NAME PLATE SHALL BE OF ANODISED ALUMINIUM WITH BLACK BACKGROUND AND WHITE LETTERS (SIZE 3mm). THE NAME PLATE SHALL BE FIXED TO INNER SIDE OF SHUTTER BY ARALDITE OR EQUIVALENT.
7. THE NAME PLATE OF EACH TEST STATION SHALL CARRY THE FOLLOWING INFORMATION.
  - A) TEST STATION CONNECTION SCHEME TYPE
  - B) RELEVANT TEST STATION CONNECTION SCHEME DIAGRAM
  - C) TEST STATION NO.
  - D) CHAINAGE IN KM
  - E) DISTANCE FROM PIPE IN m
  - F) DIRECTION OF GAS FLOW
8. WHEN ERECTED, THE TEST STATION SHALL BE IN UPRIGHT POSITION.
9. TEST STATION SHALL BE SO ERECTED AS TO SERVE ALSO AS PIPELINE MARKER. AND ANODE GROUNDBED MARKER. THEIR SHUTTERS SHALL BE PARALLEL TO THE LINE OF AXIS OF PIPELINE AND FACING IT.
10. THE NUMBER OF ALL TEST STATIONS SHALL BE WRITTEN WITH BLACK PAINT USING 40 mm STENCIL BLOCK ON THE OUTER SIDE OF THE SHUTTER IN A UNIFORM MANNER. AN ARROW SHOWING DIRECTION OF FLOW OF GAS SHALL BE MARKED TO UNDERLINE THE TEST STATION NUMBER ON SHUTTER.
11. HEIGHT OF THE TEST STATION ABOVE GROUND LEVEL SHOWN IN THE DRAWING IS TYPICAL.
12. ALL CABLES COMING TO TEST STATION SHALL BE LABELLED ON BOTH ENDS WITH IDENTIFICATION NUMBERS
13. TOTAL NUMBER OF TEST STATIONS AND THEIR TYPES ARE MENTIONED IN CONSOLIDATED B.O.M.
14. TEST BETWEEN BRASS TERMINALS AND BODY AT 2kv FOR ONE MINUTE.
15. ALL DIMENSIONS ARE APPROXIMATE AND CAN VARY SLIGHTLY.
16. ALL DIMENSIONS ARE IN mm.
17. THE ENTRY SHALL BE SEALED WITH BITUIMEN COMPOUND AFTER CABLE LAYING TO PREVENT WATER ENTRY.

VARIABLE RESISTANCE 0-0.1  
 100 MM Ø M.S. SCH.40 90°  
 BINDING WIRE, MS  
 PCC MIX, 1:5:10  
 RCC MIX, M20  
 ROD, 8Ø MS  
 STIFFENER PLATE, 8THK.  
 FOUNDATION BOLT M12  
 RUBBER BUSH MATCHING WITH PIPE  
 FOUNDATION PLATE, 6THK x 400 x 400 MS  
 NEOPRENE RUBBER GASKET, 6THK.  
 MS PIPE, 100 Ø, IS: 1239 PT.1(1990)-HEAVY GRADE  
 COUPLING PLATE, 5THK x 180 x 130 MS PLATE, 100Ø HOLE AT CENTRE  
 LATCH FOR SHUTTER  
 BRASS SCREW, M6x16  
 ANGLE, 5THK. x 50 x 50 x 30  
 SHUNT, 0.1 OHM, 0.5 A, 50 mV  
 COPPER LINK, 2.5 THK. x 12 x LENG - AS REQD.  
 BRASS WASHER  
 NUT, M6  
 BRASS STUD, ~~M6 x 50~~  
 TERMINAL PLATE, 6THK x 160 x 200 PHENOLIC LAM. SHT  
 HINGE FOR SHUTTER  
 CASTLE LOCK WITH ONE KEY PER TEST STATION  
 NAME PLATE, 0.9THK x 120 x 160 ANODISED ALUMINIUM  
 SHUTTER, 3mm THK MS SHT  
 TOP, 475 x 350 x 3mm THK. MS SHT  
 SIDE PLATE 300 x 420 x 300 x 400 x 3mm THK MS SHT  
 REAR PLATE 425 x 420 x 3mm THK. MS SHT  
 BOTTOM PLATE, 250 x 175 x 3mm THK MS PLATE, 100Ø HOLE AT CENTRE  
 D=SCR P ON  
**BILL MATERIALS**

01	07.09	05/E9	REVISED & ISSUED	AM	DG		
REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD		
REVISIONS				REFERENCES		DRG. NO.	
SECTION: ELECTRICAL			DETAILS OF TEST STATION FOR POLARISATION CELL			 REPL /SD/05/E9/E/CP/1614R-1 Resonance Energy Pvt. Ltd.	
DSGN	AM	05.09					SS
DRWN	SJ	05.09					
APPROVED						SCALE : N.T.S.	
					REV 1		


### CATHODE JUNCTION BOX



REV	DESCRIPTION	DATE

NOTES:

REVNO	DATE	ZONE	DESCRIPTION	BY	CHKD


  
**Resonance Energy Pvt. Ltd.**

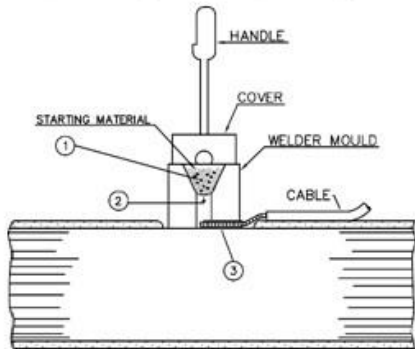
OUR TENDER PURPOSE  
**SIGNATURE :**      **DATE :**  
 REPL/SD/05/E9/E/CP/1616

SECTION : O&L  
 LOCATION : DELHI  
 PROJECT : MAHESH MOYAL  
 DRAWN : SUNNY  
 CHECKED : S.S.  
 DATE : 05/05/2016

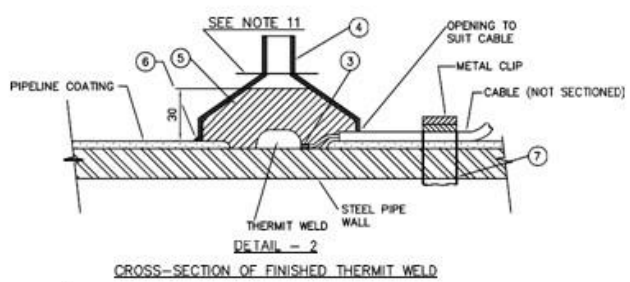
CONNECTION SCHEME FOR  
 TAPPING THROUGH C.B.T. STATION

SCALE : 1:1  
 DRG. NO. : MEG/SD/05/05/CP/1616

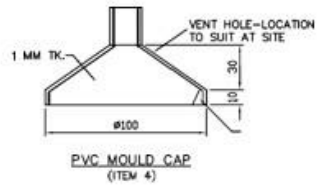
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 RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM RESONANCE  
 ENERGY.



DETAIL - 1  
WELDER-CABLE ASSEMBLY



DETAIL - 2  
CROSS-SECTION OF FINISHED THERMIT WELD



7	PLASTIC STRAPPING BAND, 12 WIDE WITH METALLIC CLIP	AS REQD.
6	12 WIDE PROTECTIVE ADHESIVE TAP: OR M-SEA COMPOUND	AS REQD.
5	EPOXY COATING COMPOUND WITH HARDENER	AS REQD.
4	PVC MOULD CAP	1
3	COPPER SLEEVE, ID 5 x OD 6	1
2	METAL DISC	1
1	THERMIT WELD CHARGE	1
ITEM NO.	DESCRIPTION	QTY.

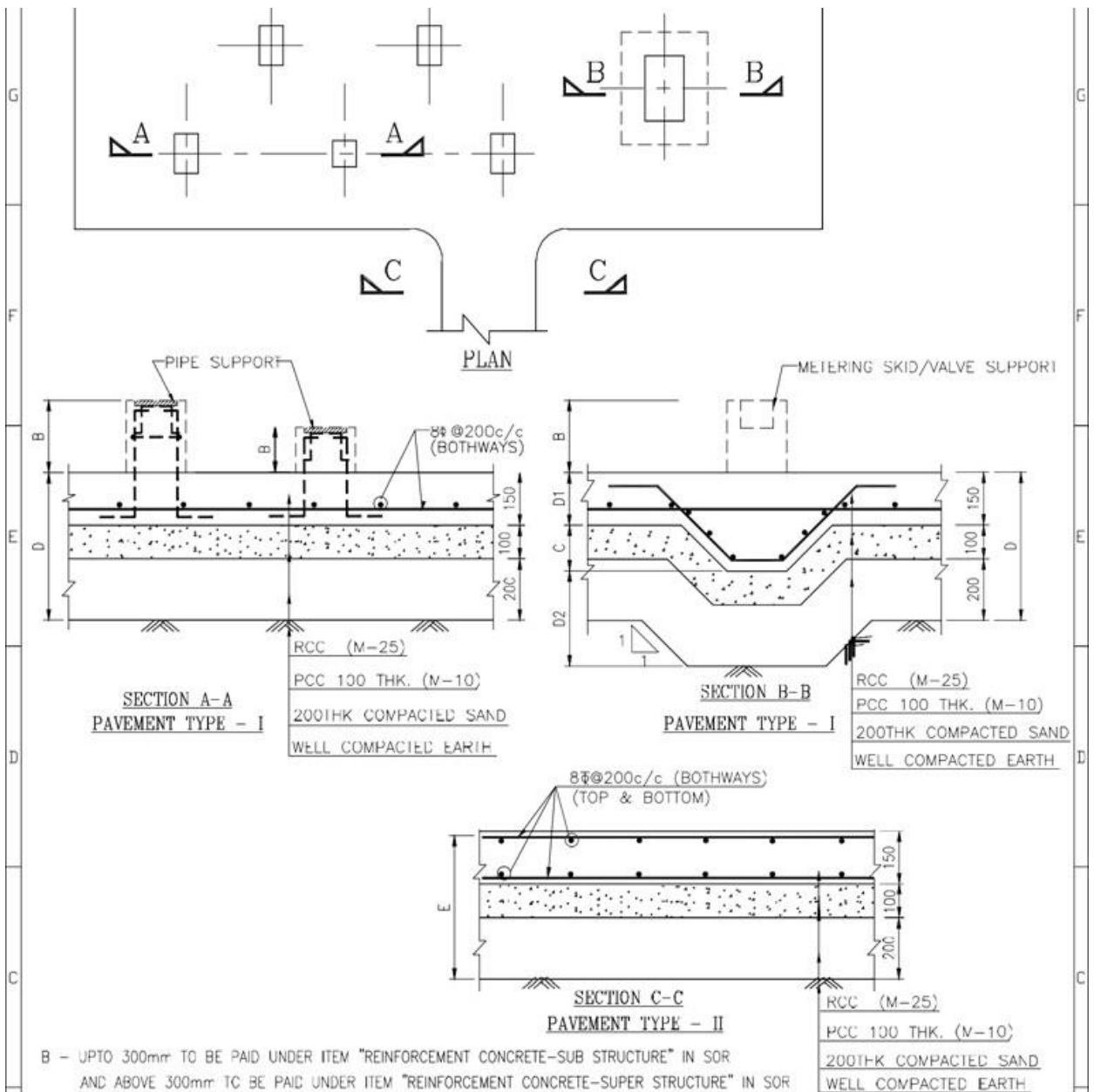
BILL OF MATERIALS

NOTES:-

- REMOVE PIPELINE COATING 45mm X 65mm OR ANY SUITABLE SIZE AS REQUIRED WITH A CUTTING TOOL HAVING CUTTING SURFACE CONTOUR MATCHING THAT OF THE PIPE. EXPOSED AREA OF PIPELINE SHALL BE CLEANED WITH FILE TO BRIGHT STEEL, FREE OF RUST, PAINT, DIRT, GREASE AND MOISTURE.
- REMOVE APPROXIMATELY 40mm OF INSULATION FROM END OF CABLE. INSTALL COPPER SLEEVE TO SUIT THE CABLE.
- HOLD MOULD IN A VERTICAL POSITION AND INSERT METAL DISC IN THE BOTTOM OF THE MOULD CAVITY.
- DUMP THERMIT WELD CHARGE WEIGHING 15g MAX. OR AS SPECIFIED BY MANUFACTURER INTO MOULD, BEING CAREFUL NOT TO UPSET THE METAL DISC. TAP THE MOULD TO LOOSEN STARTING MATERIAL.
- POSITION WELDER OVER EXPOSED AREA OF PIPELINE AND INSERT CABLE UNDER MOULD. PACK CABLE AND MOULD WITH PACKING MATERIAL, IF NECESSARY.
- PLACE IGNITOR AT OPENING OF MOULD AND APPLY SPARK WHICH WILL IGNITE WELD CHARGE. WITHDRAW IGNITOR QUICKLY TO PREVENT FOULING.
- AFTER WELDER HAS BEEN IGNITED, HOLD WELDER IN PLACE FOR 15 SECONDS. THEN REMOVE WELDER.
- LIGHTLY TAP THERMIT WELD WITH HAMMER TO REMOVE SLAG AND TEST WELD FOR GOOD BOND. CLEAN THE WELD.
- REMAKE THE THERMIT WELD, IF FOUND DEFECTIVE.
- PLACE PVC MOULD CAP OVER THE THERMIT WELD. SEAL CAP WITH ADHESIVE TAPE AROUND PVC MOULD. FILL THE MOULD WITH EPOXY COATING COMPOUND.
- CUT OFF THE STEM OF PVC MOULD CAP.
- ANY OTHER SUITABLE COATING MATERIAL TO COVER THERMIT WELD AND ALL EXPOSED COPPER WITHOUT ANY VOID MAY BE USED IN PLACE OF ITEMS 4, 5 & 6 OF BILL OF MATERIALS. THE COATING PATCH MUST OVERLAP EXISTING PIPELINE COATING AND INSULATION ON WIRE.
- ALL DIMENSIONS ARE APPROXIMATE AND CAN VARY SLIGHTLY.
- ALL DIMENSIONS ARE IN mm.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPROD	REFERENCES	DRG. NO.
01	07.09	05/E9	REVISED & ISSUED	AM	DC		
SECTION: ELECTRICAL							REPL /SD/05/E9/E/CP/1618
DSGN	AM	05.09	SS	06.09	DETAILS OF THERMIT WELD FOR CABLE TO PIPE JOINT		Resonance Energy Pvt. Ltd.
DRWN	SJ	05.09			SCALE : N.T.S.		REV 1
APPROVED							

# **CIVIL DRAWINGS**



B - UPTO 300mm TO BE PAID UNDER ITEM "REINFORCEMENT CONCRETE-SUB STRUCTURE" IN SOR AND ABOVE 300mm TO BE PAID UNDER ITEM "REINFORCEMENT CONCRETE-SUPER STRUCTURE" IN SOR

C - TC BE MEASURED AND PAID UNDER ITEM "REINFORCED CEMENT CONCRETE" IN SUB STRUCTURE

D, (D1+D2) - TO BE MEASURED AND PAID UNDER ITEM "CONCRETE PAVEMENT"

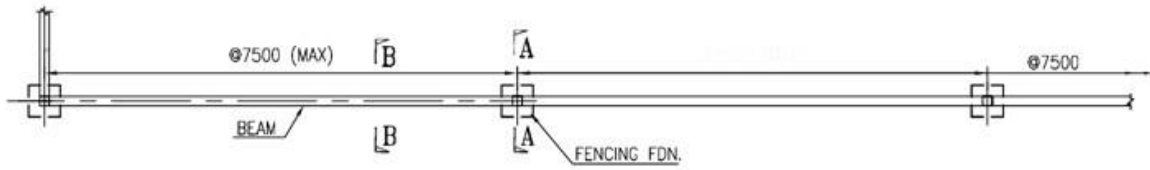
E - TC BE MEASURED AND PAID UNDER ITEM "CONCRETE PAVEMENT"

- NOTES:-
1. CASTING OF PAVEMENT TO BE DONE IN PANELS (>5x3m) & JOINTS BE FILLED WITH APPROVED GR. BITUMENIOUS FILLER COMPOUND.
  2. PAVEMENT TYPE-I TO BE USED IN EQUIPMENT/ PIPE SUPPORTS AREA.
  3. PAVEMENT TYPE-II TO BE USED FOR WALKWAY.

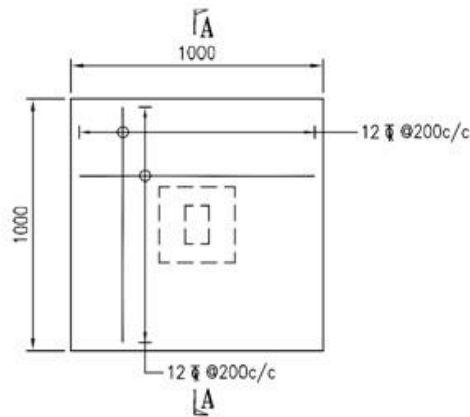
FOR TENDER PURPOSE ONLY

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
			REVISIONS			REFERENCES	DRG. NO.
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SECTION A	CIVIL			CIVIL STANDARD FOR TERMINALS			
	NAME	SIG.	DATE	 REPL /05/11/STD/TERMINAL/002 Resonance Energy Pvt. Ltd. SCALE : N/S REV			
	DSGN.	RA					
	DRWN.	MINJ					
CHKD. & VERIFIED	MKC						

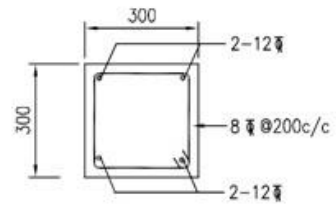




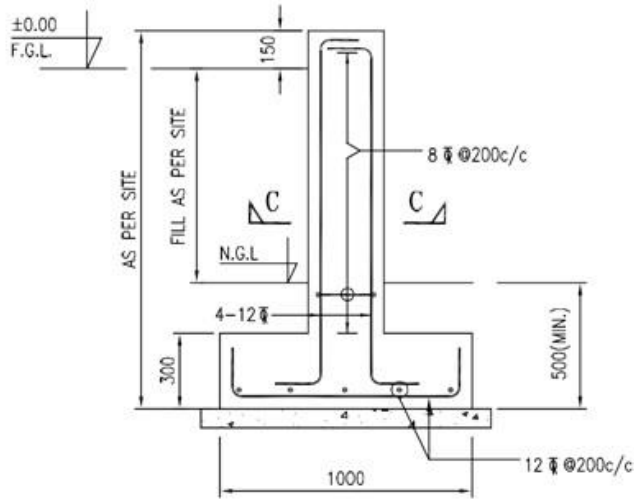
LAYOUT



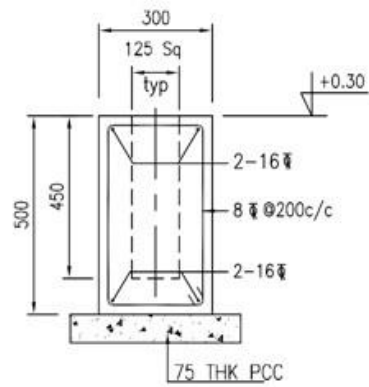
PLAN



SECTION C-C



SECTION A-A



SECTION B-B

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
REVISIONS							
REFERENCES							

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SECTION	CIVIL		
	NAME	SIG.	DATE
DSGN.	DPN		
DRWN	MINJ		
CHKD. & VERIFIED	HC		

CIVIL STANDARD FOR TERMINALS

TYPICAL DETAILS OF FENCING FOUNDATIONS



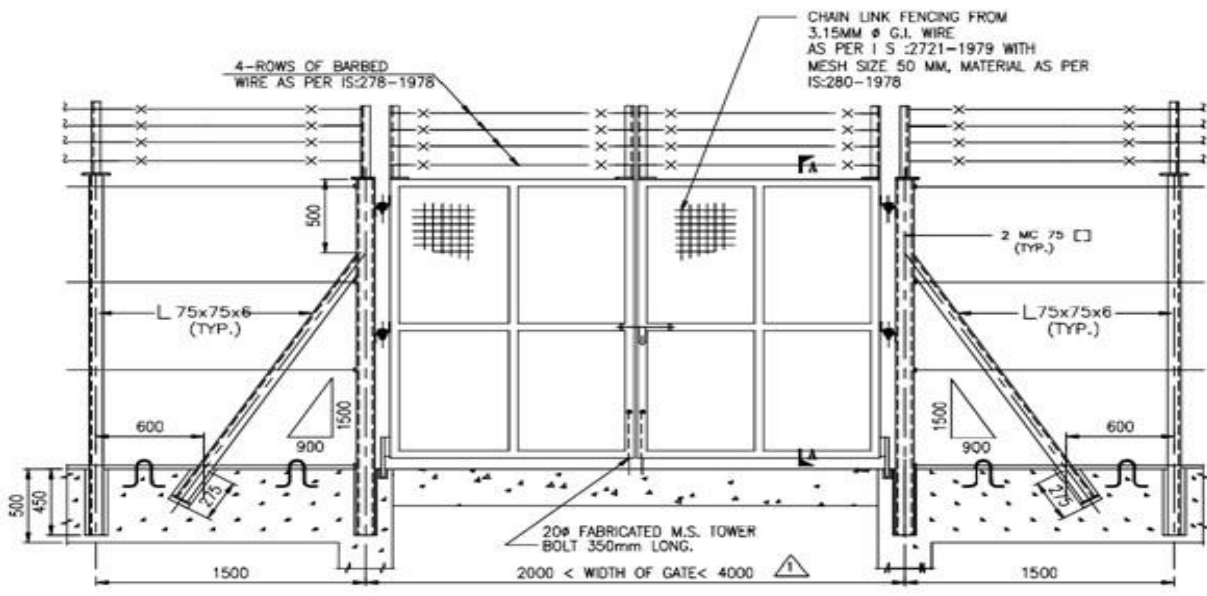
REPL /05/11/C/STD/001

Resonance Energy Pvt. Ltd.

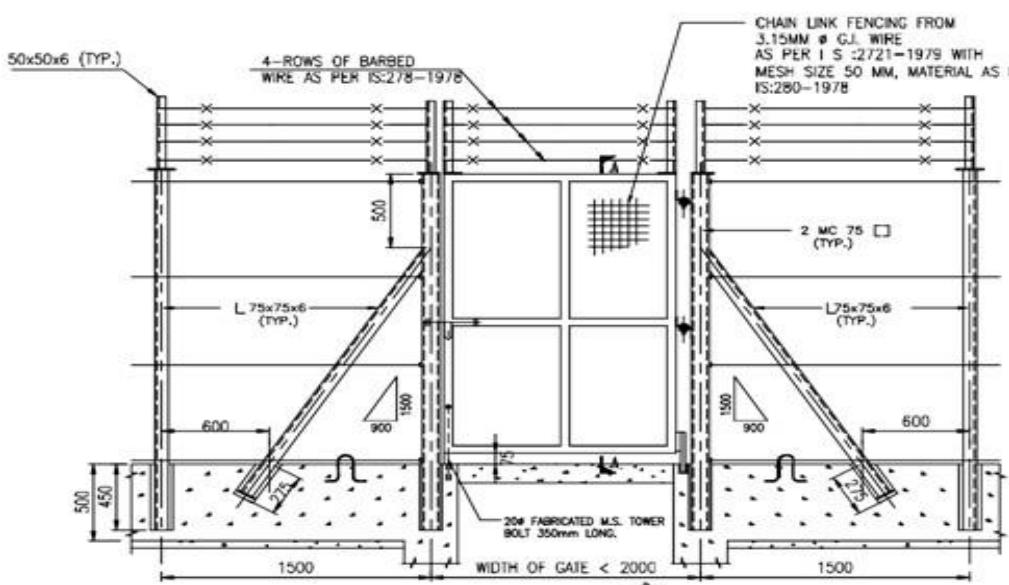
SCALE : NTS

REV 0

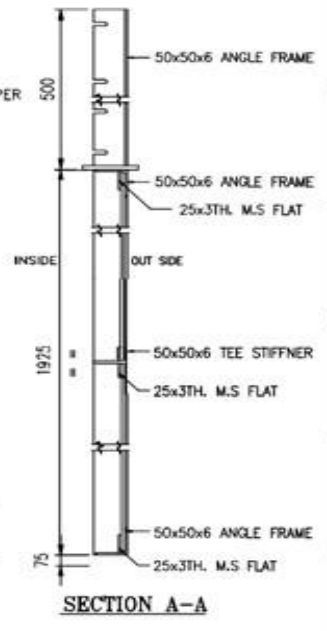
# **STRUCTURAL DRAWINGS**



**GATE DETAIL**



**GATE DETAIL**



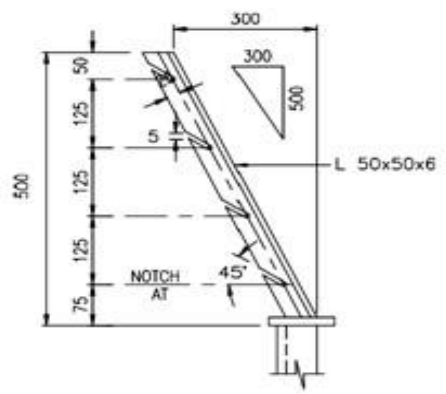
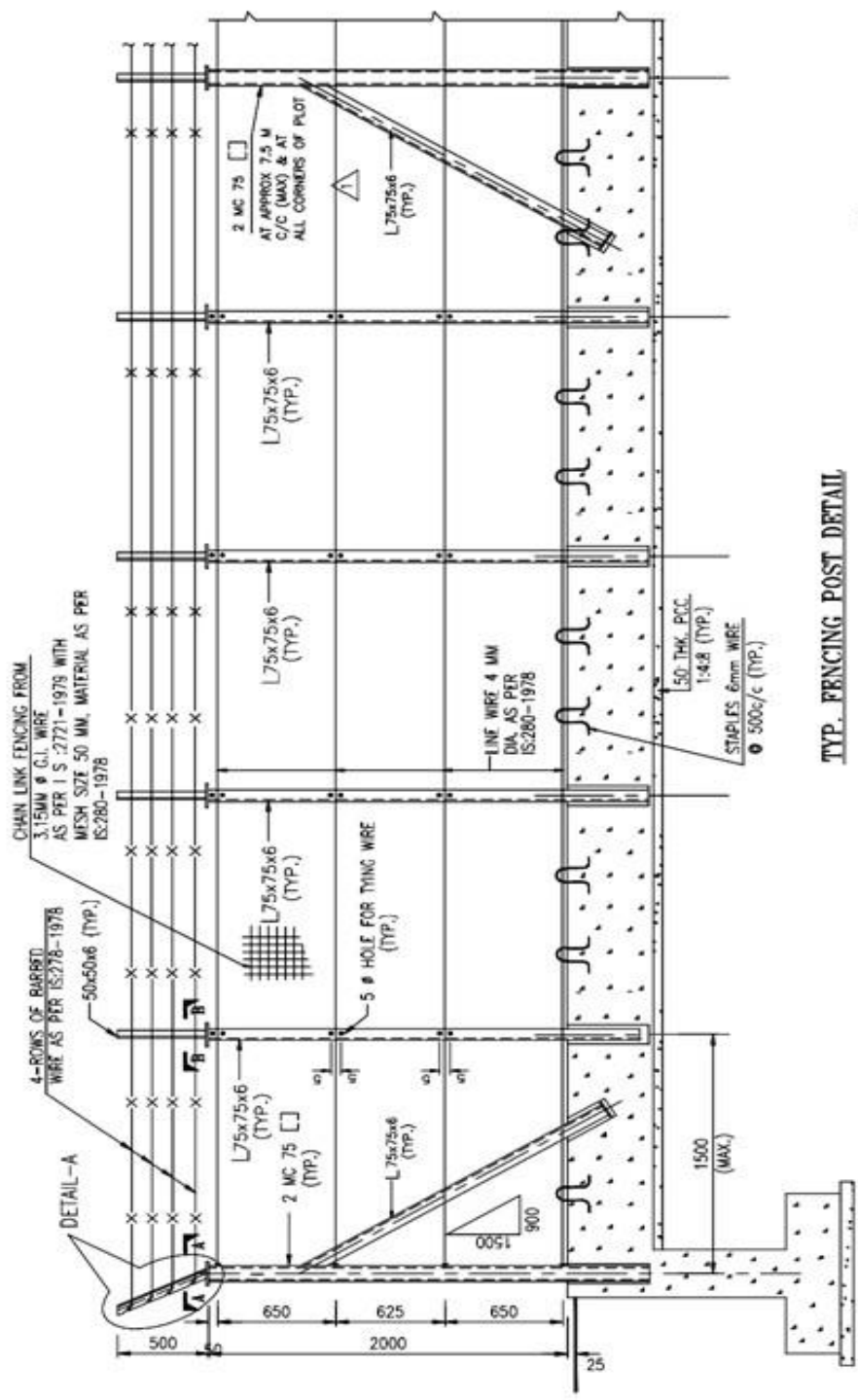
**SECTION A-A**

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
			REVISIONS				
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SECTION		STRUCTURAL (NEW DELHI)				REPL /05/11/C/STD/001	
	NAME	SIG.	DATE			Resonance Energy Pvt. Ltd.	
DSGN.	D. ARYA		07.03.2012			SCALE :	
DRWN	TUSHAR		07.03.2012			REV 0	
CHKD. & VERIFIED	D. ARYA		07.03.2012				
APPROVED	H.CHANDNANI		07.03.2012				

**DETAILS OF FENCING  
SINGLE & DOUBLE LEAF GATE**

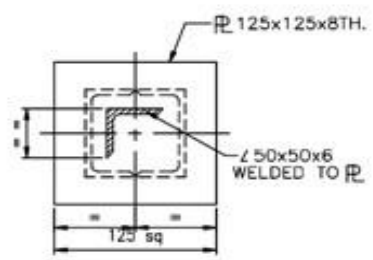


**REPL /05/11/C/STD/001**  
**Resonance Energy Pvt. Ltd.**

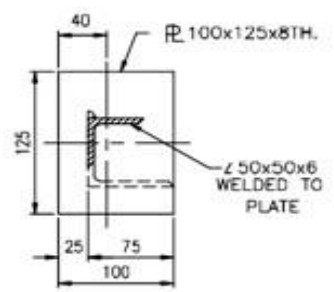


**DETAIL-A**

**TYP. FENCING POST DETAIL**



**SECTION A-A**

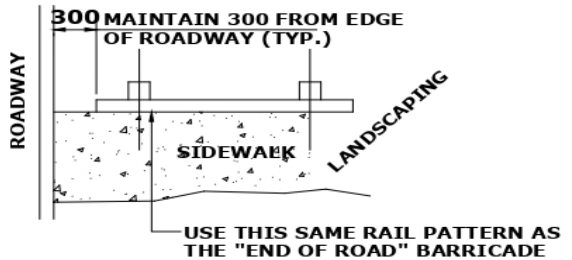
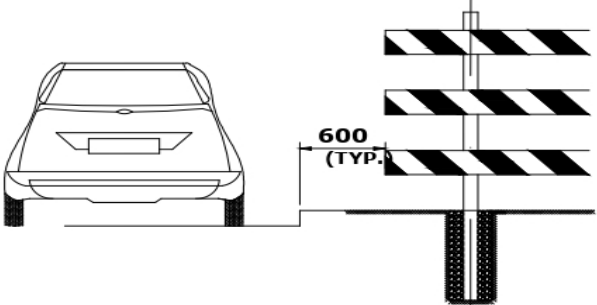


**SECTION B-B**

REV NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
REVISIONS							
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SECTION	STRUCTURAL (NEW DELHI)					REPL /05/11/C/STD/001	
	NAME	SIG.	DATE			Resonance Energy Pvt. Ltd.	
DSGN.	D. ARYA		07.03.2012				
DRWN.	TUSHAR		07.03.2012				
CHKD. & VERIFIED	D. ARYA		07.03.2012				
APPROVED	H.CHANDNANI		07.03.2012				
<b>TYPICAL DETAILS OF CHAINLINK FENCING</b>						SCALE :	REV 0

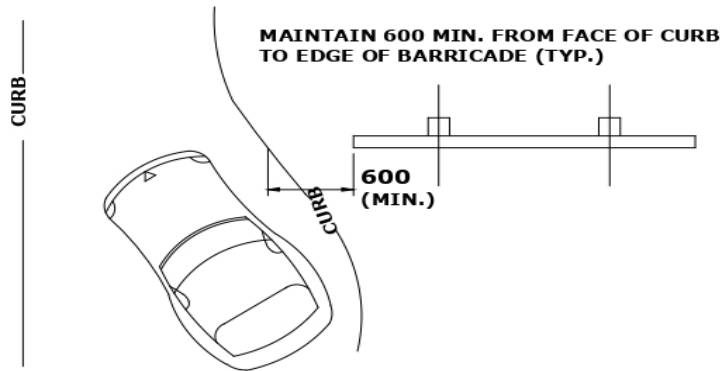
# Hard Barricading

	STANDARD FOR BARRICADES	STANDARD DRAWING NO.		REV.	SIZE
				0	A4
		SHEET NO.	1 OF 1		

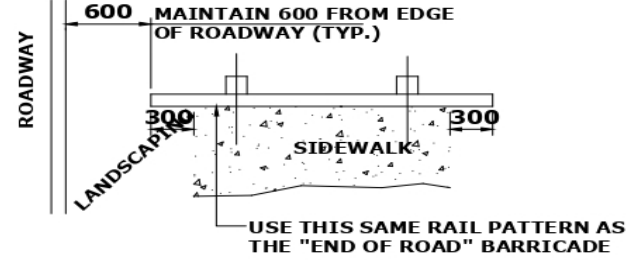


**END OF SIDEWALK ('TYPE B')**

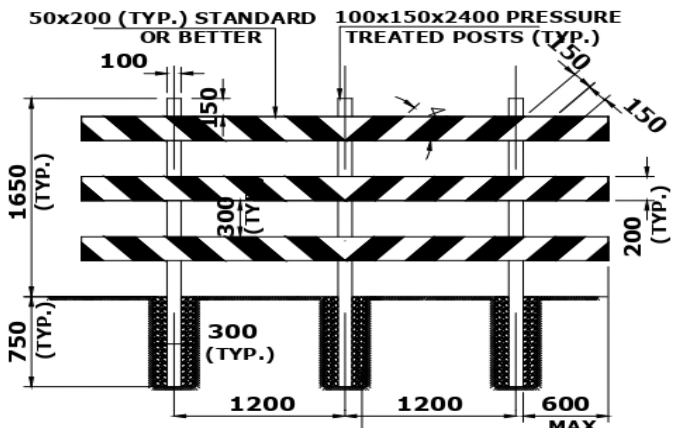
TYPICAL NARROWING OF DRIVING AREA BARRICADE (USW DIMENSIONS BELOW)  
ORIENT DIAGONAL BARS TO CHANNEL TRAFFIC AS SHOWN



**NARROWING OF DRIVING AREA**

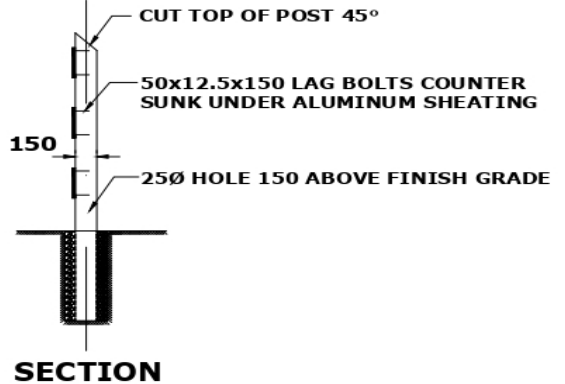


**END OF SIDEWALK ('TYPE A')**



**END OF ROAD BARRICADE**  
(TYPICAL DIMENSIONS AND LAYOUT)

BACKFILL AND COMPACTED WITH 3/4"-0" CRUSHED STONE (TYP.)



**NOTES:-**

- ALL WOOD SHALL BE PAINTED WHITE.
- ALTERNATING RED & WHITE HIGH INTENSITY PRISMATIC 0.80. ALUMINUM SHEATING SHALL BE SCREWED TO THE HORIZONTAL RAILS
- ALL FASTENERS TO BE STAINLESS STEEL OR RUST PROOF HEAVY GALVANIZED
- FOR STREET BARRICADES HORIZONTAL RAIL LENGTH SHALL EQUAL THE DISTANCE BETWEEN THE FACE OF CURB PLUS 600. (EG. 1000 CURB 1600 RAILS).