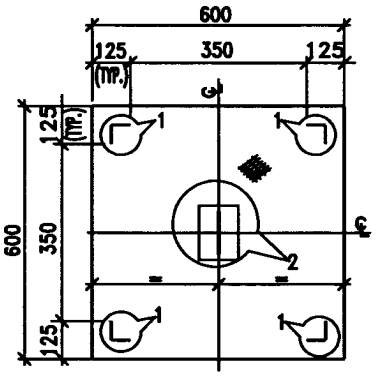
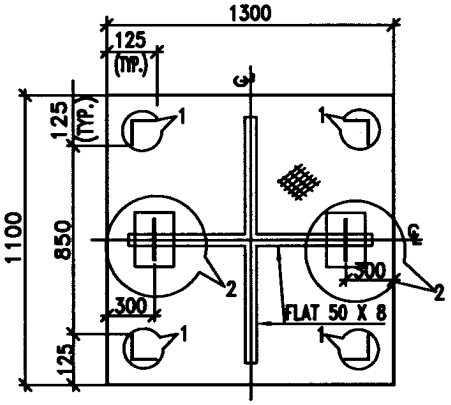


PLAN
FOR VALVE PIT TYPE-I



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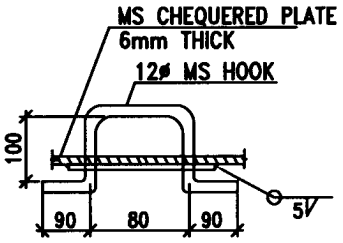
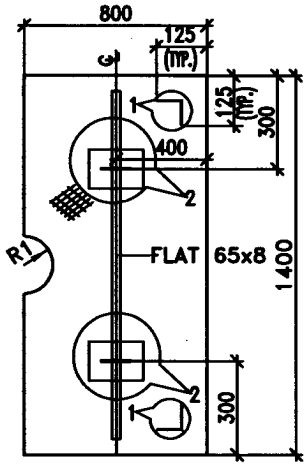
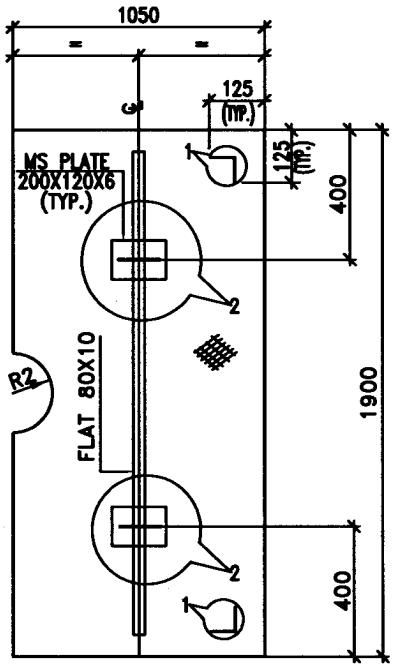
FOR VALVE PIT TYPE-II



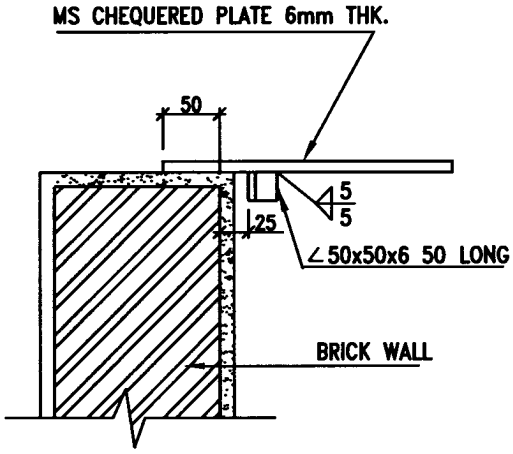
DETAIL -2



PLAN
FOR VALVE PIT TYPE-III
(2.NOS PER VALVE PIT)



PLAN
FOR VALVE PIT TYPE-IV
(2.NOS PER VALVE PIT)



DETAIL - 1

NOTE:-

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. R1 & R2 SHALL BE TO SUIT TO THE SPINDLE SIZE.
3. PAINTING OF MS CHEQUERED PLATE AND OTHER STRUCTURAL ELEMENTS SHALL BE DONE AS PER PAINTING SPEC.
4. MS CHEQUERED PLATE SHALL BE IS 3502.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
3	21.12.20	REVISED AND ISSUED AS STANDARD	ADP	AK	A.SINHA	SM
2	05.06.14	REAFFIRMED AND ISSUED AS STANDARD	ALOK	RKS	RBB	SC

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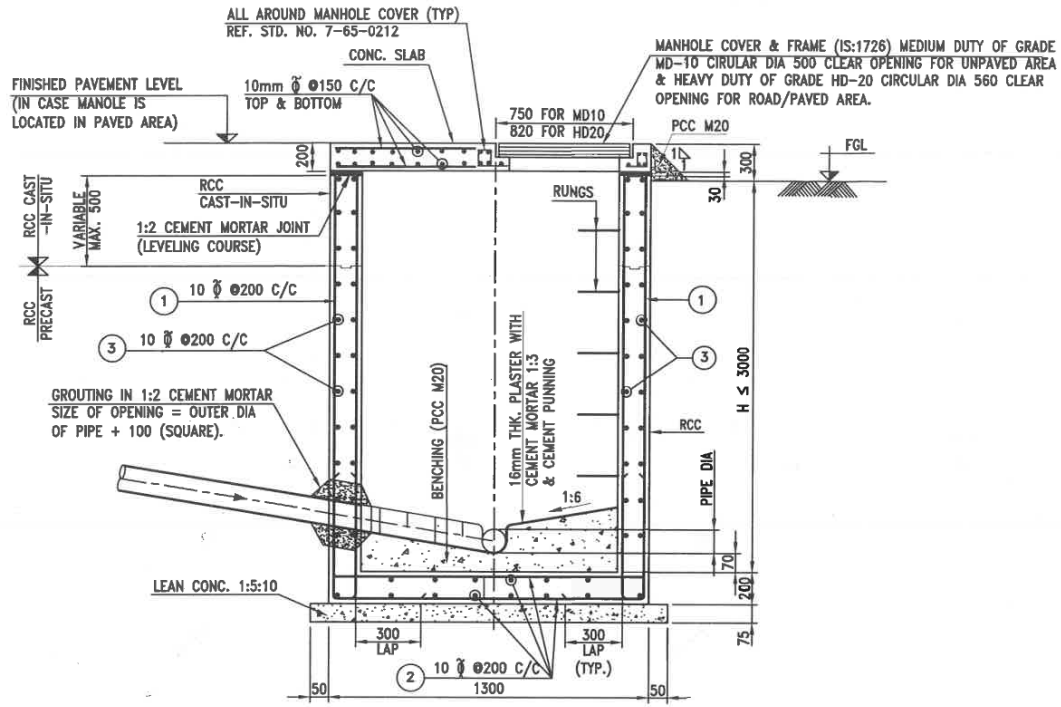
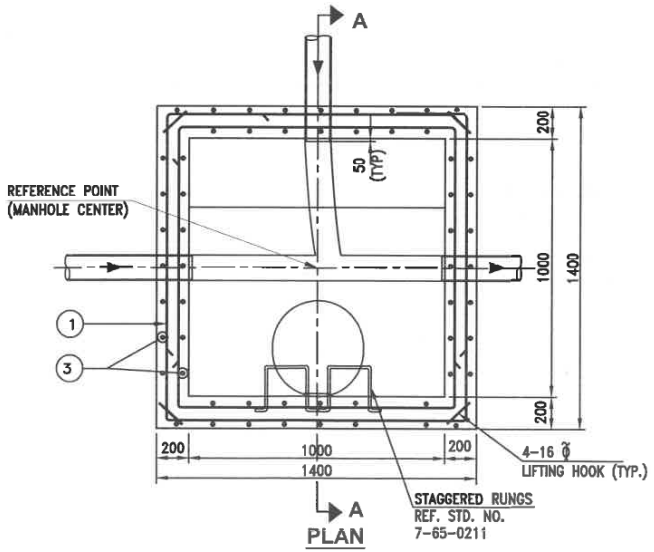
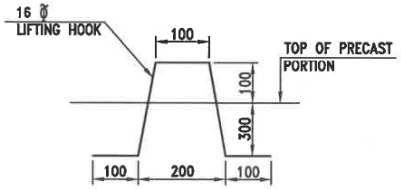


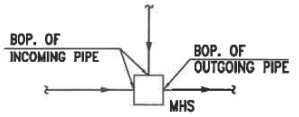
SECTION A-A



PLAN



DETAILS OF LIFTING HOOK



REPRESENTATION ON AREA DRG.

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. REFER STRUCTURAL GENERAL NOTES OF THE PROJECT REINFORCED CONCRETE STRUCTURES FOR THE FOR FOLLOWING :
   a) GRADE OF CONCRETE (MINIMUM M30 GRADE)
   b) GRADE AND TYPE OF CEMENT
   c) REINFORCEMENT STEEL BARS
   d) CLEAR COVER IN R.C.C. WORKS.
   e) ADMIXTURES IN CONCRETE.
3. BAR BENDING SHALL CONFORM TO IS:2502.
4. THIS STANDARD SHALL BE READ ALONG WITH STD. NOS. 7-65-0211 & 7-65-0212,
5. TOP SLAB SHALL BE CAST IN SITU AND REINFORCEMENT ON SIDES OF MANHOLES SHALL BE SUITABLY ADJUSTED AT SITE.
6. PRE-CAST MANHOLE SHALL BE CAST IN HEIGHT 1.0 M, 1.5M, 2.0M & 2.5M AND BALANCE WALL HEIGHT (IF ANY) SHALL BE CAST-IN-SITU CONSTRUCTION. THE LIFTING HOOKS SHALL BE CUT BEFORE PLACEMENT OF COVER SLAB IN CASE IF THE COMPLETE HEIGHT OF THE MANHOLE IS PRECAST.
7. REINFORCEMENT DOWEL SHALL BE LEFT IN UPPER PART OF PRECAST PORTION FOR CONTINUITY IN CAST-IN-SITU PORTION.
8. MINIMUM 4 NOS. OF LIFTING HOOK FOR LIFTING/ERECTION PURPOSE OF PRECAST PORTION SHALL BE PROVIDED. HOWEVER LOCATION & DETAILS OF SUCH LIFTING HOOK SHALL BE FINALIZED SHALL CONTRACTOR WITH RESPECT TO CASTING/ LIFTING/ ERECTION SCHEME ADOPTED BY HIM.
9. REFER GEOTECHNICAL RECOMMENDATIONS OF THE PROJECT FOR SOIL IMPROVEMENTS, IF ANY & FOR PROTECTIVE COATING FOR CONCRETE & R/F, IF ANY.

इंजीनियर्स इंडिया लिमिटेड (भारत सरकार का उपक्रम) ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)	0	03.05.2024	ISSUED AS STANDARD	TP	GYAS	S K NASKAR / M NANDI
	Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor / Stds. Bureau Chairman
						Approved by

PRECAST MANHOLE TYPE-4 (SANITARY WASTE SYSTEM) FOR DEPTH <= 3M

STANDARD No.
7-65-0254 Rev. 0
Page 1 of 1

Format No. 8-00-0001-F5 Rev. 0

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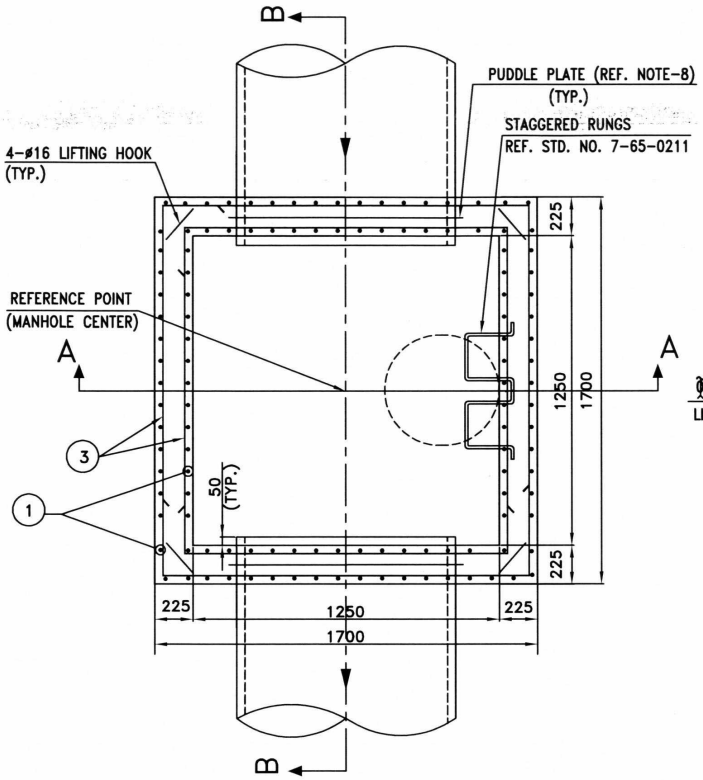
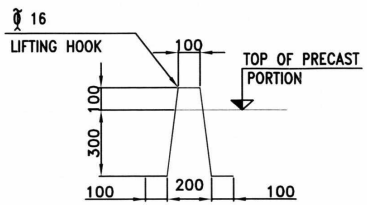
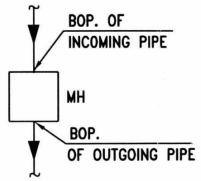


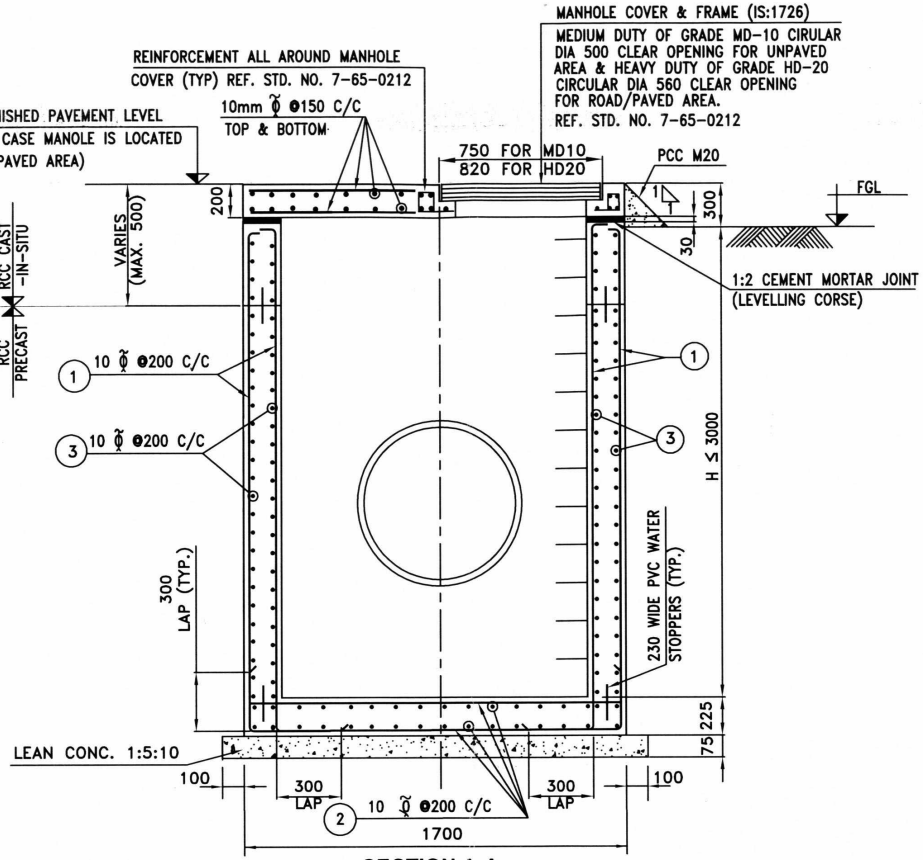
PLAN



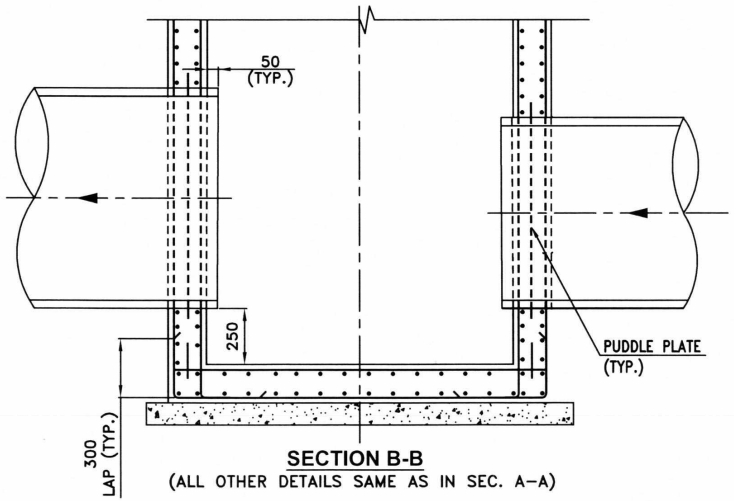
DETAILS OF LIFTING HOOK



REPPRESENTATION ON AREA DRG.



SECTION A-A



SECTION B-B
(ALL OTHER DETAILS SAME AS IN SEC. A-A)

NOTES:

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. REFER STRUCTURAL GENERAL NOTES OF THE PROJECT REINFORCED CONCRETE STRUCTURES FOR THE FOR FOLLOWING :
   a) GRADE OF CONCRETE (MINIMUM M30 GRADE)
   b) GRADE AND TYPE OF CEMENT
   c) REINFORCEMENT STEEL BARS
   d) CLEAR COVER IN R.C.C. WORKS
   e) ADMIXTURES IN CONCRETE
3. BAR BENDING SHALL CONFORM TO IS:2502.
4. THIS STANDARD SHALL BE READ ALONG WITH STD. NOS.7-65-0211, 7-65-0212, 7-65-0230 & 7-68-0630.
5. TOP SLAB SHALL BE CAST IN SITU AND REINFORCEMENT ON SIDES OF MANHOLES SHALL BE SUITABLY ADJUSTED AT SITE.
6. CONSTRUCTION OF MANHOLE SHALL BE LEAK RESISTANT. AS PER IS : 3370.
7. PVC WATER STOPPERS SHALL ALSO BE PROVIDED IN THE CONSTRUCTION JOINTS IN WALLS, IF ANY.
8. REFER STD. NO. 7-68-0630 FOR DETAIL OF PUDDLE PLATE.
9. PRE-CAST MANHOLE SHALL BE CAST IN HEIGHT 1.0 M, 1.5M, 2.0M & 2.5M AND BALANCE WALL HEIGHT (IF ANY) SHALL BE CAST-IN-SITU CONSTRUCTION. THE EXPOSED PORTION OF LIFTING HOOK ABOVE WALL SHALL BE CUT BEFORE PLACEMENT OF COVER SLAB IN CASE IF COMPLETE HEIGHT OF THE MANHOLE IS A PRECAST.
10. REINFORCEMENT DOWEL SHALL BE LEFT IN UPPER PART OF PRECAST PORTION FOR CONTINUITY IN CAST-IN-SITU PORTION.
11. MINIMUM 4 NOS. OF LIFTING HOOK FOR LIFTING/ERECTION PURPOSE OF PRECAST PORTION SHALL BE PROVIDED. HOWEVER LOCATION & DETAILS OF SUCH LIFTING HOOK SHALL BE FINALIZED BY THE CONTRACTOR WITH RESPECT TO CASTING/ LIFTING/ ERECTION SCHEME ADOPTED BY HIM.
12. REFER GEOTECHNICAL RECOMMENDATIONS OF THE PROJECT FOR SOIL IMPROVEMENTS, IF ANY & FOR PROTECTIVE COATING FOR CONCRETE & R/F, IF ANY.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	08.03.24	REVISED & ISSUED AS STANDARD	TP	GYAS	S K NASKAR	M NANDI
5	06.06.18	REVISED & ISSUED AS STANDARD	RP	DCB	RAJAN JI SRIVASTAVA	RK TRIVEDI
					Approved by	

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PRECAST MANHOLE TYPE-6 FOR DEPTH ≤ 3M (Ø ≤ 800)

STANDARD No.
7-65-0256 Rev. 6
Page 1 of 1

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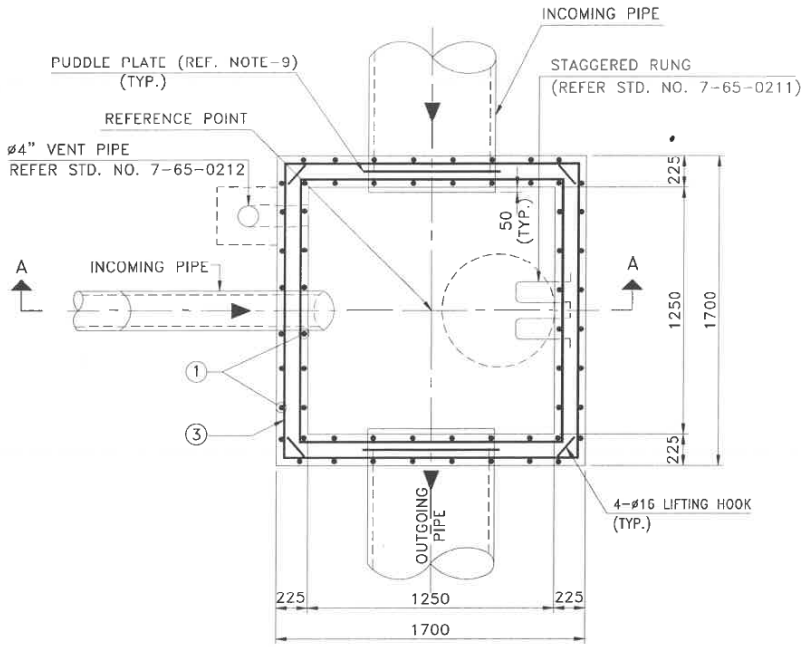
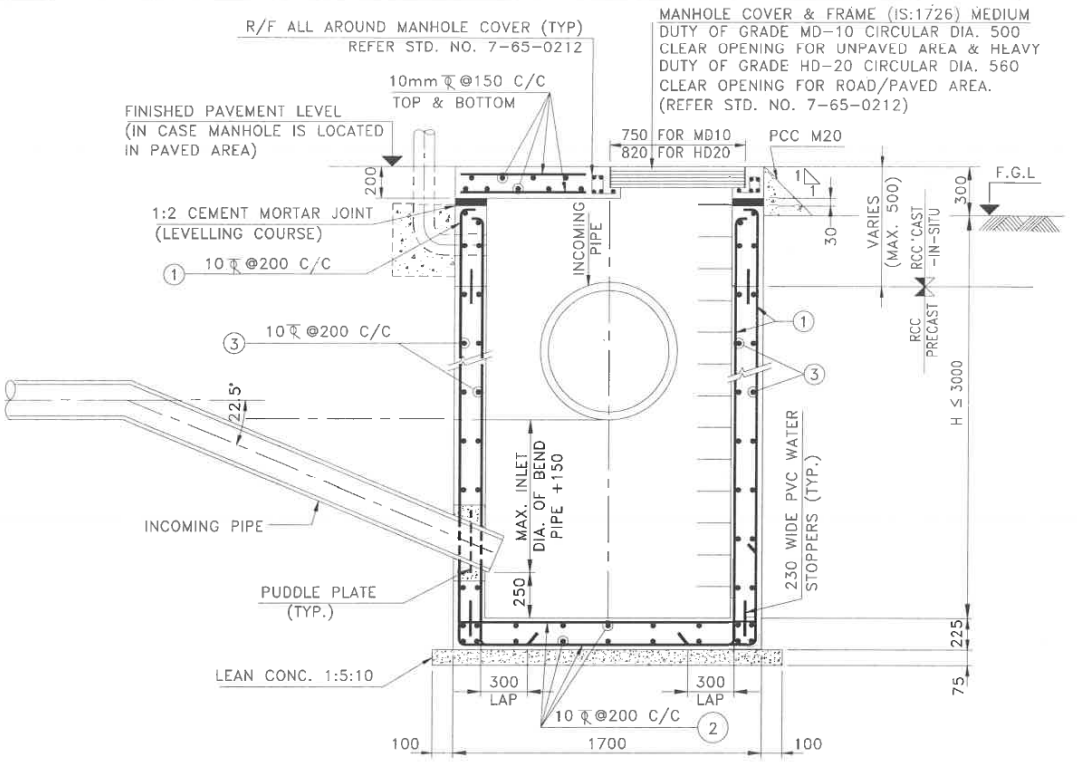
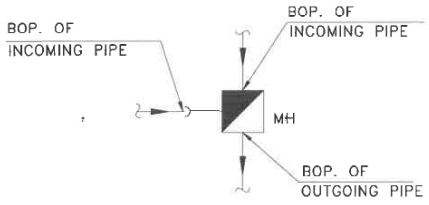


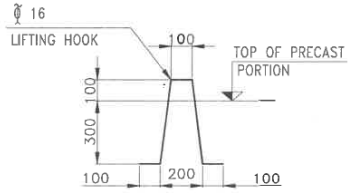
PLAN



SECTION A-A



REPRESENTATION ON AREA DRG.



DETAILS OF LIFTING HOOK

NOTES:-

1. ALL DIMENSSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. REFER STRUCTURAL GENERAL NOTES OF THE PROJECT FOR REINFORCED CONCRETE STRUCTURES FOR THE FOLLOWING :
   a) GRADE OF CONCRETE (MINIMUM M30 GRADE, LEAK RESISTANT AS PER IS:3370)
   b) GRADE AND TYPE OF CEMENT
   c) REINFORCEMENT STEEL BARS
   d) CLEAR COVER IN CONCRETE WORKS.
   e) ADMIXTURES IN CONCRETE.
3. BAR BENDING SHALL CONFORM TO IS:2502.
4. THIS STANDARD SHALL BE READ ALONG WITH STD. NO. 7-65-0211, 7-65-0212, 7-65-0219, 7-65-0230 & 7-68-0630.
5. TOP SLAB SHALL BE CAST IN SITU AND REINFORCEMENT ON WALL SIDE OF MANHOLE OPENING SHALL BE ADJUSTED AT SITE.
6. MAXIMUM DIA OF BEND/ SEALED PIPE WILL BE 400mm (16").
7. CONSTRUCTION OF MANHOLE SHALL BE LEAK RESISTANT AS PER IS:3370 PART-2 (TIGHTNESS CLASS-2)
8. PVC WATER STOPS SHALL ALSO BE PROVIDED IN THE CONSTRUCTION JOINTS IN WALLS, IF ANY.
9. REFER STD. NO. 7-68-0630 FOR DETAIL OF PUDDLE PLATE.
10. PRE-CAST MANHOLE SHALL BE CAST IN HEIGHT 1.0 M, 1.5M, 2.0M & 2.5M AND BALANCE WALL HEIGHT (IF ANY) SHALL BE CAST-IN-SITU CONSTRUCTION. THE EXPOSED PORTION OF LIFTING HOOKS ABOVE WALL SHALL BE CUT BEFORE PLACEMENT OF COVER SLAB IN CASE IF COMPLETE HEIGHT OF THE MANHOLE IS A PRECAST.
11. REINFORCEMENT DOWEL SHALL BE LEFT IN UPPER PART OF PRECAST PORTION FOR CONTINUITY IN CAST-IN-SITU PORTION.
12. MINIMUM 4 NOS. OF LIFTING HOOK FOR LIFTING/ERECTION PURPOSE OF PRECAST PORTION SHALL BE PROVIDED. HOWEVER LOCATION & DETAILS OF SUCH LIFTING HOOK SHALL BE FINALIZED BY THE CONTRACTOR WITH RESPECT TO CASTING/ LIFTING/ ERECTION SCHEME ADOPTED BY HIM.
13. REFER GEOTECHNICAL RECOMMENDATIONS OF THE PROJECT FOR SOIL IMPROVEMENTS, IF ANY & FOR PROTECTIVE COATING FOR CONCRETE & R/F, IF ANY.

इंजीनियर्स इंडिया लिमिटेड (भारत सरकार का उपक्रम) ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	31.05.24	REVISED AND ISSUED AS STANDARD	TP	SYAS	S K NASKAR	M NANDI
5	06.06.18	REVISED AND ISSUED AS STANDARD	RP	DCB	RAJAN JI SRIVASTAVA	RK TRIVEDI
			Approved by			

PRECAST MANHOLE TYPE-7 FOR DEPTH ≤ 3M (Ø ≤ 800)

STANDARD No.
7-65-0257 Rev. 6
Page 1 of 1

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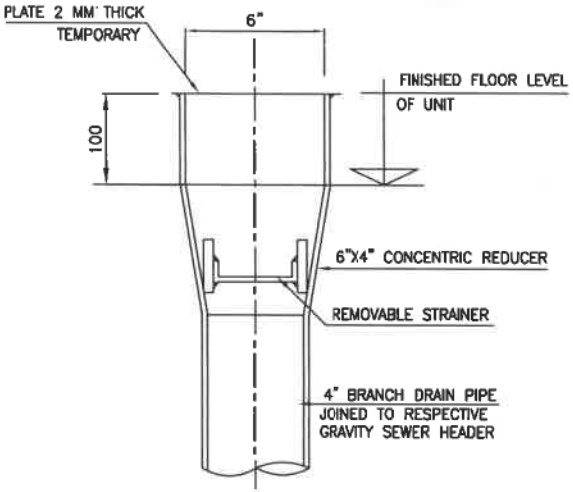
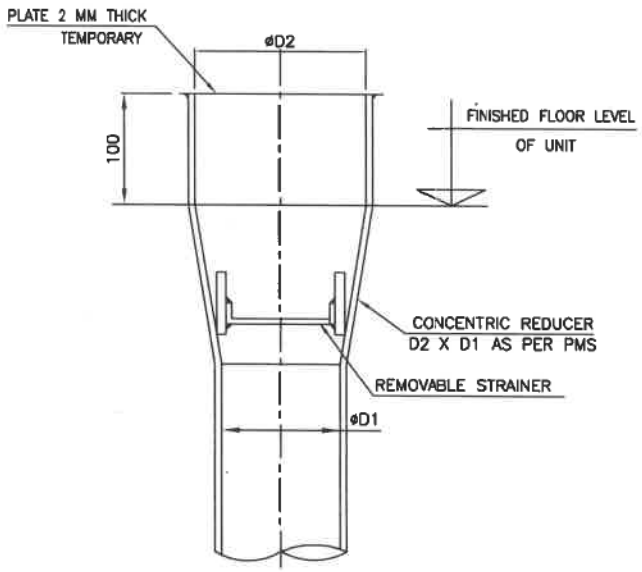
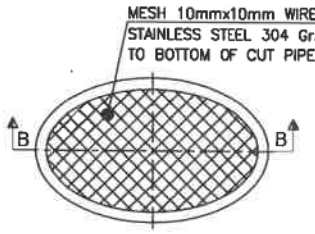


STANDARD EQUIPMENT
DRAIN FUNNEL



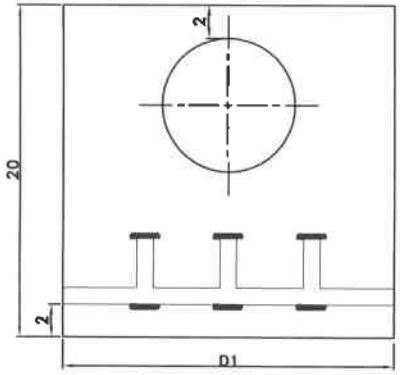
SPECIAL EQUIPMENT
DRAIN FUNNEL



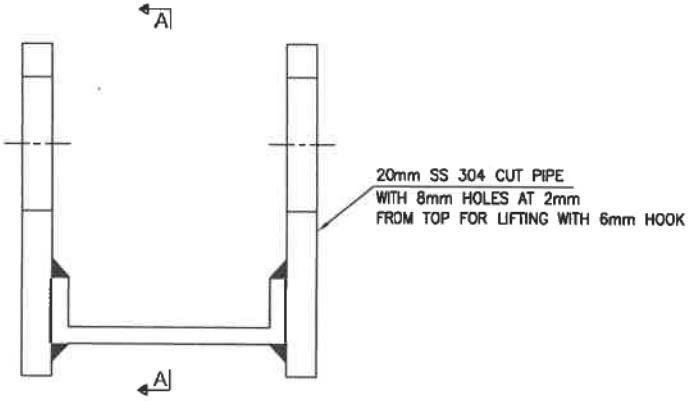
PLAN VIEW OF STRAINER

OUTLET SIZE(INCHES)	D1	D2	STRAINER WEIGHT (KG)
4"	4"	6"	0.050
6"	6"	8"	0.112
8"	8"	12"	0.199
12"	12"	16"	0.448

DRAIN DETAIL



VIEW A-A



DETAIL B-B
DETAILS OF STRAINER

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. TEMPORARY PLATE TACK WELDED ON FUNNEL TOP TO BE REMOVED DURING ERECTION OF ABOVE GROUND PIPING.
3. ALL PIPE & FITTINGS AS PER PMS.
4. WELD THICKNESS OF MESH WIRE WITH SS CUT PIPE AND LENGTH OF MESH WIRE BETWEEN WELDS ALONG SS CUT PIPE IN SECTION B–B SHALL BE DETAILED SUIT TO SITE. EACH MESH WIRE SHALL BE WELDED TO SS CUT PIPE IN SECTION B–B.

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Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	18.10.24	REVISED & ISSUED AS STANDARD	SAH	DDB	SKN	MN
5	25.07.18	REVISED & ISSUED AS STANDARD	VS	AK	RS	RKT

UNIT DRAINAGE DETAILS
(EQUIPMENT DRAIN FUNNELS)

STANDARD No.
7-65-0266 Rev. 6
Page 1 of 1

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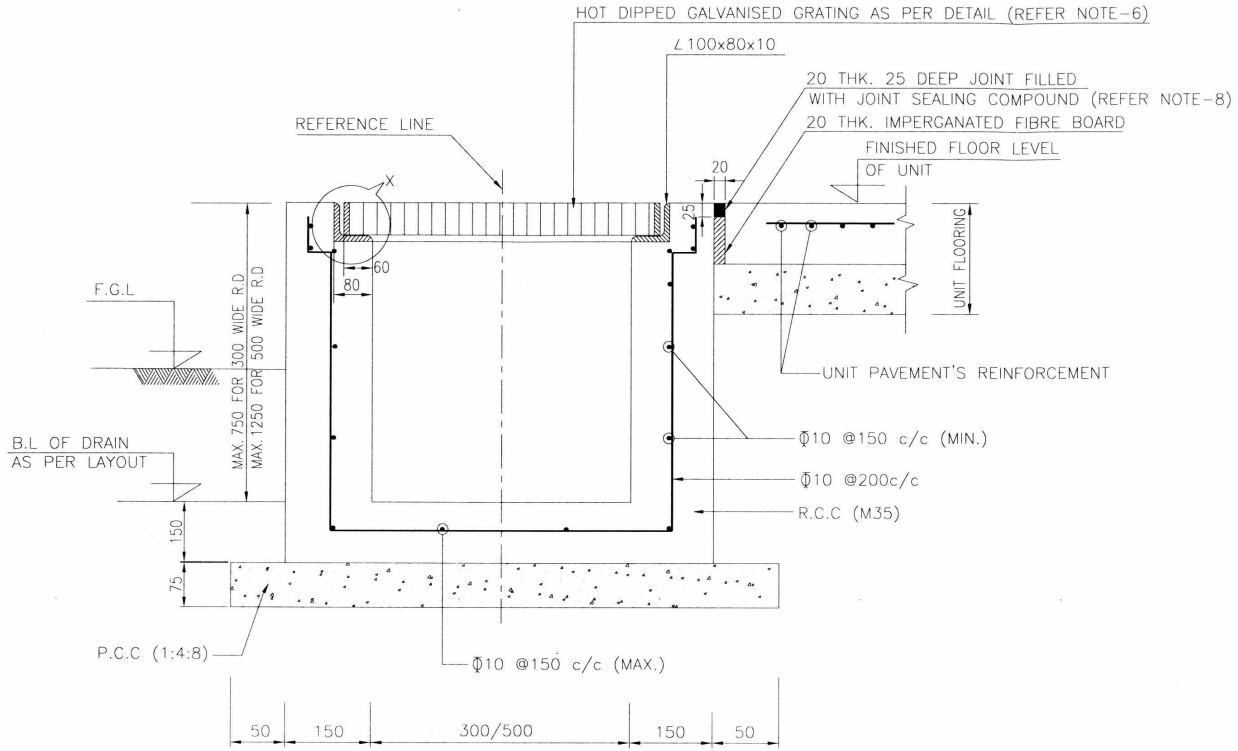
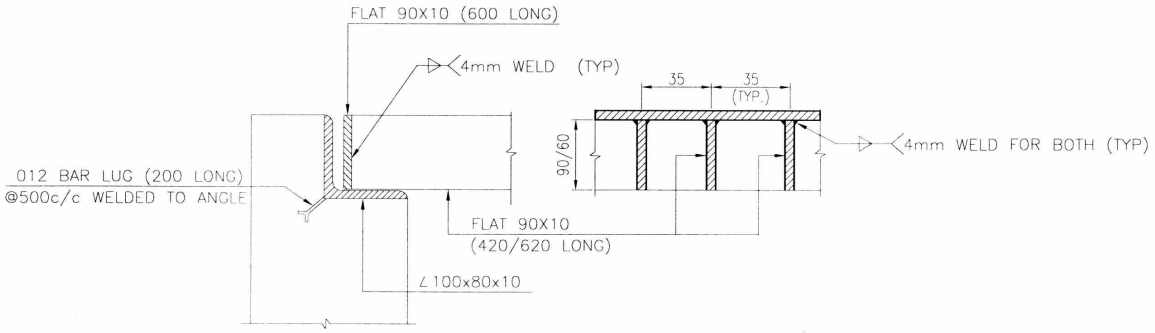
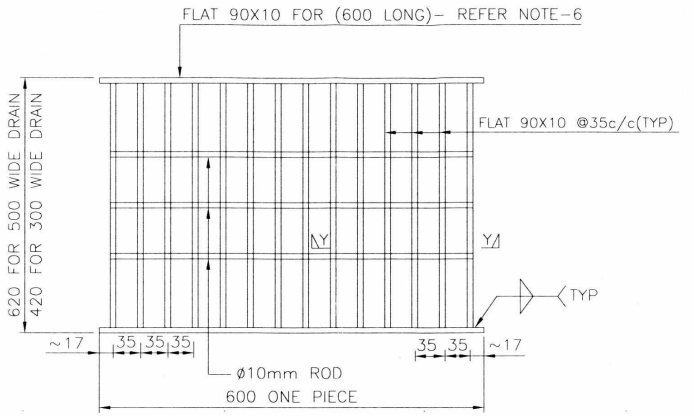


CROSS SECTION OF DRAIN.



DETAIL (X)

SECTION Y-Y



DETAIL PLAN OF GRATING

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. REFER STRUCTURAL GENERAL NOTES OF THE PROJECT FOR CONCRETE WORKS FOR THE FOLLOWING :
   a) GRADE OF CONCRETE
   b) GRADE AND TYPE OF CEMENT
   c) REINFORCEMENT STEEL BARS
   d) CLEAR COVER IN R.C.C. WORKS.
3. BAR BENDING SHALL CONFORM TO IS:2502.
4. ISA AND FLAT SHALL CONFORM TO IS:2062, GRADE-A.
5. EXPOSED STEEL SURFACES SHALL BE PROVIDED WITH PAINTING AS PER EIL STD.SPECIFICATION 6-79-0020 (OR AS PER JOB SPECIFICATION WHEREVER APPLICABLE.)
6. MATERIAL FOR GRATING (PAINTED BARS/MS FLAT) SHALL BE OF E250 SUBGRADE A/BR/BO CONFIRMING TO IS 2062. BEARING FLATS AND END FLATS SHALL BE AS PER IS 1730.
7. GRATING SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH IS 2629 AND TESTED AS PER IS 2633 AND IS 6745. QUANTITY OF ZINC COATING SHALL BE MINIMUM 900 GM/SQM OF SURFACE AREA (0.12MM UNIFORM THICKNESS) HALL BE AS PER APPROVED MANUFACTURER RECOMMENDATION.
8. JOINT SEALING COMPOUND SHALL BE APPROVED POLYSULPHIDE SEALANT (COLD SUITABLE PRIMER AS RECOMMENDED BY SEALANT MANUFACTURER, SHALL BE APPLIED IN ACCORDANCE WITH IRC:57.
9. BIPOLAR CONCRETE PENETRATING CORROSION INHIBITING ADMIXTURE OF APPROVED MAKE SHALL BE ADDED TO CONCRETE (SUB-STRUCTURE & SUPER-STRUCTURE) AS PER MANUFACTURER'S SPECIFICATIONS & EIL SPECIFICATION 6-68-0017 FOR PROTECTION OF REINFORCEMENT AGAINST CORROSION.
10. IF GRATING IS SUBJECTED ACID CONTACT THEN 30mm THICK FRP GRATING & FRP SUPPORT SHALL BE PROVIDED(FOR NON-VEHICULAR MOVEMENT AREA ONLY). DETAILING SHALL BE AS PER APPROVED MANUFACTURER RECOMMENDATION.
11. THE BAR SHALL BE PLACED AFTER CUTTING GROOVE IN THE FLAT SUCH THAT THE PROJECTION OF BAR ABOVE THE FLAT TOP IS NOT IN MORE THAN 5 MM.

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Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	20.03.23	REVISED AND ISSUED AS STD.	SJ	GY	SKN	SM
5	25.07.18	REVISED AND ISSUED AS STD.	Anil	RC	RBB	DV
					Approved by	

UNIT DRAINAGE DETAILS
(RECTANGULAR DITCH DETAILS)

STANDARD No.
7-65-0272 Rev. 6
Page 1 of 1

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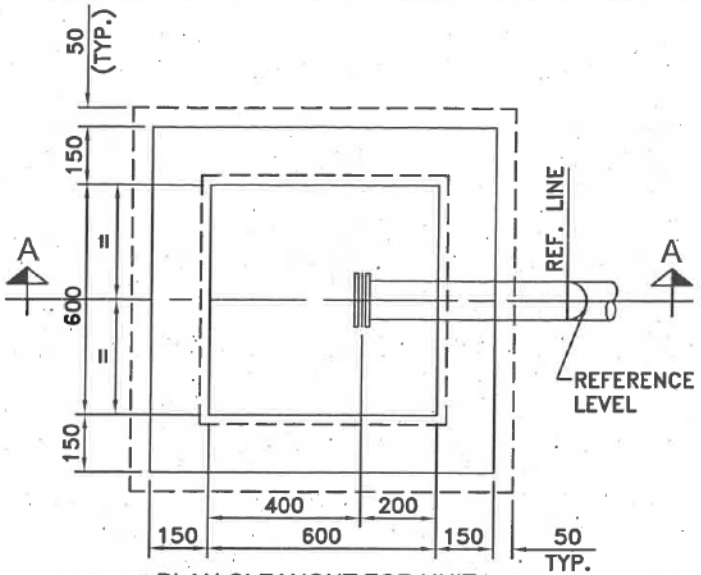
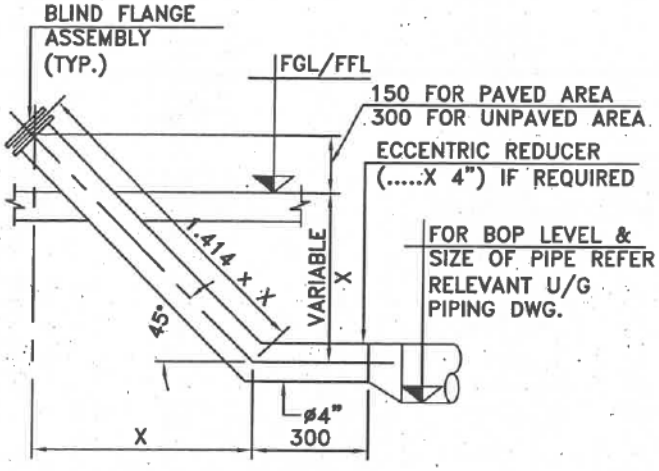
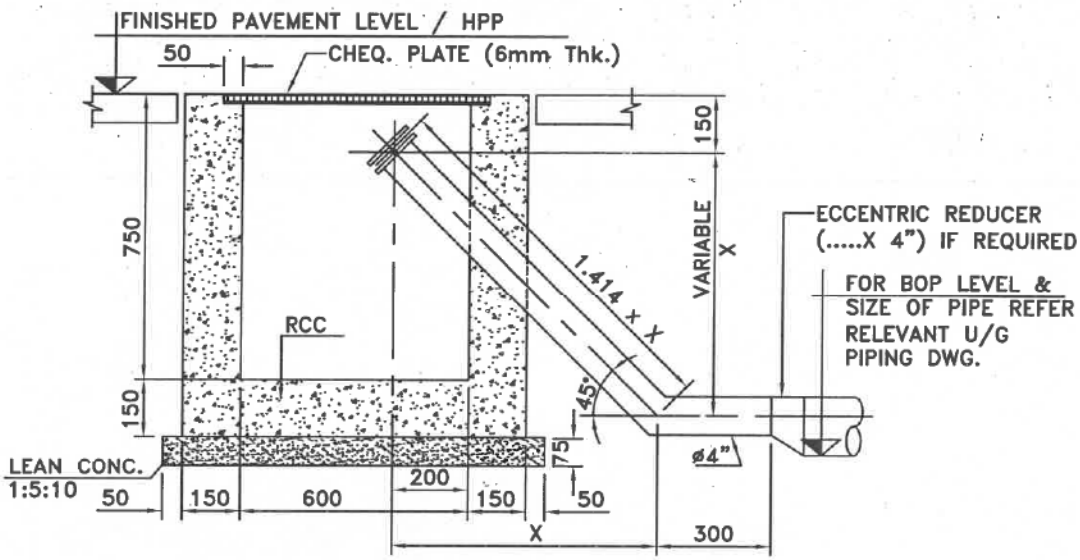


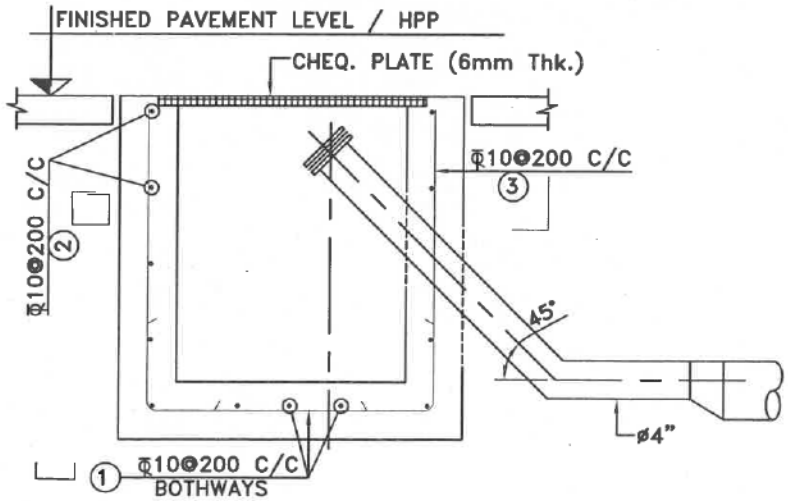
PLAN CLEANOUT FOR UNIT (TYPE-I)



INSIDE TANK FARM (TYPE-II)



SECTION - A A



SECTION - A A
FOR R/F DETAILS ONLY

LEGEND:-

OWS	OILY WASTE SEWER
SS	STORM SEWER
HPP	HIGHEST PAVEMENT POINT
BOP	BOTTOM OF PIPE

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED.
2. THE DIAMETER OF OWS HEADER SHALL BE ø4" (MINIMUM)
3. REFER STRUCTURAL GENERAL NOTES OF THE PROJECT FOR REINFORCED CONCRETE STRUCTURES FOR THE FOLLOWING :
   a. GRADE OF CONCRETE.
   b. GRADE AND TYPE OF CEMENT
   c. REINFORCEMENT STEEL BARS.
   d. CLEAR COVER IN CONCRETE WORKS.
   e. ANY ADMIXTURE IN CONCRETE
4. BAR BENDING SHALL CONFORM TO IS 2502.
5. REFER GEOTECHNICAL RECOMMENDATIONS OF THE PROJECT FOR SOIL IMPROVEMENTS, IF ANY & FOR PROTECTIVE COATING FOR CONCRETE & R/F, IF ANY.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
2	06.12.24	REVISED & ISSUED AS STANDARD	TP	GYAS	S K NASKAR	M NANDI
1	30.07.18	REVISED & ISSUED AS STANDARD	Anil	GYAS	R. SRIVASTAVA	RK TRIVEDI

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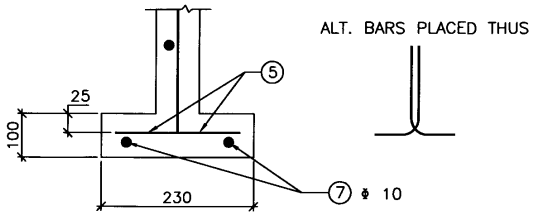
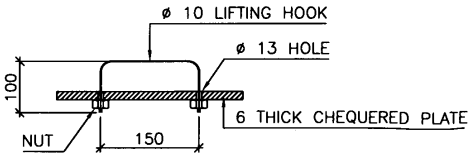
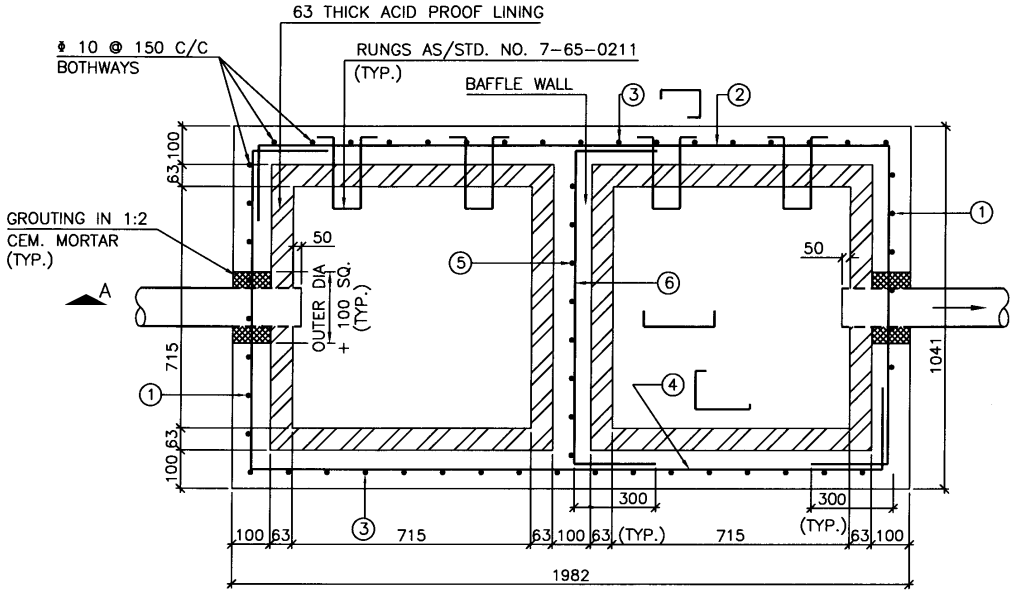


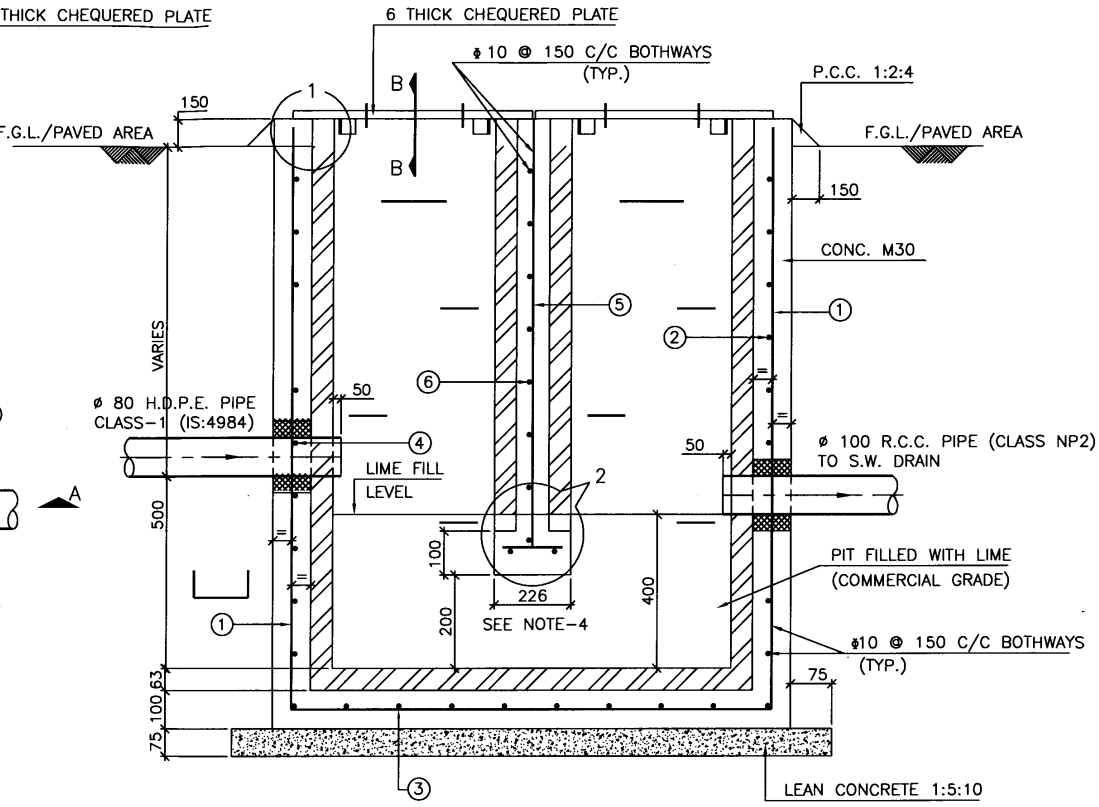
DETAIL–2



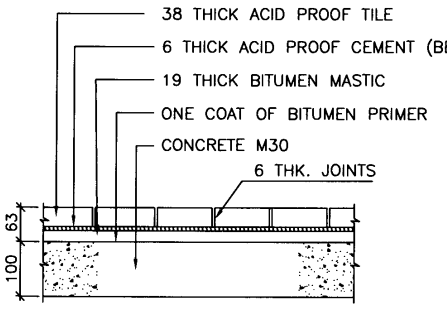
SECTION B–B



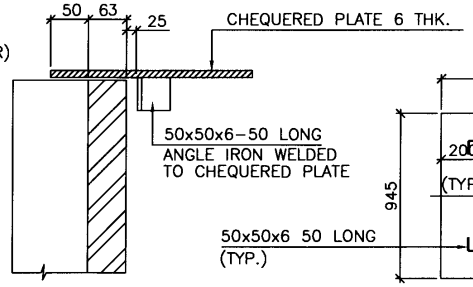
PLAN



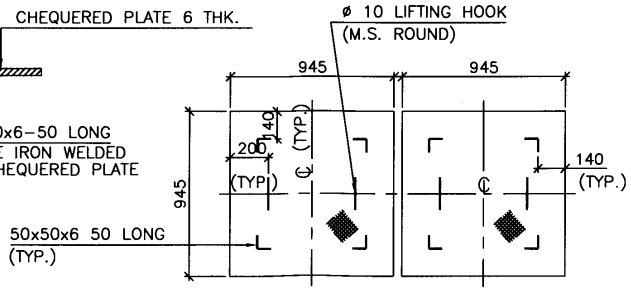
SECTION–AA



ACID PROOF LINING DETAIL



DETAIL–1



PLAN
CHEQUERED PLATE

NOTES: –

1. ALL DIEMNSIONS ARE IN MILLIMETERS
2. HYD. BARS SHALL CONFORM TO IS:1786 (FE 500)
3. UNDER SIDE OF THE CHEQUERED PLATE COVER, ANGLE IRON AND RUNGS SHALL BE PAINTED WITH AMBIENT TEMPERATURE CURING TYPE TWO COMPONENT EPOXY PHENOLIC COATING CURED WITH AMINE ADDUCT HARDENER IN THREE COATS OF 100 MICRON DFT / COAT AFTER SURFACE PREPARATION BY GRIT BLASTING.
4. EXPOSED BOTTOM AND SIDES OF THE BAFFLE WALL (CONCRETE SURFACE) SHALL BE PROVIDED WITH ONE COAT OF BITUMEN PRIMER 25 MICRON AND TWO COATS OF EPOXY PAINT 100 MICRON EACH.

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Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
4	28.06.18	REAFFIRMED & ISSUED AS STD.	RP	DCB	RS	RK TRIVEDI
3	03.02.10	REVISED & ISSUED AS STD.	SKP	RKS	RBB	ND

DETAIL OF NEUTRALISATION PIT

STANDARD No.
7-65-0310 Rev. 4
Page 1 of 1

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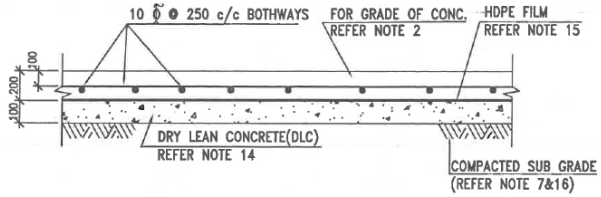
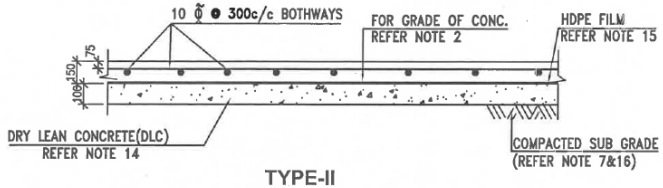
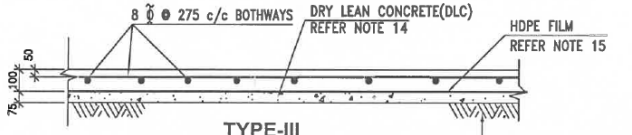


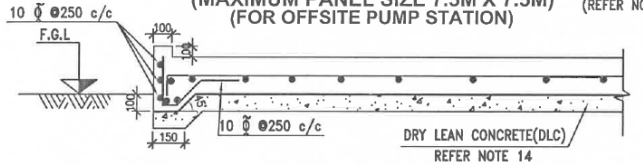
TYPE-I
(MAXIMUM PANEL SIZE 14M X 14M)
(FOR VEHICULAR MOVEMENT AREA)



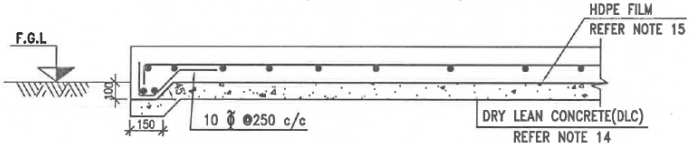
TYPE-II
(MAXIMUM PANEL SIZE 13M X 13M)
(FOR UNIT PAVEMENT)



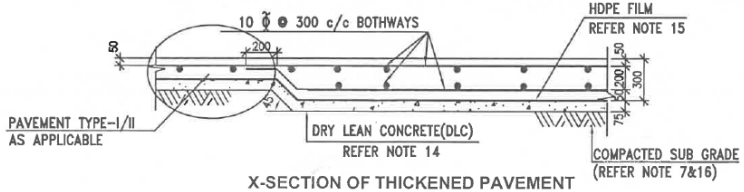
TYPE-III
(MAXIMUM PANEL SIZE 7.5M X 7.5M)
(FOR OFFSITE PUMP STATION)



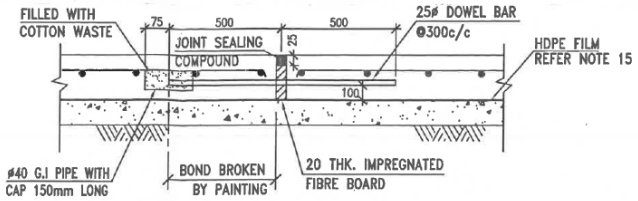
TYP. EDGE DETAIL DEPENDING ON TYPE OF PAVEMENT
(WITH KERB WALL)



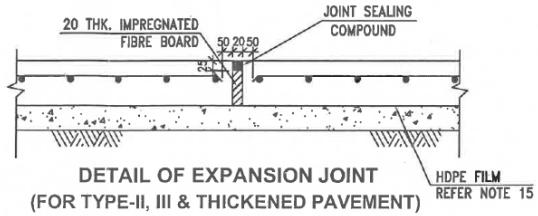
TYP. EDGE DETAIL DEPENDING ON TYPE OF PAVEMENT
(WITHOUT KERB WALL)



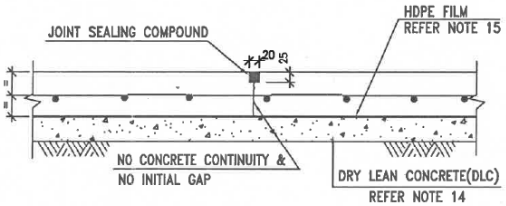
X-SECTION OF THICKENED PAVEMENT



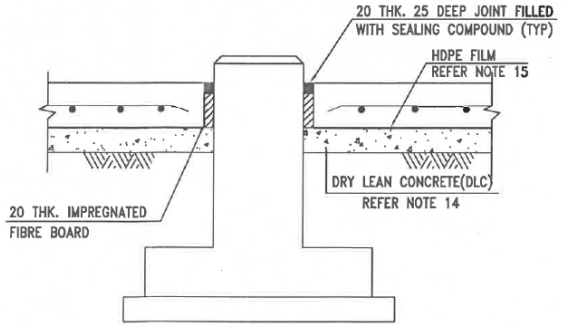
DETAIL OF EXPANSION JOINT
(FOR TYPE-I PAVEMENT)
(REFER NOTE-8 & 9)



DETAIL OF EXPANSION JOINT
(FOR TYPE-II, III & THICKENED PAVEMENT)



DETAIL OF CONSTRUCTION JOINT
(SEE NOTE-9 & 12)



TYP. DETAIL OF JOINT SEALING
AROUND FOUNDATION

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. THE GRADE OF CONCRETE SHALL BE AS PER ENGINEERING DESIGN BASIS (MIN. GRADE OF CONCRETE SHALL BE M30).
3. ϕ DENOTES HIGH YIELD DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS:1786 UNLESS OTHERWISE SPECIFIED. THE DOWEL BAR SHALL CONFORM TO IS:432 GRADE-1.
4. JOINT SEALING COMPOUND SHALL BE POLYSULPHIDE BASE JOINT SEALANT (COLD POURED) OF APPROVED MAKE CONFIRMING TO BS: 5212. SUITABLE PRIMER AS RECOMMENDED BY SEALANT MANUFACTURER, SHALL BE APPLIED IN ACCORDANCE WITH IRC 57.
5. EXPANSION AND SEALING JOINT FILLER MATERIAL SHALL BE PREFORMED FILLERS OF BITUMEN IMPREGENATED FIBRE BOARD, CONFORMING TO IS:1838, PART-1.
6. CONC. PAVING SHALL BE SLOPED STEEPEST TO 1:100 UNLESS OTHERWISE SHOWN IN DETAIL ENGINEERING DRAWING. SLOPE OF THE SUB GRADE SHALL BE PREPARED TO MATCH WITH THE SLOPE OF PAVEMENT.
7. SUB GRADE BELOW PAVEMENT SHALL BE THOROUGHLY COMPACTED TO 95% OF LAB DRY DENSITY AS PER IS:2720, PART VIII OR 85% RELATIVE DENSITY AS PER AS PER IS:2720, PART XIV.
8. EXPANSION JOINTS SHALL BE SPACED AT 14.0M (MAX.) FOR TYPE-I PAVEMENTS & 13M C/C (MAX.) FOR TYPE-II PAVEMENTS.
9. EXPANSION JOINTS SHALL BE SPACED AT 15 M C/C & CONSTRUCTION JOINTS SHALL BE SPACED AT 7.5M C/C (MAXIMUM) FOR TYPE-III PAVEMENTS.
10. THIS STANDARD IS NOT VALID FOR CAUSTIC HANDLING AREAS.
11. LIMITATION OF SINGLE AXLE LOAD ON RCC PAVEMENT: FOR TYPE-I PAVEMENT : MAX. UPTO 12.0 TONNE FOR TYPE-II PAVEMENT : MAX. UPTO 6.0 TONNE (FOR SMALL VEHICLES LIKE FORK LIFT)
12. CONSTRUCTION JOINTS MAY BE PROVIDED IN CASE PANEL SIZE IS LESS THAN THE REQUIREMENT OF ELASTIC JOINT, TO SUIT SITE REQUIREMENTS.
13. THICKENED PAVEMENT AS SHOWN IS SUITABLE FOR SINGLE POINT LOAD UPTO 5 TON. PIPE SUPPORT DETAILS COMING IN THICKENED PAVEMENT AREA REFER RELEVANT PIPING GAD / PIPING STANDARDS.
14. DRY LEAN CONCRETE (DLC) FOR SUB-BASE SHALL HAVE 7 DAYS COMPRESSIVE STRENGTH OF 10MPa.
15. 150 MICRON THICK HM HDPE (GRADE-I) FILM CONFORMING TO IS 10889 SHALL BE PROVIDED AS SEPARATION LAYER BETWEEN DLC AND RCC.
16. THIS STANDARD IS APPLICABLE FOR SUB GRADE WITH SOAKED CBR OF 4.0% AND ABOVE.

SUBGRADE

a) GEOTECHNICAL RECOMMENDATION SHALL BE FOLLOWED FOR SUBGRADE PREPARATION BELOW PAVEMENTS.
b) SPECIAL CARE AS PER GEOTECH RECOMMENDATION SHALL BE TAKEN IN CASE OF BLACK COTTON SOIL.

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Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
5	13.01.25	REVISED & ISSUED AS STANDARD	TP	GYAS	S K NASKAR	M NANDI
4	12.07.19	REVISED & ISSUED AS STANDARD	SD	GS/AK	RS	RKT

RCC PAVEMENT DETAILS

STANDARD No.
7-65-0404 Rev. 5

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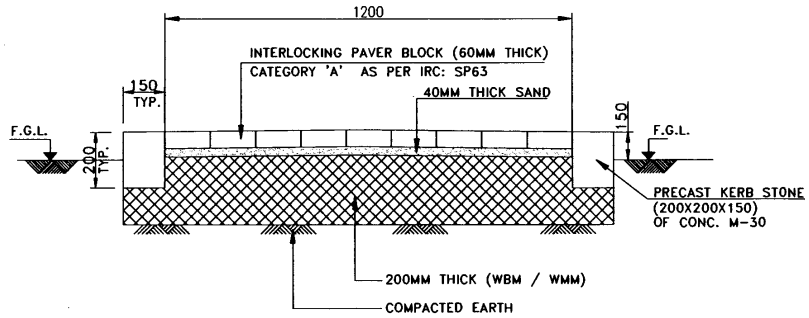
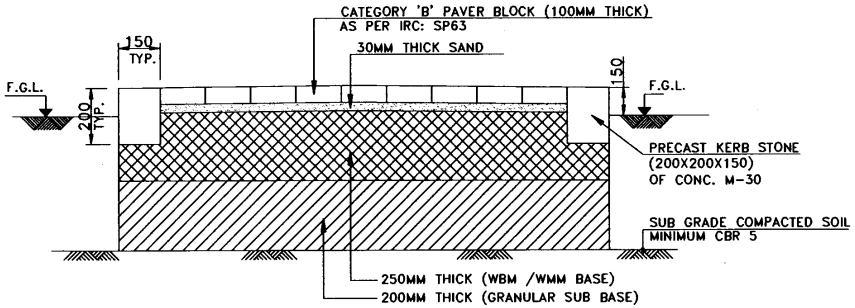
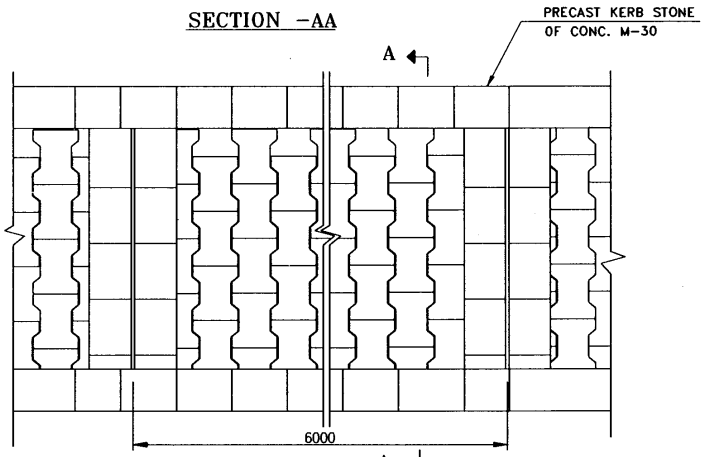


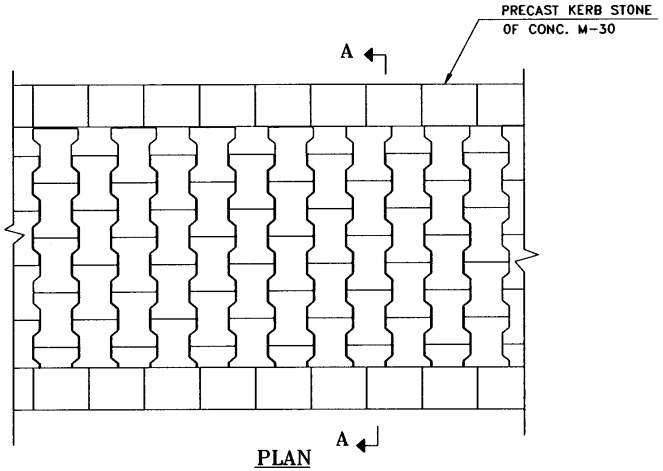


SECTION -AA

SECTION -AA



PLAN



PLAN

(DETAILS OF PAVER BLOCK PAVEMENT FOR PARKING AREAS / APPROACH ROADS)

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. AFTER EVERY 6000 LENGTH OF PAVEMENT A BREAK OF 100 mm WIDTH SHALL BE LEFT UNPAVED TO ALLOW THE SURFACE DRAINAGE BY PROVIDING KERB STONE ACROSS THE FOOTPATH IN 6.0 M PANEL.
3. THE KERB STONES AND PRECAST CONC. BLOCKS SHALL BE PLACED SIDE BY SIDE, SUCH THAT BLOCKS GET INTERLOCKED.
4. PAVER BLOCK SHALL BE DESIGNED AND PROVIDED AS PER IRC:SP:63. (MINIMUM COMPRESSIVE STRENGTH OF 30 MPA).
5. SURFACE DRAINAGE SHALL BE PROVIDED AS PER IRC:SP:63, FIGURE-9.

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Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
4	28.09.20	REAFFIRMED AND ISSUED AS STANDARD	SK	RKS	AS	SM
3	23.07.14	REVISED AND ISSUED AS STD.	KC	RKS	RBB	SC

PAVER BLOCK FOOTPATH

STANDARD No.
7-65-0405 Rev. 4
Page 1 of 1

Format No. 8-00-0001-F5 Rev. 0

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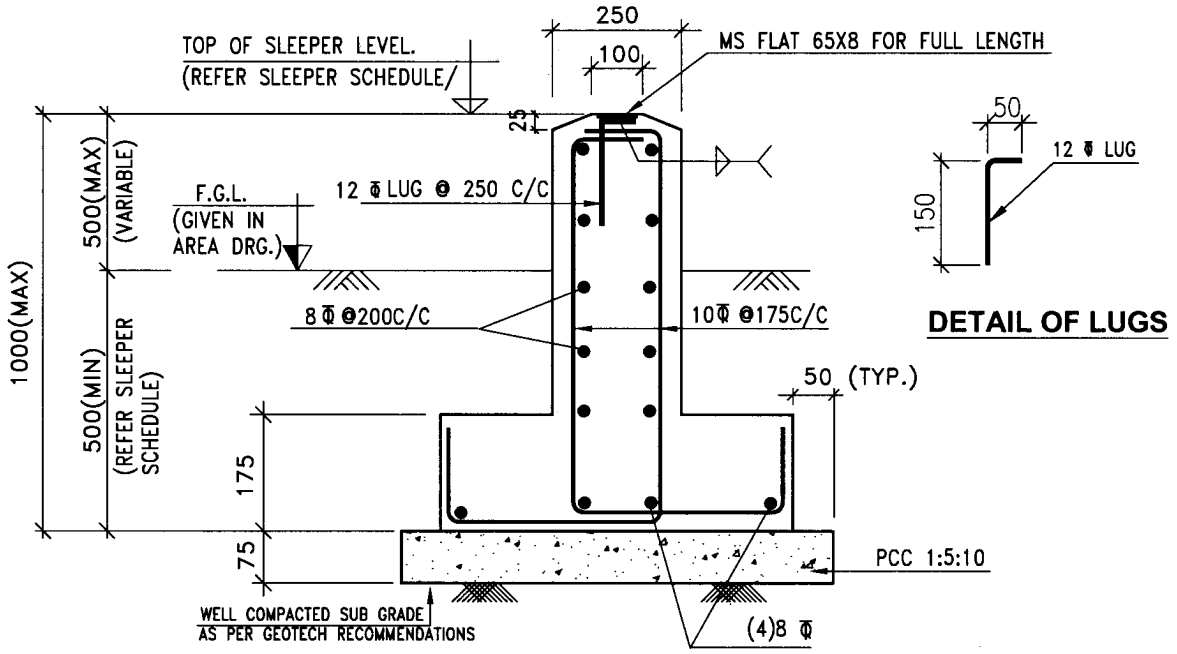
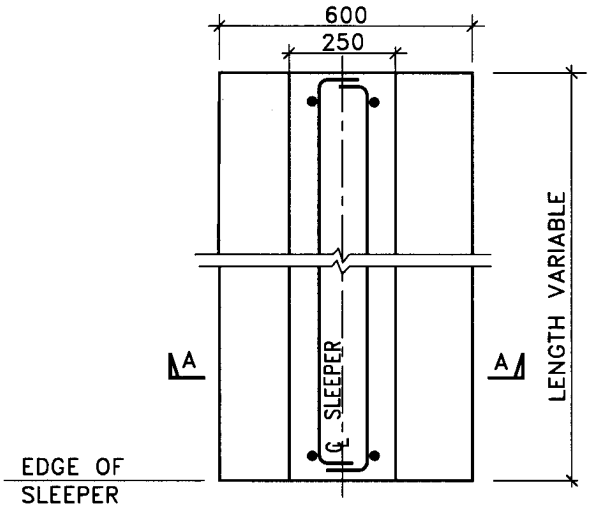


DETAIL OF LUGS

SECTION A-A



PLAN

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. REFER STRUCTURAL GENERAL NOTES OF THE PROJECT FOR CONCRETE AND STRUCTURAL STEEL WORKS FOR THE FOLLOWING:–
   a) GRADE OF CONCRETE (MIN. M30).
   b) GRADE AND TYPE OF CEMENT
   c) REINFORCEMENT STEEL BARS (MIN. Fe500D).
   d) CLEAR COVER IN RCC WORKS.
   e) GRADE OF STRUCTURAL STEEL
3. ALL LUGS SHALL BE WELDED WITH 6mm FILLET WELD WITH THE MS FLAT LOCATED AT TOP OF THE SLEEPER LEVEL.
4. LOCATION, LENGTH AND TOP OF SLEEPER LEVEL SHALL BE AS PER RELEVANT PIPING GAD.
5. THIS STANDARD IS APPLICABLE FOR THE NET BEARING CAPACITY OF SOIL 5.0T/M^2 OR MORE. IN CASE NET BEARING CAPACITY OF SOIL IS LESS THAN 5.0T/M^2, GEO. TECH RECOMMENDATIONS SHALL BE OBTAINED AND JOB DRAWING SHALL BE APPLICABLE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
7	17.08.2021	REVISED & ISSUED AS STANDARD	MSR	KG/RKS	A.SINHA	S.MAZUMDAR
6	08.06.18	REAFFIRMED & ISSUED AS STANDARD	Anil	HV/AK	RS	RKT

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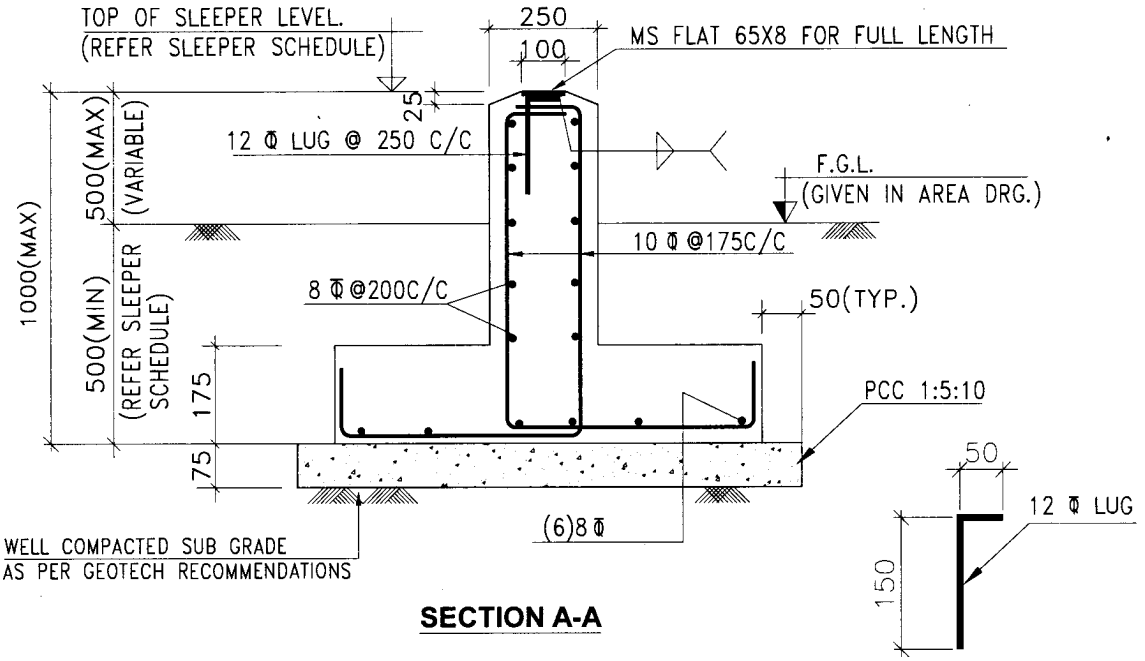
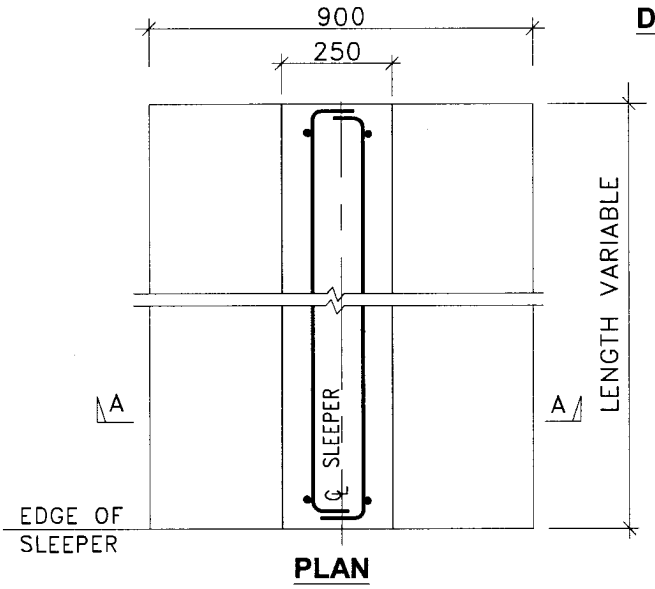
CONCRETE SLIDING SLEEPER CAST IN SITU TYPE- II



SECTION A-A

DETAIL OF LUGS



PLAN

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. REFER STRUCTURAL GENERAL NOTES OF THE PROJECT FOR CONCRETE AND STRUCTURAL STEEL WORKS FOR THE FOLLOWING:-
   a) GRADE OF CONCRETE (MIN. M30).
   b) GRADE AND TYPE OF CEMENT
   c) REINFORCEMENT STEEL BARS (MIN. Fe500D)
   d) CLEAR COVER IN RCC WORKS.
   e) GRADE OF STRUCTURAL STEEL
3. ALL LUGS SHALL BE WELDED WITH 6mm FILLET WELD WITH THE MS FLAT LOCATED AT TOP OF THE SLEEPER LEVEL.
4. LOCATION, LENGTH AND TOP OF SLEEPER LEVEL SHALL BE AS PER RELEVANT PIPING GAD.
5. THIS STANDARD IS APPLICABLE FOR THE NET BEARING CAPACITY OF SOIL 5.0T/M^2 OR MORE. IN CASE NET BEARING CAPACITY OF SOIL IS LESS THAN 5.0T/M^2, GEO. TECH RECOMMENDATIONS SHALL BE OBTAINED AND JOB DRAWING SHALL BE APPLICABLE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	17.08.2021	REVISED & ISSUED AS STANDARD	MSR	KG/RKS	A.SINHA	S.MAZUMDAR
7	08.06.18	REAFFIRMED & ISSUED AS STANDARD	Anil	HV/AK	RS	RKT

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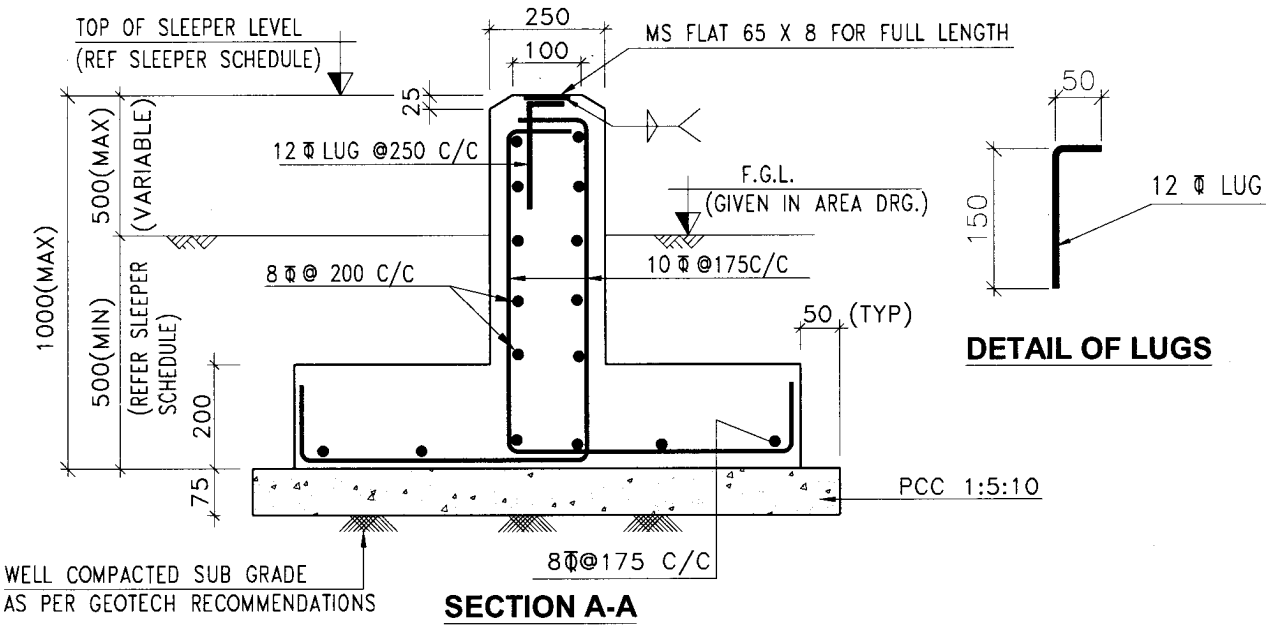
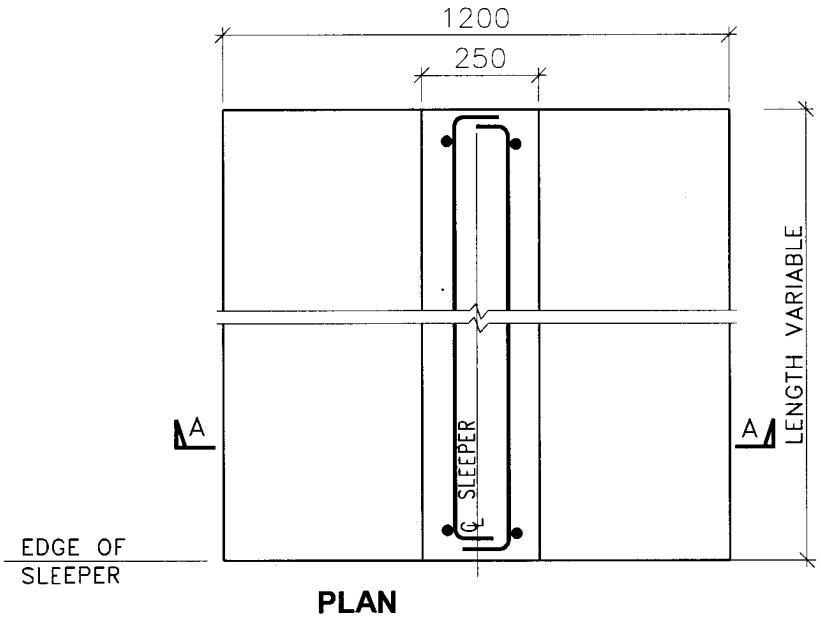


SECTION A-A

DETAIL OF LUGS



PLAN

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. REFER STRUCTURAL GENERAL NOTES OF THE PROJECT FOR CONCRETE AND STRUCTURAL STEEL WORKS FOR THE FOLLOWING:–
   a) GRADE OF CONCRETE (MIN. M30).
   b) GRADE AND TYPE OF CEMENT
   c) REINFORCEMENT STEEL BARS (MIN. Fe500D)
   d) CLEAR COVER IN RCC WORKS.
   e) GRADE OF STRUCTURAL STEEL
3. ALL LUGS SHALL BE WELDED WITH 6mm FILLET WELD WITH THE MS FLAT LOCATED AT TOP OF THE SLEEPER LEVEL.
4. LOCATION, LENGTH AND TOP OF SLEEPER LEVEL SHALL BE AS PER RELEVANT PIPING GAD.
5. THIS STANDARD IS APPLICABLE FOR THE NET BEARING CAPACITY OF SOIL 5.0T/M^2 OR MORE. IN CASE NET BEARING CAPACITY OF SOIL IS LESS THAN 5.0T/M^2, GEO. TECH RECOMMENDATIONS SHALL BE OBTAINED AND JOB DRAWING SHALL BE APPLICABLE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	17.08.2021	REVISED & ISSUED AS STANDARD	MSR	KG/RKS	A.SINHA	S.MAZUMDAR
7	08.06.18	REAFFIRMED & ISSUED AS STANDARD	Anil	HV/AK	RS	RKT

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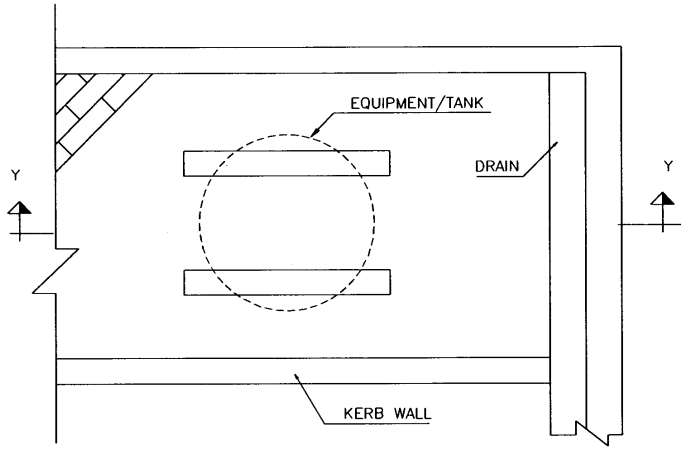

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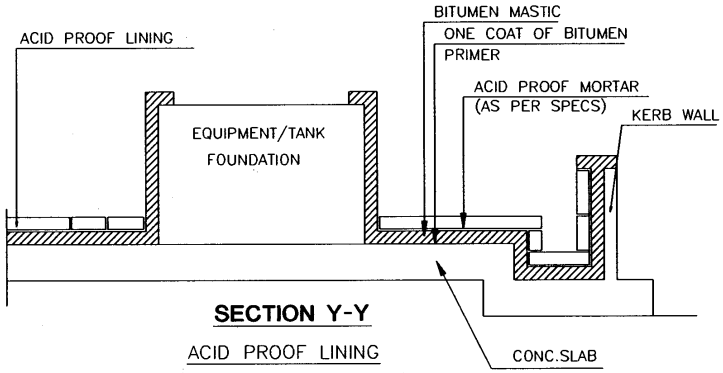
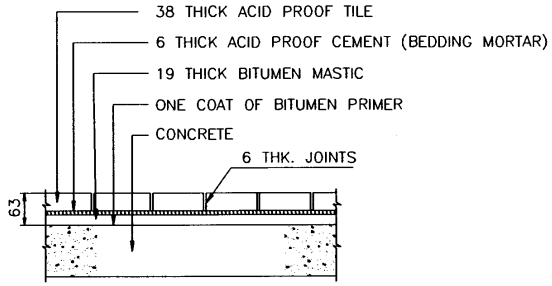


SECTION Y-Y

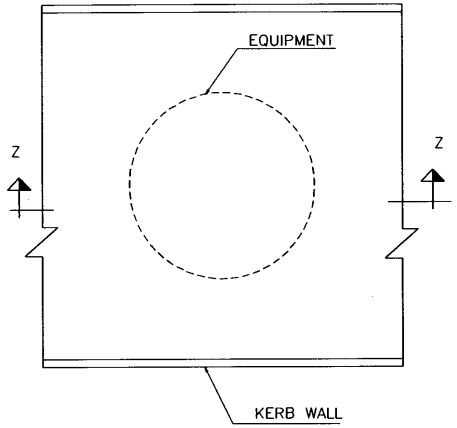
ACID PROOF LINING

(FOR H_2SO_4 STORAGE AREA)

(REFERENCE SPEC. NO 6-65-0062)



ACID PROOF LINING DETAIL



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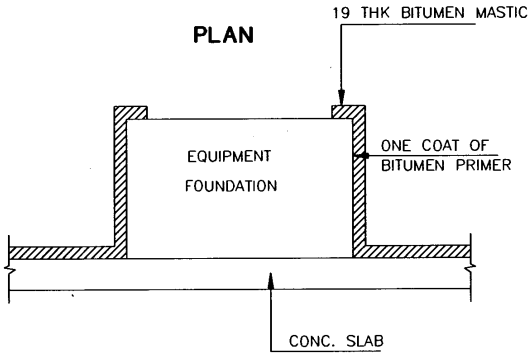

SECTION Z-Z

ACID/ALKALI PROOF LINING WITH BITUMEN MASTIC

(REFERENCE SPEC.NO. 6-65-0061)

4	28.09.20	REAFFIRMED & ISSUED AS STD.	SK	RKS	AS	SM
3	25.07.14	REAFFIRMED & ISSUED AS STD.	KC	RKS	RBB	SC
Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	

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TYP. DETAIL OF ACID / ALKALI PROOF LINING

STANDARD No.

7-65-0412 Rev. 4

Page 1 of 1

Format No. 8-00-0001-F5 Rev. 0

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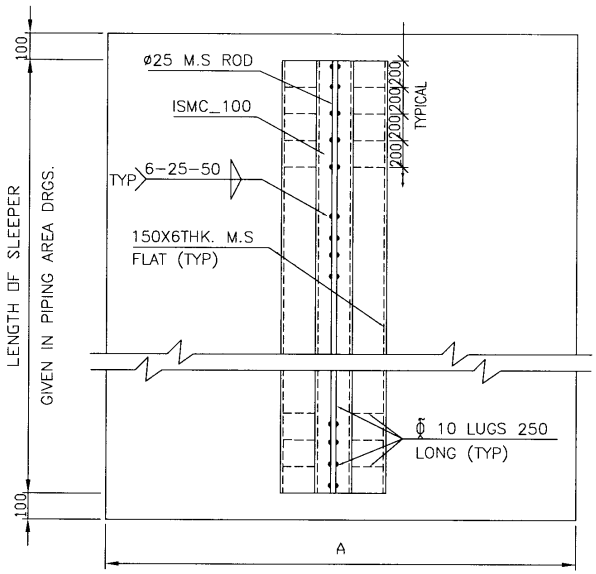

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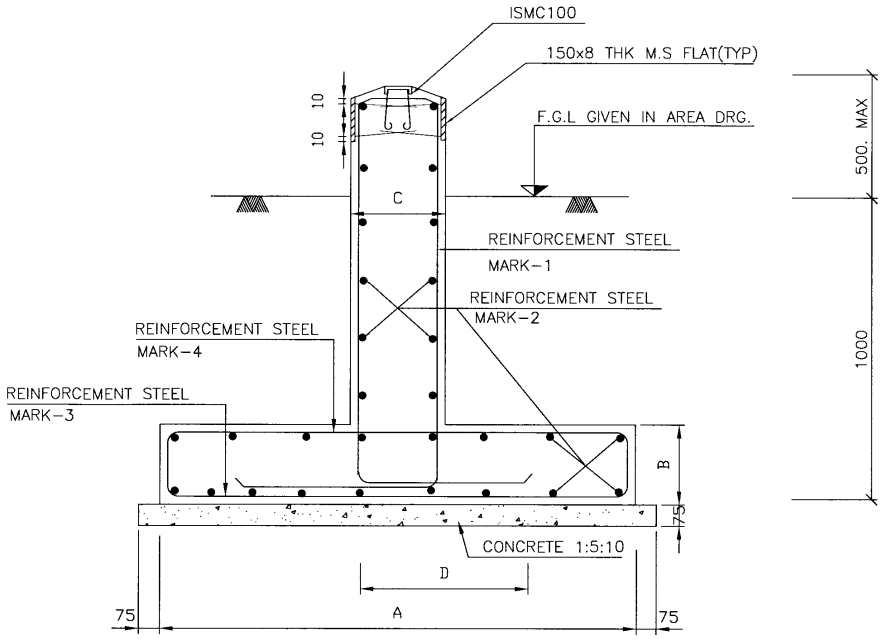

SECTION

S.NO	TYP OF ANCHOR SLEEPER	A	B	C	D	REINFORCEMENT MARK – 1	REINFORCEMENT MARK – 2	REINFORCEMENT MARK – 3	REINFORCEMENT MARK – 4
1	IA	2250	300	300	400	10 Φ @200c/c	10 Φ @250c/c	10 Φ @200c/c	10 Φ @200c/c
2	IB	3250	400	400	400	10 Φ @150c/c	10 Φ @200c/c	10 Φ @150c/c	10 Φ @150c/c
3	IC	4200	500	400	500	10 Φ @150c/c	10 Φ @200c/c	10 Φ @100c/c	10 Φ @125c/c
4	IIA	2250	300	300	400	10 Φ @200c/c	10 Φ @250c/c	10 Φ @175c/c	10 Φ @200c/c
5	IIB	3000	400	400	400	10 Φ @150c/c	10 Φ @200c/c	10 Φ @150c/c	10 Φ @150c/c
6	IIC	3600	500	400	500	10 Φ @150c/c	10 Φ @200c/c	10 Φ @150c/c	10 Φ @125c/c
7	IIIA	2000	300	300	400	10 Φ @200c/c	10 Φ @250c/c	10 Φ @150c/c	10 Φ @200c/c
8	IIIB	2600	400	400	400	10 Φ @150c/c	10 Φ @200c/c	10 Φ @150c/c	10 Φ @150c/c
9	IIIC	3200	500	400	500	10 Φ @150c/c	10 Φ @200c/c	10 Φ @150c/c	10 Φ @125c/c

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFER STRUCTURAL GENERAL NOTES OF THE PROJECT FOR CONCRETE STRUCTURES FOR FOLLOWING :
   a) GRADE OF CONCRETE
   b) GRADE AND TYPE OF CEMENT
   c) REINFORCEMENT STEEL BARS
   d) CLEAR COVER IN CONCRETE WORKS.
3. THIS STANDARD IS APPLICABLE FOR BEARING CAPACITY OF SOIL 5.0T/M² OR MORE. IN CASE BEARING CAPACITY OF SOIL IS LESS THAN 5.0T/M² GEOTECH RECOMMENDATIONS SHALL BE OBTAINED AND JOB DRAWING SHALL BE APPLICABLE.
4. LOCATION, LENGTH AND TOP OF SLEEPER LEVEL SHALL BE AS PER RELEVANT PIPING GAD.

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Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
5	08.06.18	REAFFIRMED & ISSUED AS STANDARD	Anil	HV/AK	RS	RKT
4	12.07.12	REVISED AND ISSUED AS STD.	Anil	RKS	RBB	DM

DETAIL OF ANCHOR SLEEPERS

STANDARD No.
7-65-0415 Rev. 5
Page 1 of 1

Format No. 8-00-0001-F5 Rev. 0

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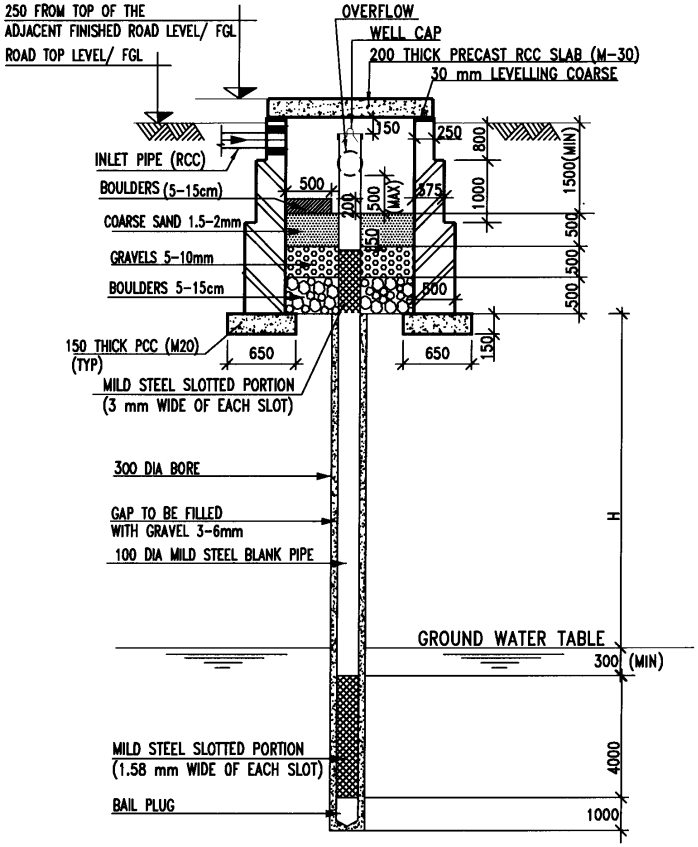
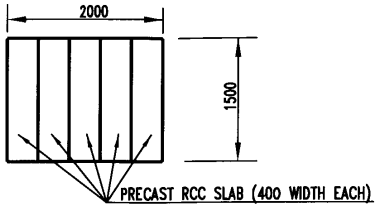
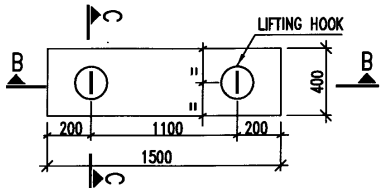


SECTION-AA



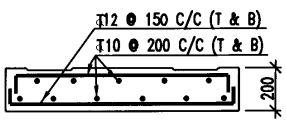
PRECAST SLAB



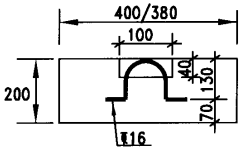
TYP DETAIL OF EACH PRECAST SLAB

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRE UNLESS OTHERWISE SPECIFIED.
2. 'H' SHALL BE AS PER GEOTECH RECOMMENDATION.
3. INLET TOWARDS RECHARGE TRENCH MAY BE ONE OR TWO NUMBERS.
4. LOCATION & LEVELS OF INLET & OUTLET RCC PIPE SHALL BE AS PER RELEVANT LAYOUT DRAWING(S).
5. THIS STANDARD IS DEVELOPED CONSIDERING BRICK SIZE 250X125X75. BRICK SIZE 230X115X75 SHALL ALSO APPLICABLE IF THE ABOVE SIZE IS NOT LOCALLY AVAILABLE.
6. MILD STEEL BLANK PIPE INCLUDING SLOTTED PORTION SHALL CONFORM TO IS:1239 PART-1.
7. THIS DRG. SHALL BE READ IN CONJUNCTION WITH THE SPEC. NO. 6-65-0055 (ERECTION OF TUBE WELLS.)
8. REINFORCEMENT SHALL BE OF GRADE Fe 500(D) CONFORMING TO IS: 1786.
9. COVER TO MAIN REINFORCEMENT IS 40 mm.
10. THIS DWG. IS APPLICABLE FOR RECHARGING OF GROUND WATER TABLE BY UNCONTAMINATED RAIN WATER (ROOF TOP RAIN WATER AND RUN-OFF OF STORM WATER DRAIN ONLY).



SECTION-BB



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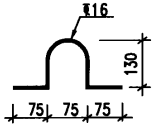
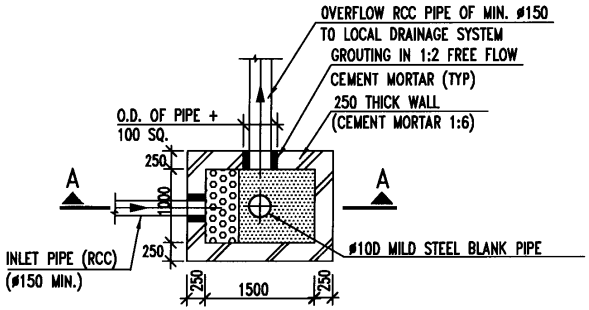
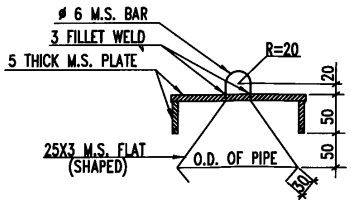


DETAIL OF LIFTING HOOK



PLAN



DETAIL OF WELL CAP

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	3	20.06.18	REVISED & ISSUED AS STANDARD	MK	RKS	RS	RKT		Page 1 of 1
	2	24.06.13	REVISED & ISSUED AS STANDARD	KC	RKS	RBB	DM		
						Approved by			

Format No. 8-00-0001-F5 Rev. 0

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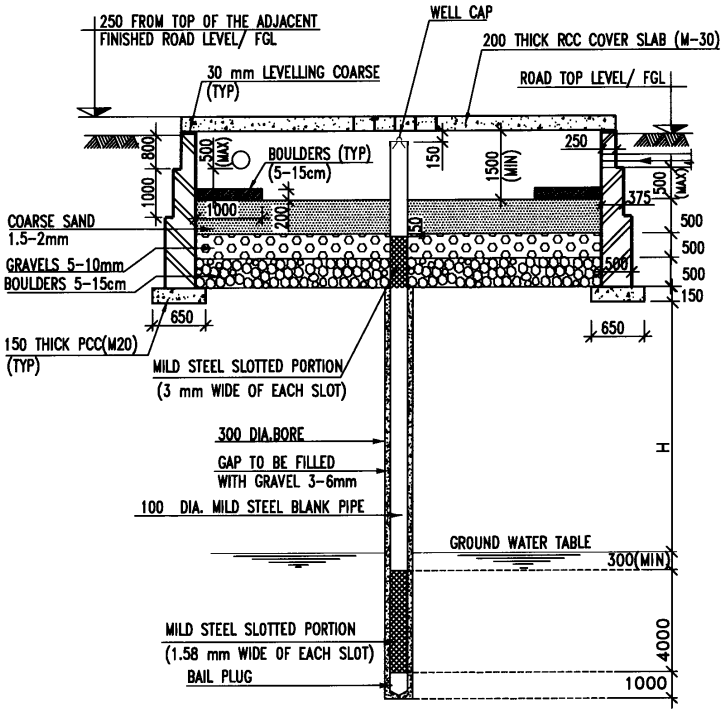
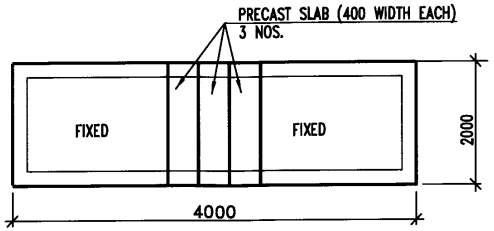
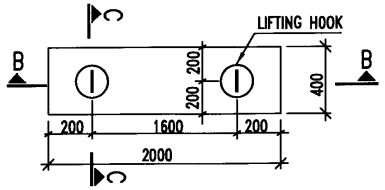


SECTION-AA



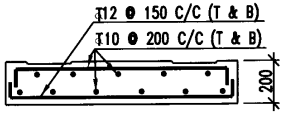
COVER SLAB



TYP DETAIL OF EACH PRECAST SLAB

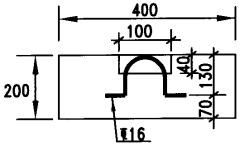
NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRE UNLESS OTHERWISE SPECIFIED.
2. 'H' SHALL BE AS PER GEOTECH RECOMMENDATION.
3. INLET TOWARDS RECHARGE TRENCH MAY BE ONE OR TWO NUMBERS.
4. LOCATION & LEVELS OF INLET & OUTLET RCC PIPE SHALL BE AS PER RELEVANT LAYOUT DRAWING(S).
5. THIS STANDARD IS DEVELOPED CONSIDERING BRICK SIZE 250X125X75. BRICK SIZE 230X115X75 SHALL ALSO APPLICABLE IF THE ABOVE SIZE IS NOT LOCALLY AVAILABLE.
6. MILD STEEL BLANK PIPE INCLUDING SLOTTED PORTION SHALL CONFORM TO IS:1239 PART-1.
7. THIS DRG. SHALL BE READ IN CONJUNCTION WITH THE SPEC. NO. 6-65-0055 (ERECTION OF TUBE WELLS.)
8. REINFORCEMENT SHALL BE OF GRADE Fe 500(D) CONFORMING TO IS: 1786.
9. COVER TO MAIN REINFORCEMENT IS 40 mm.
10. THIS DWG. IS APPLICABLE FOR RECHARGING OF GROUND WATER TABLE BY UNCONTAMINATED RAIN WATER (ROOF TOP RAIN WATER AND RUN-OFF OF STORM WATER DRAIN ONLY).



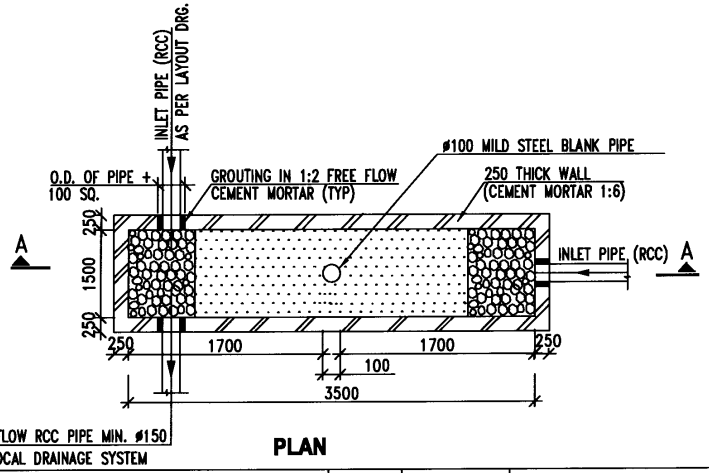
SECTION-BB

(REINFORCEMENT STEEL SHALL BE COMMON FOR BOTH FIXED & PRECAST SLAB)

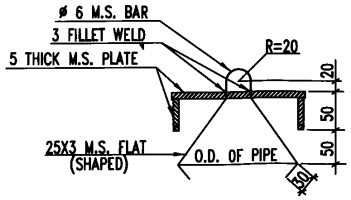


SECTION-CC

DETAIL OF LIFTING HOOK



PLAN



DETAIL OF WELL CAP

3	20.06.18	REVISED & ISSUED AS STANDARD	MK	RKS	RS	RKT
2	24.06.13	REVISED & ISSUED AS STANDARD	KC	RKS	RBB	DM
Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	

इंजीनियर्स इंडिया लिमिटेड (भारत सरकार का उपक्रम) ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

DETAIL FOR RAIN WATER HARVESTING (CATCHMENT AREA ≃1500 SQ.M.)

STANDARD No.
7-65-0443 Rev. 3
Page 1 of 1

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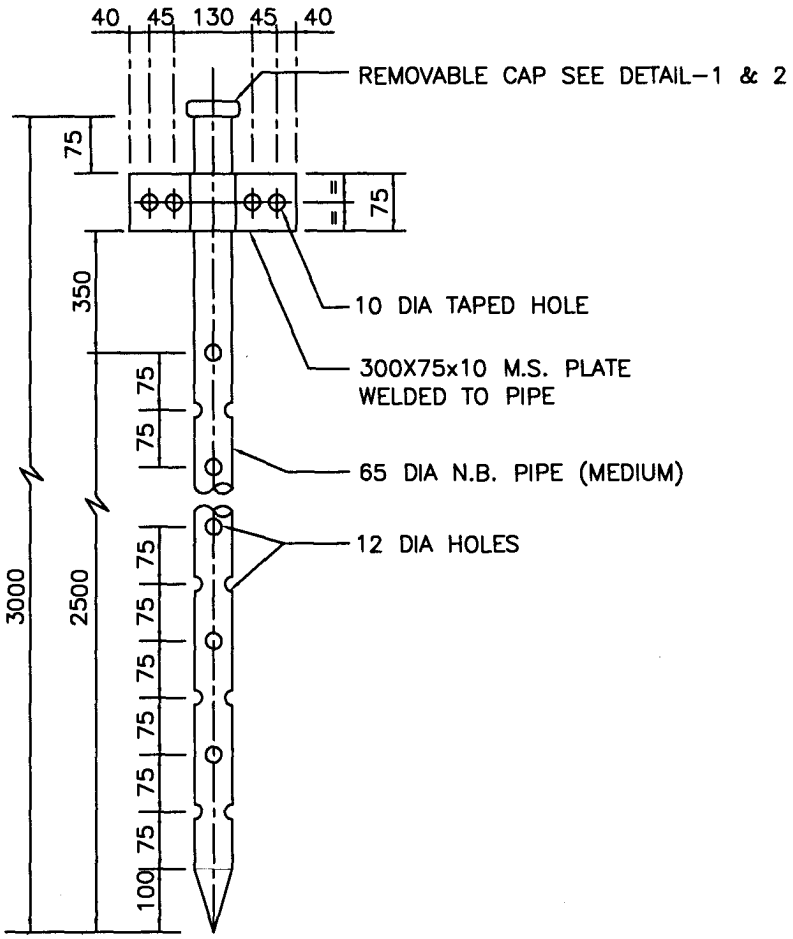
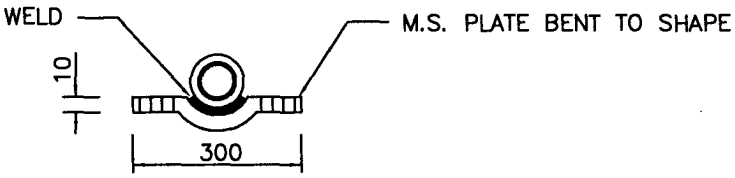
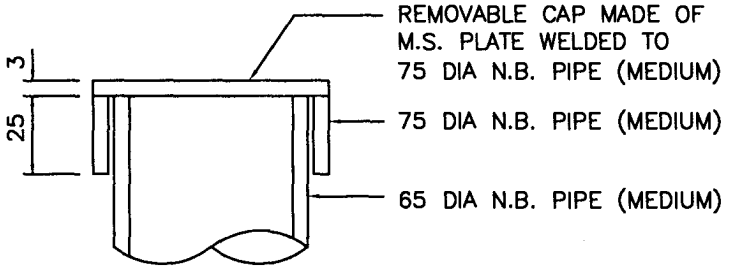
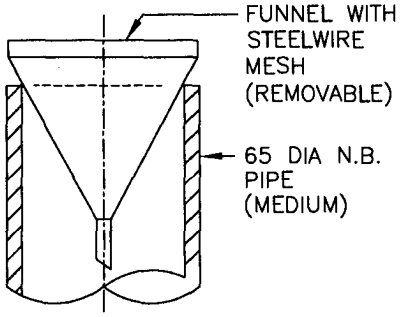






DETAIL–1



DETAIL–2

NOTE:–

1. THE PIPE ASSEMBLY SHALL BE HOT DIP GALVANISED AFTER FABRICATION. AMOUNT OF GALVANISING SHALL BE 150 MICRONS (MIN.) AS PER IS:3043.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	29.11.21	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
5	08.11.16	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN
4	27.06.11	REAFFIRMED & ISSUED	BP	RKS/RSC	UAP	DM

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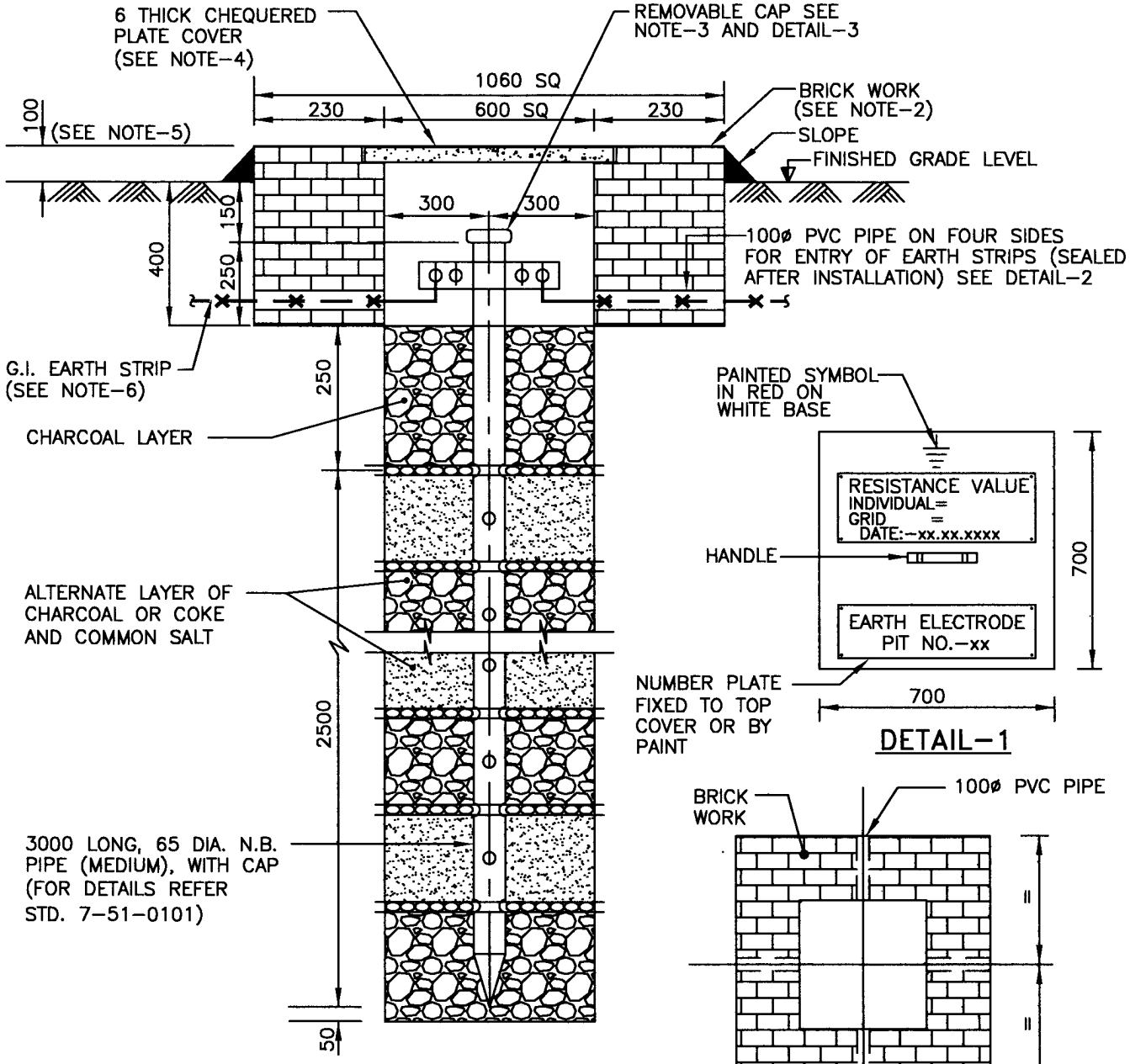
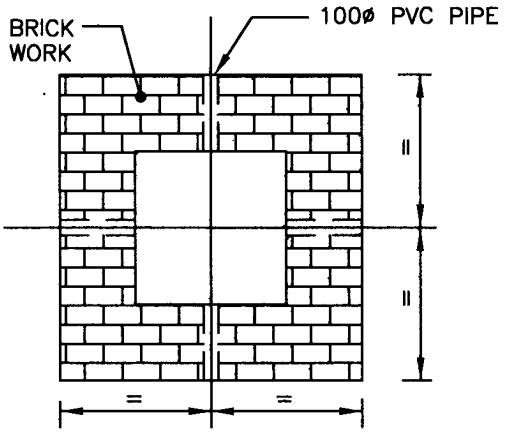
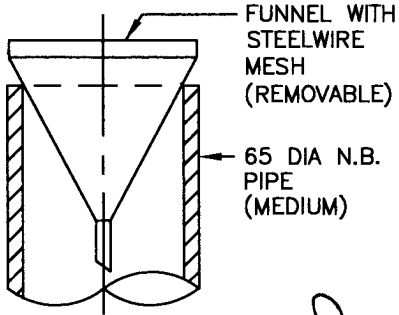


DETAIL-1



DETAIL-2



DETAIL-3

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. BRICK WORK SHALL BE DONE AFTER COMPACTING THE SOIL IN UNPAVED AREA.
3. AFTER REMOVAL OF CAP, OWNER SHALL BE ABLE TO POUR WATER THROUGH HIS OWN FUNNEL WITH STEEL WIRE MESH.
4. COLOUR CODING & PAINTING OF COVERS SHALL BE AS PER PAINTING SPEC. NO. 6-79-0020.
5. IN CASE OF PAVED AREAS, TOP OF PIT SHALL BE FLUSHED WITH FFL, WHEREAS IN UNPAVED AREAS, TOP OF PIT SHALL BE PROJECTED 100MM ABOVE FGL.
6. CONNECTIONS OF G.I. EARTH STRIP TO THE PLATE SHALL BE IN LINE WITH STD. 7-51-0103.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	01.11.21	REAFFIRMED & ISSUE AS STANDARD	JSK	VKS/HK	PG	SM
7	22.11.17	UPDATED & ISSUED AS STANDARD	BP	VKS/HK	BRB	RN
6	08.11.16	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN

Page No. 2019 of 2390_Tender Document Ref. No. 8000016687-8202-0
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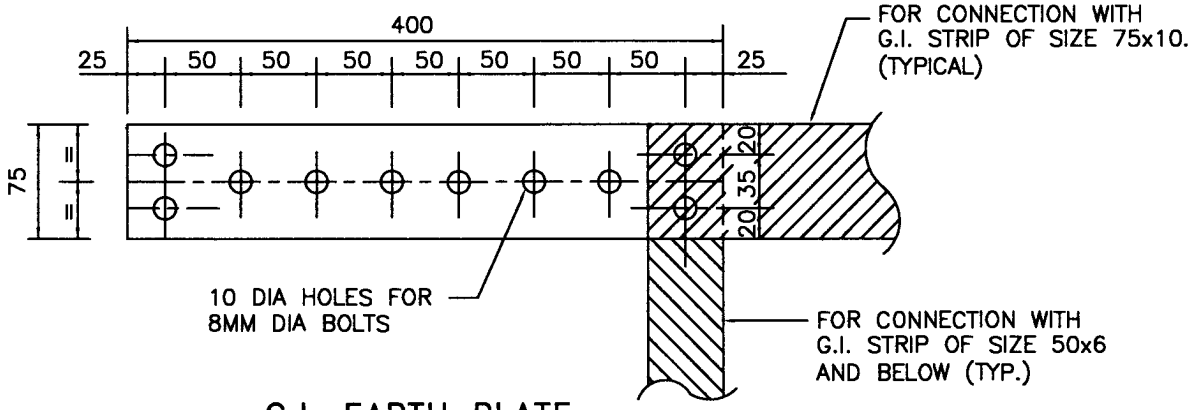
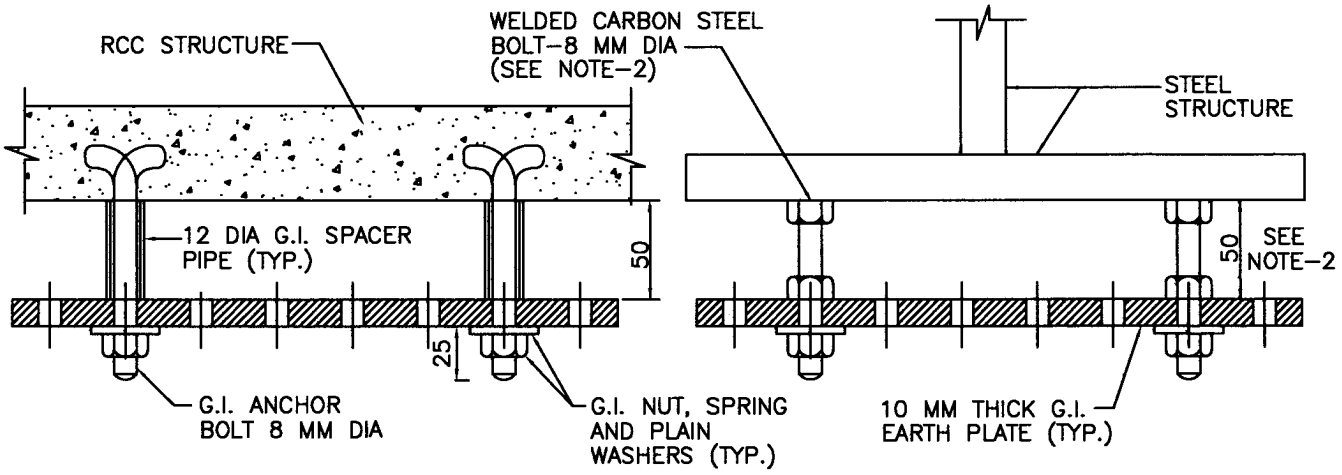
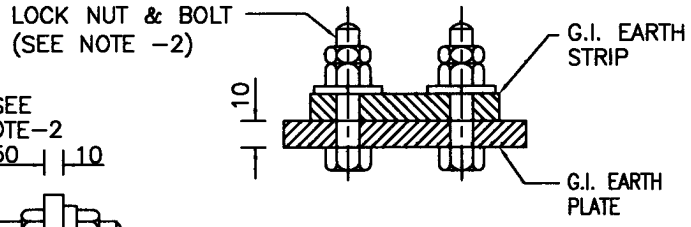
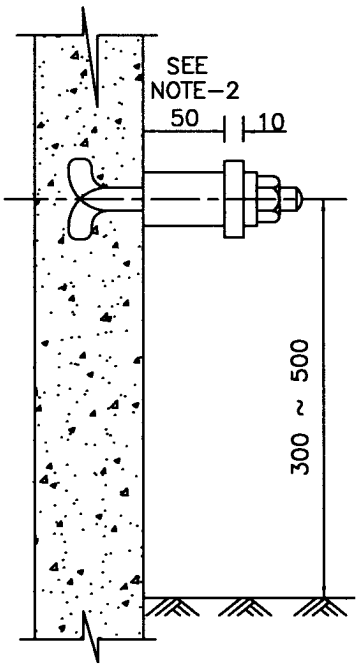


G.I. EARTH PLATE

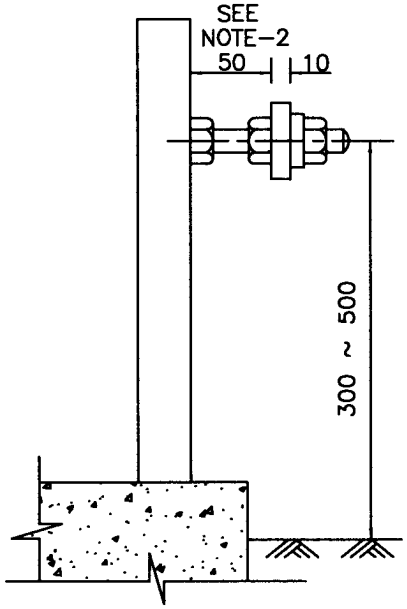




TYPICAL FIXING DETAIL OF G.I. EARTH STRIP TO EARTH PLATE



TYPICAL INSTALLATION OF EARTH PLATE ON R.C.C. STRUCTURES



TYPICAL INSTALLATION OF EARTH PLATE ON STEEL STRUCTURES

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. WHERE FIRE PROOFING OF STEEL STRUCTURES ARE ENCOUNTERED LENGTH OF CARBON STEEL BOLTS SHALL BE SUITABLY INCREASED FOR FIXING OF EARTH PLATE.
3. ALL CONNECTIONS WITH EARTH PLATE SHALL BE MADE WITH 8MM DIA. G.I. BOLT, NUT, SPRING AND PLAIN WASHERS.
4. CRIMP TYPE CABLE LUGS SHALL BE USED FOR CONNECTION WITH G.I. WIRE ROPE/CU/AL CABLES.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	01.11.21	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
6	08.11.16	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN
5	27.06.11	REAFFIRMED & ISSUED	BP	RKS/RSC	UAP	DM

Approved by

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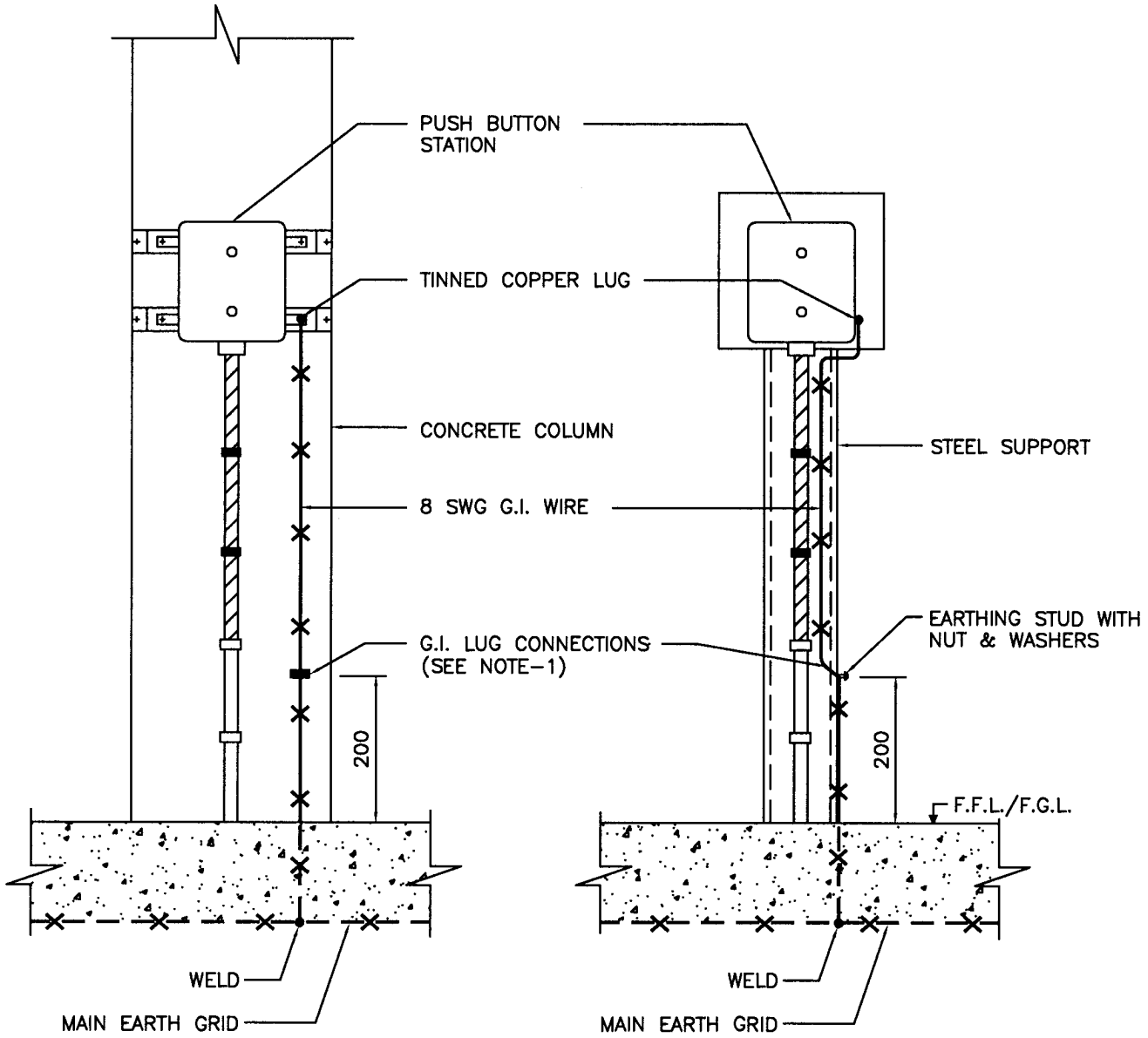

NOTES:-

1. ALTERNATIVELY, CONNECTION SHALL BE TAKEN FROM THE NEAREST AVAILABLE EARTH PLATE.

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6	29.11.21	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
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4	27.06.11	REAFFIRMED & ISSUED	BP	RKS/RSC	UAP	DM

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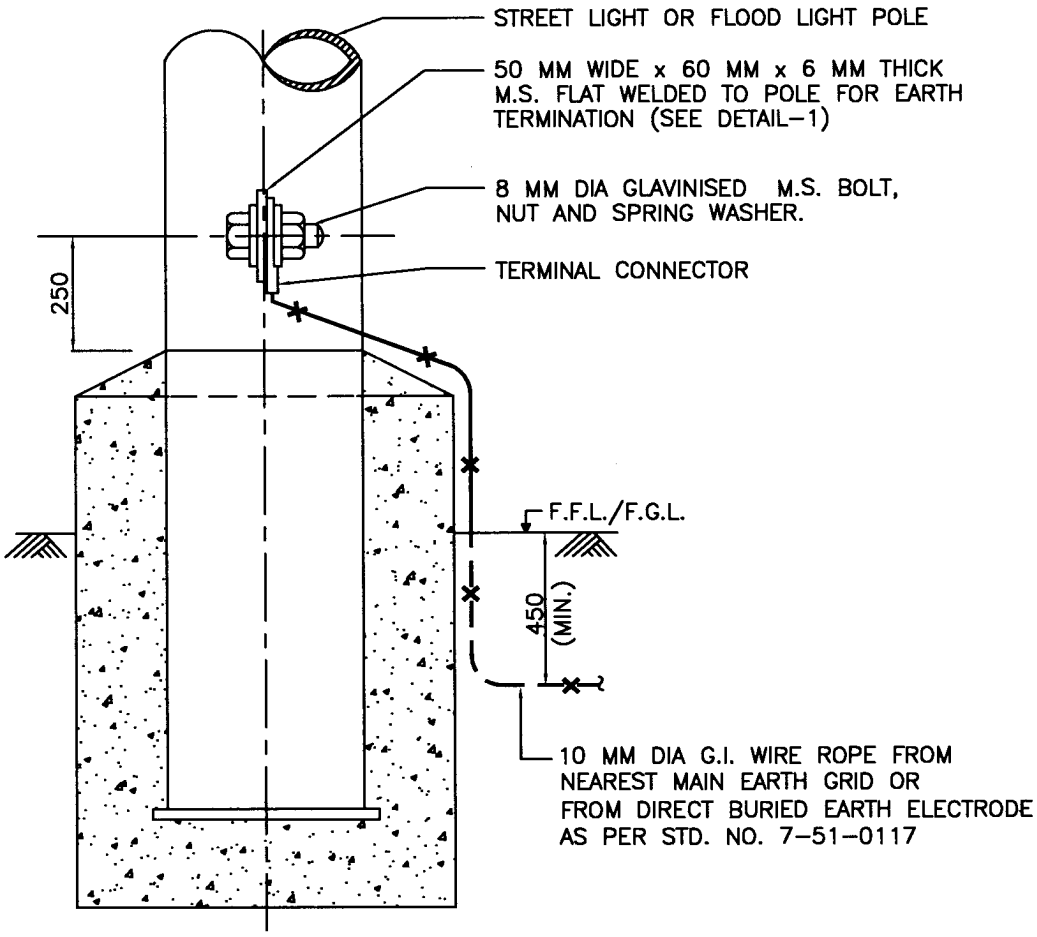

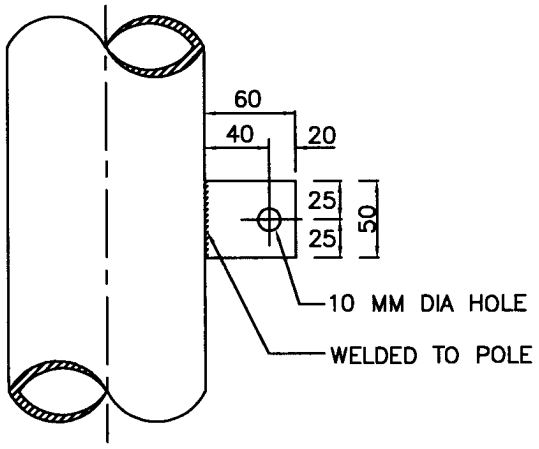

DETAIL–1

NOTES:–

1. USE TWO WIRES ROPES IF VOLTAGE IN THE POLE JUNCTION BOX IS 415 VOLTS.

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6	01.11.21	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
5	08.11.16	REAFFIRMED & ISSUED	BP	FA/HK	BRB	RN
4	27.06.11	REAFFIRMED & ISSUED	BP	RKS/RSC	UAP	DM

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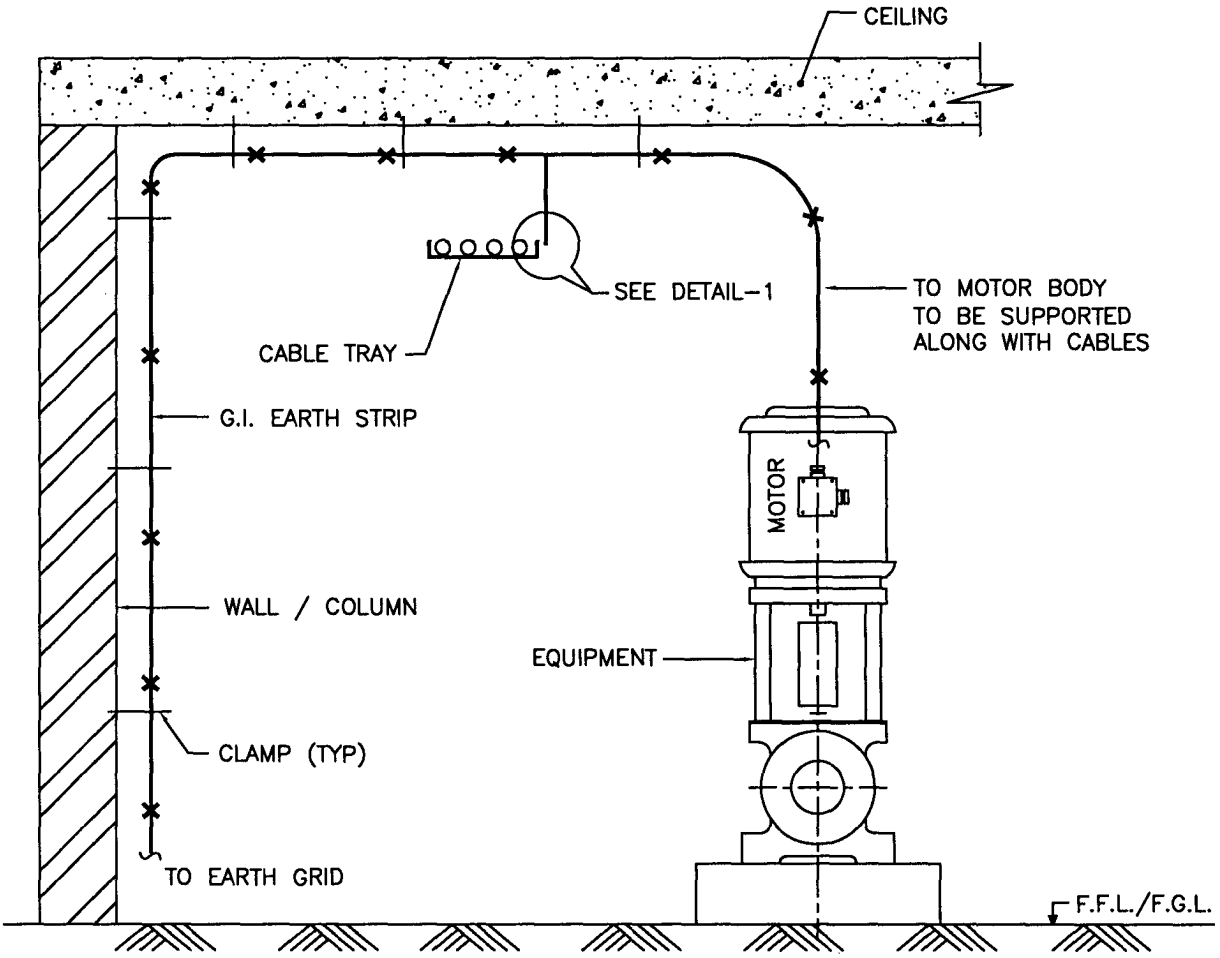
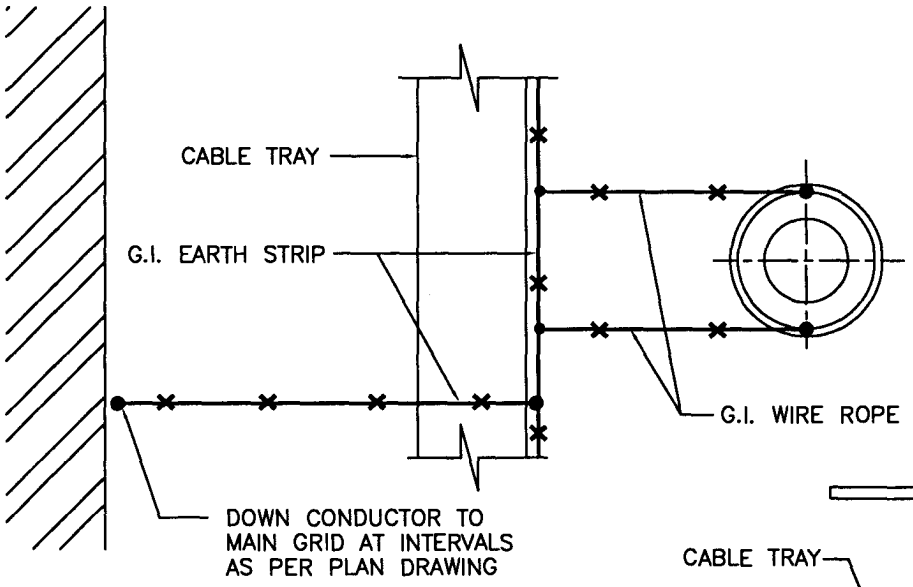
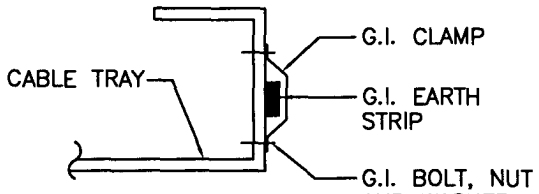




PLAN VIEW



DETAIL-1

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	29.11.21	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
5	08.11.16	REAFFIRMED & ISSUED	BP	FA/HK	BRB	RN
4	27.06.11	REAFFIRMED & ISSUED	BP	RKS/RSC	UAP	DM

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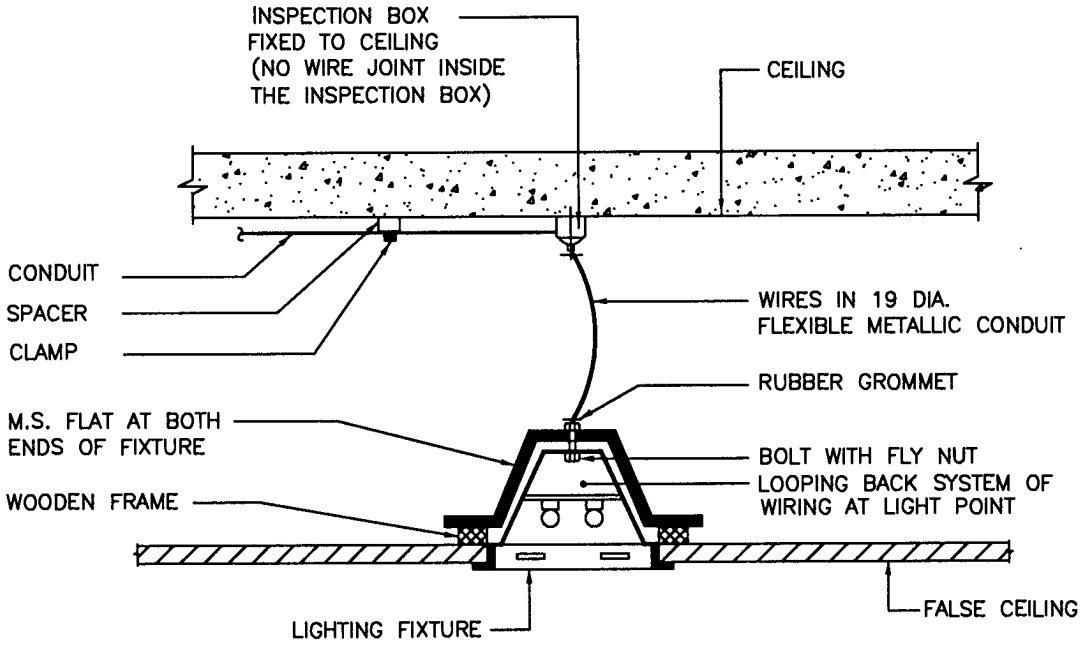
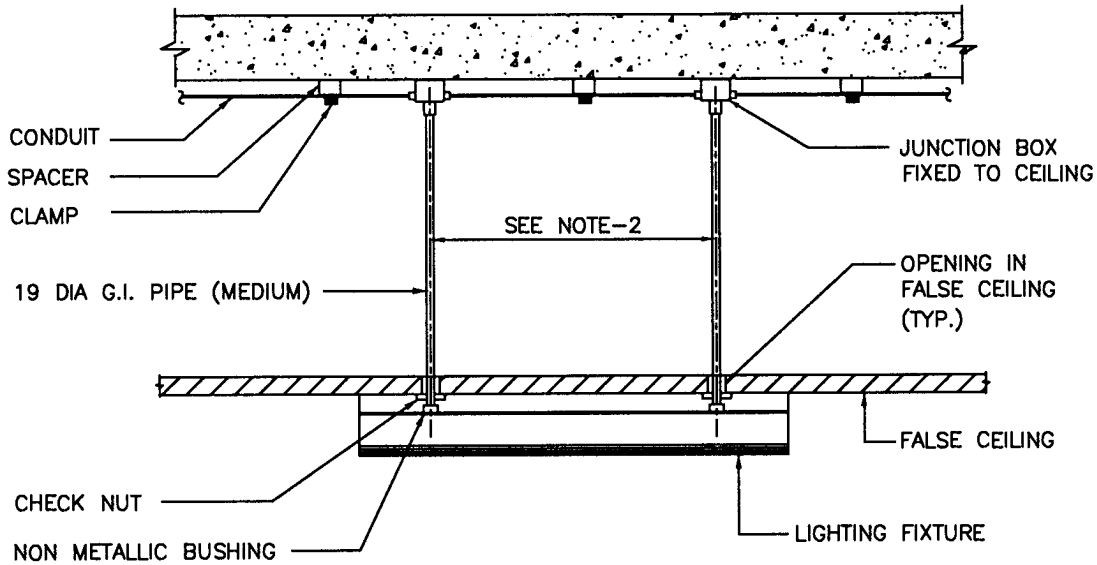


DETAIL–1
RECESS MOUNTED FIXTURE SUPPORTED ON WOODEN FRAME



DETAIL–2
FIXTURE MOUNTING BELOW FALSE CEILING

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. SUSPENSION/FIXING CENTRES SHALL BE AS PER FIXTURE MANUFACTURER'S DETAILS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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6	29.11.21	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	PG	SM
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4	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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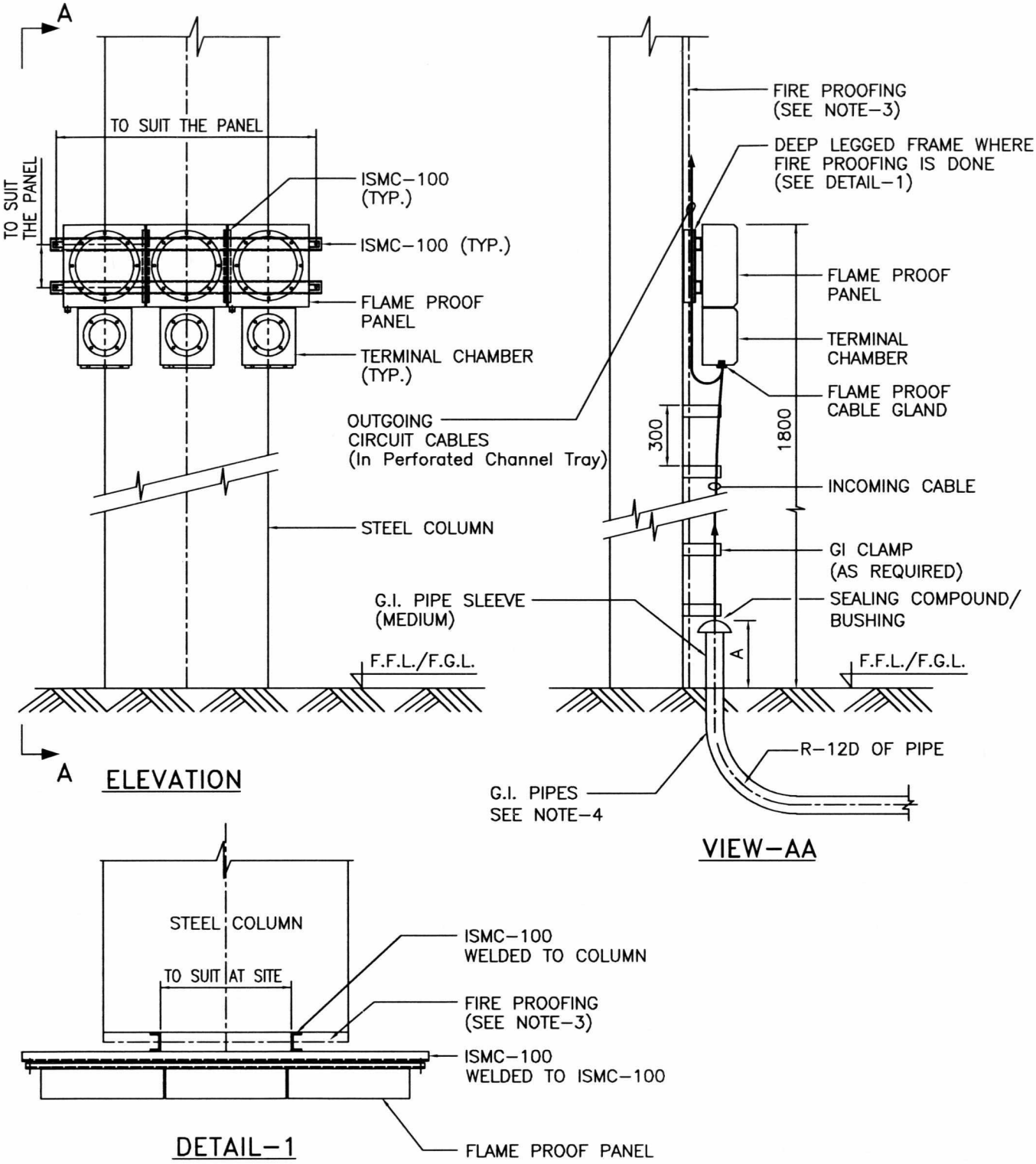

NOTES:–

A= { 150 MM (MIN.) FOR INDOOR LOCATIONS. / 300 MM (MIN.) FOR OUTDOOR LOCATIONS.

1. ALL DIMENSIONS ARE IN MM.
2. THE SUPPORT STRUCTURES SHALL BE PAINTED WITH SAME PAINT, AS FOLLOWED FOR CORRESPONDING STRUCTURE.
3. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED, FLAME PROOF PANEL AND CABLE SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED CHANNEL FRAME / DISTANCE BRACKET.
4. QUANTITY AND SIZE OF PIPE SLEEVES SHALL BE AS PER LAYOUT DRAWINGS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	25.08.23	UPDATED & ISSUED AS STANDARD	SONU	VKS/HK	MKS	SM
5	16.07.18	UPDATED & ISSUED AS STANDARD	RSD	VKS/HK	BRB	RKT
4	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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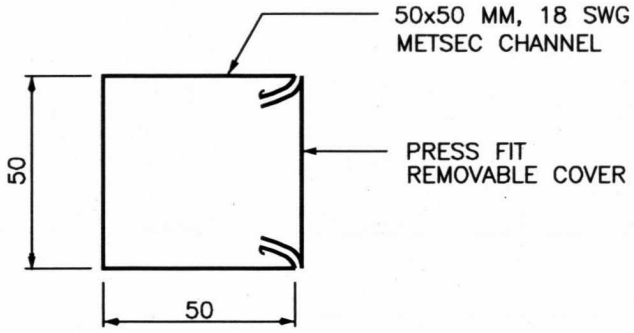
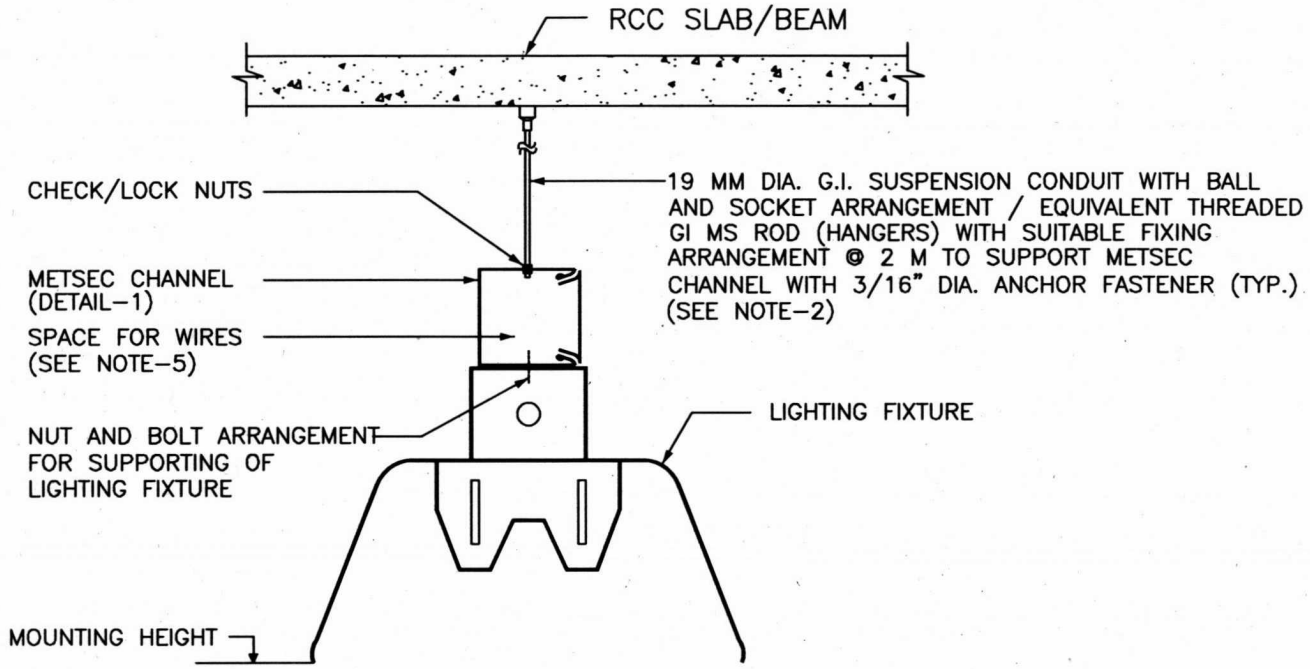


DETAIL–1
METSEC CHANNEL



INSTALLATION OF LIGHTING FIXTURE BELOW METSEC CHANNEL

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. LENGTH OF SUSPENSION CONDUITS / MS ROD SHALL BE ADJUSTED AS PER MOUNTING HEIGHT OF LIGHTING FIXTURES.
3. IN CASE, METSEC CHANNEL IS NOT TO BE SUSPENDED, IT SHALL BE DIRECTLY FIXED TO THE CEILING BY 3/16" DIA. ANCHOR FASTENERS @ 2 M INTERVALS.
4. METSEC CHANNEL SHALL BE SPRAY PAINTED AFTER INSTALLATION.
5. WIRES FOR EACH TYPE OF CIRCUIT (LIGHTING/POWER/DC LIGHTING) SHALL BE NEATLY BUNCHED IN METSEC CHANNEL.

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5	15.09.22	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
4	09.03.18	UPDATED & ISSUED AS STANDARD	RSD	VKS/HK	BRB	RN
3	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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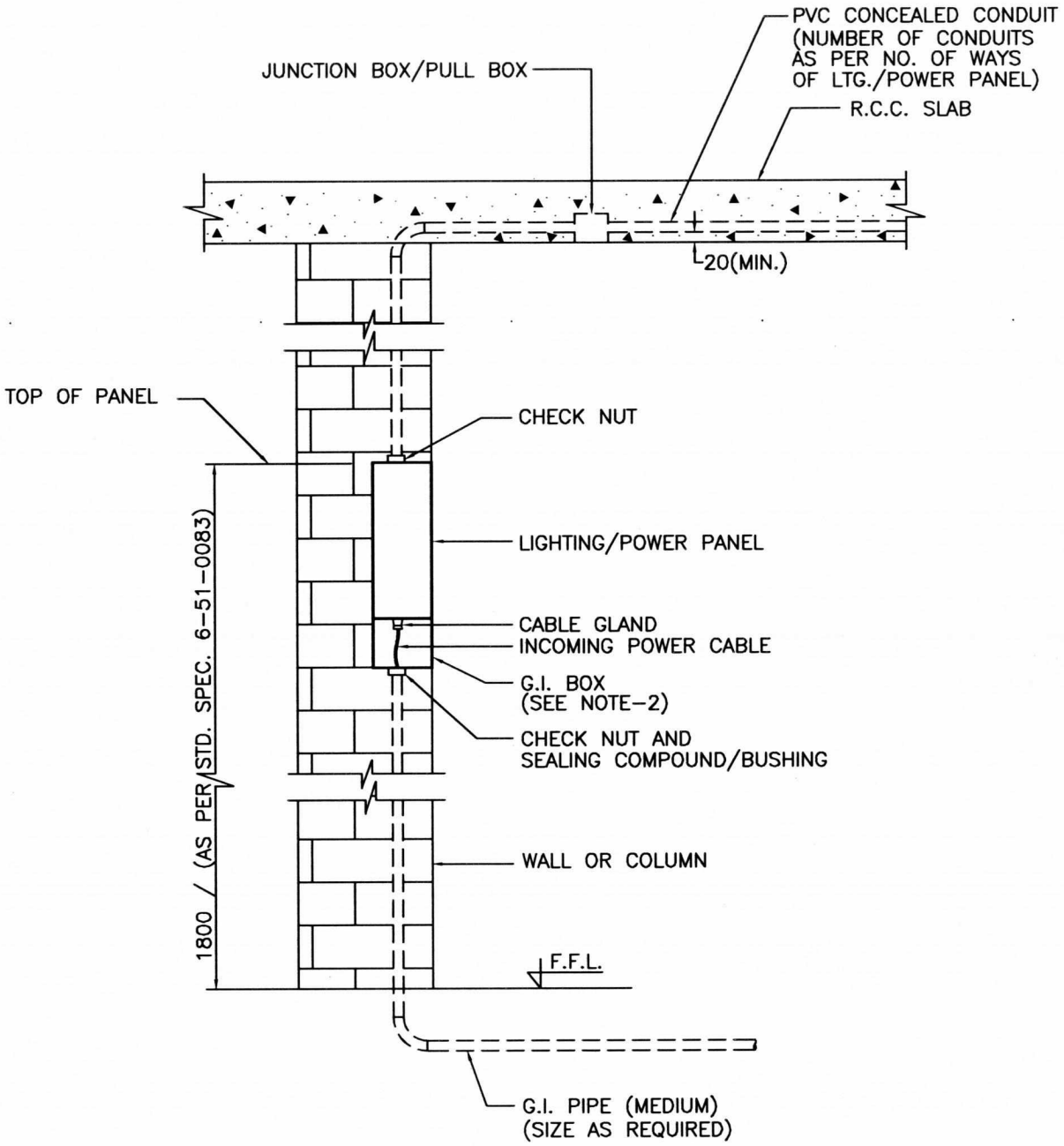

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. G.I. ADAPTOR BOX OF SUITABLE SIZE WITH REMOVABLE COVER SHALL BE PROVIDED BELOW THE PANEL TO FACILITATE CABLE TERMINATION.

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6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
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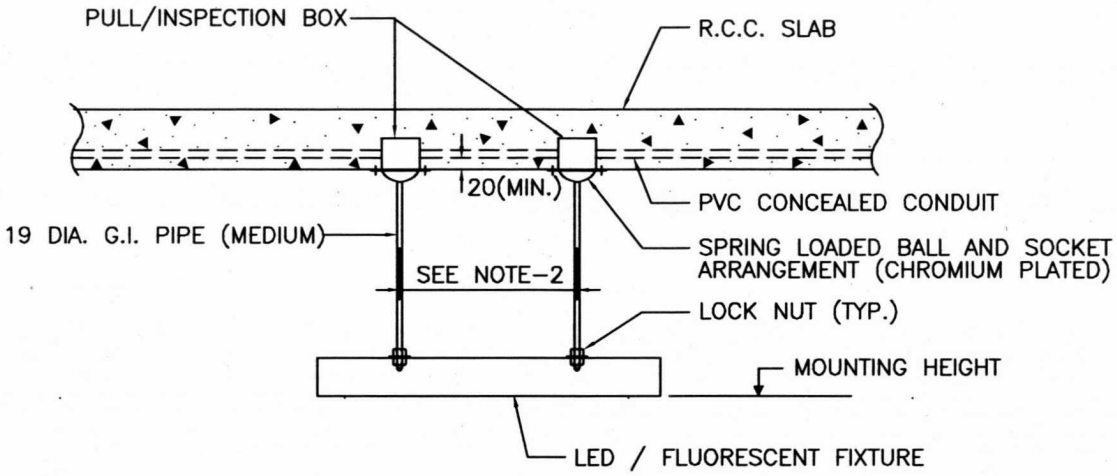
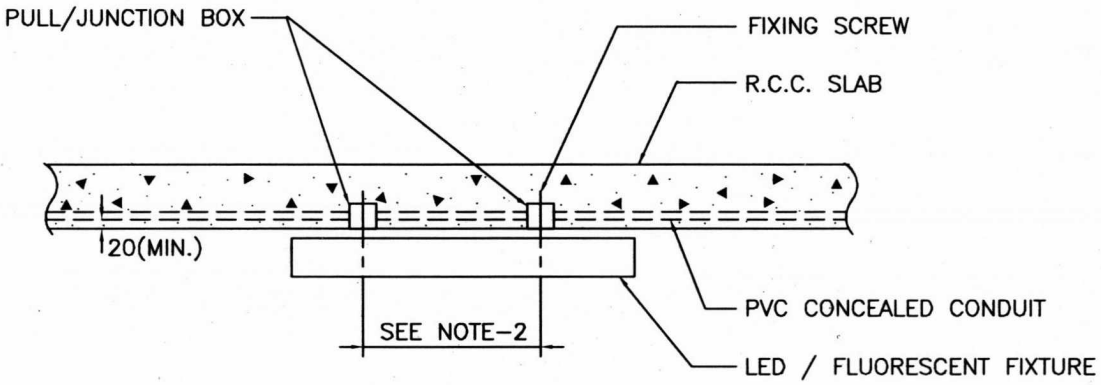


SUSPENSION MOUNTING



CEILING MOUNTING

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. SUSPENSION/FIXING CENTERS SHALL BE AS PER FIXTURE MANUFACTURER'S DETAILS.

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6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
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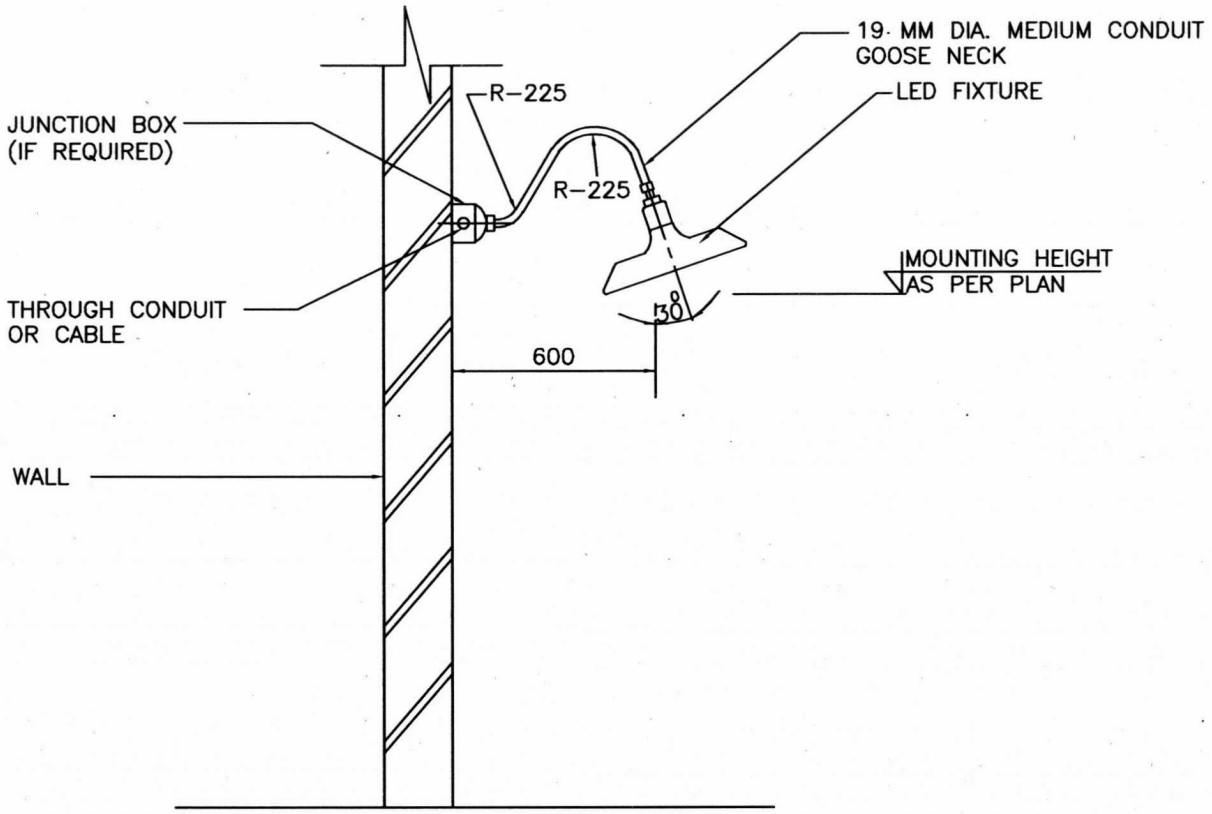
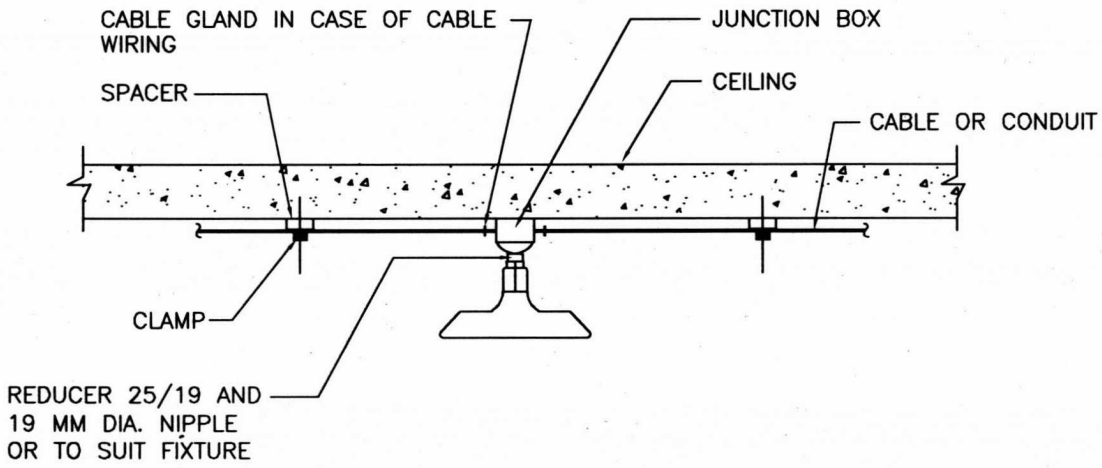


WALL-MOUNTED



CEILING-MOUNTED

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. APPLICABLE FOR SAFE AREAS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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5	22.02.18	UPDATED & ISSUED AS STANDARD	BP	VKS/HK	BRB	RN
4	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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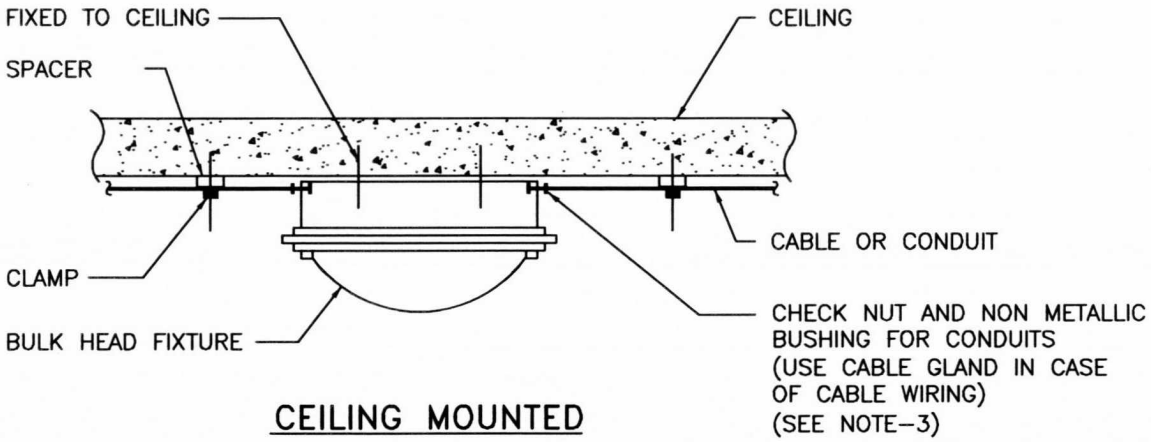
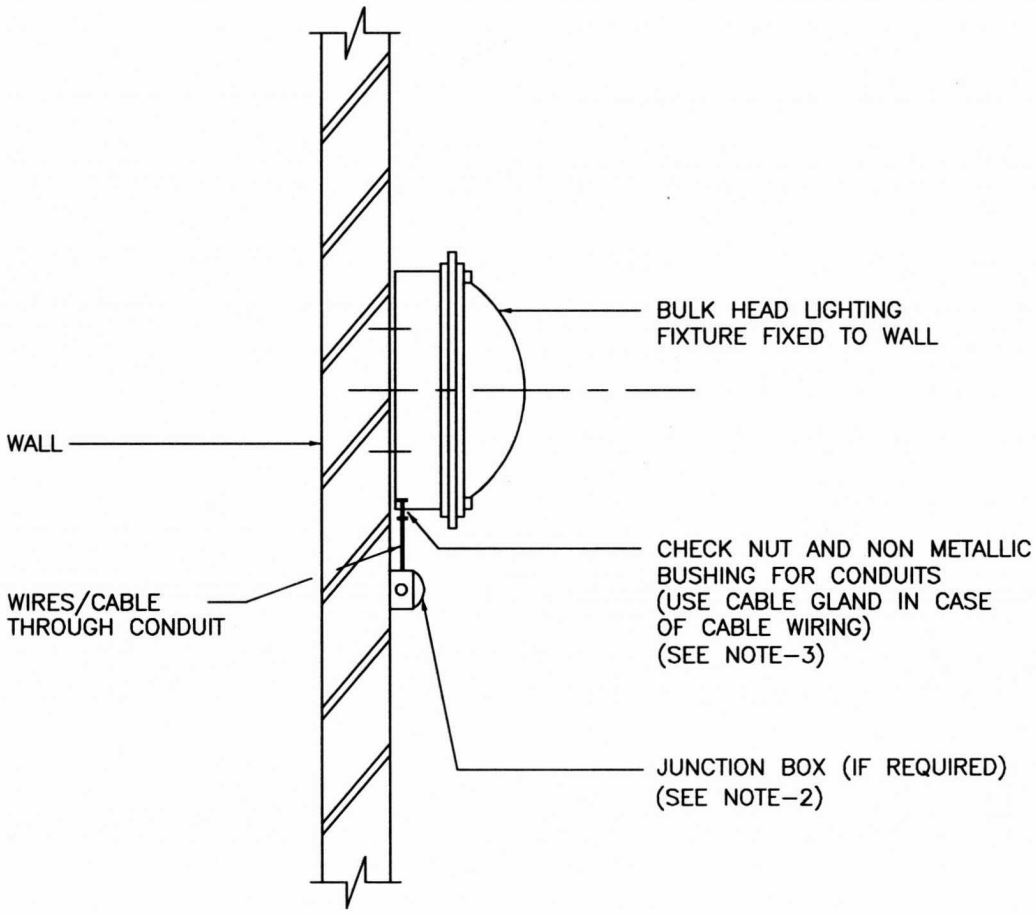


CEILING MOUNTED



WALL MOUNTED

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. FOR INSTALLATION IN OUT DOOR FIXTURES, FIXTURES & JUNCTION BOX SHALL BE IP–55 (WEATHER PROTECTED).
3. PROPER SEALING SHALL BE ENSURED WHEREVER REQUIRED TO PREVENT INGRESS OF WATER.

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6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
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4	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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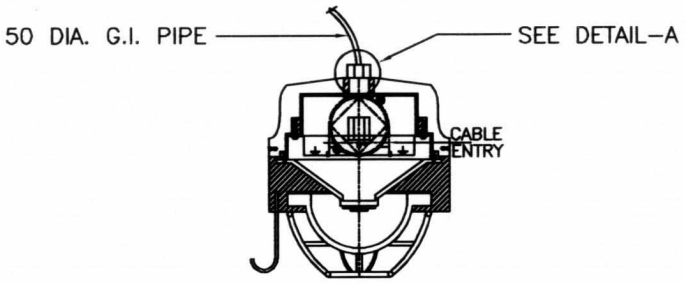
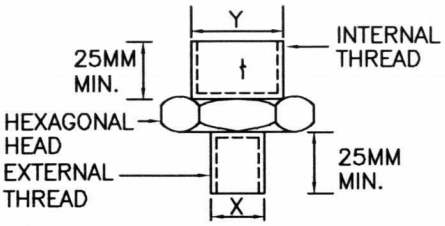


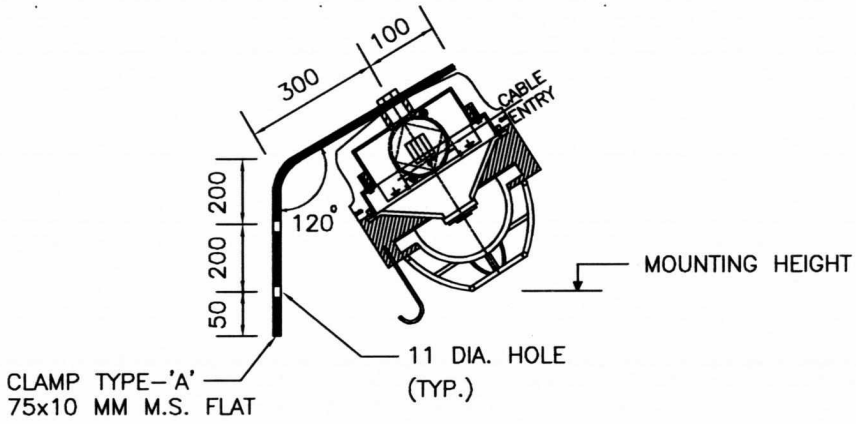
DETAIL–1
POLE MOUNTED



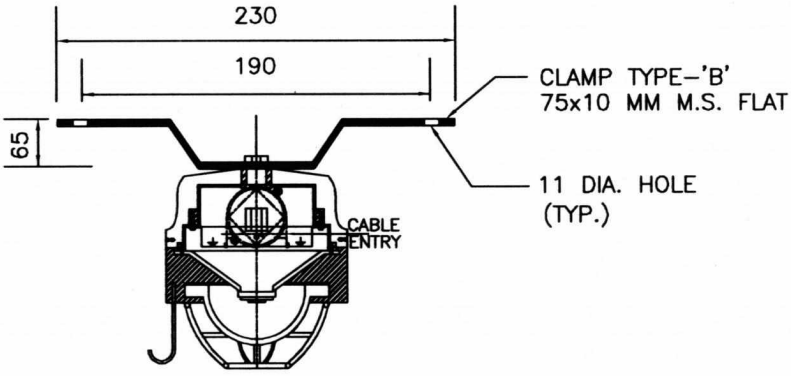
DETAIL–A
(ADAPTOR)

DIMENSIONS	
X	Y
*TO SUIT 19 DIA.	TO SUIT 50 DIA.

* ALTERNATIVELY SIZE TO SUIT FIXTURE



DETAIL–2
BRACKET MOUNTED



DETAIL–3
CEILING MOUNTED

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. SUPPORT ACCESSORIES VIZ THE BRACKET, CEILING ADAPTOR SHALL BE PAINTED WITH EPOXY BASED PAINT.

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6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
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4	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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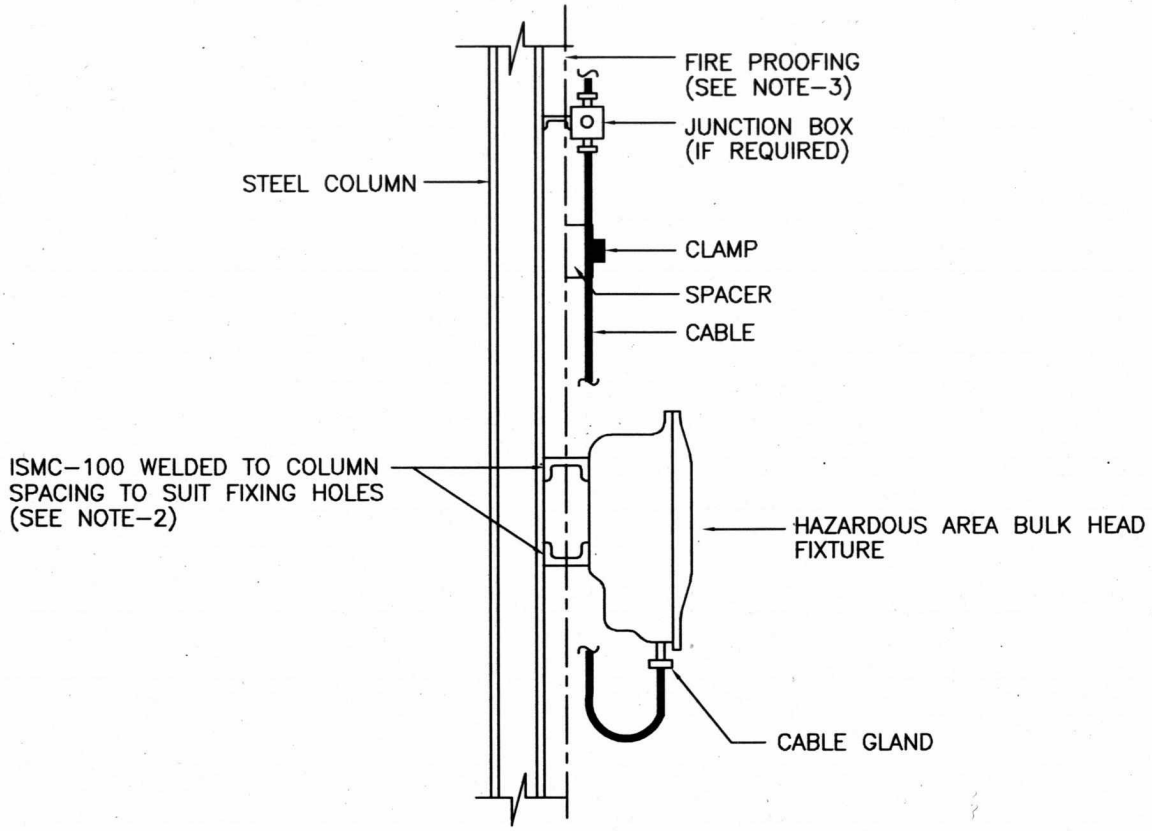
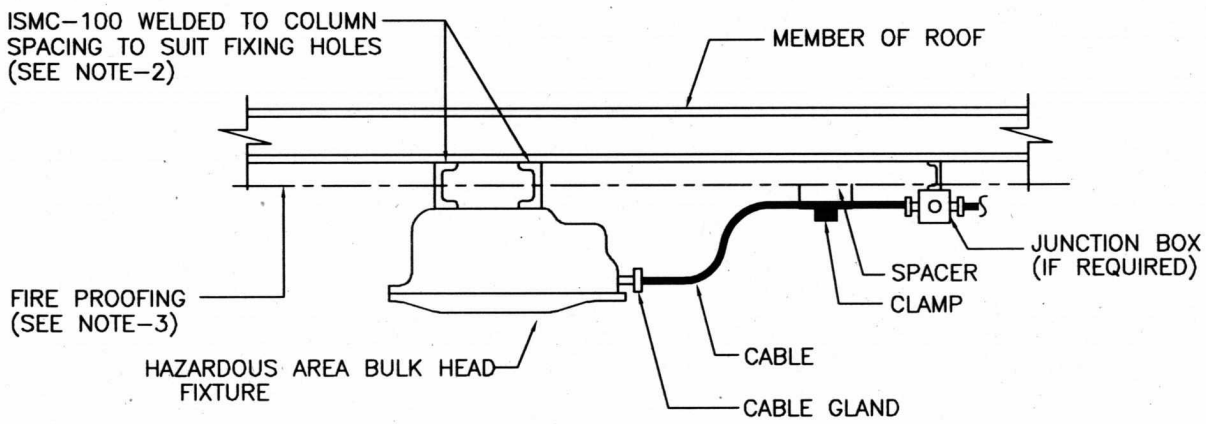


DETAIL–1
COLUMN MOUNTED



DETAIL–2
CEILING MOUNTED

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. USE ANCHOR BOLTS FOR INSTALLATION OF FIXTURES ON CONCRETE COLUMNS.
3. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED FIXTURE/ JUNCTION BOX AND CABLE/CONDUIT SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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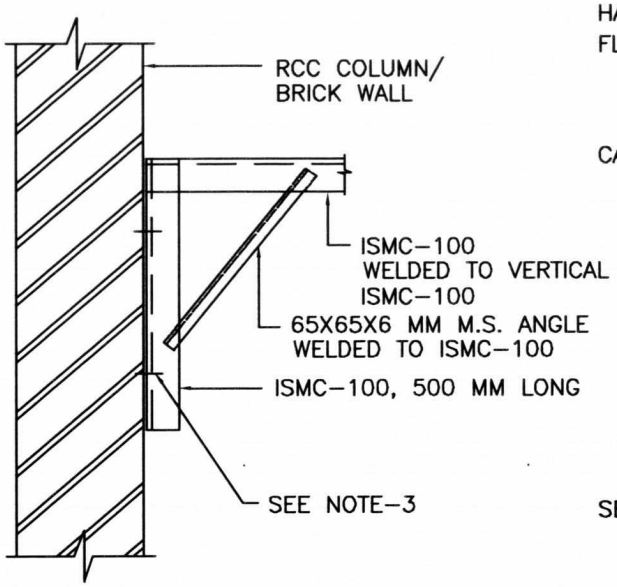
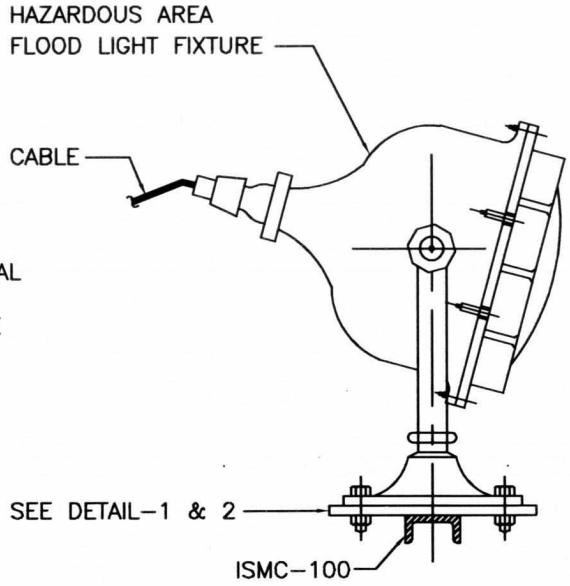
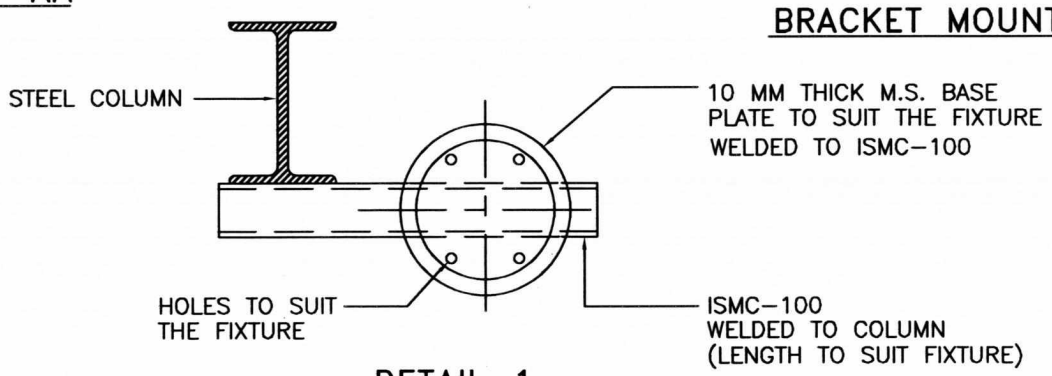


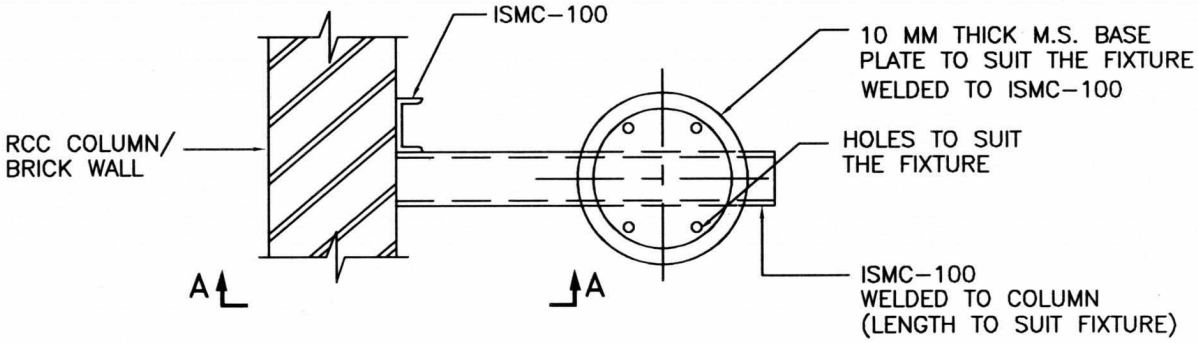
VIEW–AA



ELEVATION
BRACKET MOUNTED



DETAIL–1
MOUNTED ON STEEL COLUMN



DETAIL–2
MOUNTED ON RCC COLUMN/BRICK WALL

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED FIXTURE/ JUNCTION BOX AND CABLE/CONDUIT SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.
3. SUPPORT FOR FLOOD LIGHT FIXTURE SHALL BE SUITABLY FIXED TO RCC COLUMN/ BRICK WALL BY USING ANCHOR FASTENER.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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6	15.09.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
5	22.02.18	UPDATED & ISSUED AS STANDARD	BP	VKS/HK	BRB	RN
4	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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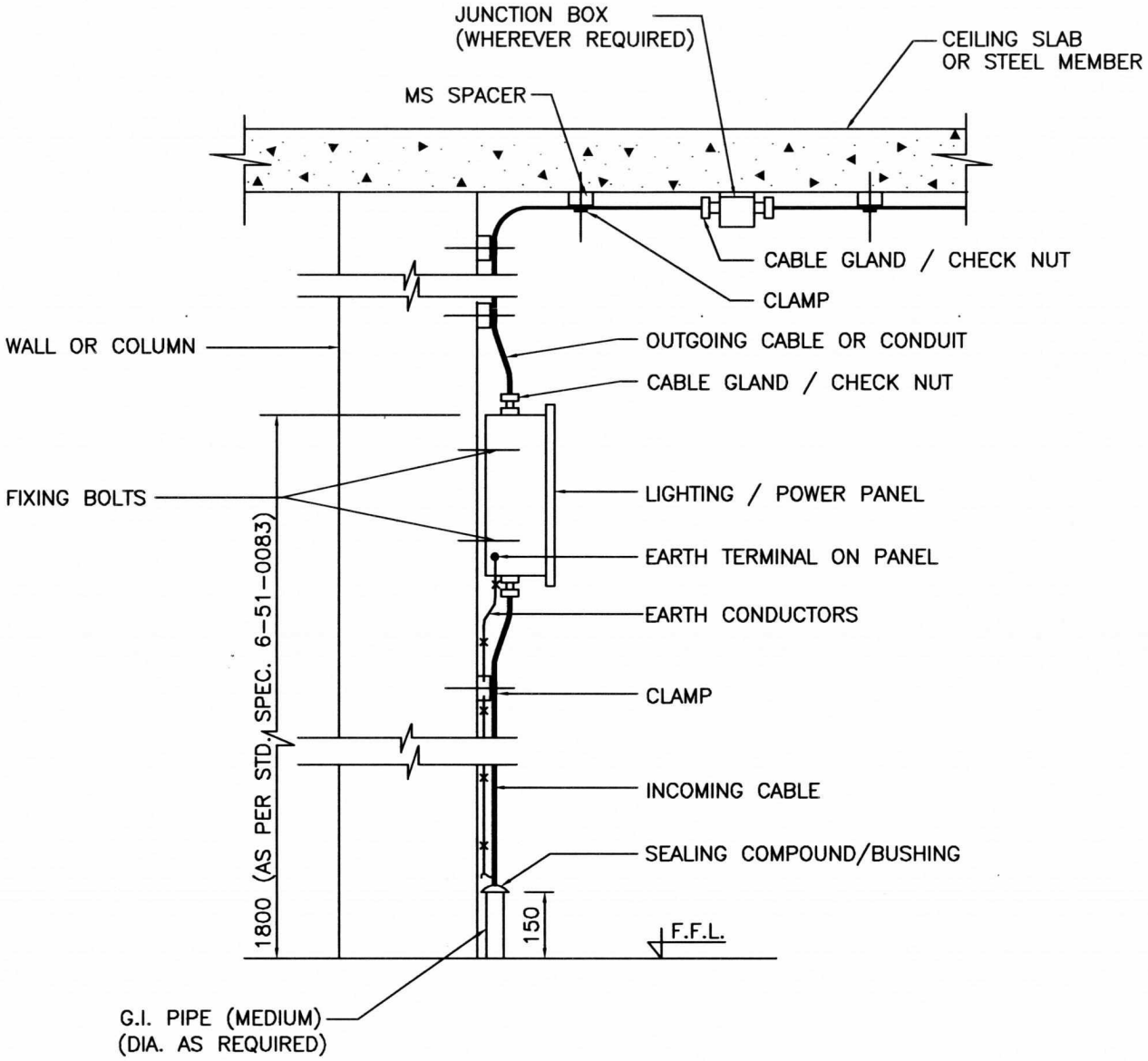

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED FIXTURE/ PANEL/ JUNCTION BOX AND CABLE/CONDUIT SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.

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5	22.02.18	UPDATED & ISSUED AS STANDARD	BP	VKS/HK	BRB	RN
4	17.07.13	REAFFIRMED & ISSUED AS STANDARD	BP	FA/SA	UAP/JMS	DM

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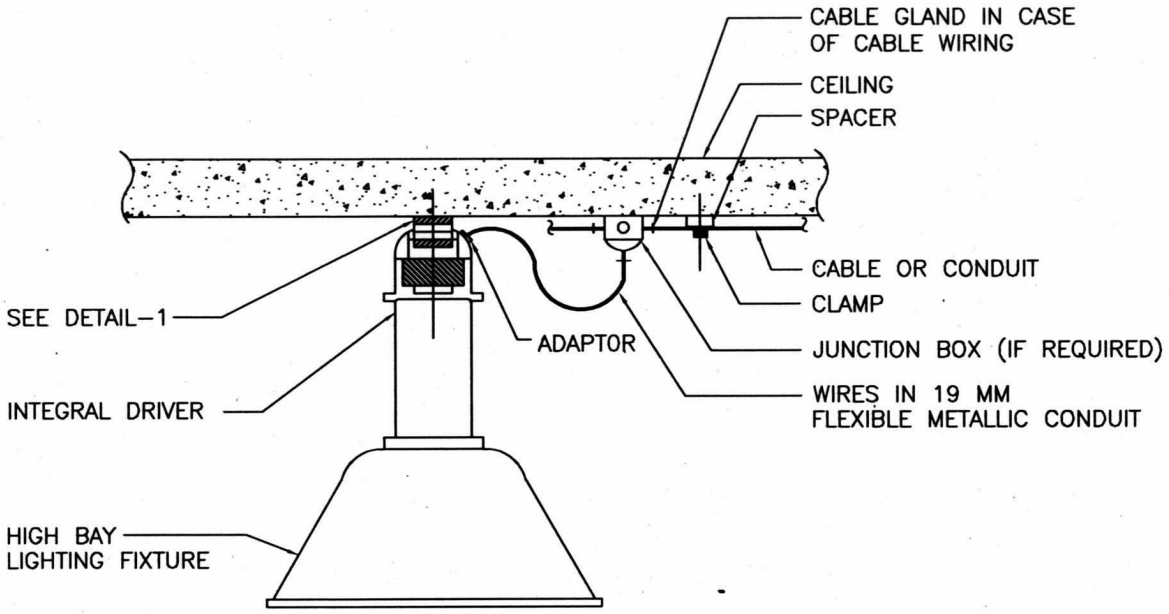

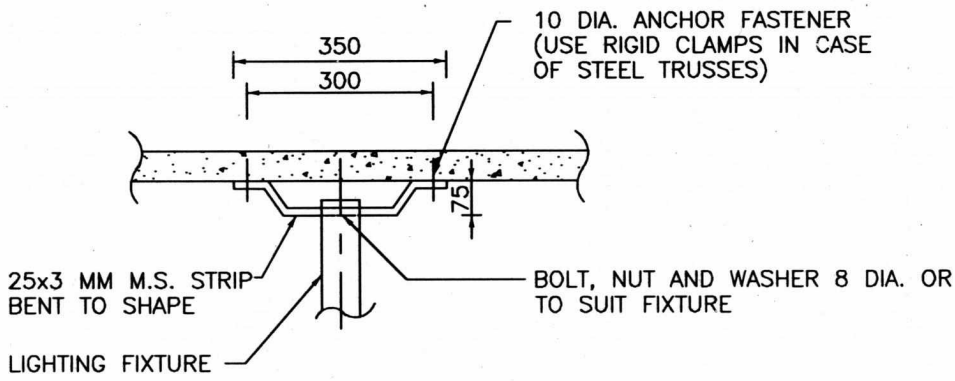

DETAIL–1

NOTES:–

1. ALL DIMENSIONS ARE IN MM.

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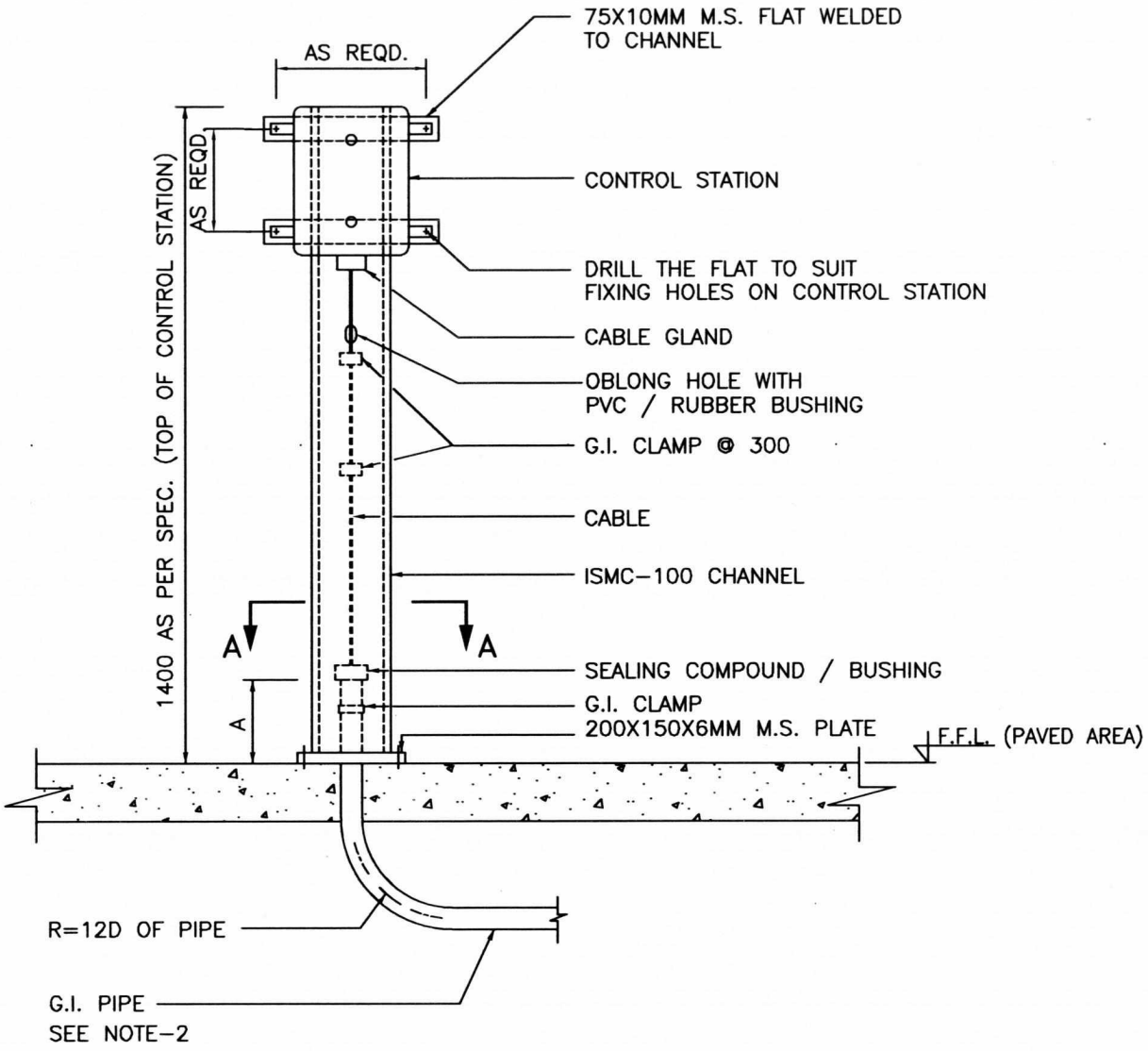
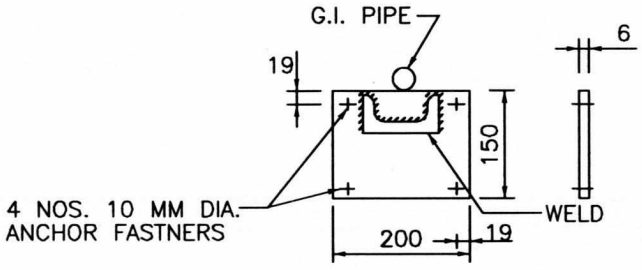


A= { 150 MM (MIN.) FOR INDOOR LOCATION
300 MM (MIN.) FOR OUTDOOR LOCATION



SECTION–AA

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. SIZE OF PIPE SLEEVE SHALL BE AS PER LAYOUT DRAWINGS.

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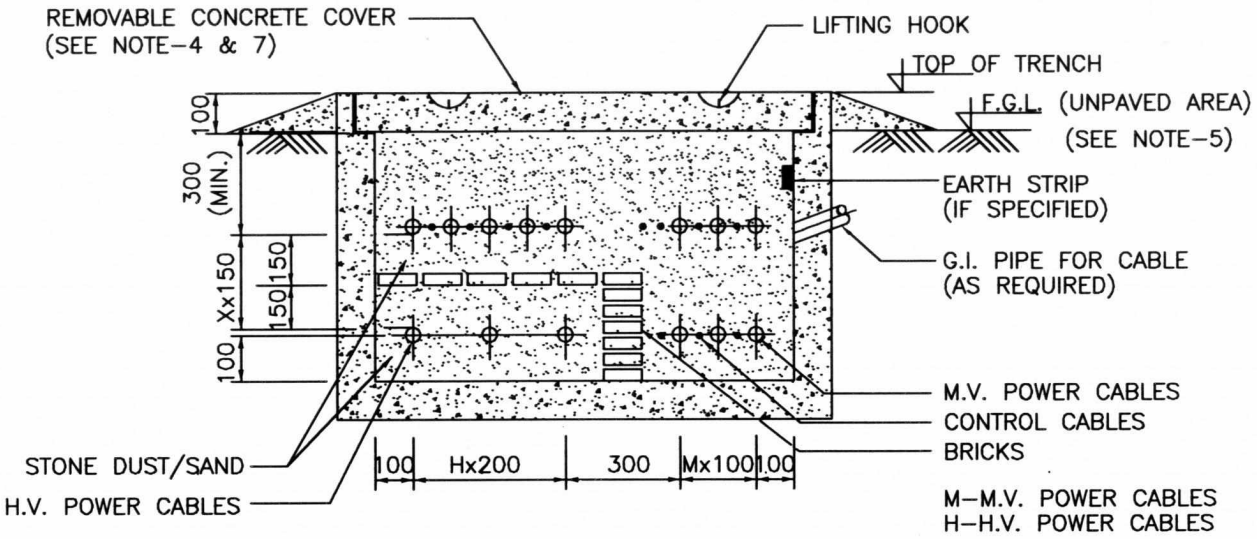
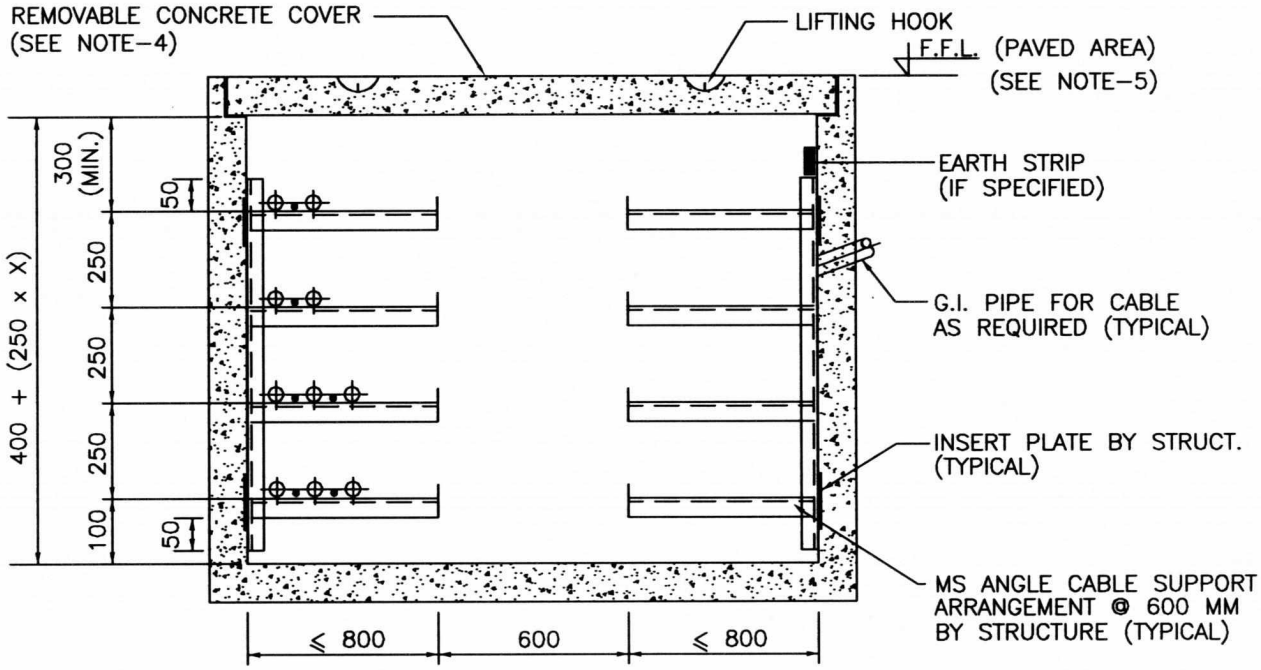


TYPICAL SECTION OF RCC CABLE TRENCH WITHOUT RACKS



TYPICAL SECTION OF RCC CABLE TRENCH WITH RACKS

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. WIDTH OF RACKS ON ONE SIDE OR BOTH SIDES SHALL BE DECIDED AS PER JOB REQUIREMENT.
3. THE EXACT HEIGHT OF OPENING IN TRENCH WALL FOR G.I. PIPE FOR TAKING CABLE SHALL BE SUITABLY DECIDED AT SITE.
4. THE REMOVABLE CONCRETE COVERS SHALL BE SEALED WITH MASTIC ASPHALT FILLER / BITUMEN TO PREVENT INGRESS OF WATER / HYDROCARBONS IN CABLE TRENCH.
5. TOP OF THE TRENCH SHALL BE 100 MM ABOVE FINISHED GRADE LEVEL (F.G.L.) IN CASE OF UNPAVED AREAS AND SHALL BE FLUSHED WITH FINISHED FLOOR LEVEL (F.F.L.) IN CASE OF PAVED AREAS.
6. MINIMUM GAP OF 250MM SHALL BE PROVIDED BETWEEN FA / COMMUNICATION / TELEPHONE CABLES AND ALL OTHER POWER / CONTROL CABLES.
7. INSTEAD OF REMOVABLE CONCRETE COVER, PCC/LEAN CONCRETE SHALL BE PROVIDED IF SPECIFIED IN JOB SPECIFICATION. THE THICKNESS OF PCC SHALL BE MININUM 100mm OR AS SPECIFIED IN STRUCTURAL SPECIFICATION.

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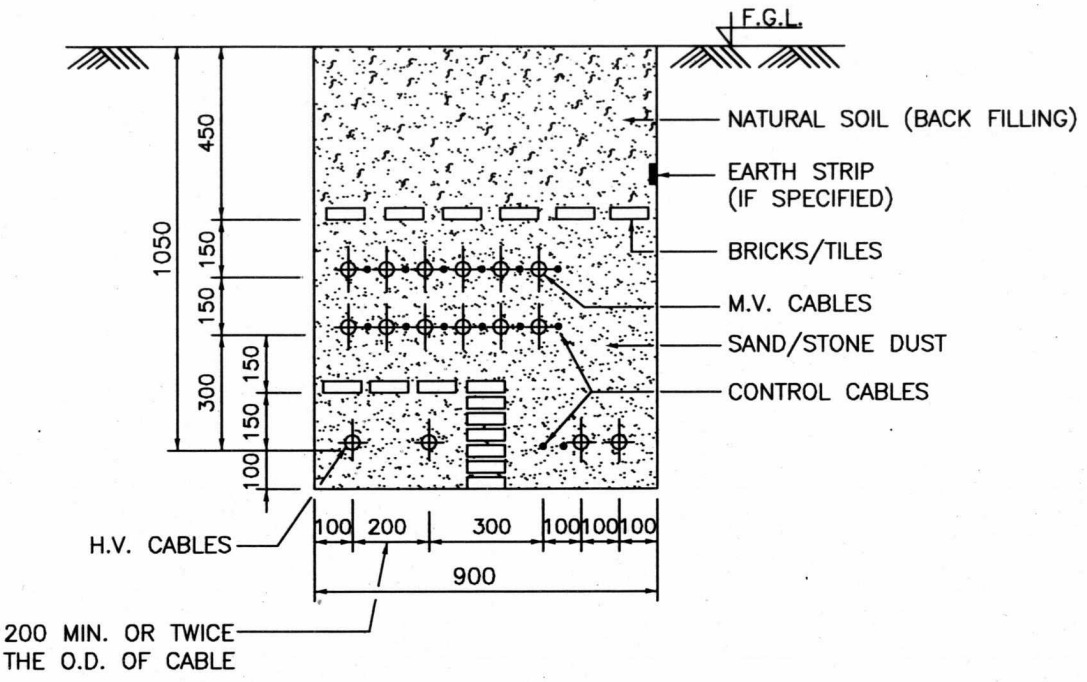
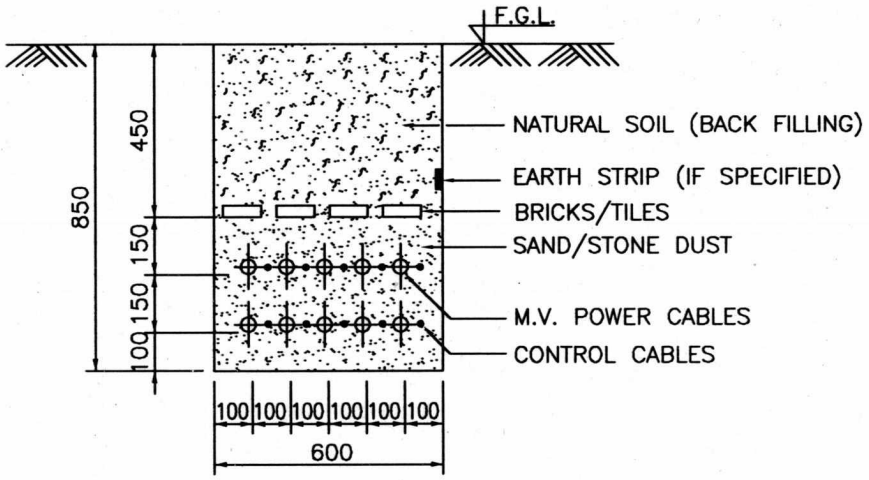


TYPICAL SECTION WITH H.V. AND M.V. CABLES



TYPICAL SECTION WITH M.V. CABLES

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. LEAVE SPACE FOR LATER ADDITION OF AT LEAST 2 CABLES OR 15% AVERAGE SPARE SPACE FOR FUTURE EXPANSION.
3. IF FIRE ALARM AND COMMUNICATION CABLES ARE LAID IN THE SAME TRENCH, A CLEARANCE OF 300 MM (MIN.) FROM ELECTRIC POWER CABLES SHALL BE PROVIDED.

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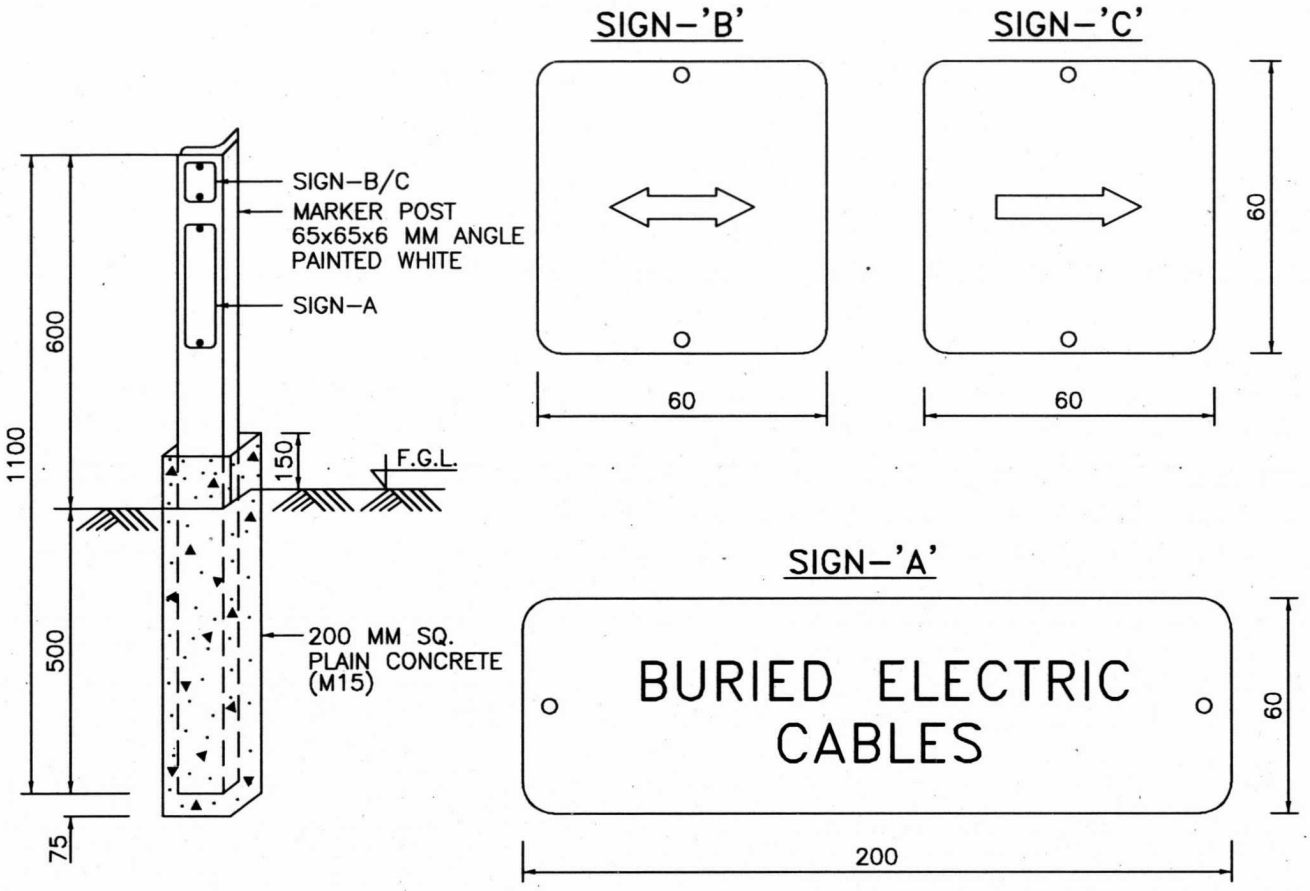
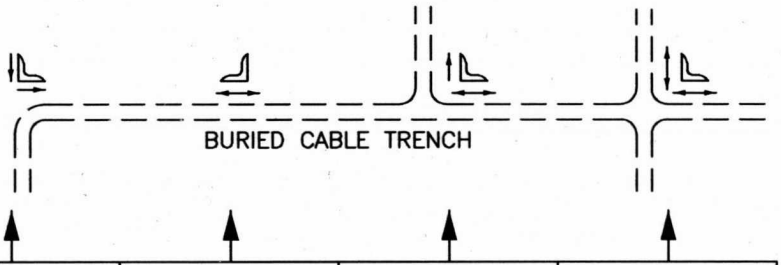


TYPICAL ARRANGEMENT OF MARKER

(SEE NOTE–2)



	ANGLE 65x65x6 1100 MM LONG	ANGLE 65x65x6 1100 MM LONG	ANGLE 65x65x6 1100 MM LONG	ANGLE 65x65x6 1100 MM LONG
ASSEMBLY CONSISTING OF	SIGN.–A–1 NO. SIGN.–C–2 NOS.	SIGN.–A–1NO. SIGN.–B–1NO.	SIGN.–A–1NO. SIGN.–B–1NO. SIGN.–C–1NO.	SIGN.–A–1NO. SIGN.–B–2NOS.

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. TRENCHES SHALL BE MARKED AT ALL DIRECTION CHANGES, INTERSECTIONS AND STRAIGHT RUNS.
3. SIGN BOARDS SHALL BE MADE OF 14 GAUGE ENAMELLED STEEL PLATE. WHITE LETTERING SHALL BE ON JADE GREEN BACKGROUND.

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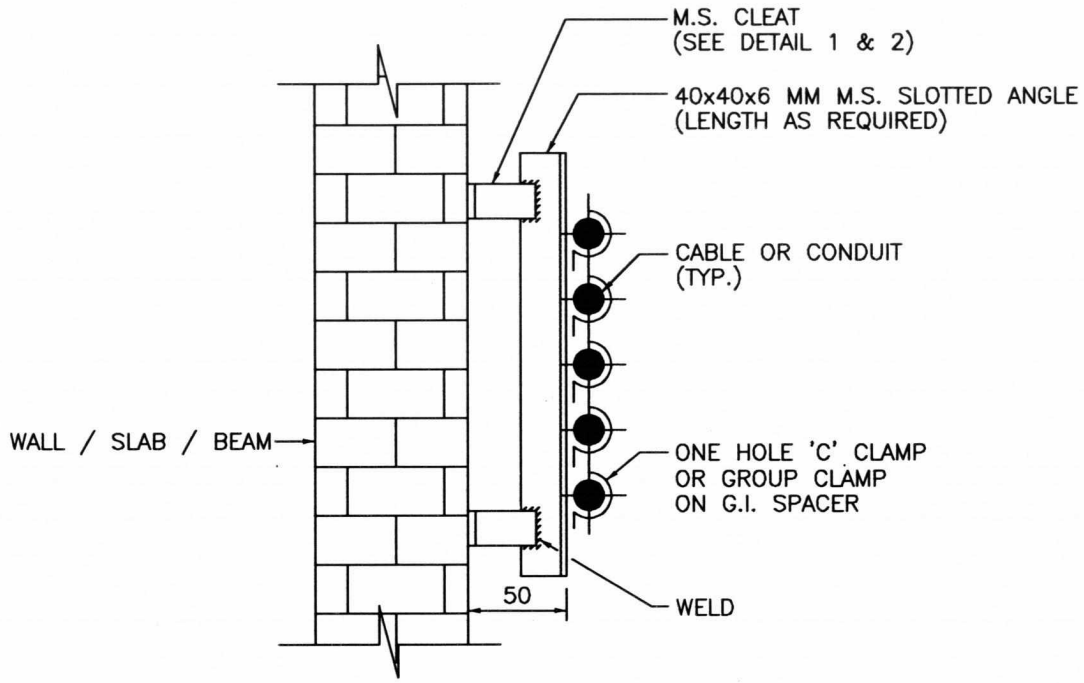
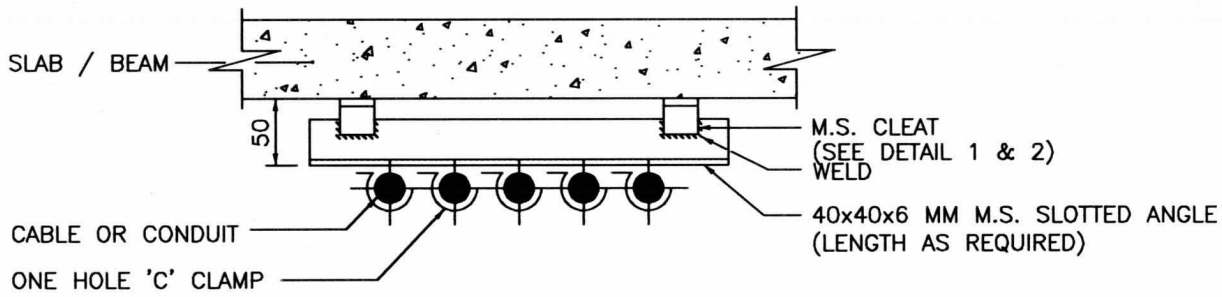
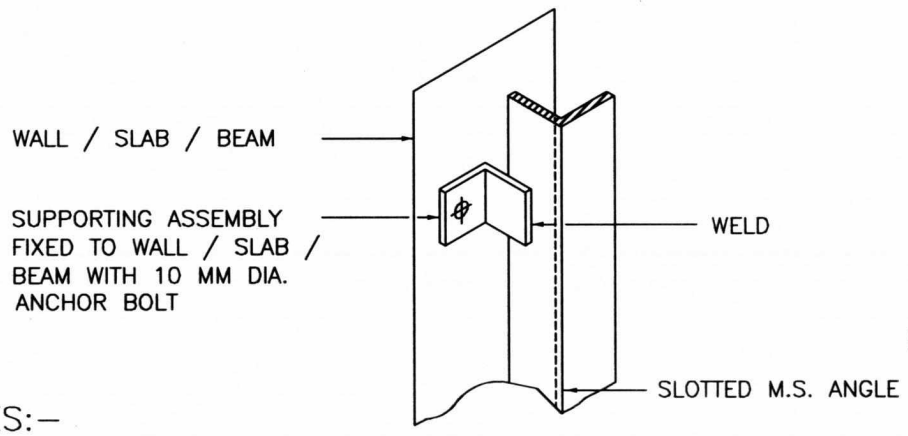


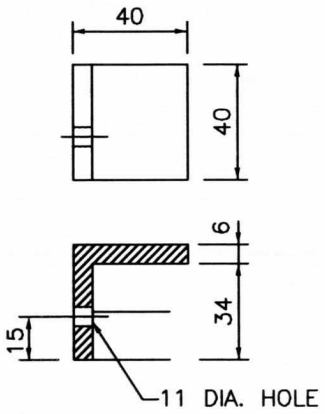
SUPPORT ON WALL



SUPPORT ON SLAB / BEAM



DETAIL–1



DETAIL–2
M.S. CLEAT

NOTES:–

1. ALL DIMENSIONS ARE IN MM.

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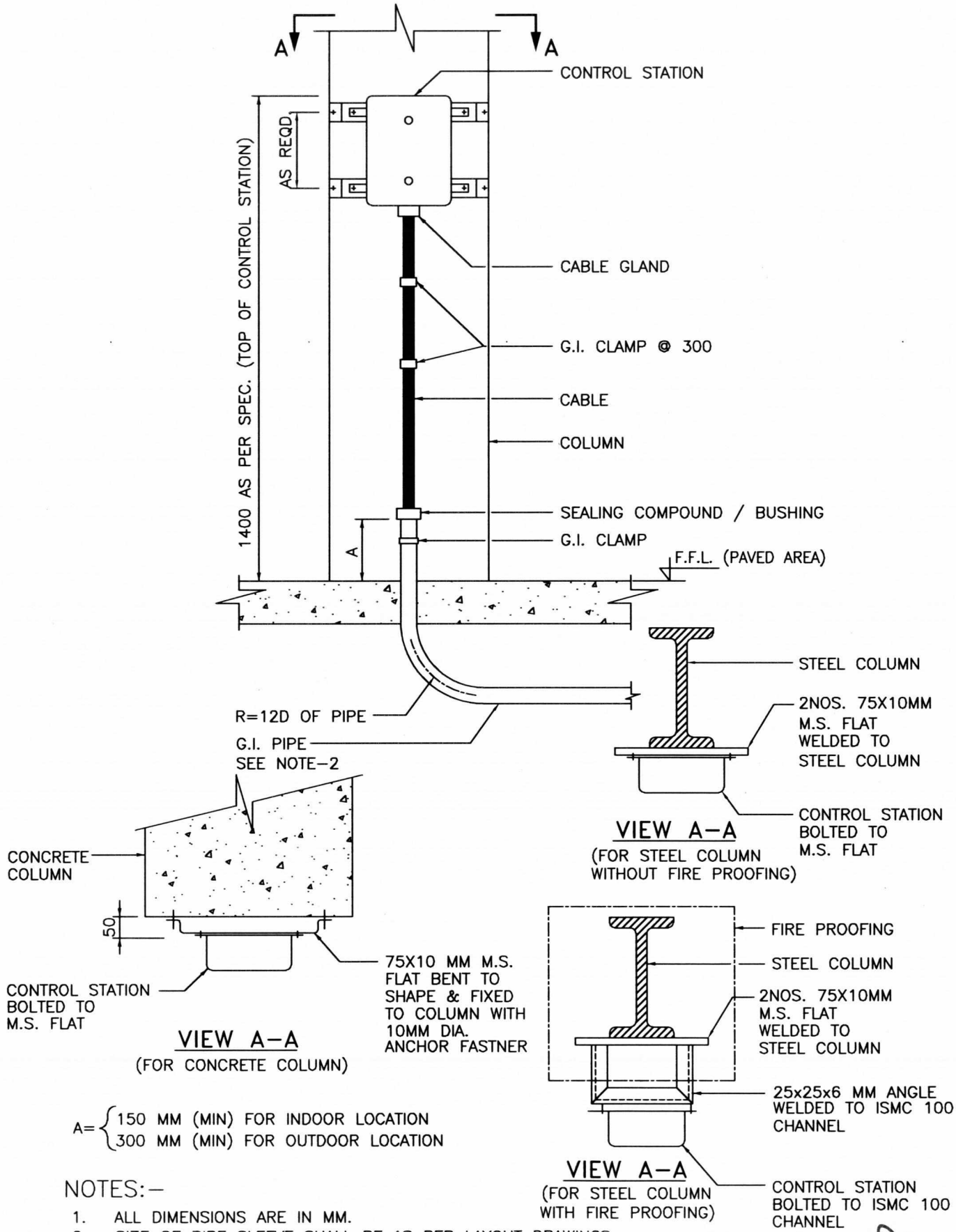
INSTALLATION DETAILS FOR CONTROL STATION ON CONCRETE / STEEL COLUMN IN PAVED AREA



A= { 150 MM (MIN) FOR INDOOR LOCATION
300 MM (MIN) FOR OUTDOOR LOCATION

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. SIZE OF PIPE SLEEVE SHALL BE AS PER LAYOUT DRAWINGS.

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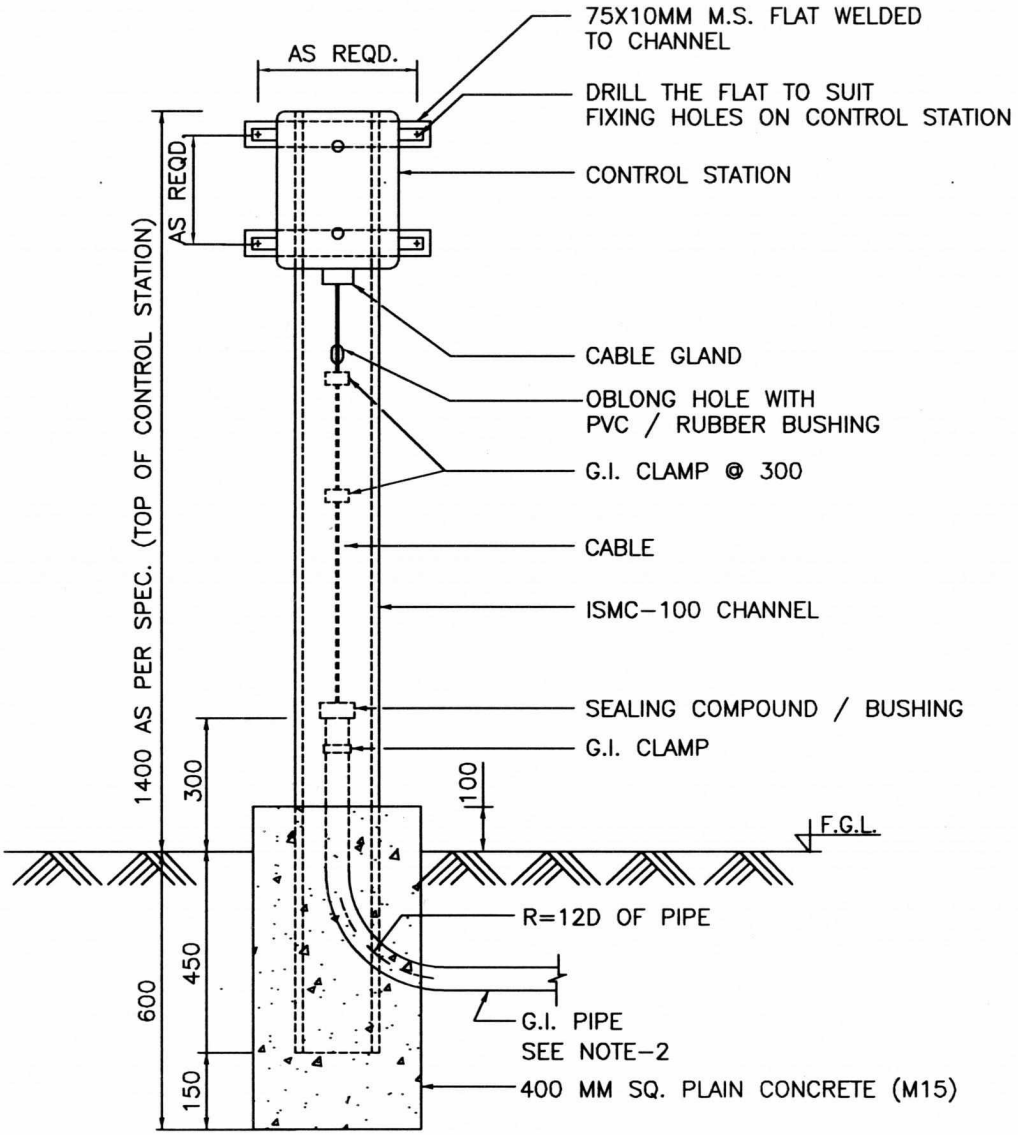

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. SIZE OF PIPE SLEEVE SHALL BE AS PER LAYOUT DRAWINGS.

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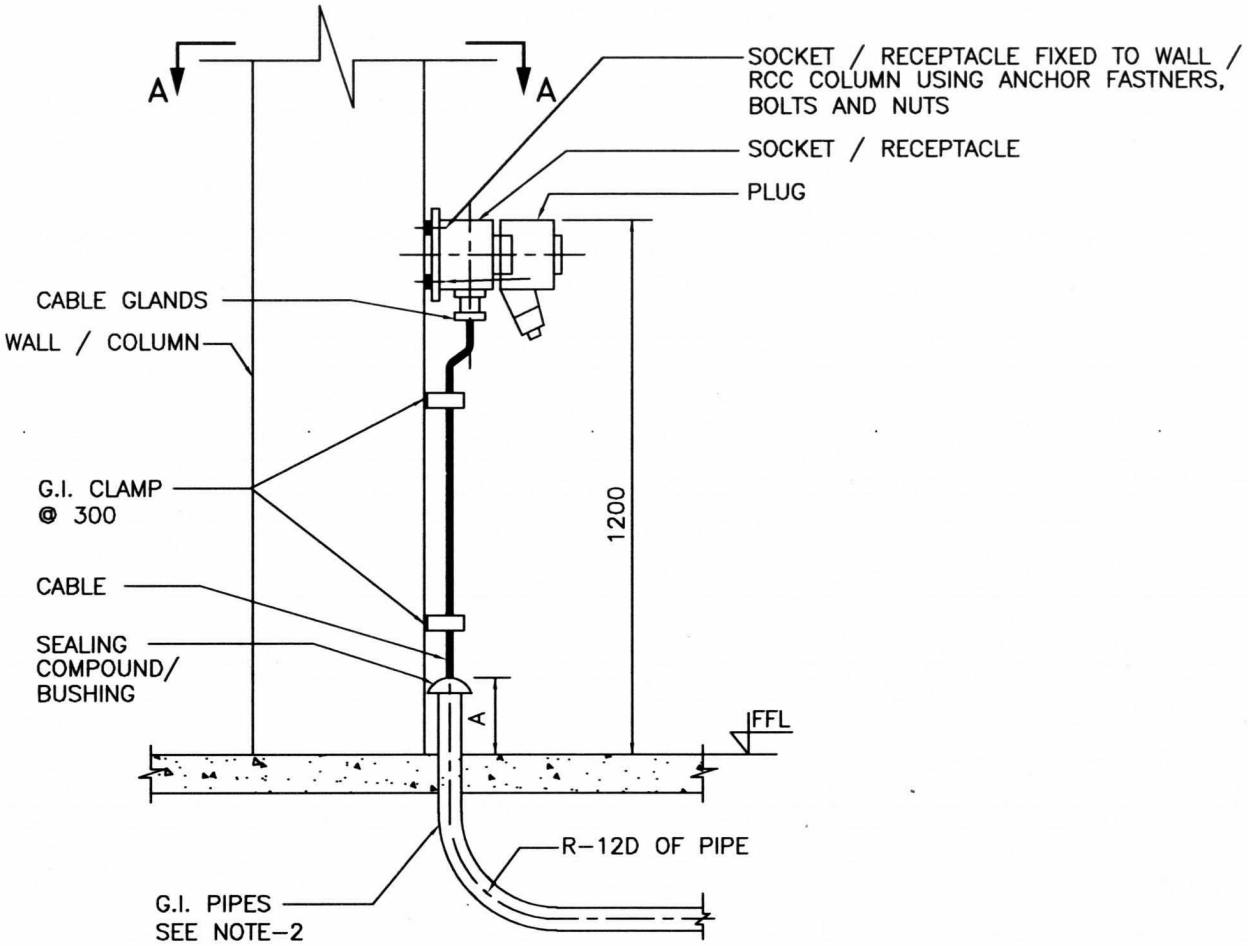
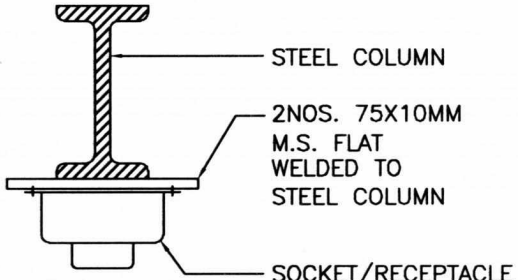
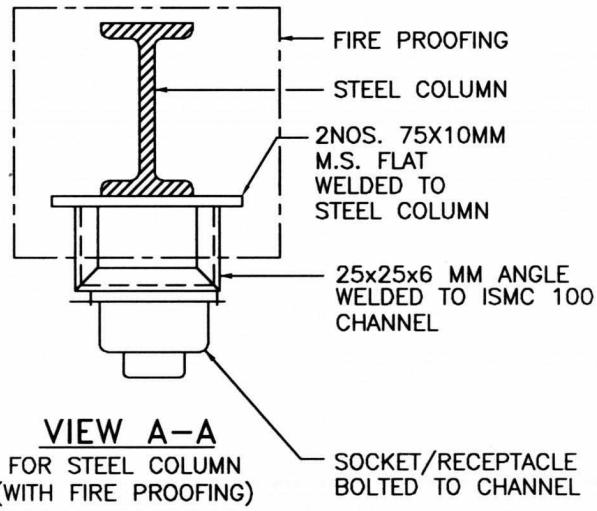




VIEW A-A
(FOR STEEL COLUMN WITHOUT FIRE PROOFING)

A = 150 MM (MIN.) FOR INDOOR LOCATIONS.
300 MM (MIN.) FOR OUTDOOR LOCATIONS.



VIEW A-A
FOR STEEL COLUMN (WITH FIRE PROOFING)

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. QUANTITY AND SIZE OF PIPE SLEEVES SHALL BE AS PER LAYOUT DRAWINGS.
3. WHERE STEEL STRUCTURES ARE ENCOUNTERED, SOCKET / RECEPTACLE SHALL BE MOUNTED ON SUITABLE ANGLE IRON FRAME WELDED TO STEEL STRUCTURE.
4. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED SOCKET / RECEPTACLE AND CABLE SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.

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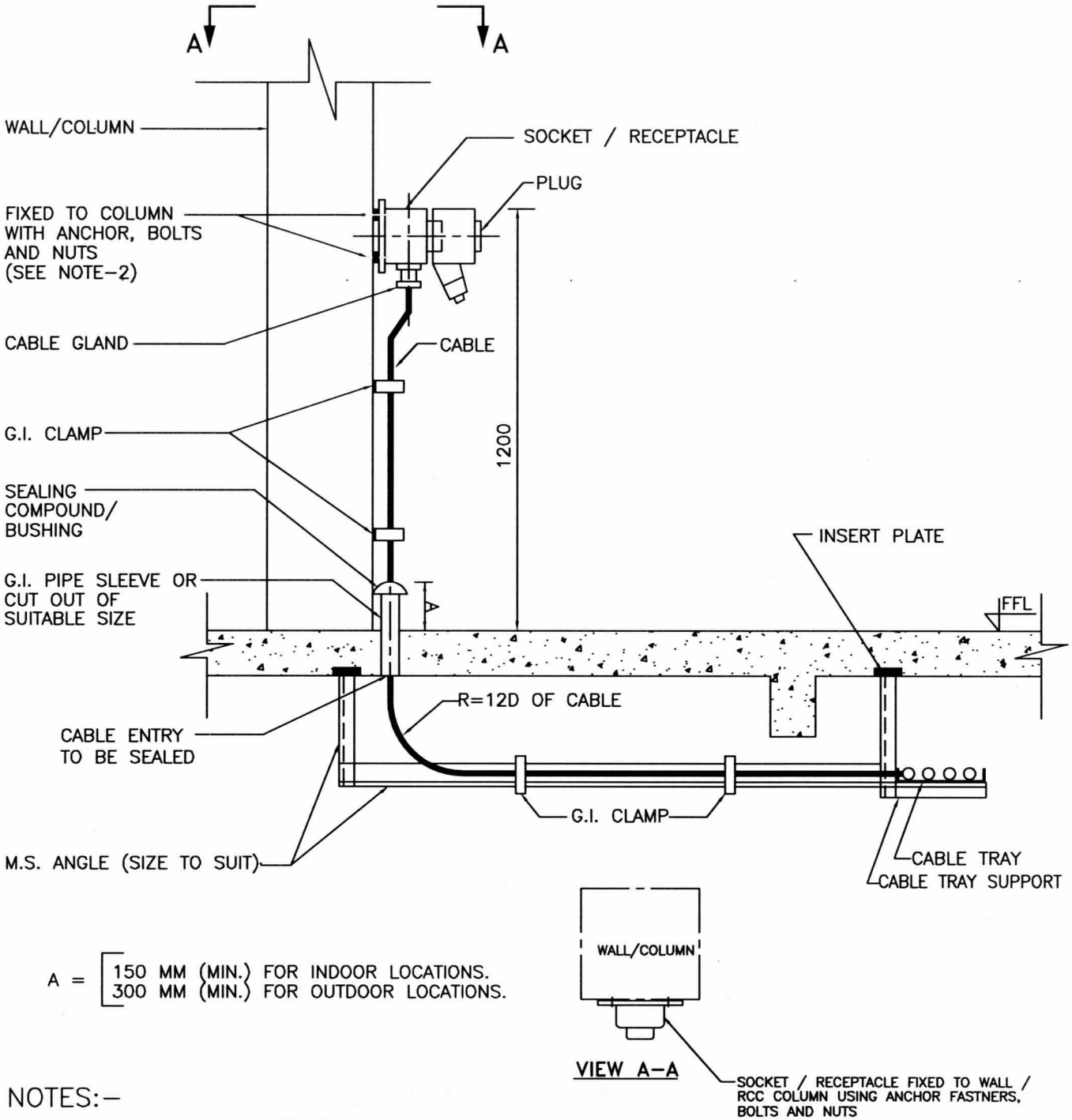

A = 150 MM (MIN.) FOR INDOOR LOCATIONS.
300 MM (MIN.) FOR OUTDOOR LOCATIONS.

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. WHERE STEEL STRUCTURES ARE ENCOUNTERED, SOCKET / RECEPTACLE SHALL BE MOUNTED ON SUITABLE ANGLE IRON FRAME WELDED TO STEEL STRUCTURE.
3. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED SOCKET / RECEPTACLE AND CABLE SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.
4. QUANTITY AND SIZE OF PIPE SLEEVES SHALL BE AS PER LAYOUT DRAWINGS.

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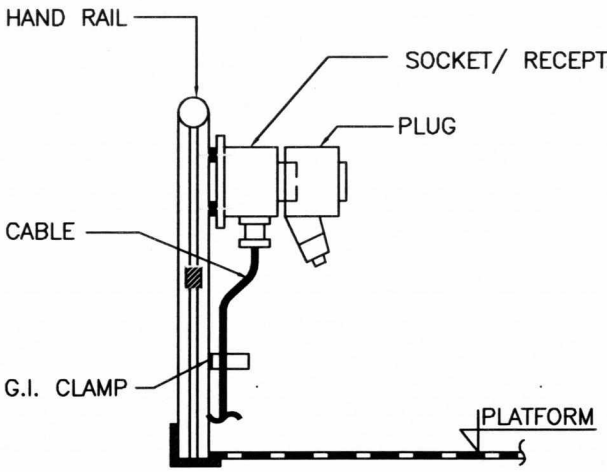

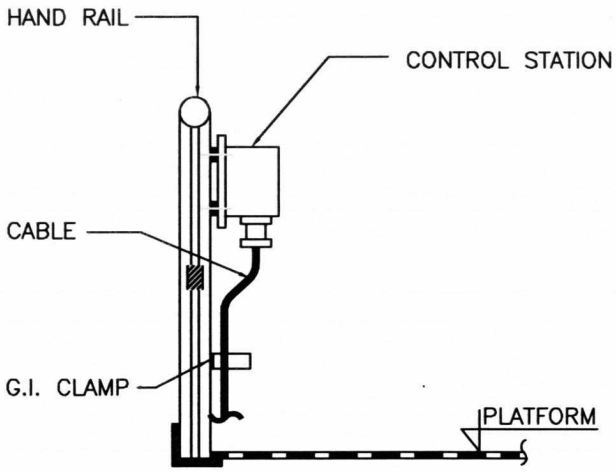

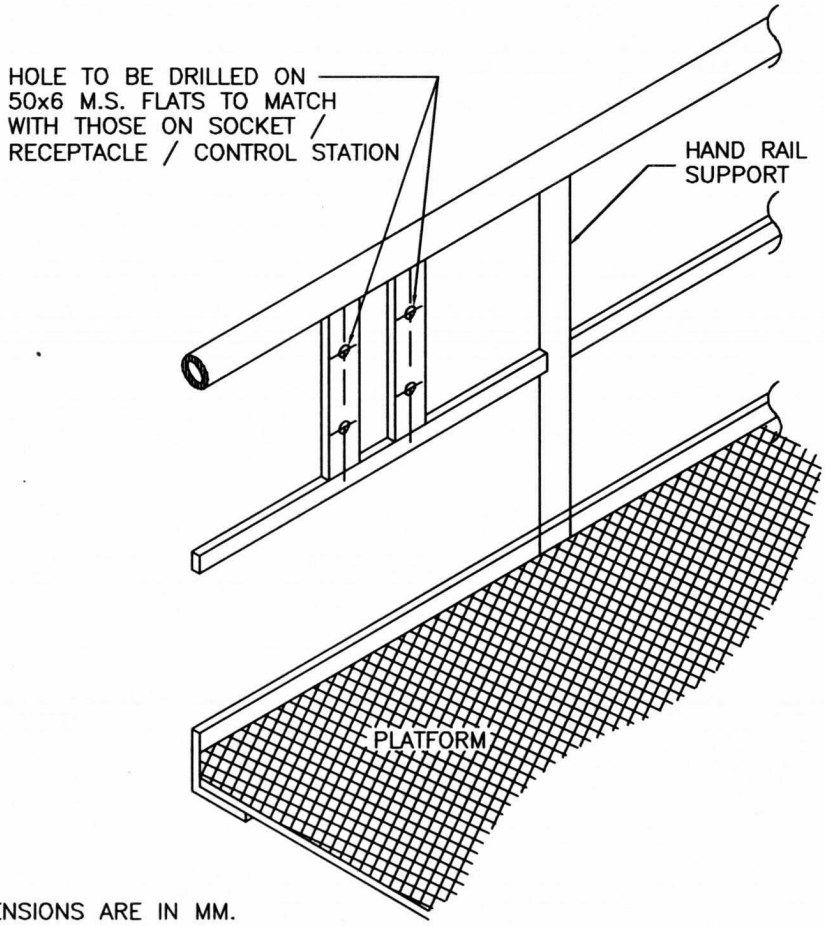

NOTES:–

1. ALL DIMENSIONS ARE IN MM.
2. CABLE SHALL NOT BE ROUTED ALONG HAND RAIL.

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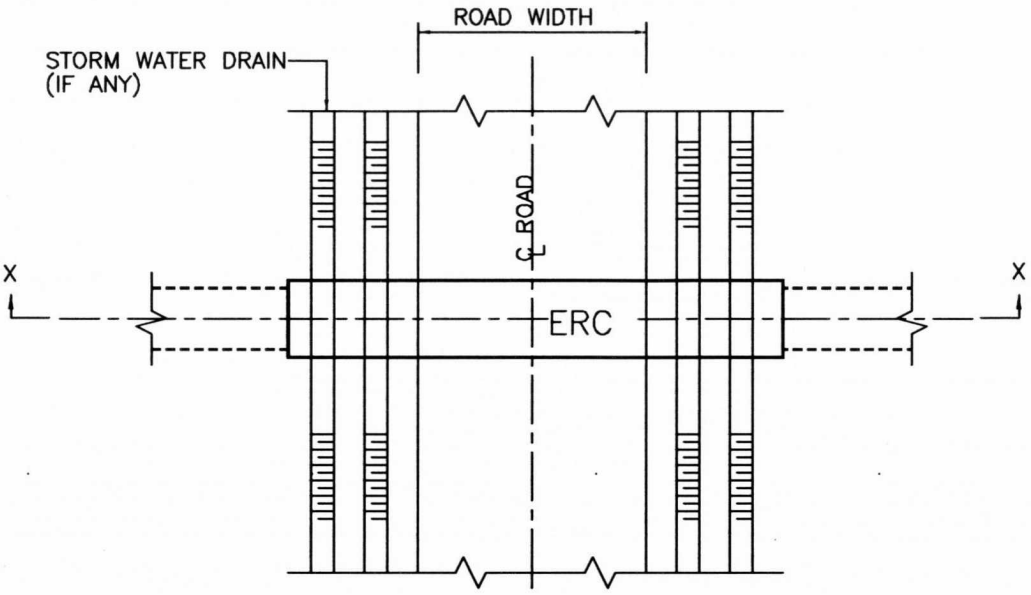

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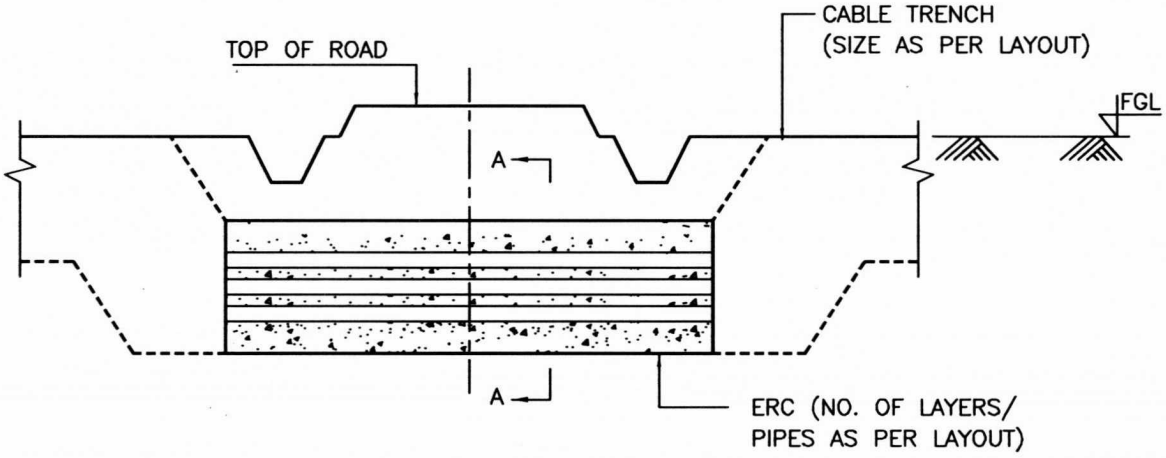
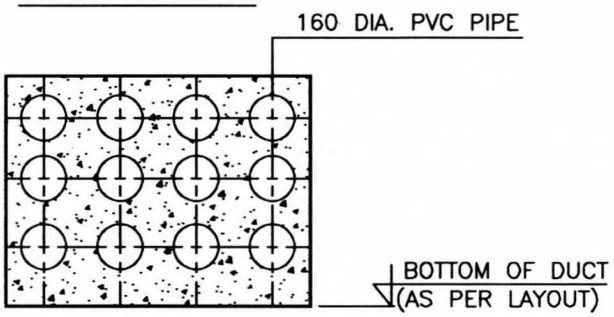


SECTION X–X



SECTION A–A (ERC)

(AS PER STRUCTURAL STD.)

NOTES:–

1. ALL DIMENSIONS ARE IN MM.

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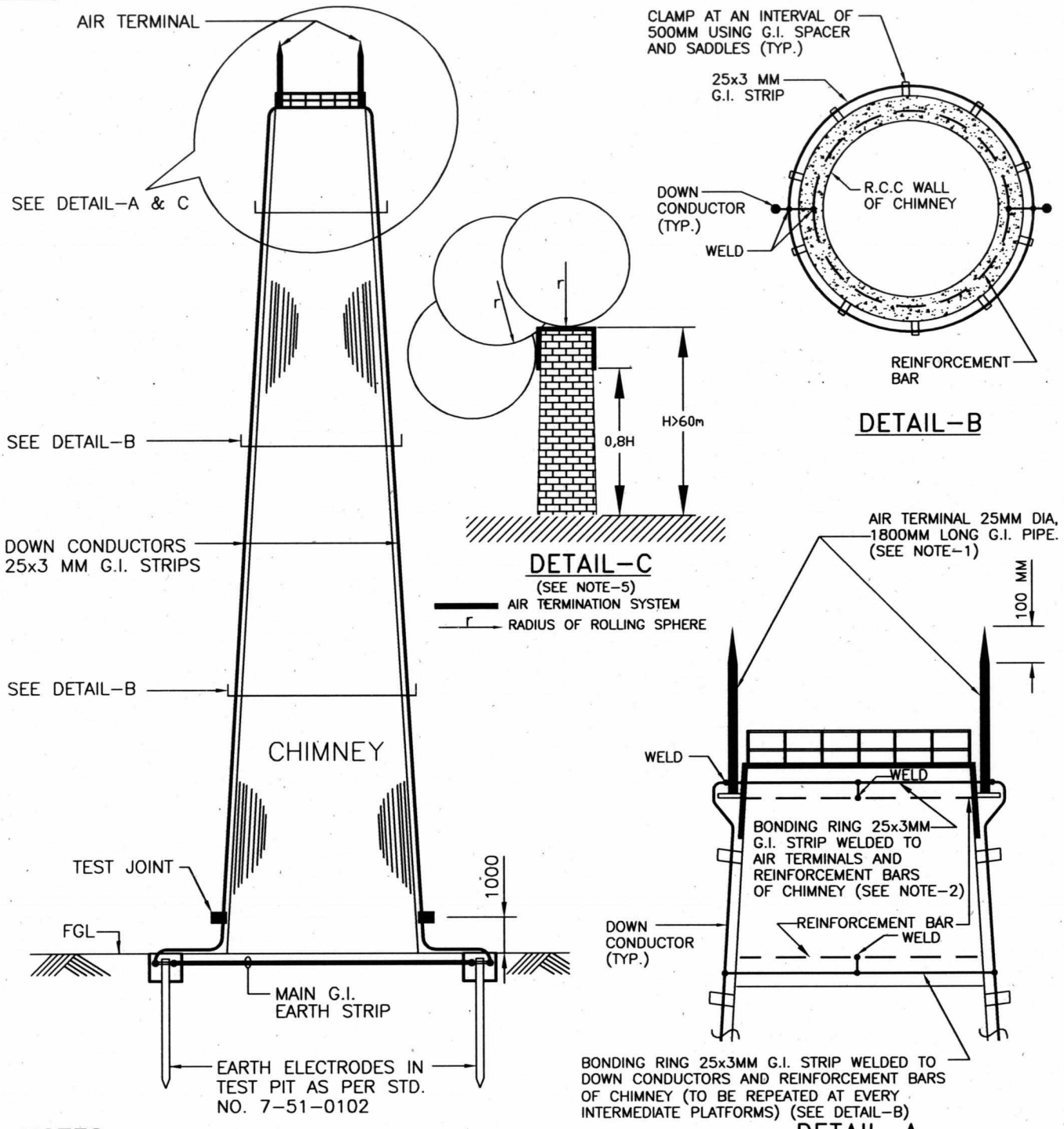

DETAIL–B

DETAIL–C
(SEE NOTE–5)

DETAIL–A

NOTES:–

1. FOR CHIMNEYS UP TO 1.5 MTR. DIA AT TOP 1 NO. AIR TERMINAL AND 1 NO. DOWN CONDUCTOR SHALL BE PROVIDED. FOR CHIMNEYS MORE THAN 1.5 MTR. DIA AT TOP 2 NOS. AIR TERMINALS AND 2 NOS. DOWN CONDUCTORS SHALL BE PROVIDED.
2. THE DOWN CONDUCTORS SHALL BE CONNECTED TO THE RE–BARS OF CHIMNEY BY WELDING AT TWO DIAMETERICALLY OPPOSITE POINTS. REFER DETAIL–B.
3. DEDICATED EARTH ELECTRODES FOR LIGHTNING PROTECTION SHALL BE PROVIDED IN ADDITION TO SYSTEM EARTHING ELECTRODES.
4. EARTH ELECTRODE SHALL BE LOCATED MINIMUM 1000MM AWAY FROM FOUNDATION.
5. FOR CHIMNEY GREATER THAN 60M HEIGHT, AN AIR TERMINATION SYSTEM OF APPLICABLE LPS CLASS SHALL BE INSTALLED TO PROTECT THE UPPER PART OF TALL STRUCTURE UP TO 20% OF THE HEIGHT OF STRUCTURE AS SHOWN IN DETAIL–C

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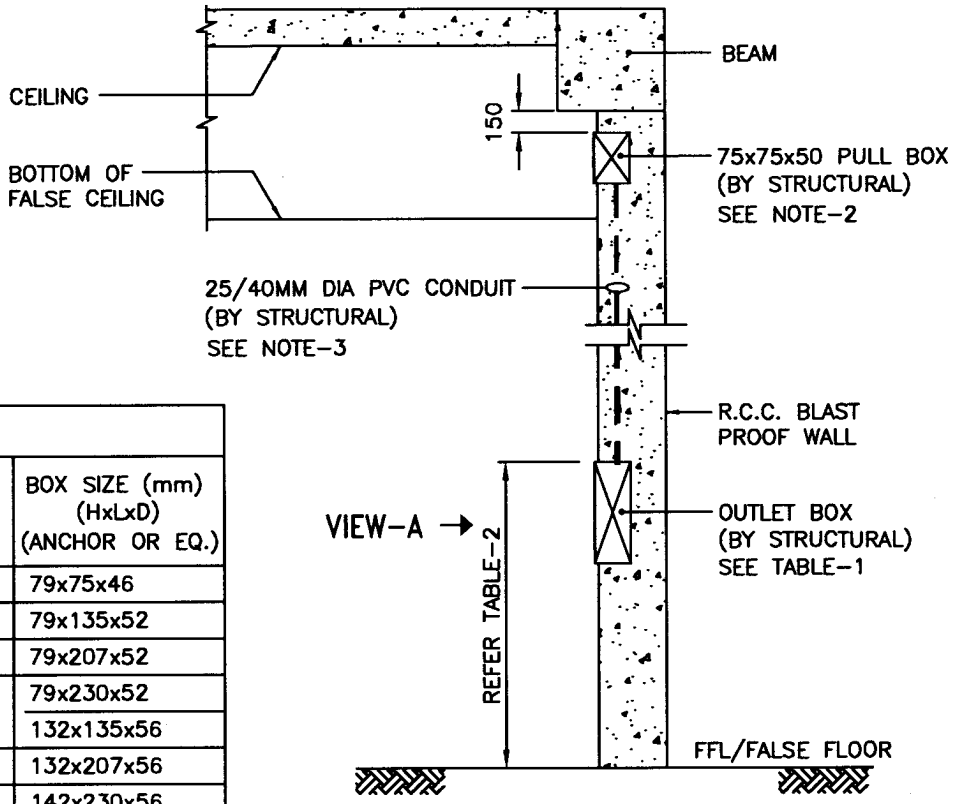
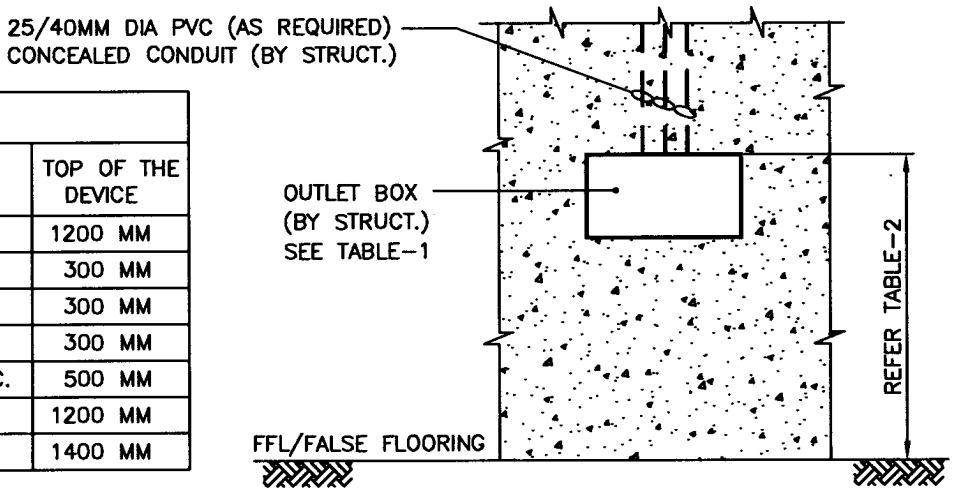


DETAIL-1

TYPICAL ARRANGEMENT FOR LIGHTING/MCP/FCS OUTLET BOX IN BLAST PROOF WALL WITH FALSE CEILING

TABLE-1		
S. NO.	NO. OF MODULES*	BOX SIZE (mm) (HxLxD) (ANCHOR OR EQ.)
1	2 MODULES	79x75x46
2	4 MODULES	79x135x52
3	6 MODULES	79x207x52
4	8 MODULES	79x230x52 132x135x56
5	12 MODULES	132x207x56
6	16 MODULES	142x230x56
7	18 MODULES	207x207x60
* 1 MODULE FOR 1 SWITCH/REGULATOR * 2 MODULES FOR 1 POWER SOCKET		



VIEW-A

TABLE-2		
S. NO.	DEVICE NAME	TOP OF THE DEVICE
1	LIGHTING SWITCH BOX	1200 MM
2	POWER RECEPTACLE	300 MM
3	LAN SOCKETS/SWITCH	300 MM
4	TELEPHONE SOCKET	300 MM
5	DP MCB BOX FOR A.C.	500 MM
6	MCP	1200 MM
7	FCS	1400 MM

NOTES:-

1. NO. OF CONDUITS FOR LIGHTING/POWER CIRCUITS SHALL BE PROVIDED AS PER LAYOUT DRAWING/OUTLET BOX.
2. 75x75x50MM PULL BOX TO BE PROVIDED IN RCC BLAST PROOF WALL/CEILING AT END OF CONDUITS TO ENABLE WIRING BY ELECTRICAL CONTRACTOR (NO. OF BOXES SHALL BE AS PER NO. OF CONDUITS). THE PULL BOXES SHALL BE COVERED WITH FACE PLATE AFTER LAYING OF WIRING.
3. 25MM PVC CONDUIT SHALL BE USED FOR LIGHTING/POWER AND 40MM PVC CONDUIT SHALL BE USED FOR FIRE ALARM AND PLANT COMMUNICATION SYSTEM.
4. JUNCTION BOX FOR FIRE DETECTORS/CEILING FANS SHALL BE PROVIDED AS PER LAYOUT DRAWINGS.

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1	31.03.22	REAFFIRMED & ISSUED AS STANDARD	JSK	VKS/HK	MKS	SM
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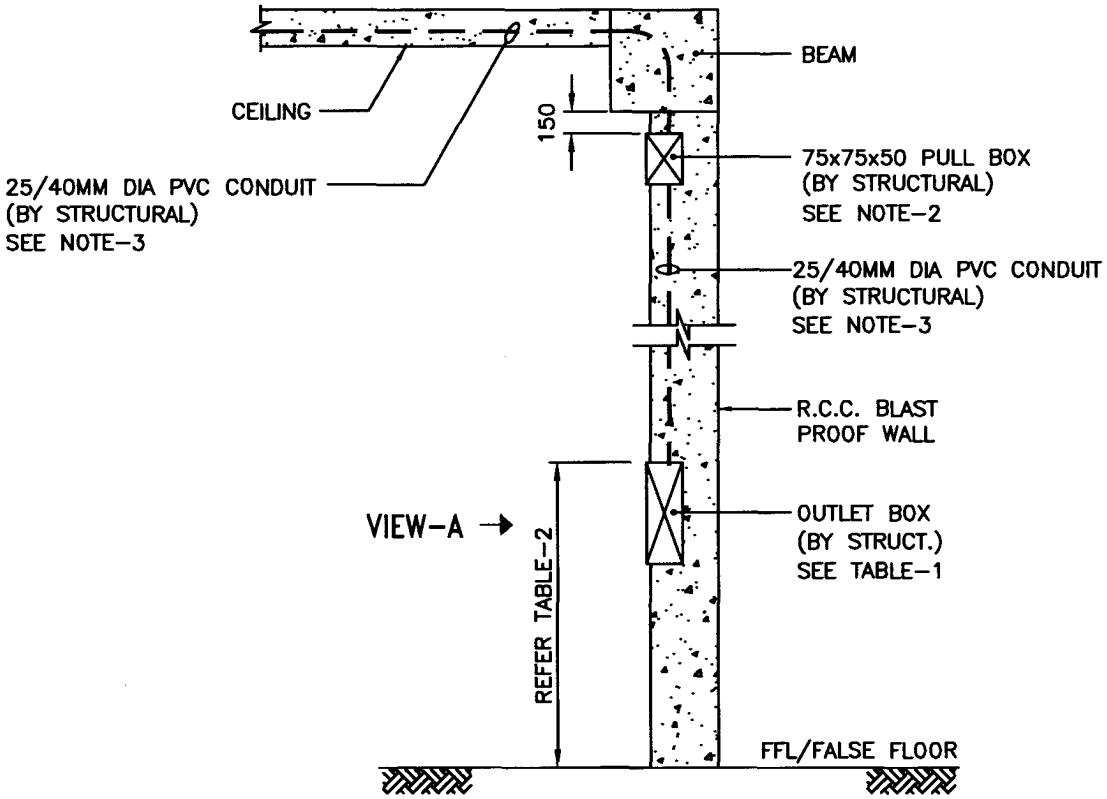
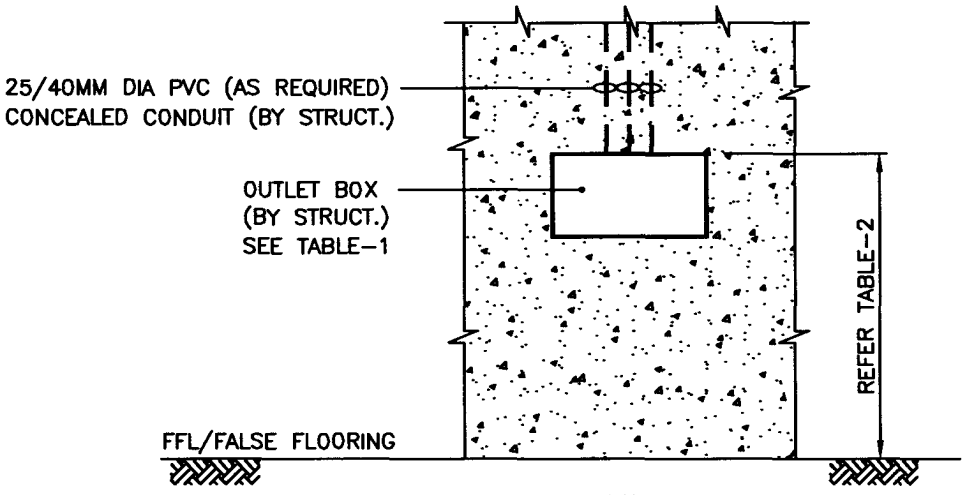


DETAIL-2

TYPICAL ARRANGEMENT FOR LIGHTING/MCP/FCS OUTLET BOX IN BLAST PROOF WALL WITHOUT FALSE CEILING



VIEW-A

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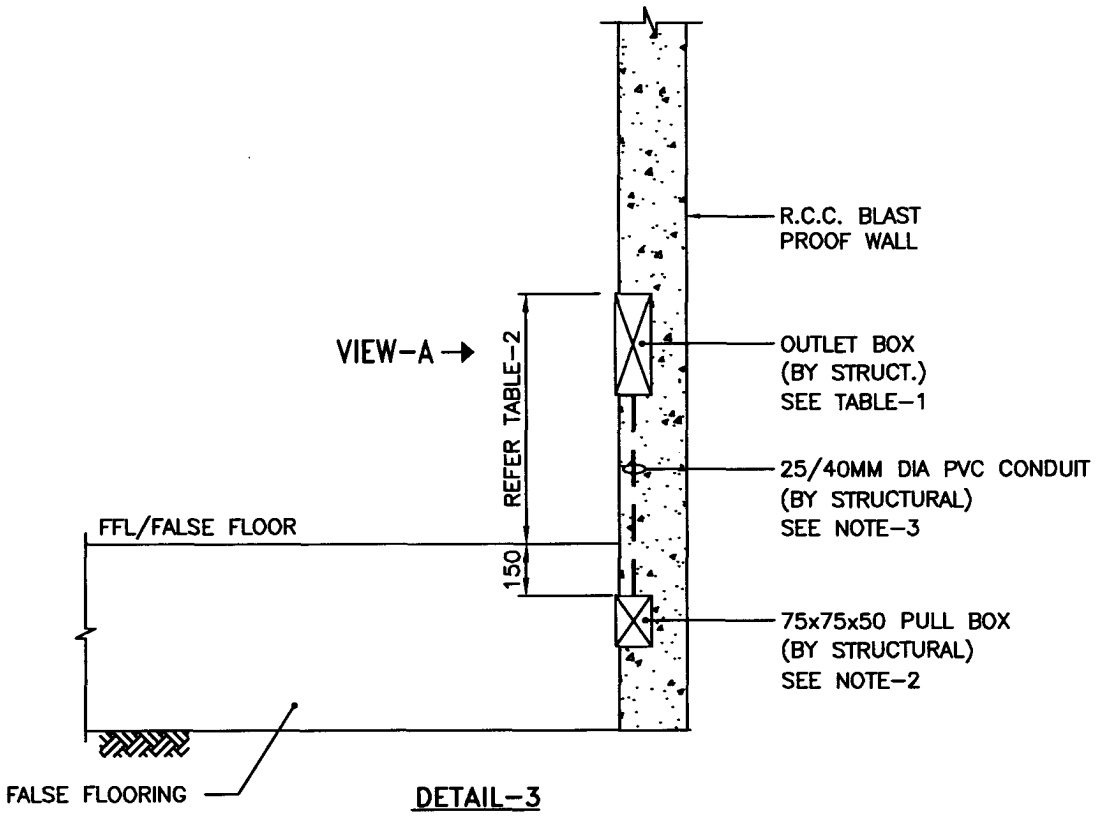
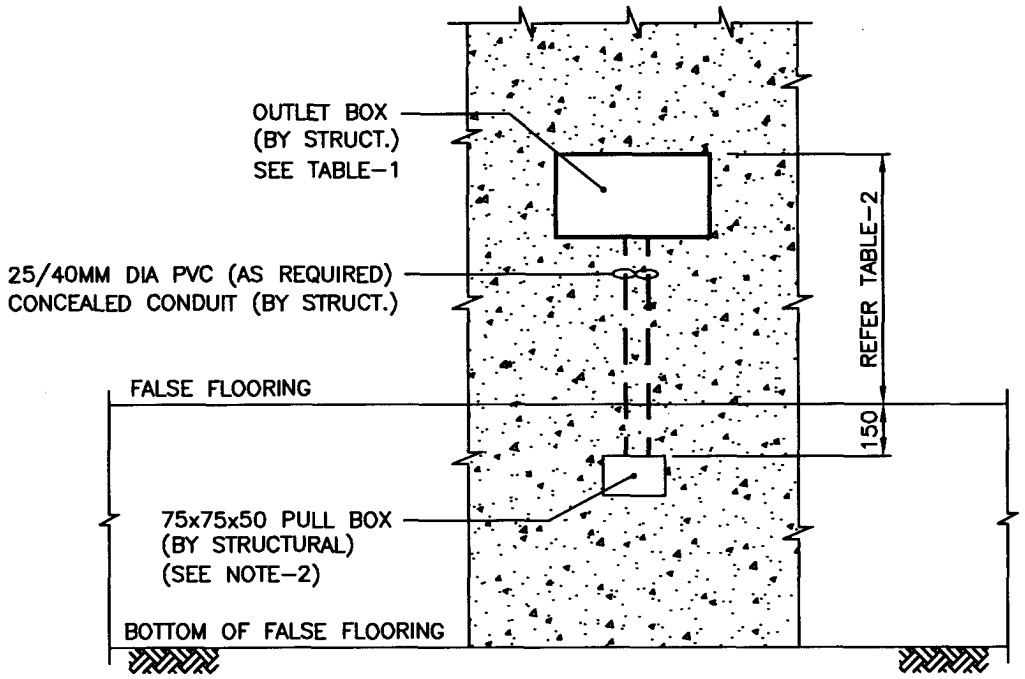


DETAIL-3

TYPICAL ARRANGEMENT FOR POWER/TELEPHONE SOCKET OUTLET BOX IN BLAST PROOF WALL WITH FALSE FLOORING



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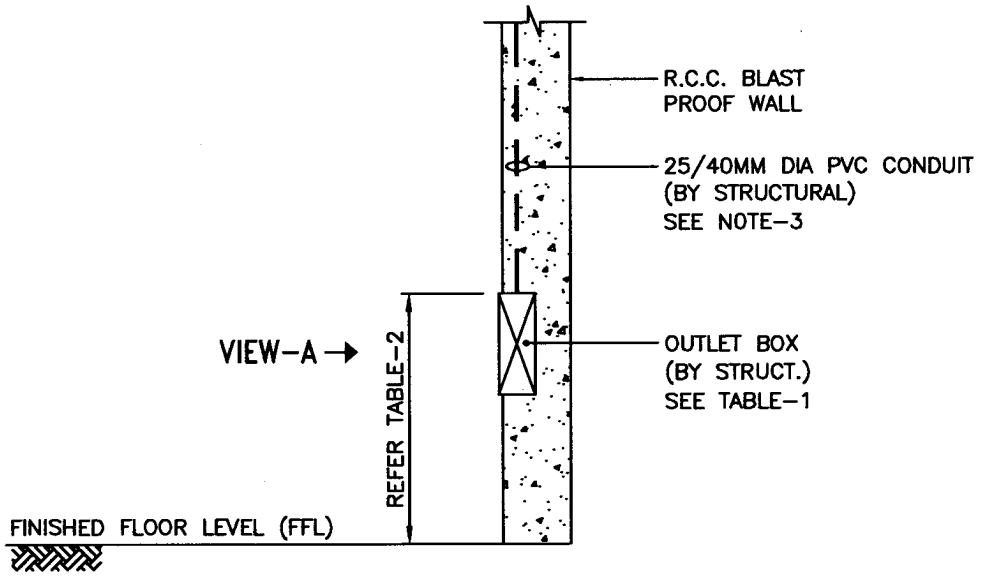
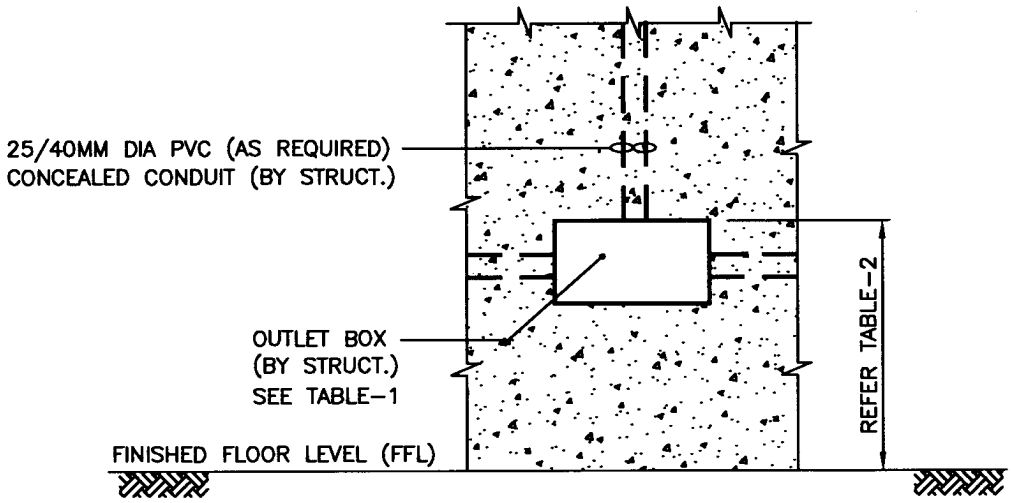


DETAIL-4

TYPICAL ARRANGEMENT FOR POWER/TELEPHONE SOCKET OUTLET BOX IN BLAST PROOF WALL WITHOUT FALSE FLOORING



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ELECTRICAL POWER IS THE MAINSTAY OF ANY CONSTRUCTION ACTIVITY. AT THE SAME TIME IT REQUIRES UTMOST CARE IN IT'S UTILISATION TO AVOID ACCIDENTS DUE TO ELECTRICAL SHOCK, FIRE INCIDENTS OR ELECTRIC SHORT CIRCUITS. EXPOSURE OF ELECTRICAL INSTALLATION TO ADVERSE ENVIRONMENTAL CONDITIONS INCREASE THE RISK OF SUCH ACCIDENTS. HENCE IT IS NECESSARY TO TAKE EXTRA PRECAUTIONS FOR SUCH INSTALLATIONS TO ENSURE SAFETY OF PERSONNEL AND EQUIPMENT. THIS STANDARD ADDRESSES THE SAFETY MEASURES REQUIRED TO BE ADOPTED FOR THE ELECTRICAL INSTALLATIONS BY ALL CONTRACTORS DURING CONSTRUCTION PHASE.

1. ALL ELECTRICAL CONNECTIONS/WORK FOR ELECTRICAL INSTALLATIONS SHALL BE CARRIED OUT AS PER PROVISIONS OF THE LATEST REVISION OF THE FOLLOWING CODES AND STANDARDS IN ADDITION TO THE REQUIREMENTS OF STATUTORY AUTHORITIES AND CEA REGULATIONS–2010.
   OISD–STD–173 : FIRE PREVENTION AND PROTECTION SYSTEM FOR ELECTRICAL INSTALLATIONS.
   OISD–STD–192 : SAFETY PRACTICE DURING CONSTRUCTION.
   SP–30 (BIS) : NATIONAL ELECTRIC CODE.
   THE INSTALLATION SHALL HAVE APPROVAL FROM CONCERNED STATUTORY AUTHORITIES.
2. ALL ELECTRICAL CONNECTIONS SHALL BE DONE BY AN ELECTRICIAN WITH VALID LICENCE AND TO THE SATISFACTION OF ENGINEER–IN–CHARGE.
3. ONE COMPETENT LICENCED ELECTRICIAN SHALL BE MADE AVAILABLE BY CONTRACTOR AT SITE ROUND THE CLOCK TO ATTEND TO THE NORMAL/EMERGENCY JOBS.
4. ALL SWITCH BOARDS/WELDING MACHINES SHALL BE KEPT IN WELL VENTILATED & COVERED SHED. THE SHED SHALL BE ELEVATED TO AVOID WATER LOGGING. NO FLAMMABLE MATERIALS SHALL BE USED FOR CONSTRUCTING THE SHED. ALSO FLAMMABLE MATERIALS SHALL NOT BE STORED IN AND AROUND ELECTRICAL EQUIPMENT/SWITCHBOARD. ADEQUATE CLEARANCES AND OPERATIONAL SPACE SHALL BE PROVIDED AROUND THE EQUIPMENT.
5. FIRE EXTINGUISHERS AND INSULATING MATS SHALL BE PROVIDED IN ALL POWER DISTRIBUTION CENTERS.
6. TEMPORARY ELECTRICAL EQUIPMENT SHALL NOT BE EMPLOYED IN HAZARDOUS AREAS WITHOUT OBTAINING SAFETY PERMIT.
7. PROPER HOUSE KEEPING SHALL BE DONE AROUND THE ELECTRICAL INSTALLATIONS.
8. ALL TEMPORARY INSTALLATIONS SHALL BE TESTED BEFORE ENERGISING, TO ENSURE PROPER EARTHING, BONDING, SUITABILITY OF PROTECTION SYSTEM, ADEQUACY OF FEEDERS/CABLES ETC.
9. ALL WELDERS SHALL USE HAND GLOVES IRRESPECTIVE OF HOLDER VOLTAGE.
10. MULTILINGUAL (ENGLISH, HINDI AND LOCAL LANGUAGE) CAUTION BOARDS, SHOCK TREATMENT CHARTS AND INSTRUCTION PLATE CONTAINING LOCATION OF ISOLATION POINT FOR INCOMING SUPPLY, NAME & TELEPHONE NO. OF CONTACT PERSON IN EMERGENCY SHALL BE PROVIDED IN SUBSTATIONS AND NEAR ALL DISTRIBUTION BOARDS/LOCAL PANELS.
11. OPERATION OF EARTH LEAKAGE DEVICE SHALL BE CHECKED REGULARLY BY PORTABLE ELCB/RCCB TESTER.
12. THE FOLLOWING DESIGN FEATURES SHALL BE ENSURED FOR ALL ELECTRICAL INSTALLATIONS DURING CONSTRUCTION PHASE.

12.1 EACH INSTALLATION SHALL HAVE A MAIN SWITCH WITH A PROTECTIVE DEVICE, INSTALLED IN AN ENCLOSURE ADJACENT TO THE METERING POINT. THE OPERATING HEIGHT OF THE MAIN SWITCH SHALL NOT EXCEED 1.5 M. THE MAIN SWITCH SHALL BE CONNECTED TO THE POINT OF SUPPLY BY MEANS OF ARMOURED CABLE.

12.2 THE OUTGOING FEEDERS SHALL BE DOUBLE OR TRIPLE POLE SWITCHES WITH FUSES/MCBs. LOADS IN A THREE PHASE CIRCUIT SHALL BE BALANCED AS FAR AS POSSIBLE AND LOAD ON NEUTRAL SHOULD NOT EXCEED 20% OF LOAD IN THE PHASE.

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12.3 THE INSTALLATION SHALL BE ADEQUATELY PROTECTED AGAINST OVERLOAD, SHORT CIRCUIT AND EARTH LEAKAGE BY THE USE OF SUITABLE PROTECTIVE DEVICES. FUSES WHEREVER USED SHALL BE HRC TYPE. USE OF REWIRABLE FUSES SHALL BE STRICTLY PROHIBITED. THE EARTH LEAKAGE DEVICE SHALL HAVE AN OPERATING CURRENT NOT EXCEEDING 30 mA.

12.4 ALL CONNECTIONS TO THE HANDTOOLS/WELDING RECEPTACLES SHALL BE TAKEN THROUGH PROPER SWITCHES, SOCKETS AND PLUGS.

12.5 ALL SINGLE PHASE SOCKETS SHALL BE MINIMUM 3 PIN TYPE ONLY. ALL UNUSED SOCKETS SHALL BE PROVIDED WITH SOCKET CAPS.

12.6 ONLY 3 CORE (P+N+E) OVERALL SHEATHED FLEXIBLE CABLES WITH MINIMUM CONDUCTOR SIZE OF 1.5 MM^2 COPPER SHALL BE USED FOR ALL HAND TOOLS.

12.7 ONLY METALLIC DISTRIBUTION BOXES WITH DOUBLE EARTHING SHALL BE USED AT SITE. NO WOODEN BOXES SHALL BE USED.

12.8 ALL POWER CABLES SHALL BE TERMINATED WITH COMPRESSION TYPE NICKEL PLATED BRASS CABLE GLANDS. LUGS OF COPPER/ALUMINIUM/BIMETALLIC MATERIAL, AS APPLICABLE SHALL BE USED FOR MULTISTRAND WIRES/CABLES HAVING MUTISTRAND/SOLID CONDUCTOR.

12.9 CABLES SHALL BE FREE FROM ANY INSULATION DAMAGE.

12.10 CABLES SHALL BE LAID IN UNDERGROUND AT A MINIMUM DEPTH OF 750 MM, FOR LV & CONTROLS AND 900MM FOR HV CABLES COVERED WITH SAND, BRICK AND SOIL FOR ENSURING MECHANICAL PROTECTION. CABLES SHALL NOT BE LAID IN WATER LOGGED AREA AS FAR AS PRACTICABLE. CABLE ROUTE MARKERS SHALL BE PROVIDED AT EVERY 25 M OF BURIED TRENCH ROUTE. WHEN LAID ABOVE GROUND, CABLES SHALL BE PROPERLY CLEATED OR SUPPORTED ON RIGID POLES OF ATLEAST 2.1 M HIGH. MINIMUM HEAD CLEARANCE OF 6 METERS SHALL BE PROVIDED AT ROAD CROSSING.

12.11 UNDER GROUND CABLES SHALL NOT BE ALLOWED TO CROSS THE ROADS WITHOUT PIPE SLEEVE.

12.12 ALL CABLE JOINTS SHALL BE DONE WITH PROPER JOINTING KIT. NO TAPED/TEMPORARY JOINTS SHALL BE USED.

12.13 AN INDEPENDENT EARTHING FACILITY SHOULD PREFERABLY BE ESTABLISHED WITHIN THE TEMPORARY INSTALLATION PREMISES. ALL APPLIANCES AND EQUIPMENT SHALL BE ADEQUATELY EARTHED. IN CASE ARMOURED CABLES ARE USED, THE ARMOUR SHALL BE BONDED TO THE EARTHING SYSTEM.

12.14 ALL CABLES AND WIRE ROPE USED FOR EARTH CONNECTIONS SHALL BE TERMINATED THROUGH LUGS OF TINNED COPPER/ALUMINIUM/ BIMETALLIC MATERIAL, AS APPLICABLE.

12.15 IN CASE OF LOCAL EARTHING, EARTH ELECTRODES SHALL BE BURIED NEAR THE SUPPLY POINT AND EARTH CONTINUITY WIRE SHALL BE CONNECTED TO LOCAL EARTH PLATE FOR FURTHER DISTRIBUTION TO VARIOUS APPLIANCES. ALL INSULATED WIRES FOR EARTH CONNECTION SHALL HAVE INSULATION OF GREEN COLOUR.

12.16 SEPARATE CORE SHALL BE PROVIDED FOR NEUTRAL. EARTH/STRUCTURES SHALL NOT BE USED AS A NEUTRAL IN ANY CASE.

12.17 ON/OFF POSITION OF ALL SWITCHES SHALL BE CLEARLY DESIGNATED/PAINTED FOR EASY ISOLATION IN EMERGENCY.

13. ALL INSULATIONS AND ELECTRICAL INSTALLATIONS SHALL BE INSPECTED BY ENGINEER-IN-CHARGE ATLEAST ONCE IN A MONTH.

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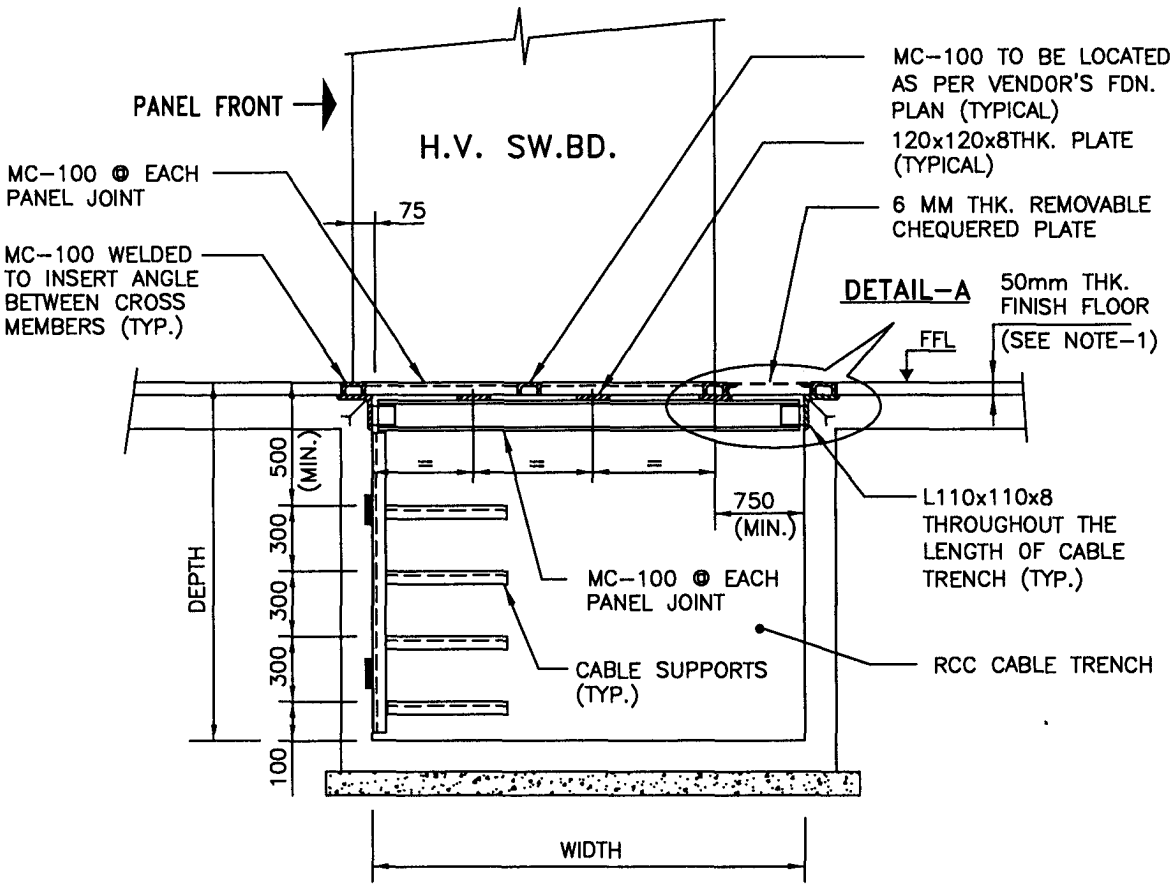
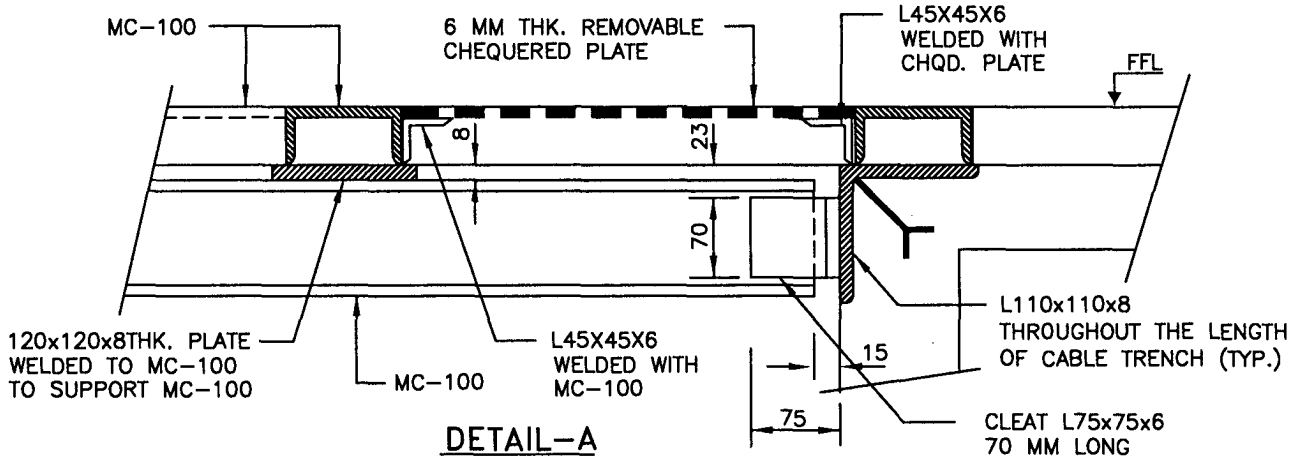


TYPICAL INSTALLATION DETAIL OF H.V. SWITCHBOARD (FOR REMOTE LOCATION SUB STATION)

(UPTO 11KV AND FOR MAXIMUM 3 CABLES PER PHASE)



NOTES:-

1. 50 THICK FINISH FLOORING SHALL BE DONE ONLY AFTER INSTALLATION OF BASE FRAME
2. ALL PANELS SHALL BE TACK WELDED WITH BASE FRAME OF SWITCHBOARD.
3. UNUSED PORTION OF CUTOUTS SHALL BE COVERED WITH 6 MM THICK CHEQUERED PLATES.
4. WIDTH OF TRENCH TO SUIT THE DIMENSIONS OF SWITCHBOARD SHALL BE AS PER AFC DRAWING OF THE PROJECT.

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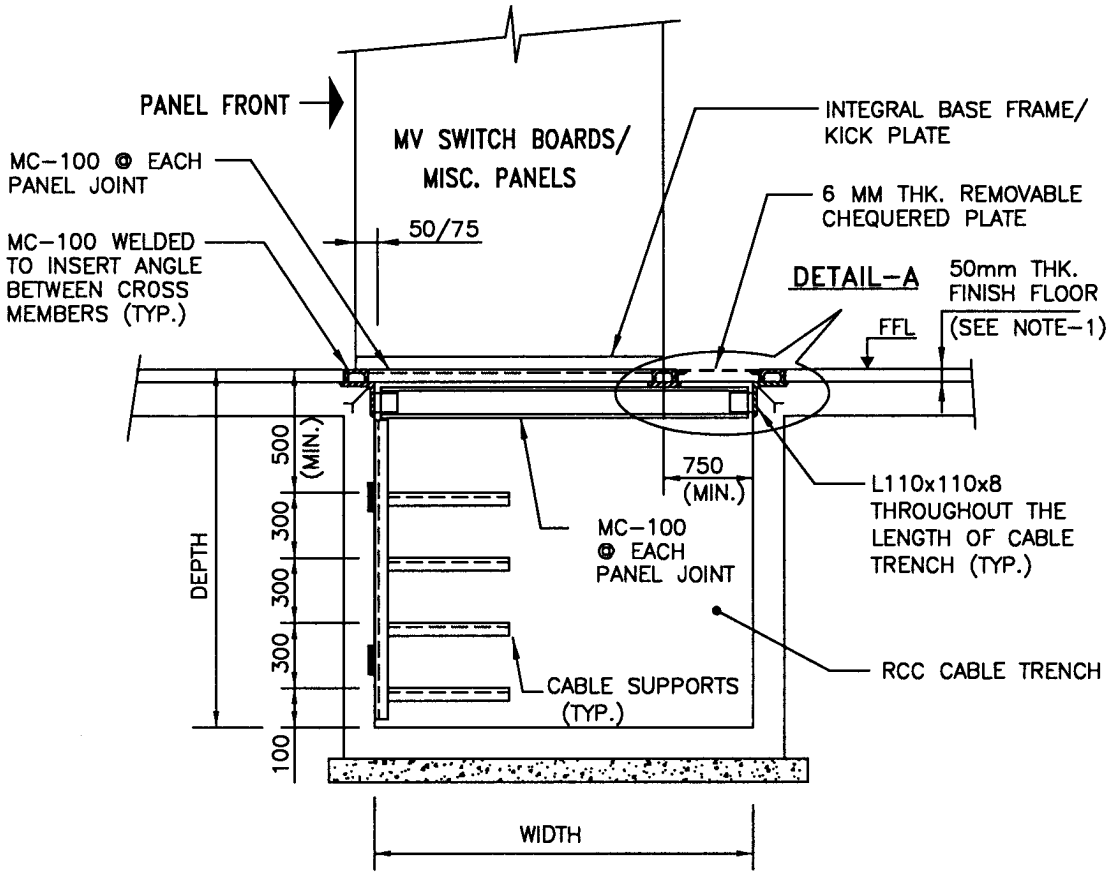
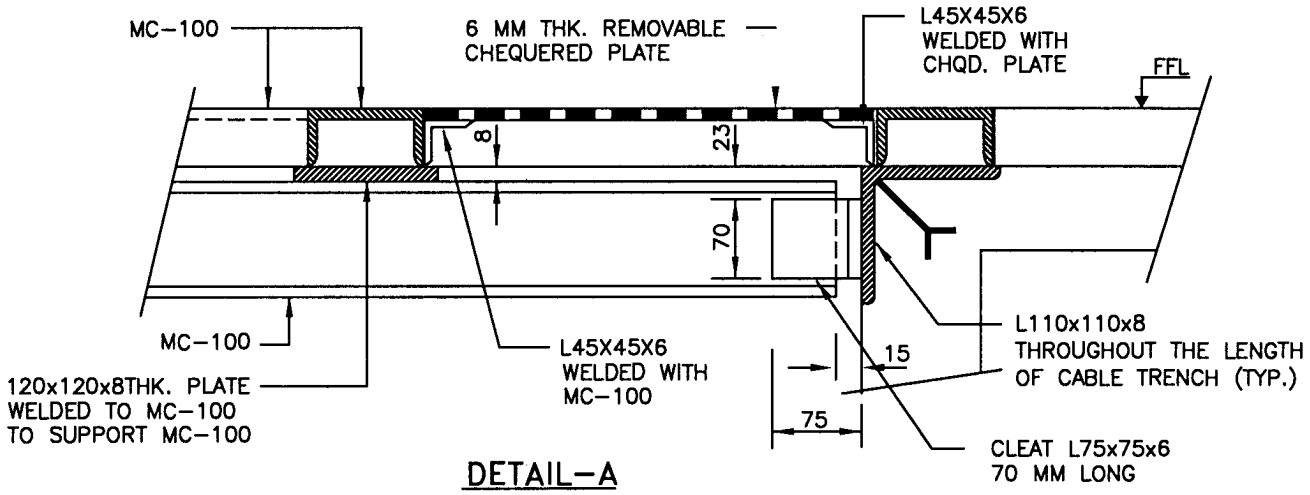


TYPICAL INSTALLATION DETAIL OF M.V. PANELS ON CABLE TRENCH



DETAIL-A

NOTES:-

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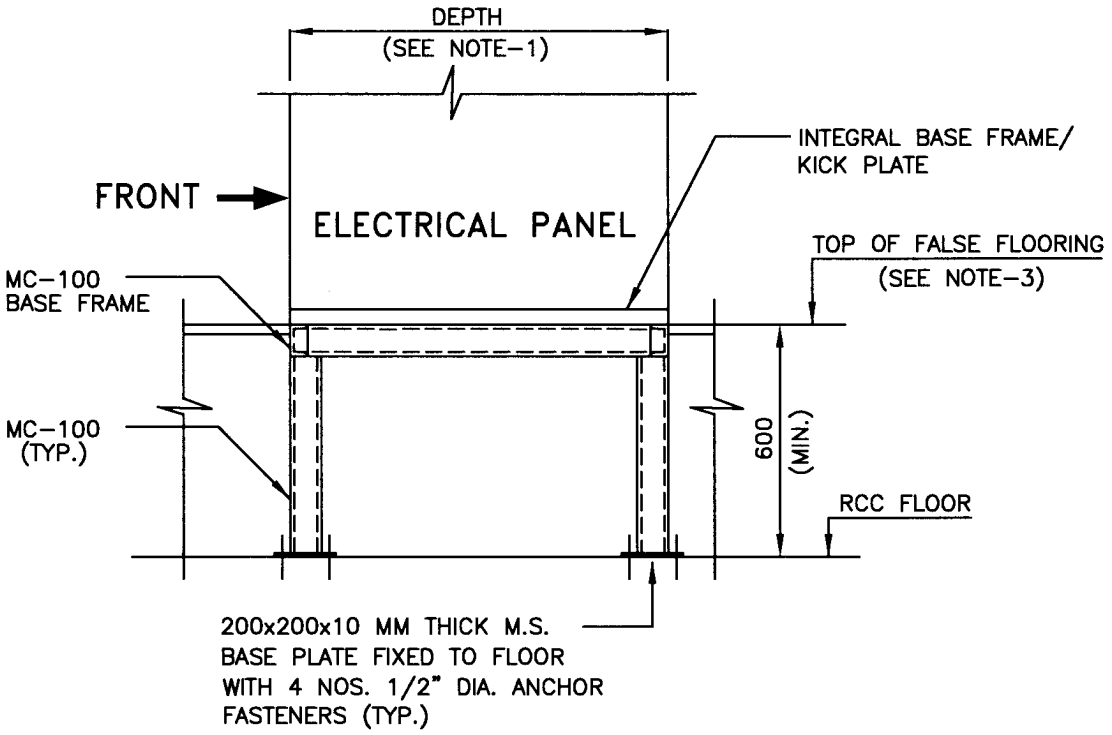
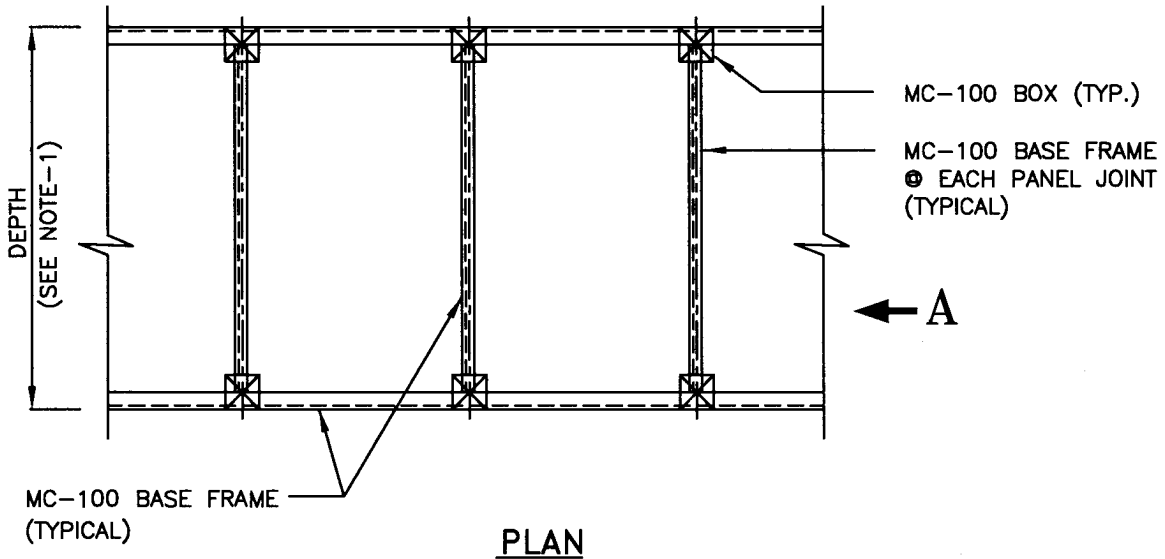


ELEVATION
(VIEW-A)



PLAN

NOTES:-

1. FOR PANELS DEPTH UPTO 800 MM SUPPORTING ARRANGEMENT AS SHOWN SHALL BE FOLLWED. FOR PANELS DEPTH MORE THAN 800 MM ADDITIONAL SUPPORTS AS PER VENDOR'S FDN. PLAN SHALL BE PROVIDED.
2. ALL PANELS SHALL BE TACK WELDED WITH BASE FRAME OF SWITCHBOARD.
3. SUPPORTING ARRANGEMENT FOR FALSE FLOORING SHALL BE AS PER ARCHITECTURAL DRAWINGS.

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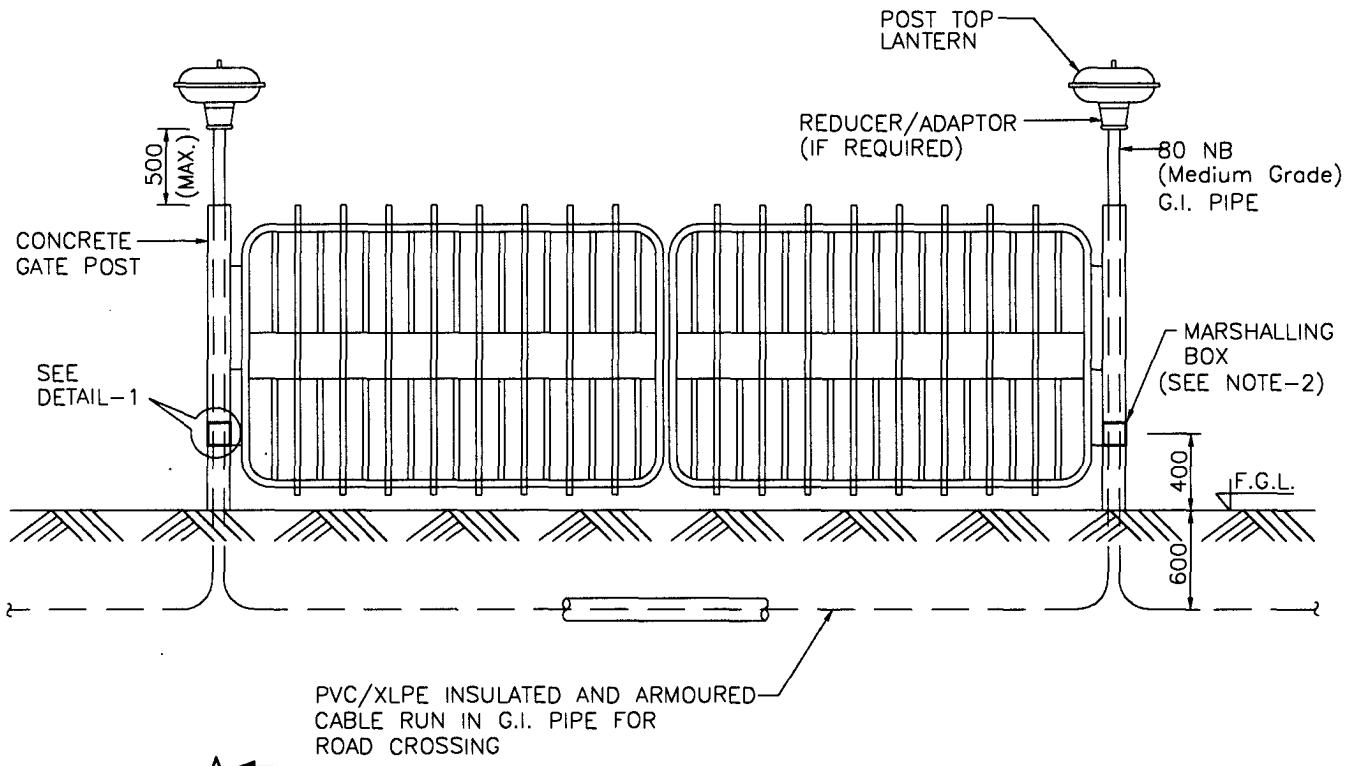

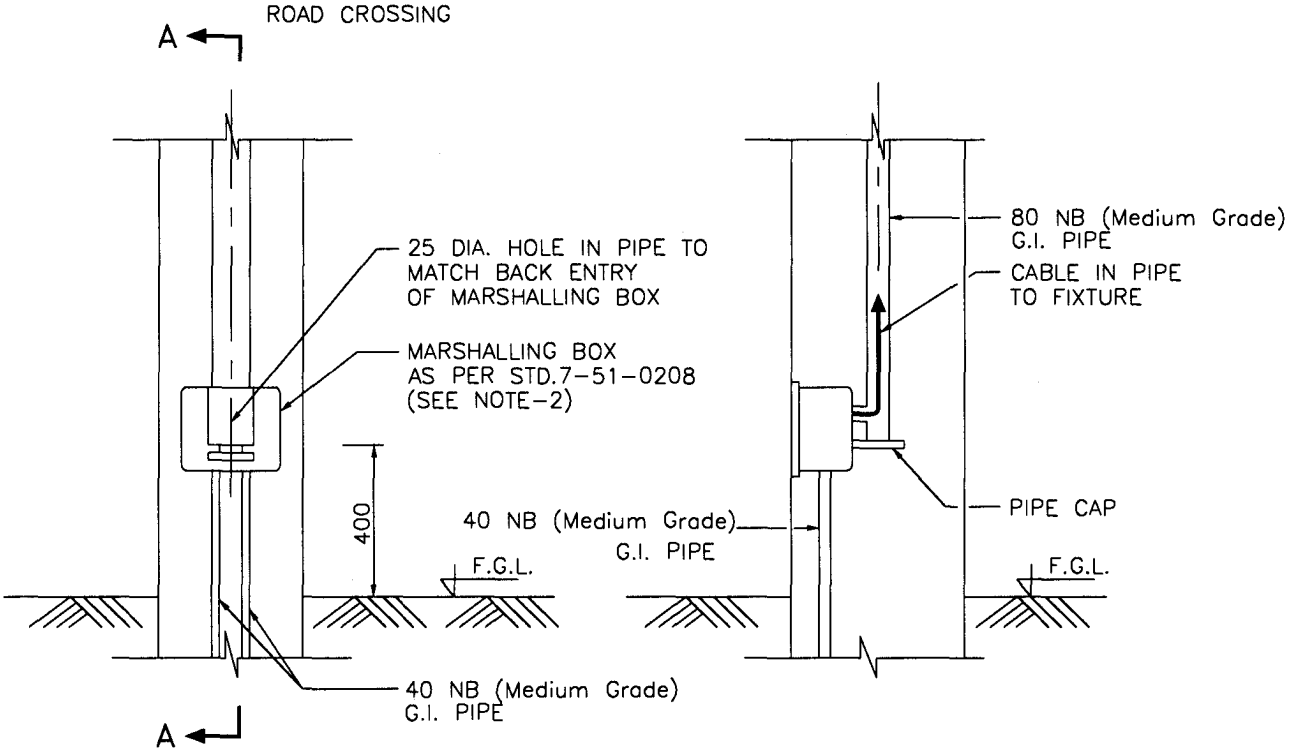

DETAIL-1

SECTION A-A

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. USE WEATHER PROTECTED SINGLE PHASE JUNCTION BOX IN PLACE OF MARSHALLING BOX IF SUPPLY IS SINGLE PHASE.
3. ALL G.I. PIPES SHALL BE MEDIUM GRADE.

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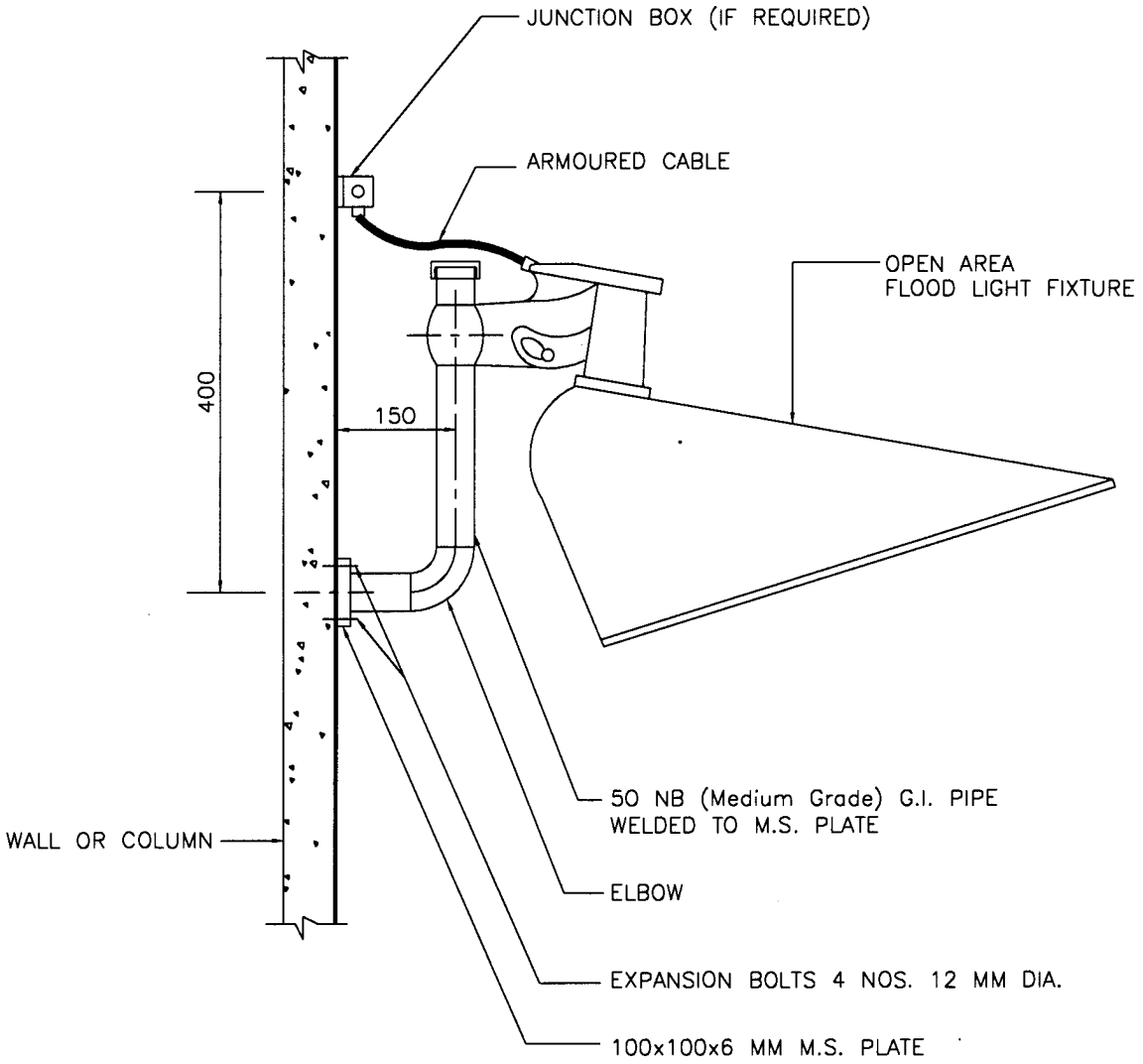

NOTES:–

1. ALL DIMENSIONS ARE IN MM.

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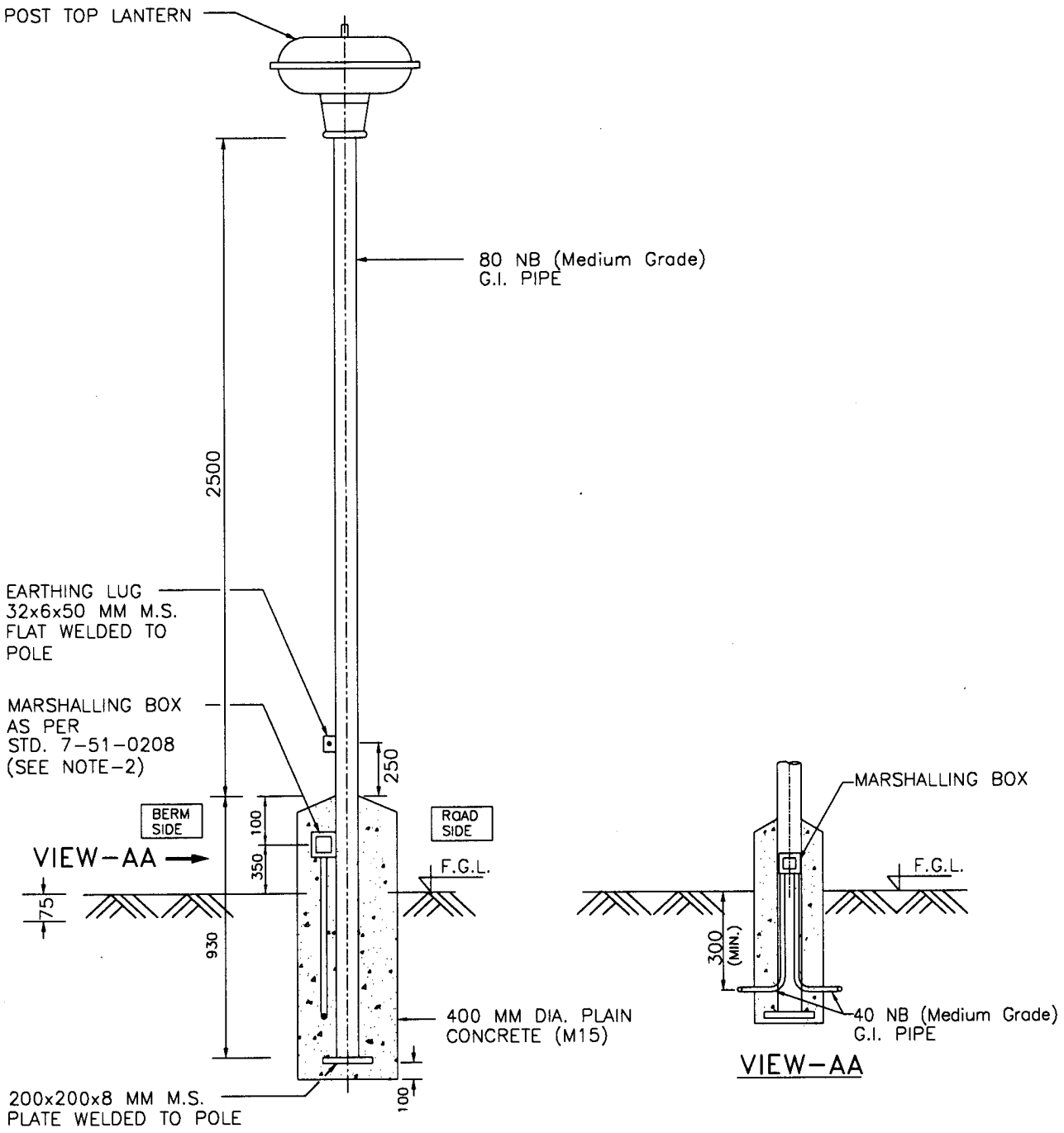

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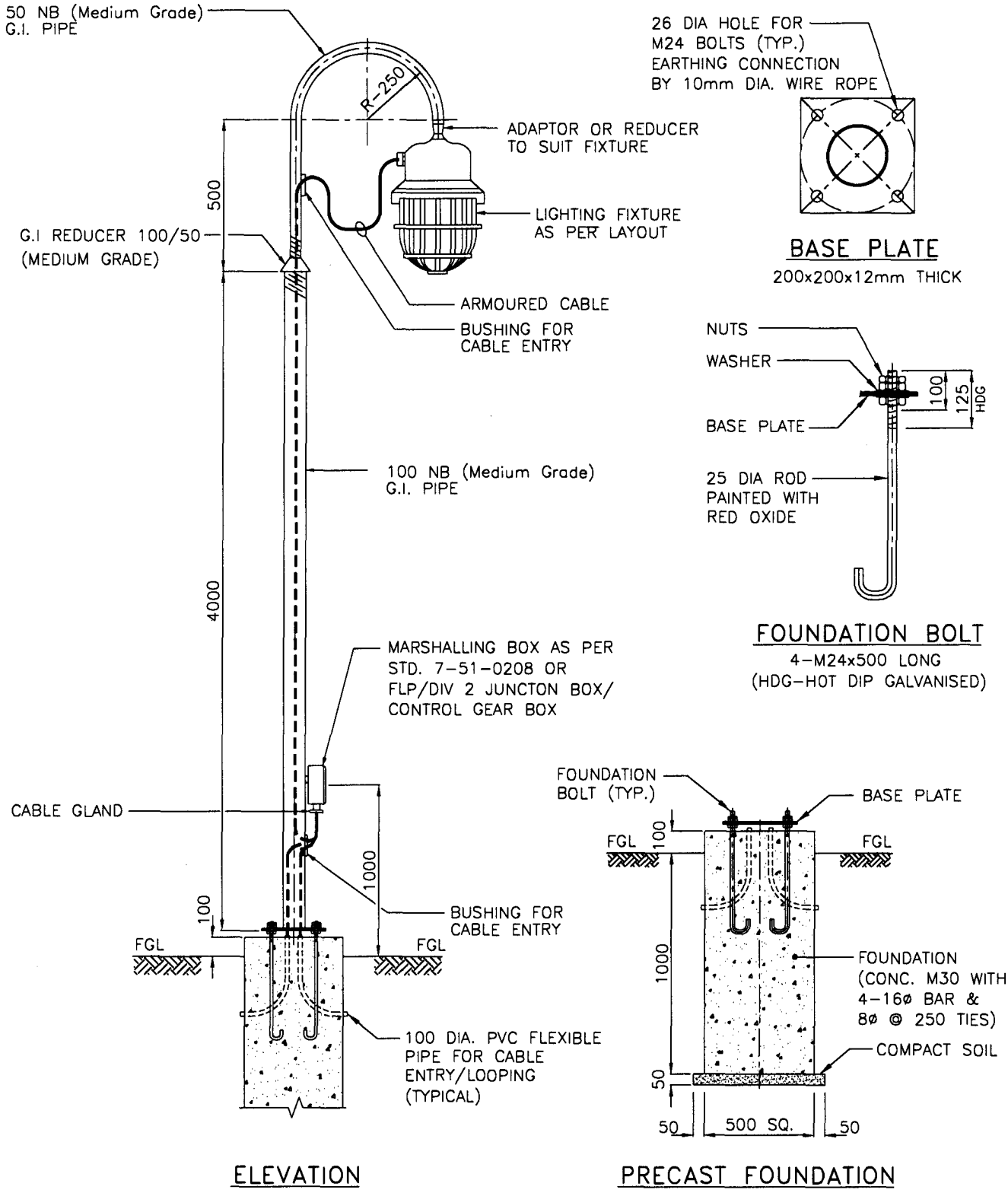

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE LIGHTING POLE AND ACCESSORIES DETAILS SHOWN HERE ARE INDICATIVE ONLY. ACTUAL DESIGN & ARRANGEMENT SHALL BE AS PER MANUFACTURER'S DETAILS.

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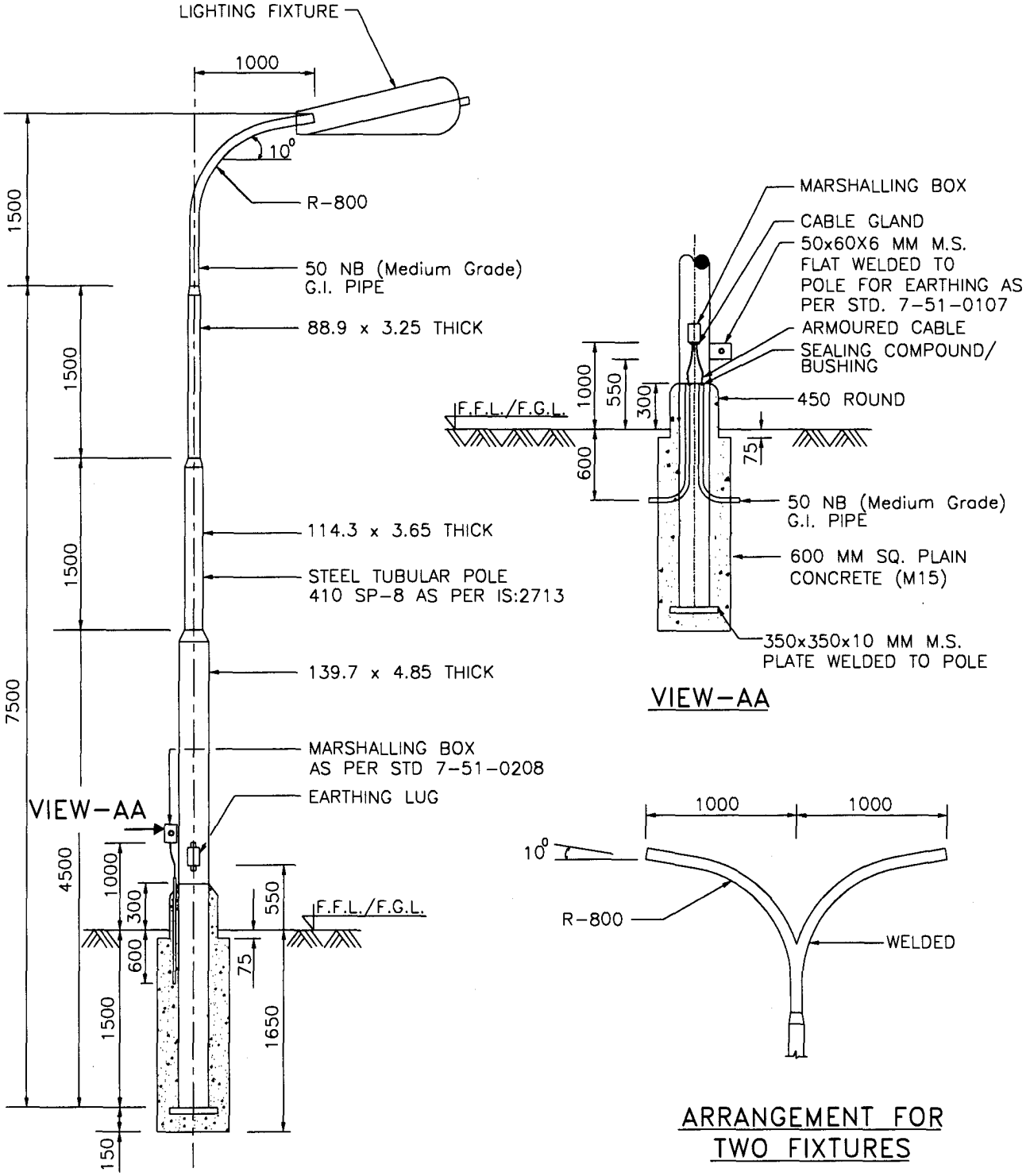

7.5M HIGH ABOVE ROAD LEVEL

ARRANGEMENT FOR TWO FIXTURES

NOTES:-

1. ALL G.I. PIPE SHALL BE MEDIUM GRADE.

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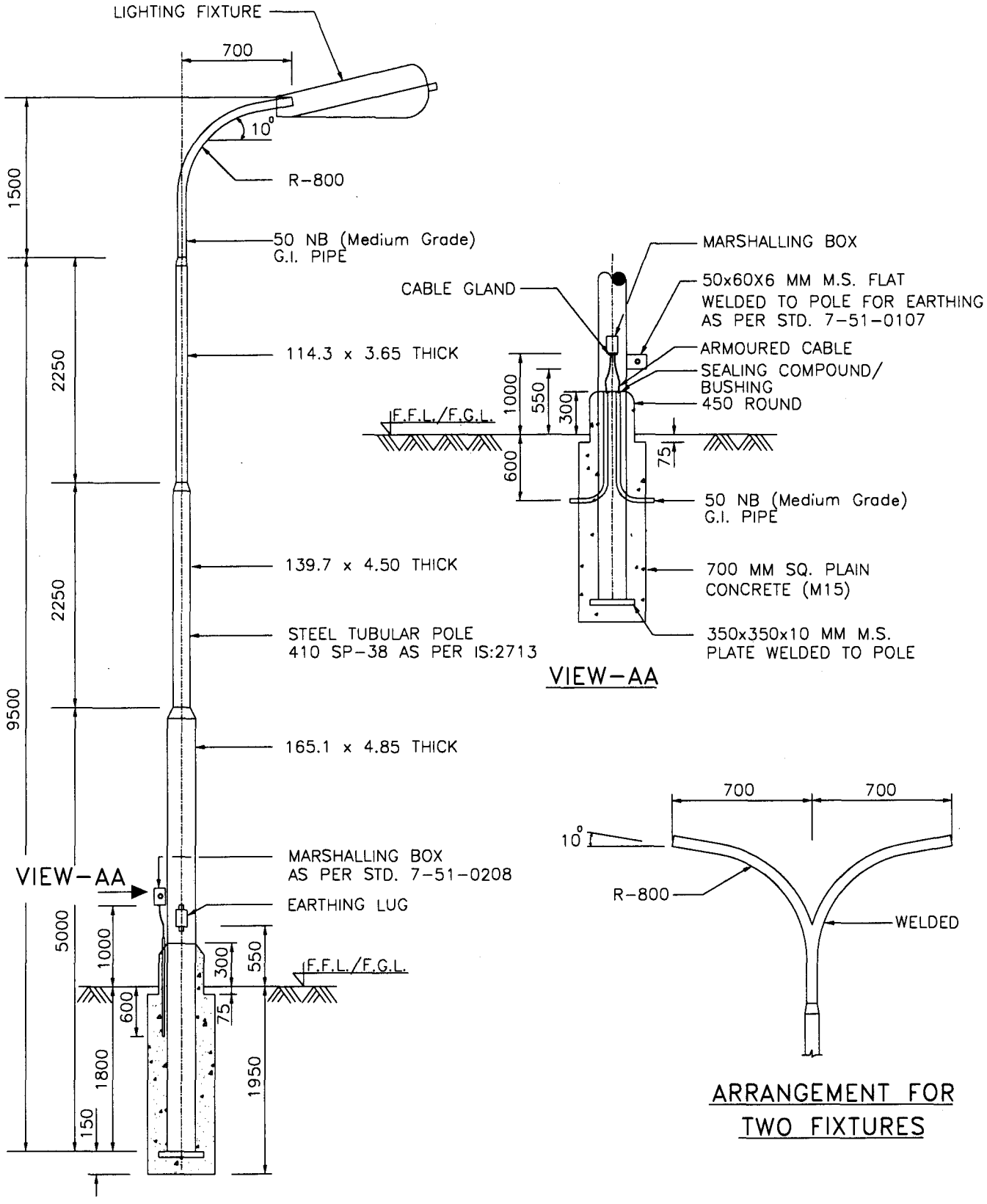

9.2M HIGH ABOVE ROAD LEVEL

ARRANGEMENT FOR TWO FIXTURES

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. ALL G.I. PIPES SHALL BE MEDIUM GRADE.

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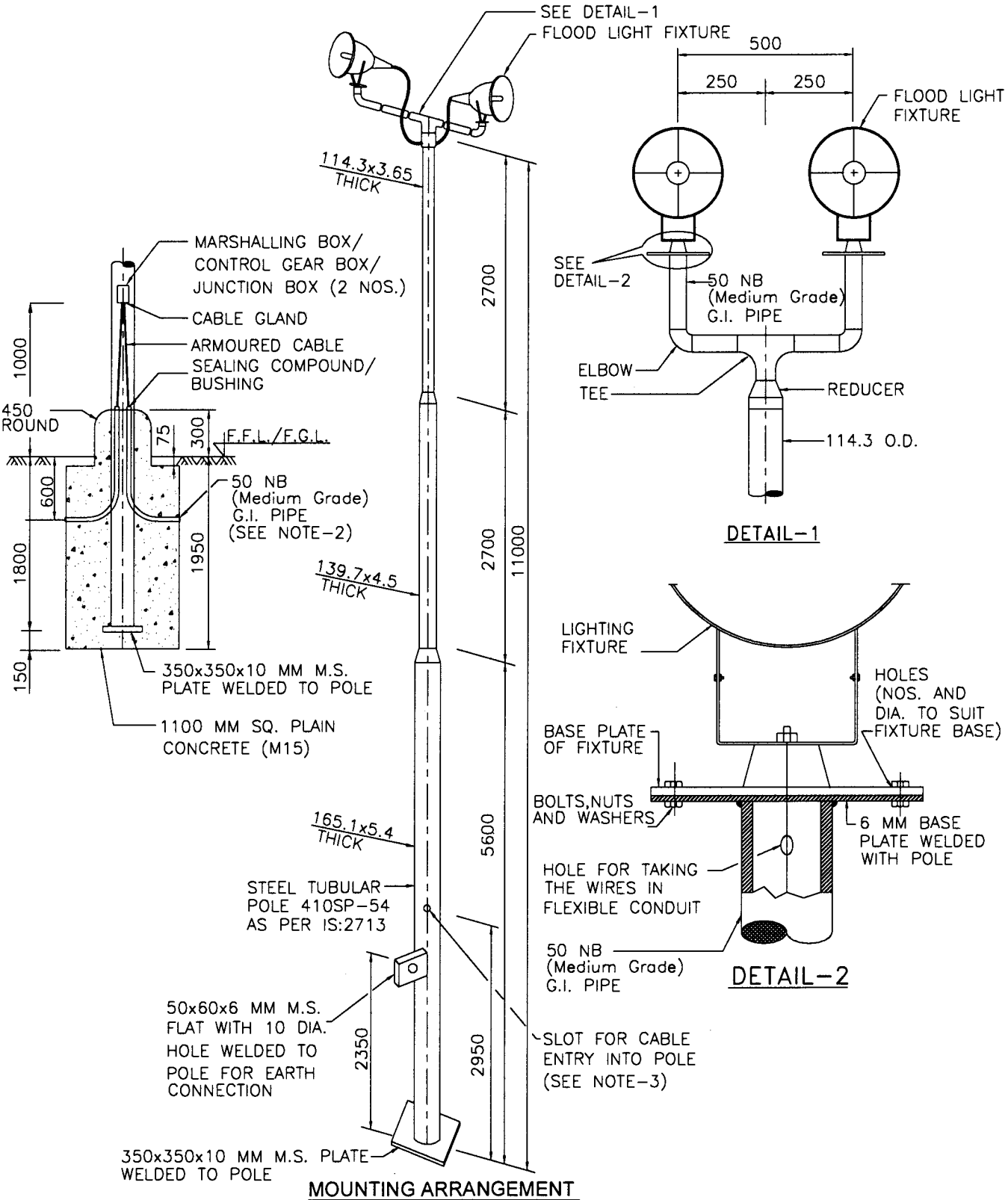

MOUNTING ARRANGEMENT FOR SAFE AREA FIXTURES

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. MINIMUM TWO AND MAXIMUM THREE NUMBERS OF SLEEVES SHALL BE PROVIDED AS PER PLAN DRAWING.
3. 2 NOS. 25 DIA. HOLES SHALL BE POVIDED ON OPPOSITE ENDS FOR FIXING OF MARSHALLING BOX ON ONE END AND CONTROL GEAR BOX/JUNCTION BOX ON OTHER END.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
5	10.07.17	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN

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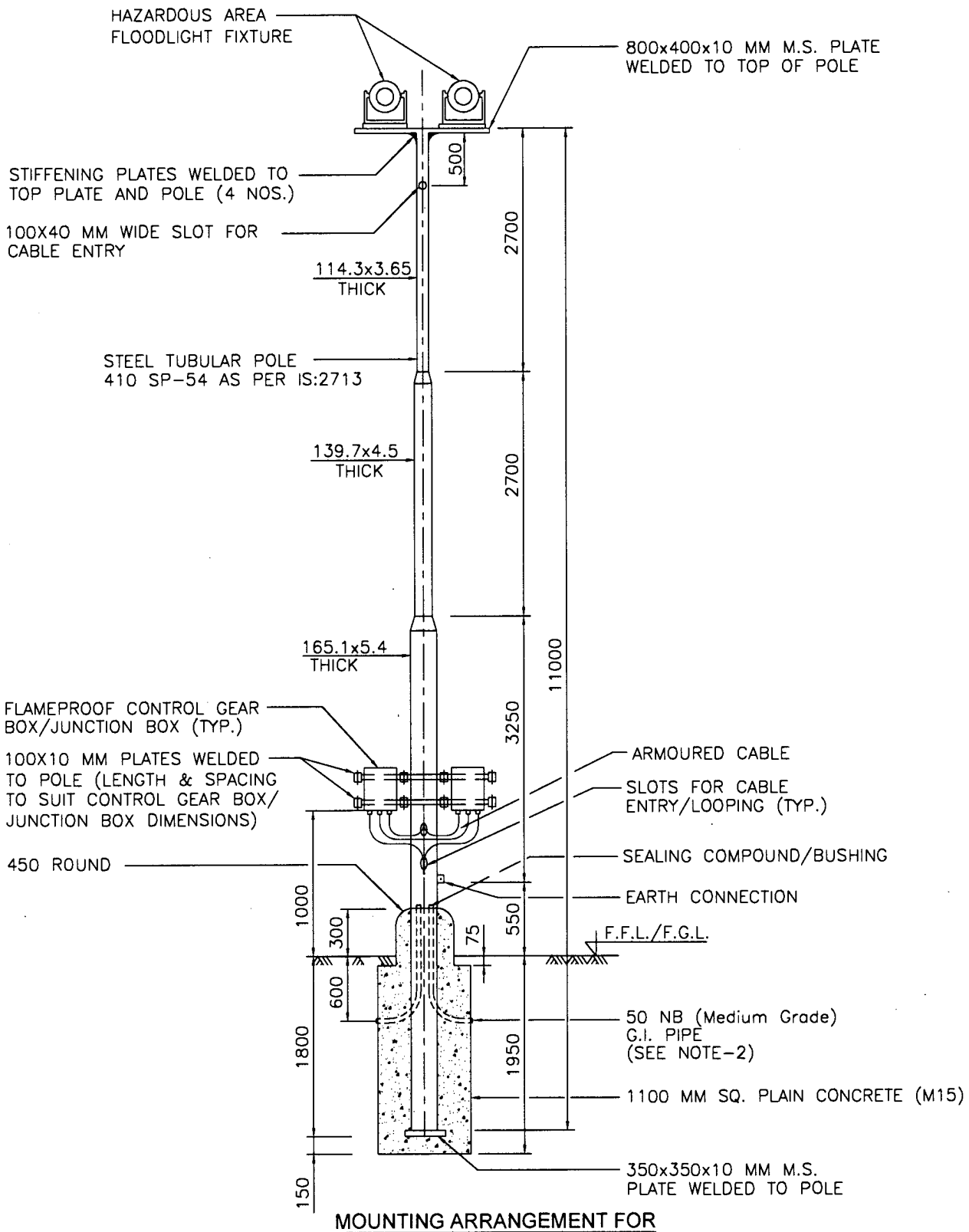

MOUNTING ARRANGEMENT FOR HAZARDOUS AREA FIXTURES

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. MINIMUM TWO AND MAXIMUM THREE NUMBERS OF SLEEVES SHALL BE PROVIDED AS PER PLAN DRAWING.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
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5	10.07.17	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	DM

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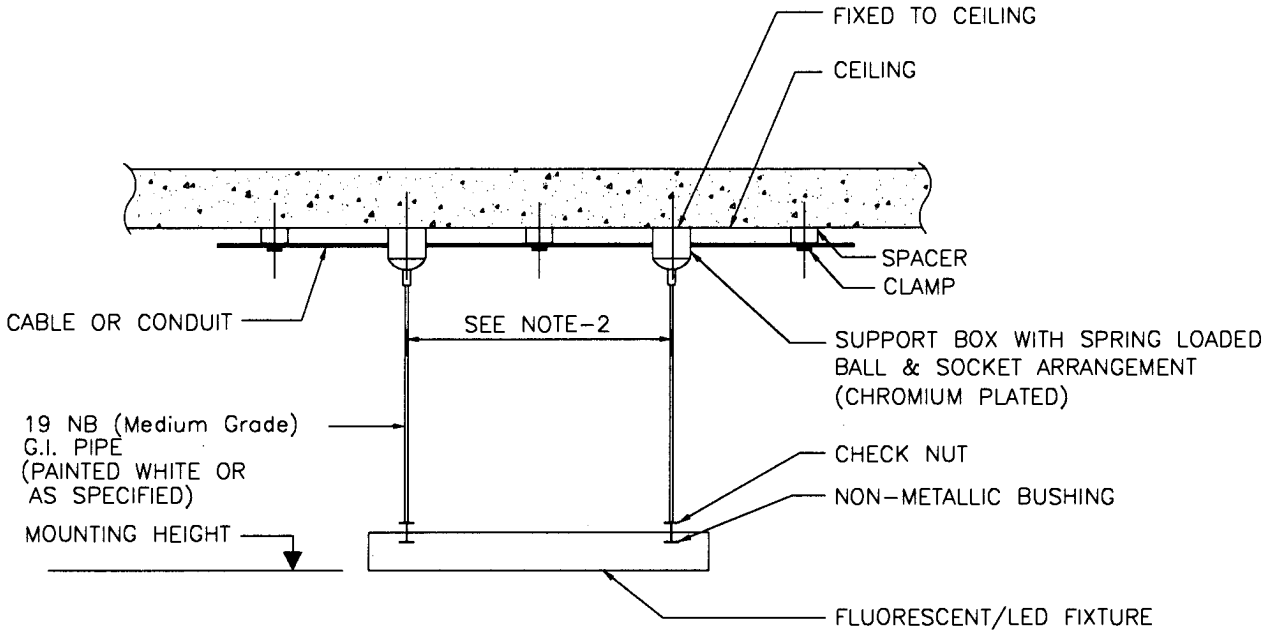
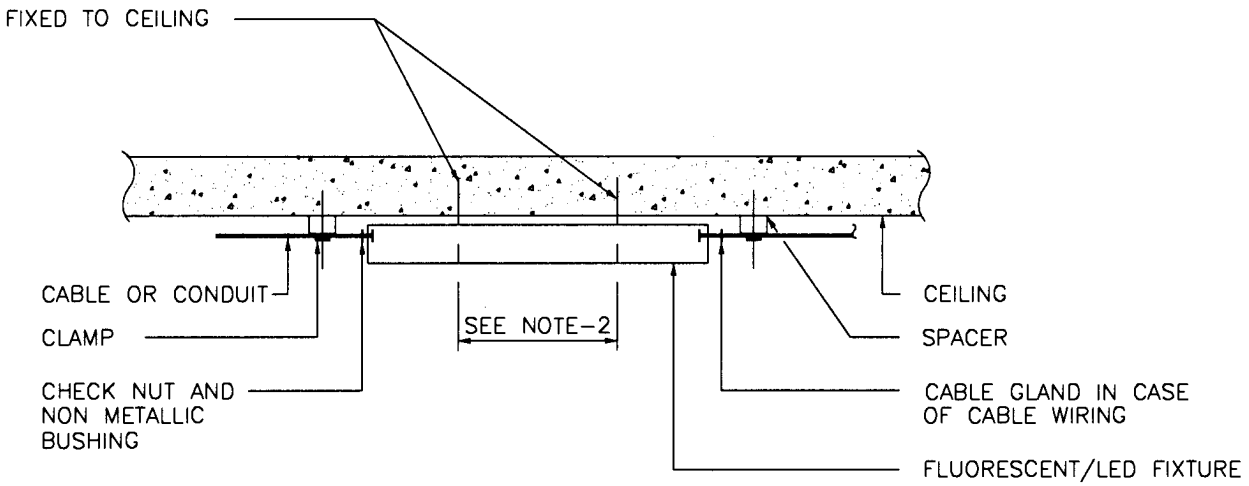


DETAIL-1
SUSPENSION MOUNTING



DETAIL-2
CEILING MOUNTING

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. SUSPENSION/FIXING CENTRES SHALL BE AS PER FIXTURE MANUFACTURER'S DETAILS.
3. IN CASE OF CABLE WIRING ONE NO. JUNCTION BOX COMPLETE WITH CABLE GLANDS SHALL BE PROVIDED NEAR EACH FIXTURE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
5	10.07.17	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN

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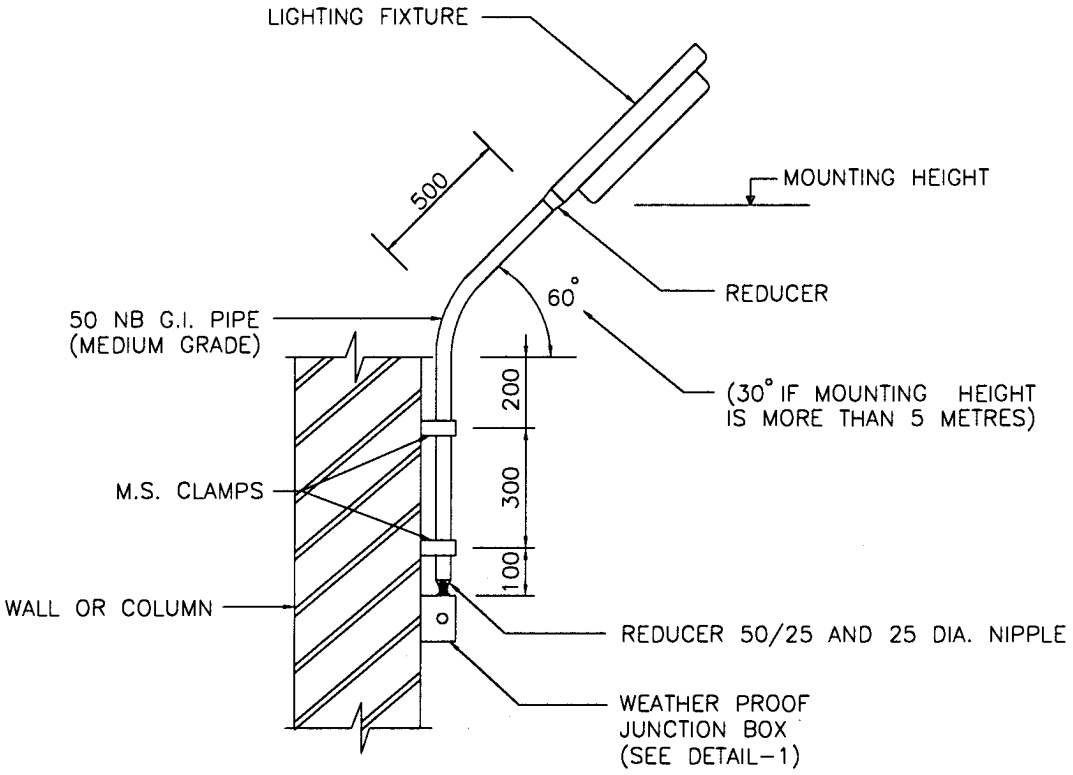
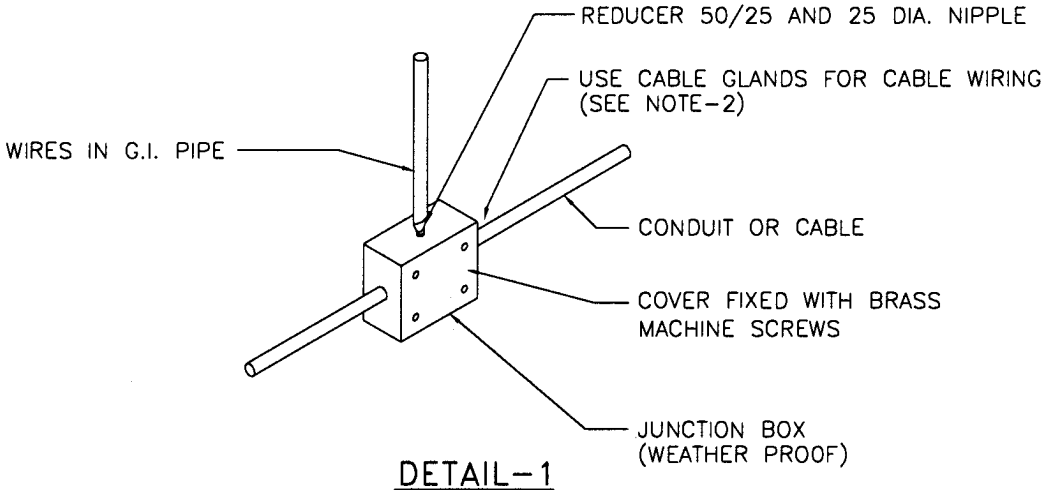


MOUNTED ON WALLS OR COLUMNS



DETAIL-1

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. PROPER SEALING SHALL BE ENSURED TO PREVENT INGRESS OF WATER.
3. WHERE FIRE PROOFING COLUMNS / STRUCTURES ARE ENCOUNTERED FIXTURE/ JUNCTION BOX AND CABLE/CONDUIT SHALL BE INSTALLED ON A SUITABLE DEEP LEGGED ANGLE IRON FRAME / DISTANCE BRACKET.

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			JSK	VKS/HK	SA	SM
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5	22.02.18	UPDATED & ISSUED AS STANDARD	BP	VKS/HK	BRB	RN

Approved by

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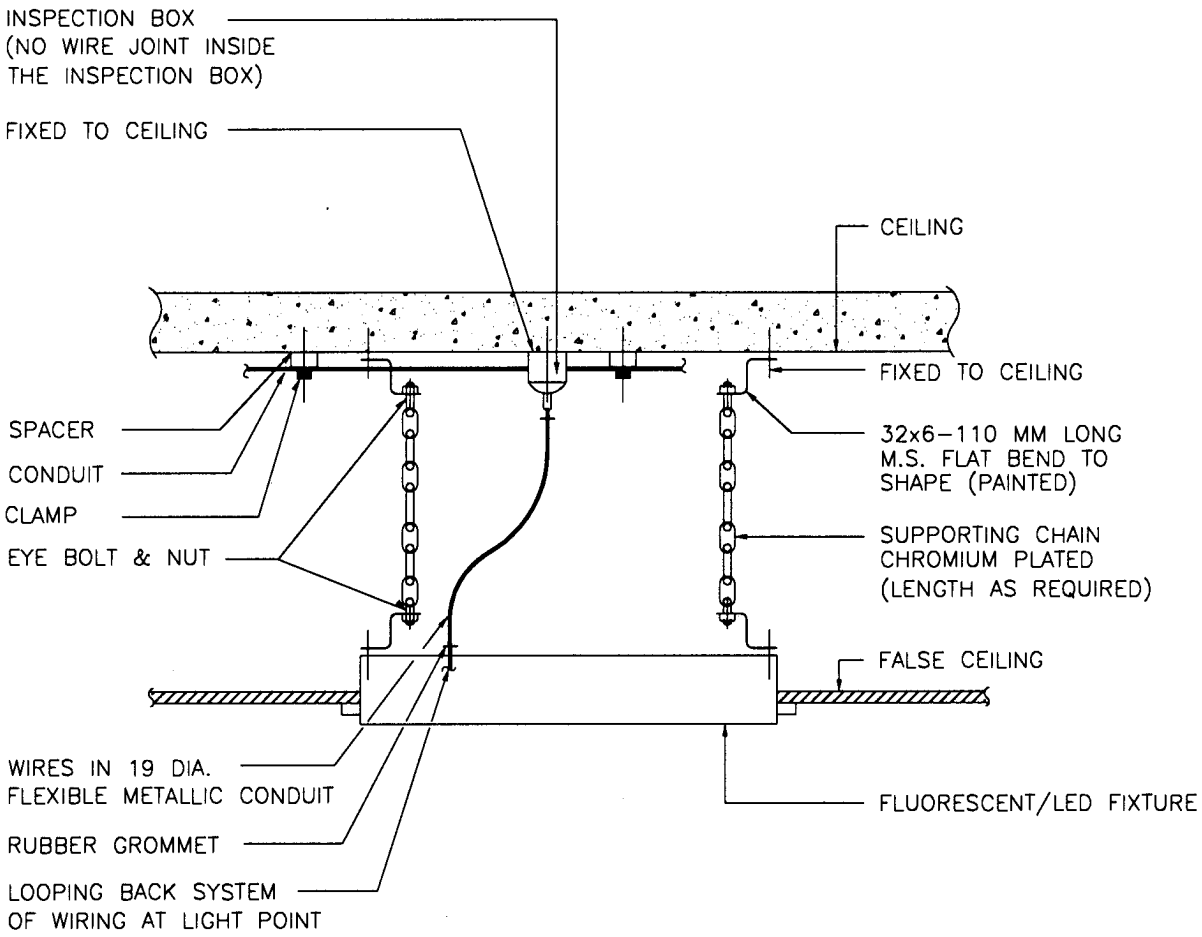

MOUNTING ARRANGEMENT WITH CHAIN SUPPORT

NOTES:–

1. ALL DIMENSIONS ARE IN MM.

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					Approved by	
6	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
5	10.07.17	UPDATED & ISSUED AS STANDARD	BP	FA/HK	BRB	RN

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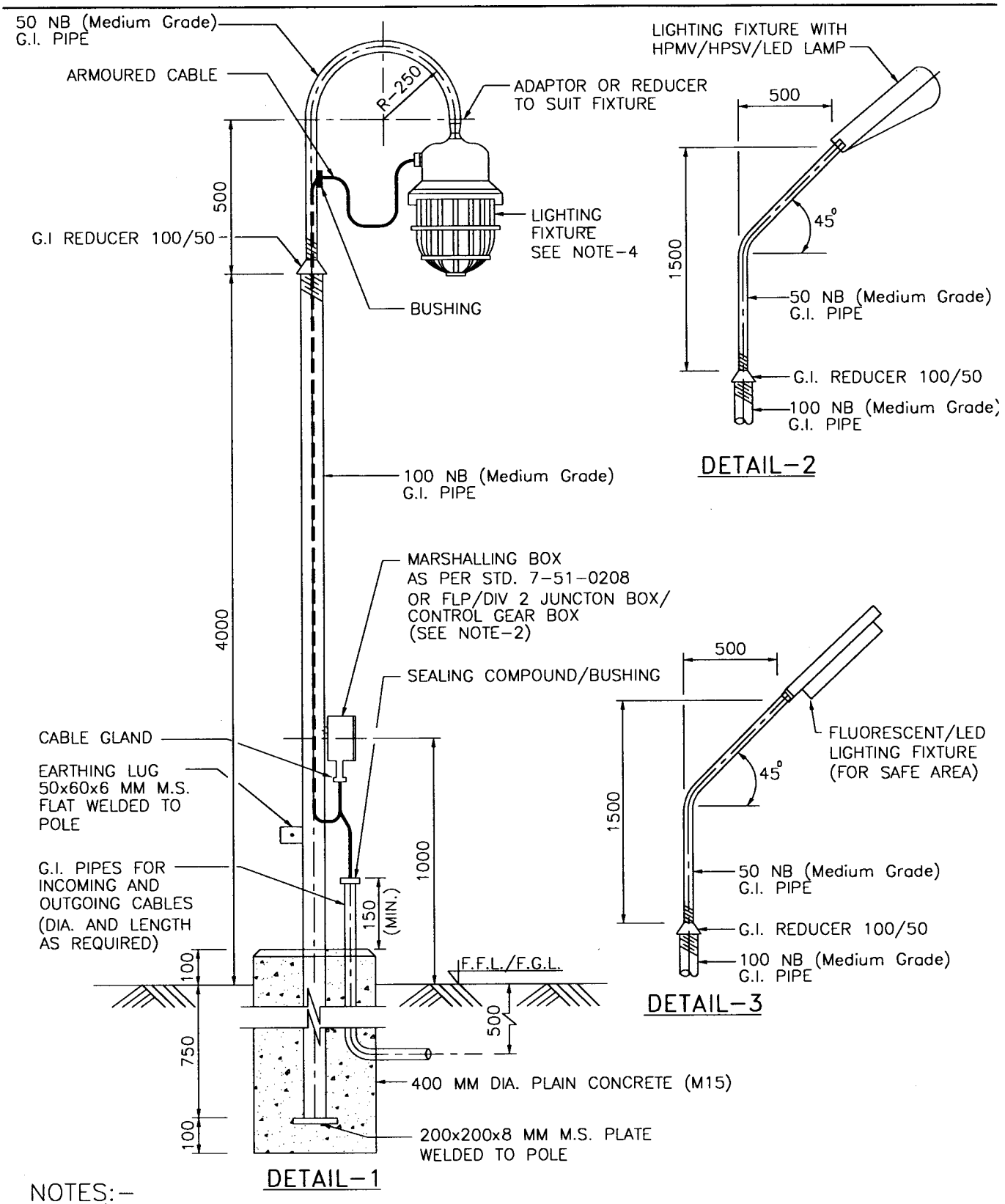

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. MARSHALLING BOX/JUNCTION BOX AND G.I. PIPES FOR CABLES SHALL BE LOCATED FACING CABLE TRENCH SIDE.
3. ALL G.I. PIPES SHALL BE MEDIUM GRADE.
4. LIGHTING FIXTURE CAN BE WELL GLASS/DOME GLASS/FLAT GLASS TYPE BASED ON TYPE OF LAMP.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
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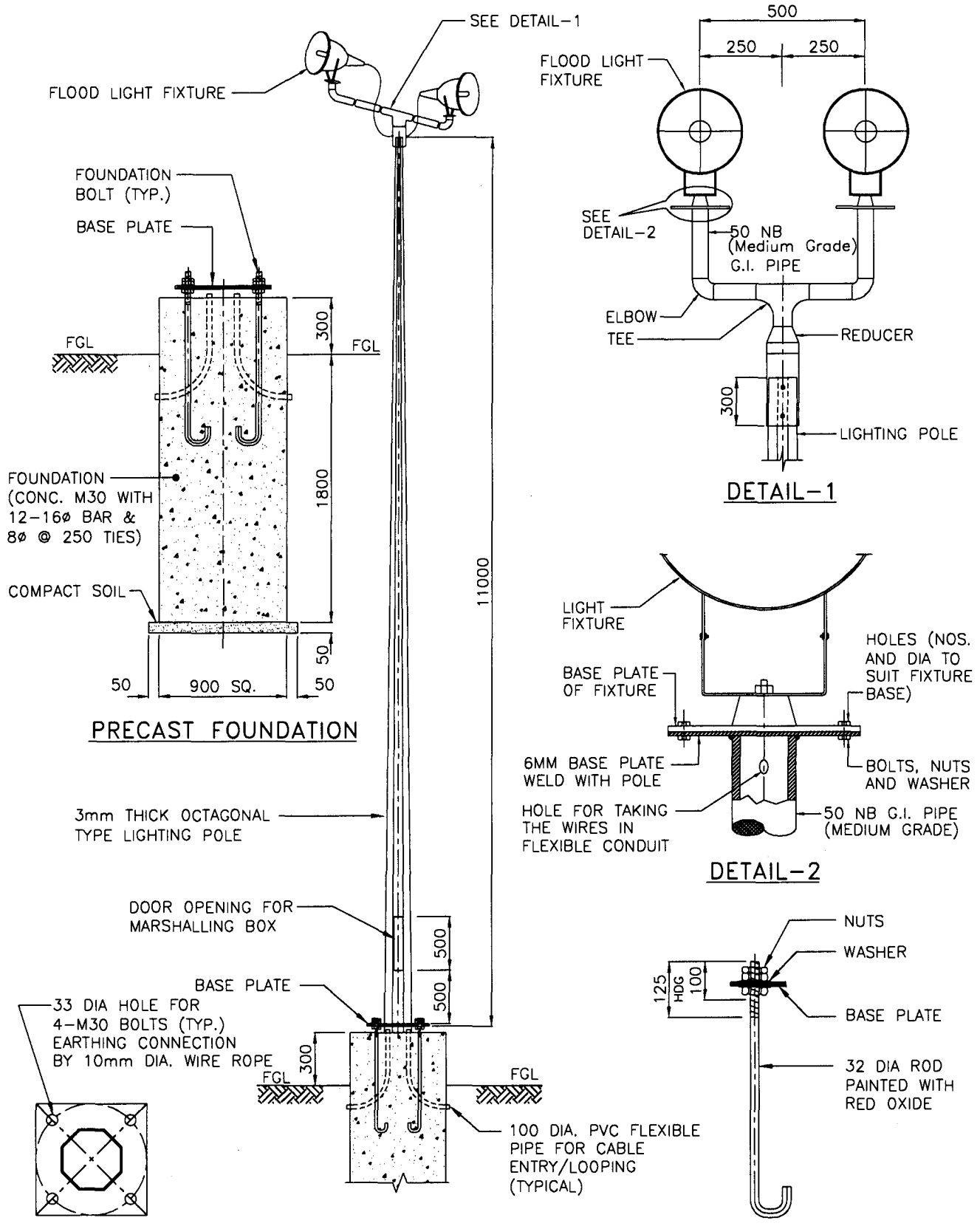

PRECAST FOUNDATION

DETAIL-1

DETAIL-2

BASE PLATE
350x350x16mm THICK

MOUNTING ARRANGEMENT FOR SAFE AREA LIGHTING FIXTURE

FOUNDATION BOLT
4-M30x900 LONG
(HDG-HOT DIP GALVANISED)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
1	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
0	18.03.16	ISSUED AS STANDARD	BP	FA/SA	BRB	SC

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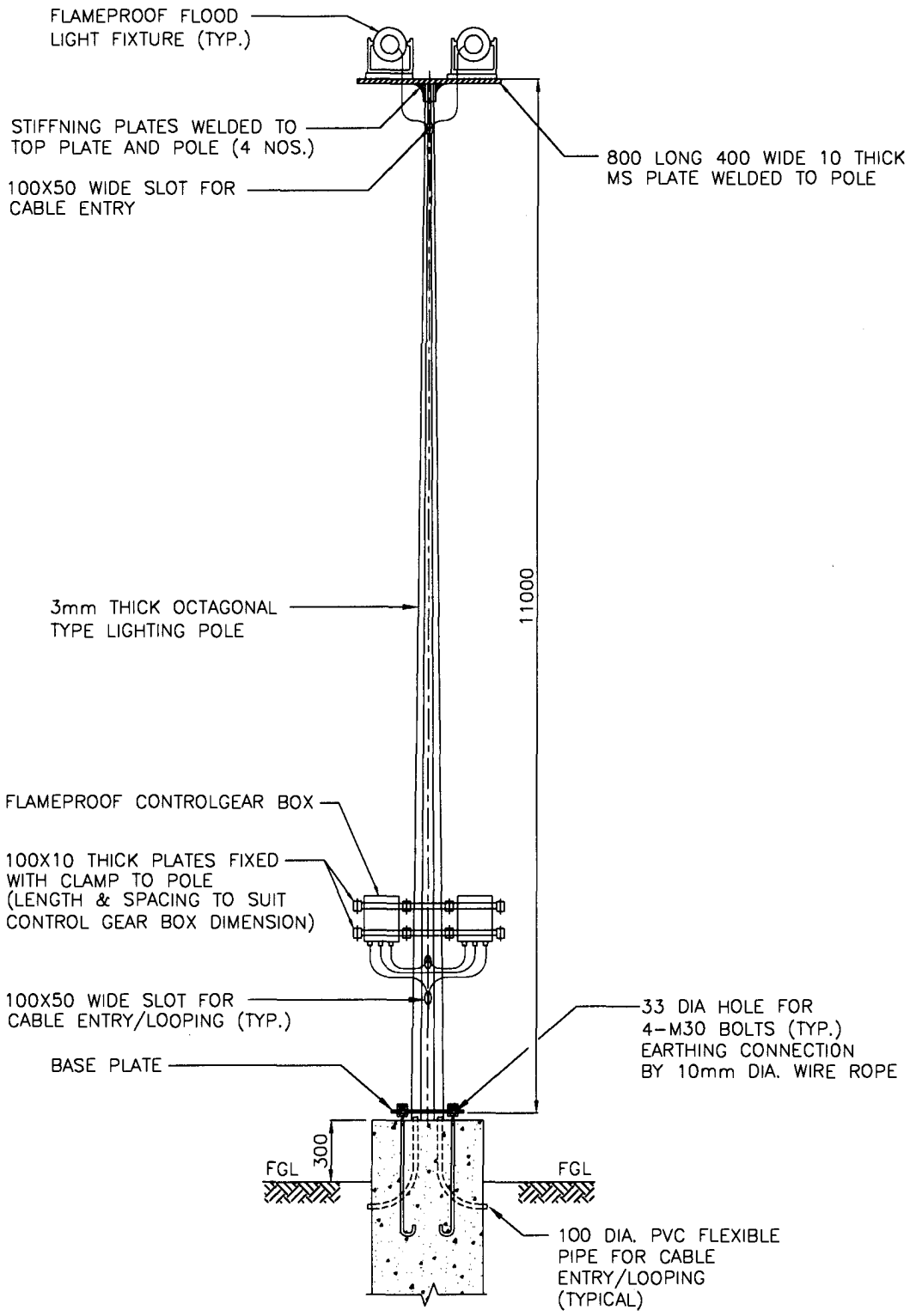

MOUNTING ARRANGEMENT FOR HAZARDOUS AREA LIGHTING FIXTURE

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE LIGHTING POLE AND ACCESSORIES DETAILS SHOWN HERE ARE INDICATIVE ONLY. ACTUAL DESIGN & ARRANGEMENT SHALL BE AS PER MANUFACTURER'S DETAILS.
3. 2 NOS. 25 DIA. HOLES SHALL BE PROVIDED ON OPPOSITE SIDE FOR FIXING OF MARSHALLING BOX ON ONE END AND CONTROL GEAR BOX ON OTHER END.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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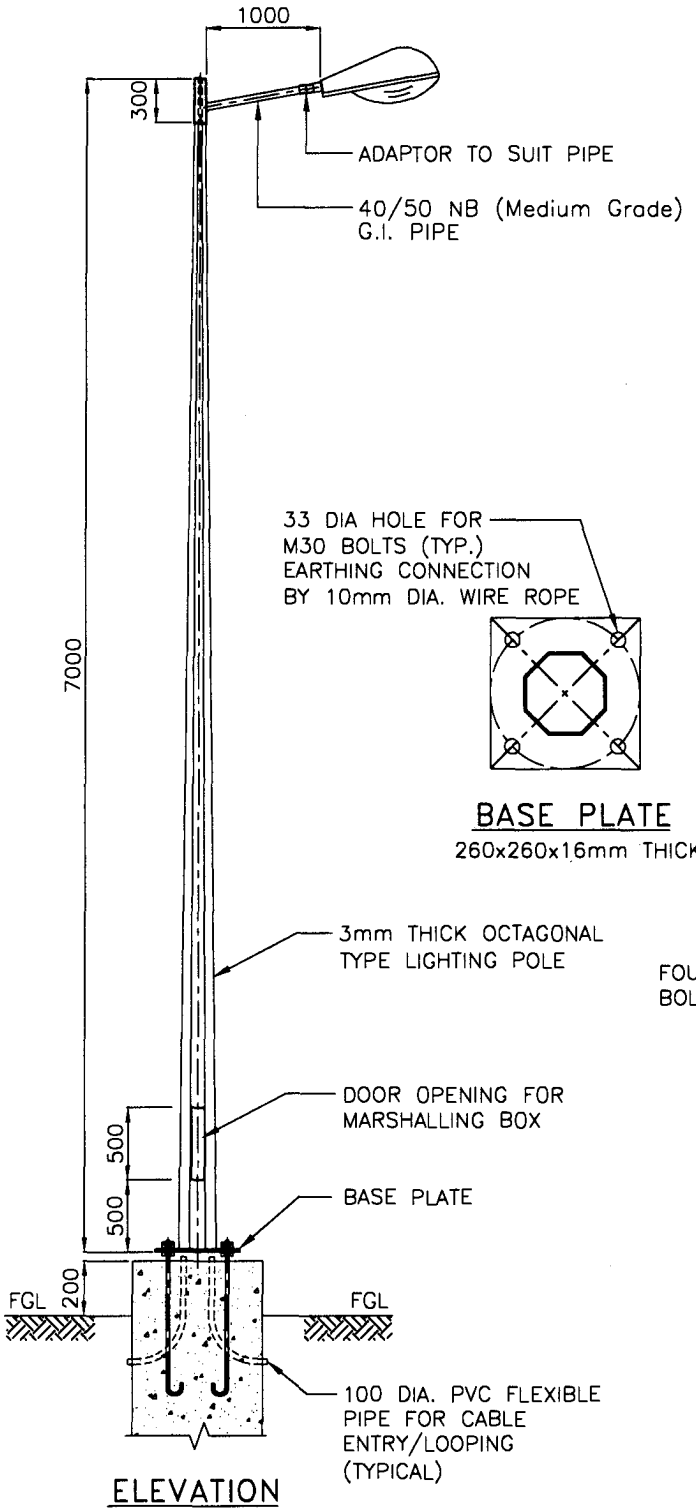
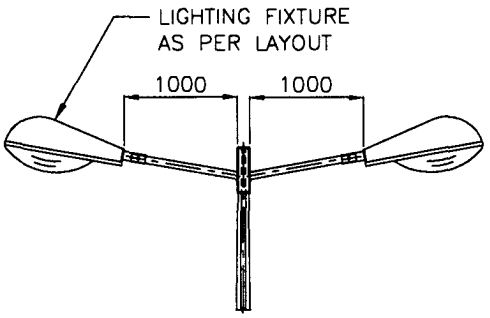


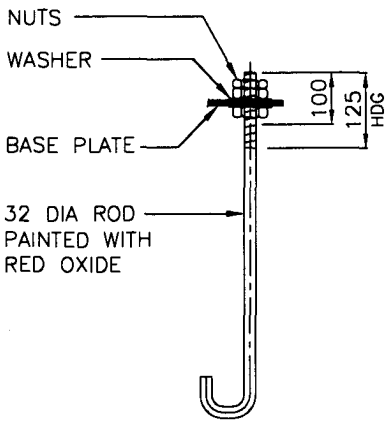
ELEVATION



ARRANGEMENT FOR TWO FIXTURES

BASE PLATE

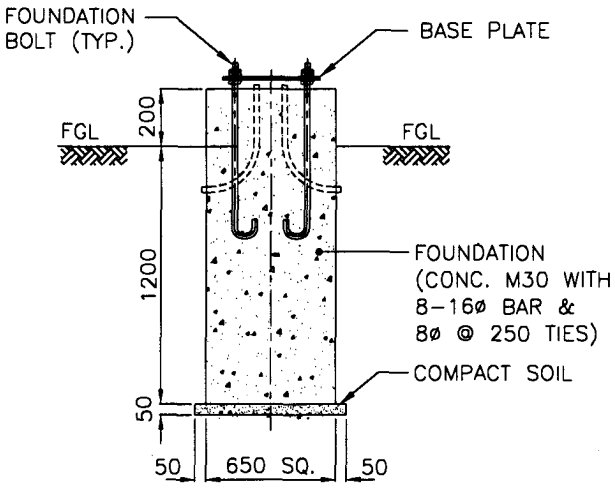
260x260x16mm THICK



FOUNDATION BOLT

4–M30x750 LONG

(HDG–HOT DIP GALVANISED)



PRECAST FOUNDATION

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE LIGHTING POLE AND ACCESSORIES DETAILS SHOWN HERE ARE INDICATIVE ONLY. ACTUAL DESIGN & ARRANGEMENT SHALL BE AS PER MANUFACTURER'S DETAILS.

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1	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HR	SA	SM
0	18.03.16	ISSUED AS STANDARD	BP	FA/SA	BRB	SC

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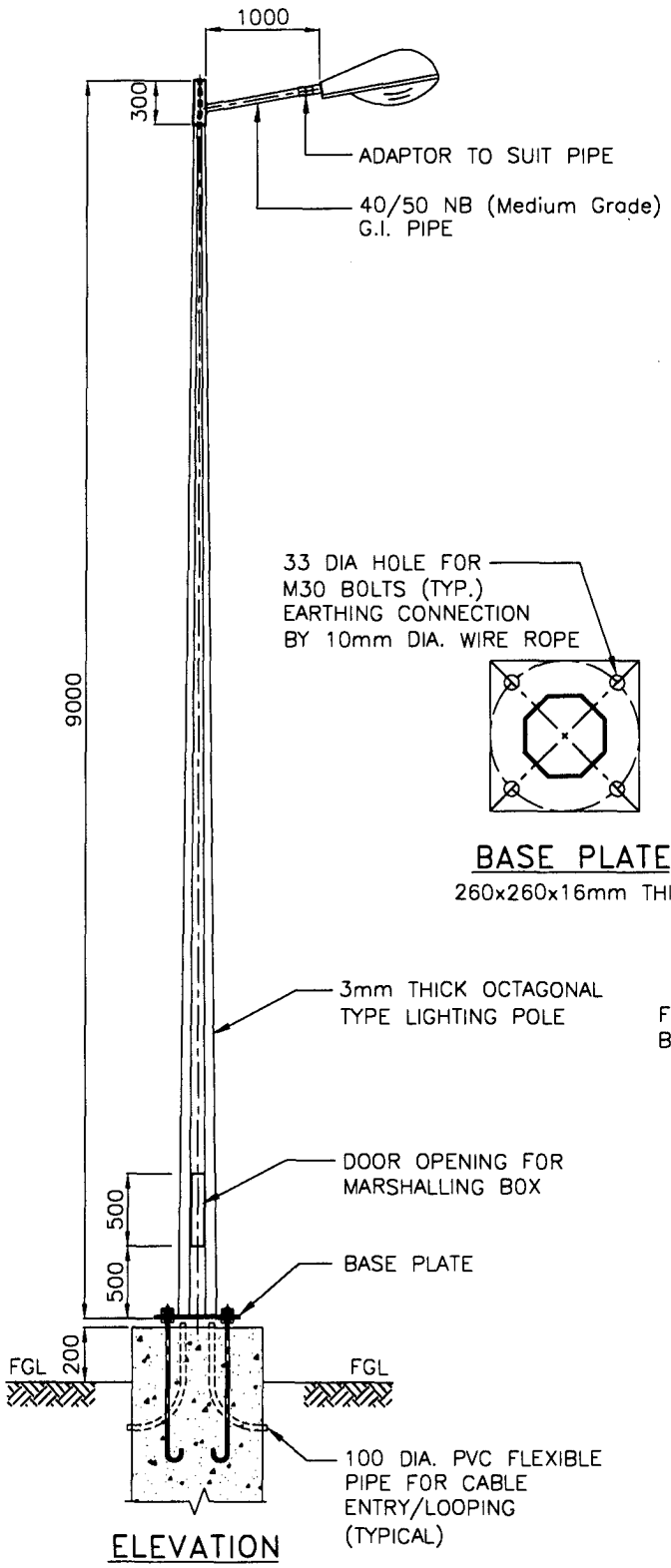

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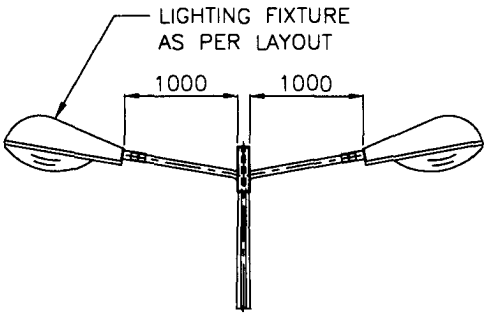
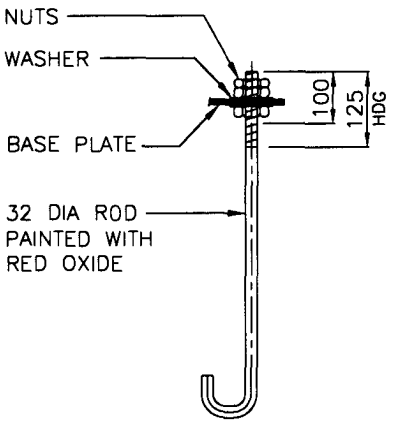


ARRANGEMENT FOR TWO FIXTURES

BASE PLATE

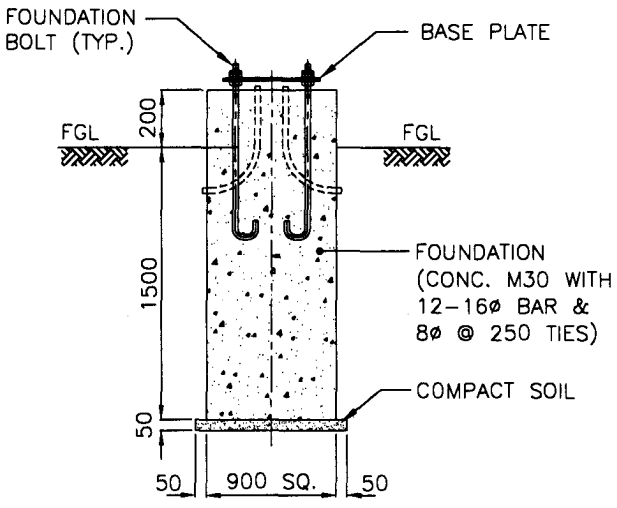
260x260x16mm THICK



FOUNDATION BOLT

4–M30x750 LONG

(HDG–HOT DIP GALVANISED)



PRECAST FOUNDATION

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE LIGHTING POLE AND ACCESSORIES DETAILS SHOWN HERE ARE INDICATIVE ONLY. ACTUAL DESIGN & ARRANGEMENT SHALL BE AS PER MANUFACTURER'S DETAILS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
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1	29.09.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
0	18.03.16	ISSUED AS STANDARD	BP	FA/SA	BRB	SC

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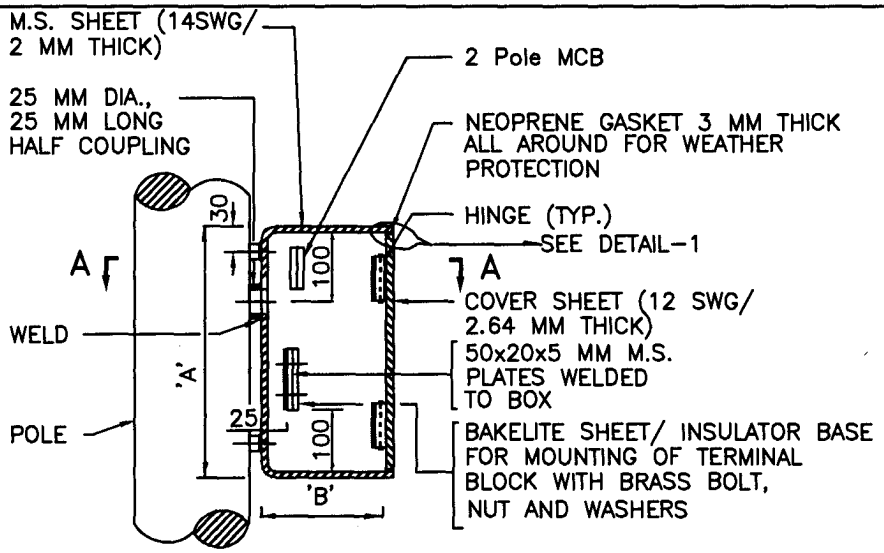
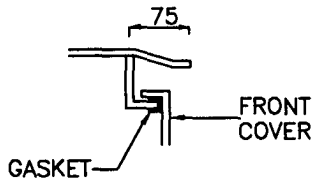
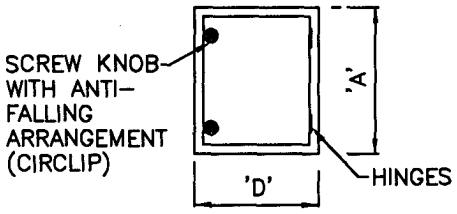
TYPICAL MARSHALLING BOX DETAILS FOR LIGHTING POLES

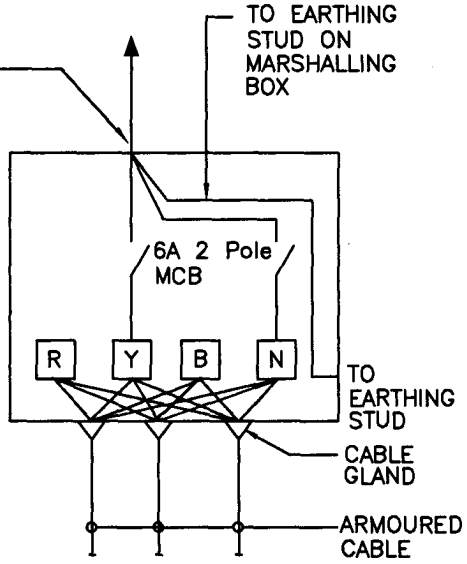




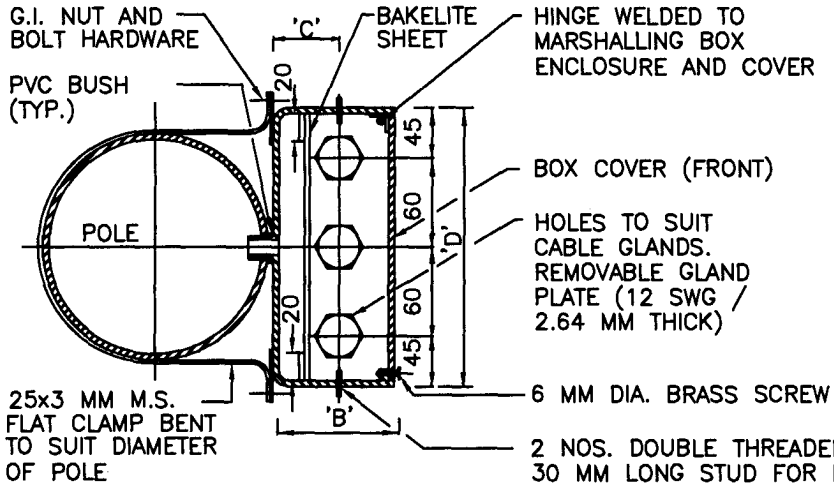
DETAIL-1



BOX COVER



WIRING DIAGRAM OF MARSHALLING BOX



SECTION-AA

MARSHALLING BOX DIMENSIONS

CABLE SIZE (IN SQ. MM)	CABLE ENTRIES	DIMENSIONS IN MM				
		'A'	'B'	'C'	'D'	Terminal Bolt Size
UPTO 4 X 16	2	250	100	45	210	5
ABOVE 4 X 16 AND UPTO 3.5 X 50	3	300	150	75	210	10

NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. MARSHALLING BOX SHALL HAVE WEATHER PROOF (IP55) ENCLOSURE PROTECTION, WITH DOUBLE COMPRESSION CABLE GLANDS WITH CHECK NUTS & LUGS.
3. THE BOX WITH ALL WELDED ATTACHMENTS, SHALL BE THOROUGHLY CLEANED AFTER FABRICATION AND SHALL BE PAINTED WITH EPOXY PAINT.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
7	12.10.20	UPDATED & ISSUED AS STANDARD	JSK	VKS/HK	SA	SM
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पैकेज इकाइयों के लिए साइट निष्पादन गारंटी अपेक्षाएँ तैयार करने हेतु विक्रेता को अनुदेश

INSTRUCTIONS TO VENDOR FOR SITE PERFORMANCE GUARANTEE REQUIREMENTS FOR PACKAGE UNITS

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
					Approved by	
2	30.03.2019	Reaffirmed & Reissued	RRS	PPP	RP	RKT
1	30.05.2008	Revised & Reissued	SMA	PKR	AA	VC
0	10.11.2003	ISSUED AS STANDARD	PKR	PM	VC	SKG

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Abbreviations:

LSTK	:	Lumpsum Turnkey
PG	:	Performance Guarantee

General Engg. Standards Committee

Convenor : Ms R Priyamvada (Convenor)

Members :
Mr BR Bhogal (Elect.)
Mr Rajan Srivastava (Strl.)
Mr RB Bhutda (EWS)
Mr Amrendra Kumar (Piping)
Ms NP Guha (Projects)
Mr Amit Prakash (FEM)
Mr KJ Harinarayanan (SME)
Mr VK Tonger (Process-1)
Mr Satyabrata Biswas (Process-2)

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CONTENTS

1.0 INTRODUCTION 4

2.0 PURPOSE 4

3.0 SCOPE 4

4.0 DEFINITIONS 4

5.0 PERFORMANCE GUARANTEE TESTING AT SITE 4

6.0 SITE PERFORMANCE GUARANTEE TEST PROFORMA 5

7.0 ATTACHMENTS 5

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1.0 INTRODUCTION

As a part of engineering services, EIL procures different types of Package Units for various Projects, for and on behalf of the Owner/Purchaser. The vendor is required to design, engineer, manufacture/ procure, inspect, test and supply to site, and also in many cases construct/erect, commission and Performance test the Package Units before handing over the same to Owner/Purchaser, based on Process and Technical requirements defined in the Inquiry/Order document.

2.0 PURPOSE

This document provides instructions to Vendor for Site Performance Guarantee (PG) Requirements for Package Units and shall form a part of the contract, wherever site performance guarantee test is specified in the Inquiry/Order document. The aim is to provide clarity to the Vendor as well as the Commissioning team on site performance guarantee parameters, their measurements during PG Test, and the acceptance of the Package Unit by the Owner/Purchaser after the successful PG Test.

3.0 SCOPE

The requirements of this standard are applicable for all Package Units including LSTK Bid Packages, which require Performance Guarantee Test, after installation and commissioning of the unit at site.

4.0 DEFINITIONS

4.1 "Vendor" means the person(s), company, organization from whom EIL procures products/services as a part of services rendered to the Owner/Purchaser. "Contractor", "Supplier" are considered synonymous to "Vendor".

4.2 "Owner" means the person(s), company, organization to whom EIL is rendering services for the Project.

4.3 "Purchaser" means the person(s), company, organization which awards order for the Package Unit on the Vendor.

5.0 PERFORMANCE GUARANTEE TESTING AT SITE

5.1 General

5.1.1 The overall performance testing of the completely assembled/erected Package unit as a whole shall be carried out at site to establish the performance guarantee parameters specified in Inquiry/Order document. In addition, certain critical equipment/sub-packages may also be performance tested at site if so specified in Inquiry/Order document. The duration of site performance guarantee run shall be as defined in the Inquiry/order document.

The measured parameters, where necessary, shall be adjusted to account for the variation in ambient/operating conditions actually prevailing at site during performance testing, before comparing it with the guaranteed value.

5.1.2 Performance test shall be carried out as per relevant Codes, Standards and Specifications. The Vendor shall submit the following during detail engineering and the same shall be subject to Owner/Purchaser's approval:

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- Detailed Test procedure including measurement tolerances, if applicable, calculations/ correction curves for changes in ambient/ operating conditions, and complete test layout, etc.

- Site Performance Guarantee Test Proforma completed in line with enclosed format 7-76-0103-F1.

- Vendor shall list out parameters to be measured and corresponding installed instrument type and tag no. to be used for measurements. Any instrument/measurement device, (required for testing) not installed at site, shall be arranged by vendor. Vendor shall furnish list of such instruments alongwith instrument details.

- Log sheets indicating all parameters that are to be recorded.

- Method of computation of test results including interpretation of test results.

5.2 Test Instruments

All necessary test instruments required for measuring the performance guarantee parameters shall be arranged by the vendor free of charge. These instruments shall be tested & calibrated from reputed test houses like National Physical Laboratories (NPL), Institute for Design of Electrical Measuring Instruments (IDEMI), Electronics Regional Test Laboratories (ERTL) or any other test house approved by the Owner. All test instruments shall have valid calibration reports. The Vendor shall furnish calibration certificates before putting them to use and also, wherever applicable, after completion of the PG test.

5.3 Performance Guarantee Parameters

Guarantee performance parameters shall be as defined in the Process/Mechanical data sheets, Specification, etc. included in the Inquiry/Order document.

5.4 Repair/Rectification/Modification

5.4.1 In case the unit fails to meet the guaranteed parameters, the Vendor shall carryout, necessary repair, rectification and modification within the time frame defined in the contract or as mutually agreed with the Owner/Purchaser, at his own risk and cost to establish the guaranteed parameters in the final performance test. All costs involved for above activities i.e. supply of manpower, materials, consumables and machines etc. shall be to Vendor's account.

5.4.2 Inspite of repair/rectification, incase the guaranteed performance parameters are not met, penalty/rejection as defined in the contract document for shortfall from guaranteed performance parameters shall be applied.

6.0 SITE PERFORMANCE GUARANTEE TEST PROFORMA

Typical Proforma shown in enclosed Format 7-76-0103-F1, shall be used for assessment of Performance guarantee parameters during site PG test.

7.0 ATTACHMENTS

Format No. 7-76-0103-F1	:	SITE PERFORMANCE GUARANTEE TEST PROFORMA.

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SITE PERFORMANCE GUARANTEE TEST PROFORMA

Client : *
Project/Location : *
EIL Job No. : *
Package Unit/System: *
Order No. : *
Vendor : *

1. PACKAGE OPERATING CONDITION (FOR GUARANTEE):

Operating Parameter	Values as per Inquiry/Order	Value (Actual at site)
*	*	

2. PERFORMANCE :

SITE PERFORMANCE TEST PROCEDURE DOC. NO: *

TEST PERIOD:

Parameter (1) *	Measuring Unit (2) *	Guaranteed Value (3) *	Permissible Tolerance (4) *	Measured Value at site (5)	Value after correction for site conditions (6)	Deviation (6) w.r.t.- (3)	Remarks (Acceptable-Y/N) (7)
a)							
b)							
c)							
d)							
e)							

Vendor's Representative
Date

Owner's Commissioning Incharge
Date

Owner
Date

* TO BE FILLED-UP AND/OR DEVELOPED BY VENDOR & SUBMITTED ALONGWITH PERFORMANCE TEST PROCEDURE.

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3. OBSERVATIONS:

4. CONCLUSIONS :

Vendor's Representative	**Owner's Commissioning Incharge**	**Owner**
Date	Date	Date

Copy : Engineer-In-Charge.

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VENDOR LIST FOR STRUCTURAL WORKS

PROJECT: EXECUTION OF TRI-NITRO TOLUENE (TNT) PLANT ON OBE BASIS

UNIT : 000

CLIENT : M/S MUNITION IINDIA LIMITED (HEF), KHADKI, PUNE

JOB NO : B889

Rev. No.	Date	Purpose	Prepared by	Checked by	Approved by
A	08.01.2025	ISSUED FOR TENDER	AB	SD	VKG

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Sr No	Supplier Name	City	Phone	E-Mail	Remarks
Department : STRUCTURE					
General Notes/ Instructions:- *1. SPECIFICATION OF THE PRODUCT SHALL BE CHECKED AGAINST TENDER SPECIFICATIONS BEFORE SELECTING ANY PRODUCT/ BRAND. IN CASE OF ANY DISCREPANCY, TENDER ITEM/ SPECIFICATIONS SHALL PREVAIL, AND ANY SUCH PRODUCT/ BRAND SHALL NOT BE USED WHICH IS NOT CONFORMING TO TENDER SPECIFICATIONS EVEN IF IT IS APPEARING IN THIS LIST.* *2. DOSAGE OF ADMIXTURES, WHEREVER NOT MENTIONED IN THIS LIST,SHALL BE AS PER MANUFACTURER'S SPECIFICATIONS.* *3. IN CASE OF NON-AVAILABILITY OF ANY PRODUCT AMONG APPROVED PRODUCTS/ BRANDS AT A PARTICULAR SITE/ REGION, ALTERNATE PRODUCT/ BRAND NAME SHALL BE PROPOSED BY RCM TO EIL-HO FOR APPROVAL, ALONG WITH THE CREDENTIALS OF THE MANUFACTURER AND DETAILS OF THE PROPOSED PRODUCT/BRAND.* *4. UNDER THE LISTED CATEGORIES, ALL PRODUCTS CARRYING "ISI" CERTIFICATION MARK OF BIS ALONG WITHRELEVANT STANDARD NUMBER "IS:*****" AND THE RELEVANT LICENSE NUMBER "CM/L*******" AND LISTED AT BIS WEBSITE "http://www.manakonline.in" ON THE DATE OF PLACEMENT OF PURCHASE ORDER ARE DEEMED TO BE CONSIDERED AS APPOVED FOR USAGE.* *5. IN ADDITION TO PRODUCTS MENTIONED IN THIS LIST, PRODUCTS APPROVED AFTER ISSUE OF THIS LIST SHALL ALSO BE CONSIDERED FOR USE BASED ON PRODUCTION OF "PRODUCT APPROVAL LETTER" ISSUED TO THE MANUFACTURER BY EIL-HO.*				
Area of Experience: Other					
Item : A. INTEGRAL WATER-PROOFING COMPOUNDS FOR CONCRETE (AS PER IS:2645)					
1	Refer Remark	INDIA	, ,	NA	All Integral Waterproofing Compounds for Concrete which carry "ISI" certification mark of BIS along with standard number "IS 2645" and the license number "CM/L**....*)" and listed at BIS website "https://www.bis.gov.in".
Item : B. CONCRETE ADMIXTURES -(AS PER IS:9103)					
1	Refer Remark	INDIA	, ,	NA	All Accelerating, Retarding, Water-reducing, Air-entraining & Super-plastizing Admixtures for Concrete which carry "ISI" certification mark of BIS along with standard number "IS 9103" and the license number "CM/L**....*)" and listed at BIS website "https://www.bis.gov.in".
Item : C. BI-POLAR CONCRETE PENETRATING CORROSION INHIBITING ADMIXTURE (AS PER EIL STD SPEC NO 6-68-0017)					
1	APPLE CHEMIE INDIA PVT LTD	NAGPUR	+91 9607001014, ,	www.applechemie.com	PRODUCT NAME-AC CORROGUARD-BP

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Sr No	Supplier Name	City	Phone	E-Mail	Remarks
2	CHRYSO INDIA PRIVATE LIMITED	NAVI MUMBAI	022 2768 5991, ,	info.india@chryso.com	BRAND NAME-CHRYSO CORROCRETE
3	CLEAN COATS PVT LTD	THANE	, ,		PRODUCT NAME-CONPROOF IA (DOSAGE 1% W/W OF CEMENT)
4	FOSROC CHEMICALS (INDIA) PVT LTD	BENGALURU	+91 8042521900, ,	enquiry.india@fosroc.com	BRAND NAME-AURAMIX BCI
5	HINDCON CHEMICALS LTD	KOLKATA	, ,	NA	BRAND NAME- HIND CORROGUARD
6	KRISHNA CONCHEM PRODUCTS PVT LTD	NAVI MUMBAI	, ,		PRODUCT NAME-EPCO KP-200 (DOSAGE 1% W/W OF CEMENT)
7	MASTER BUILDERS SOLUTIONS INDIA PVT LTD	NAVI MUMBAI	, ,	NA	PRODUCT NAME- MASTERLIFE CI 220 (DOSAGE 1% W/W OF CEMENT)
8	SP CONCARE PVT. LTD.	SANGLI	, ,	NA	BRAND NAME:ADDMIX 109 PCCI
9	STP LTD.	DELHI	, ,	NA	PRODUCT NAME-SHALIPLAST MCI (DOSAGE 1% W/W OF CEMENT)
10	SUNANDA SPECIALITY COATING PVT LTD	MUMBAI	, , 065053049052		PRODUCT NAME-POLYALK CP 293 (DOSAGE 1% W/W OF CEMENT)
Item : D. POLYSULPHIDE SEALANTS (TWO PART, AS PER IS:12118)					
1	APPLE CHEMIE INDIA PVT LTD	NAGPUR	+91 9607001014, ,	www.applechemie.com	PRODUCT NAME-AC POLYSEAL (PG)
2	CHOWKSEY CHEMICALS PVT LTD	MUMBAI	, ,		PRODUCT NAME-TECHSEAL 940/941
3	CICO TECHNOLOGIES LIMITED	DELHI	, ,		PRODUCT NAME-CICO SEAL T680
4	DON CONSTRUCTION CHEMICALS INDIA LTD	CHENNAI	, ,	NA	BRAND NAME- 1. FLEXSEAL PS660 (GUN GRADE) 2. FLEXSEAL PS660 (POUR GRADE)
5	DURA BUILD CARE PVT LTD	DELHI	, ,	NA	PRODUCT NAME- DURASIL PPS (POURING GRADE)
6	FOSROC CHEMICALS (INDIA) PVT LTD	BENGALURU	+91 8042521900, ,	enquiry.india@fosroc.com	PRODUCT NAME-THIOFLEX 600
7	HINDCON CHEMICALS LTD	KOLKATA	, ,	NA	BRAND NAME- 1. HIND SEALANT PS (POUR GRADE). 2. HIND SEALANT PS (GUN GRADE)
8	JAY CHEMICAL INDUSTRIES PVT LTD	AHMEDABAD	, ,	NA	PRODUCT NAME- K2 POLYSEAL 22P (POUR GRADE)

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Sr No	Supplier Name	City	Phone	E-Mail	Remarks
9	KANSAI NEROLAC PAINTS LIMITED	MUMBAI	9999100064, ,	preetirohatgi@nerolac.com	PRODUCT NAME- 1. PERMA POLYSEAL (GUN GRADE) 2. PERMA POLYSEAL (POUR GRADE)
10	PIDILITE INDUSTRIES LTD (DR. FIXIT)	MUMBAI	, ,	NA	PRODUCT NAME-1. PIDISEAL PS41G, 2. PIDISEAL PS42P
11	SIKA INDIA PVT LTD	KOLKATA	, ,		BRAND NAME- 1. SIKA POLYSULPHIDE (SIKALASTIC) 2. SIKAFLEX CONSTRUCTION 3. IGAS Ih
12	STP LIMITED	NEW DELHI	, ,		PRODUCT NAME- SHALISEAL PS
13	ZZ-Refer Remarks (ZZ inserted to maintain the alphabetic chronology)	INDIA	, ,	NA	All other Polysulphide Sealants (Two Parts) which carry "ISI" certification mark of BIS along with standard number "IS 12118" and the license number "CM/L**....*)" and listed at BIS website "https://www.bis.gov.in".
Item : E. ANCHOR FASTENERS - CHEMICAL TYPE (EOTA / DIBt/ FM/ ICBO-ES APPROVED). Note- Design of post-installed Anchors and Rebars shall be provided/ verified by the approved manufacturer with installation instructions and execution shall be done by an applicator trained by the approved manufacturer (preferably in the presence of manufacturer for critical applications/ structures).					
1	FISCHER FIXING SYSTEMS(MICO) LTD	BENGALURU	, ,		BRAND NAME-FISCHER ANCHORS
2	FOSROC CHEMICALS (INDIA) PVT LTD	BENGALURU	+91 8042521900, ,	enquiry.india@fosroc.com	CHEMICAL ANCHORING OF REBAR, BRANDS NAMES-LOKFIX E55, LOKFIX E77 & LOKFIX E45T
3	HILTI INDIA PVT LTD	DELHI	, ,		BRAND NAME-HILTI ANCHORS
4	INDO SPARK CONSTRUCTION SERVICES	KOLHAPUR	, ,	NA	BRAND NAME-ICFS CM VESF, CM VESF TROPICAL, CM SH, CM SH TROPICAL, CM 585 PE PRO, CM 385 PE PRO, CM 400 PE, CM 650 PE
5	MASTER BUILDERS SOLUTIONS INDIA PVT LTD	NAVI MUMBAI	, ,	NA	BRAND NAMES-MASTERFLOW 916 AN, 918 AN, 920 AN, 932 AN, 936 AN
6	MUNGO FIXINGS INDIA PVT LTD	BENGALURU	, ,	NA	BRAND NAME-MIT 700 RE, MIT SE PLUS, MIT TROPICAL, MIT SP & MVA CAPSULE
7	POWERS FASTENERS(THROUGH M/S KRAFT SALES & SERVICES (I) LTD.)	PUNE	, ,	NA	BRAND NAME-POWERS FASTENERS

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Sr No	Supplier Name	City	Phone	E-Mail	Remarks
8	UIP SYSTEMS (INDIA) PVT LTD	MUMBAI	, ,	NA	UIP FASTENERS
9	WUERTH INDIA PVT LTD	DELHI	, ,	NA	BRAND NAME-WUERTH ANCHORS
Item : F. ANCHOR FASTENERS - MECHANICAL TYPE (EOTA / DIBT/ FM/ ICBO-ES APPROVED). Note- Design of post-installed Anchors and Rebars shall be provided/ verified by the approved manufacturer with installation instructions and execution shall be done by an applicator trained by the approved manufacturer (preferably in the presence of manufacturer for critical applications/ structures).					
1	FISCHER FIXING SYSTEMS(MICO) LTD	BENGALURU	, ,		BRAND NAME-FISCHER ANCHORS
2	HILTI INDIA PVT LTD	DELHI	, ,		BRAND NAME-HILTI ANCHORS
3	INDO SPARK CONSTRUCTION SERVICES	KOLHAPUR	, ,	NA	BRAND NAME: (ICFS) INDO WEDGE ANCHOR IWA, IWA-A2, IWA-A4
4	MUNGO FIXINGS INDIA PVT LTD	BENGALURU	, ,	NA	BRAND NAME-M1 POWER GRIP, M1r POWER GRIP, M1T, M2, M2r, MCS, MEA
5	POWERS FASTENERS(THROUGH M/S KRAFT SALES & SERVICES (I) LTD.)	PUNE	, ,	NA	BRAND NAME-POWERS FASTENERS
6	UIP SYSTEMS (INDIA) PVT LTD	MUMBAI	, ,	NA	UIP FASTENERS
7	WUERTH INDIA PVT LTD	DELHI	, ,	NA	PRODUCT NAME- WUERTH ANCHORS
Item : G. ELECTRO-FORGED GALVANISED GRATINGS (AS PER EIL STD 7-68-0697, BS:4592)					
1	ABHYANT EFG & ENGINEERING PVT. LTD	RAIPUR	, ,	NA	TYPE-I & TYPE-II
2	ANKIT ELECTROGRATING	RAIPUR	, ,	NA	TYPE-I & TYPE-II
3	BHOLA RAM STEEL PVT LTD	PATNA	, ,		BRAND NAME-BHOLARAM GRATINGS
4	CELL COM TELESERVICES PVT LTD	SIKANDRABAD	, ,	NA	BRAND NAME-CELLCOM GRATINGS
5	FERROTECH STRUCTURALS (INDIA) PVT LTD	KANCHIPURAM & PUNE	+91 9840308880, ,	www.ferrotechindia.net	TYPE-I & TYPE-II
6	GREATWELD ENGINEERING PVT. LTD.	PUNE	+91 7350304304, ,	sumit.rungta@greatweld.com	BRAND NAME-GREATWELD GRATINGS, TYPE-I & TYPE-II
7	INDIANA GRATING PVT.LTD	MUMBAI	, ,		BRAND NAME-INDIANA GRATINGS
8	IRONWELD ENGINEERING PVT LTD	PUNE	, ,	NA	TYPE-I & TYPE-II
9	JACINTH ENGINEERING PVT LTD	MUMBAI	, ,	NA	BRAND NAME-JACINTH GRATINGS
10	KANADE ANAND UDYOG PVT LTD	MUMBAI	, ,		BRAND NAME-KANADE GRATINGS
11	LIONWELD MEISER LLC	DUBAI	, ,	NA	TYPE-I & TYPE-II

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Sr No	Supplier Name	City	Phone	E-Mail	Remarks
12	MEET ENGINEERING	VADODARA	, ,	NA	TYPE-I & TYPE-II
13	OMKAR GRATINGS PVT LTD	MUMBAI	, ,		BRAND NAME-OMKAR GRATINGS (FOR EIL TYPE-II GRATING ONLY)
14	PARCO ENGINEERS (MUMBAI) PVT LTD	Mumbai	9819278530, , 9819278530	info@parcoengineers.com	TYPE-I & TYPE-II
15	PINAX STEEL INDUSTRIES PVT LTD	KOLKATA	, ,		BRAND NAME-PINAX GRATINGS
16	PREMIER POWER PRODUCTS PVT LTD	KOLKATA	, ,		BRAND NAME-PREMIER GRATINGS
17	RATAN PROJECTS & ENGINEERING CO.PVT LTD.	KOLKATTA	, ,	sales@ratans.com	BRAND NAME- RATAN GRATINGS
18	SIGMA GALVANIZING PVT LTD	NAVI MUMBAI	, ,	NA	TYPE-I & TYPE-II
19	VINFAB GRATINGS	MUMBAI	, ,		BRAND NAME-VINFAB GRATINGS
20	WHEELS INDIA LTD	CHENNAI	, ,	NA	PRODUCT NAME-WHEELS GRATINGS
Item : H. INTEGRAL CRYSTALLINE ADMIXTURE FOR WATERPROOFING TREATMENT TO CONCRETE (AS PER CPWD SPECIFICATION 2019, CLAUSE 22.14)					
1	CHRYSO INDIA PRIVATE LIMITED	NAVI MUMBAI	022 2768 5991, ,	info.india@chryso.com	PRODUCT NAME-CHRYSO CWA10
2	KRYTON BUILDMAT CO PVT LTD	GURUGRAM	0124 4381 140, ,	info@kryton.in	PRODUCT NAME-KRYSTOL INTERNAL MEMBRANE "KIM"
3	PENETRON INFRA PRODUCTS PVT LTD	NAVI MUMBAI	+91 7738444041, ,	inquiry@penetron.co.in	PRODUCT NAME-PENETRON ADMIX
4	SHALIMAR SEAL & TAR PRODUCTS PVT LTD	JAIPUR	+91 9829065184, ,	ocrd@shalimartar.com	PRODUCT NAME-KAVASSU CRYSTALLOMIX-PG
5	XYPEX	GAUTAM BUDH NAGAR	0120-4090900, ,	info@xypex.in	PRODUCT NAME-XYPEX ADMIX C-2000 NF

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JOB SPECIFICATION FOR SURFACE PREPARATION AND PROTECTIVE COATING

Rev. No	Date	Purpose	Prepared by	Checked by	Approved by
1	27.05.2025	Revised including RCC panting for inside building and RE-ISSUED AS JOB SPECIFICATION	JATIN	SAHIL	SRIDHAR
0	07.01.2025	ISSUED AS JOB SPECIFICATION	JATIN	SAHIL	SRIDHAR
A	26.11.2024	ISSUED FOR CLIENT COMMENTS	JATIN	SAHIL	SRIDHAR

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Abbreviations:

AS	:	Alloy Steel
ASTM	:	American Society for Testing and Materials
AWWA	:	American Water Works Association
CS	:	Carbon Steel
DFT	:	Dry Film Thickness
GI	:	Galvanized Iron
ID	:	Internal Diameter
ISO	:	International Organization for Standardization
LTCS	:	Low temperature Carbon Steel
MS	:	Mild Steel
MR	:	material requisition
NB	:	Nominal Bore
NA	:	Not applicable
OD	:	Outside Diameter
OEM	:	Original Equipment Manufacturer
OSHA	:	Occupational Safety and Health Act
RCC	:	Reinforced Cement Concrete
RH	:	Relative humidity
SS	:	Stainless Steel
SOR	:	Schedule of Rate
SSPC	:	Steel Structure Painting Council
WFT	:	Wet Film Thickness

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Sl. No.	CONTENTS	PAGE NO.
1.0	General	4
2.0	Scope	4
3.0	Reference codes & standards	5
4.0	Surface Preparation	7
5.0	Coating Application	10
6.0	Paint materials	13
7.0	Selection of Coating systems	18
8.0	Guidelines for Storage and handling	27
9.0	Colour code	27
10.0	Identification of vessels, piping etc.	28
11.0	Painting for civil defense requirements	29
12.0	Quality control, inspection and testing	29
13.0	Paint material Guarantee certificate	32
14.0	Qualification criteria of painting CONTRACTOR/Sub CONTRACTOR	32
15.0	Pre-Qualification/acceptance criteria of paint coating system	32
16.0	Method of sampling & dispatch for laboratory testing	35
	Annexure I-Color code	36

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1.0 GENERAL

1.1 This technical specification shall be applicable for the work covered by the contract and without prejudice to the provisions of various international codes of practice, standard specifications etc. It is understood that the CONTRACTOR shall carry out the work in all respects with the best quality of materials and workmanship and in accordance with the best engineering practice and instructions of Engineer-In-Charge in consultation with EIL-SMMS.

1.2 This specification covers the requirement for protective coating for new construction.

2.0 SCOPE

2.1 Scope of work covered in the specification shall include, without being limited to, the following:

This specification defines the requirements for surface preparation, selection and application of primers and coatings on external surfaces of items mentioned in clause 2.2 of this specification and quality control, inspection & testing of the coating systems. The items listed in clause 2.2 and the heading of tables of paint systems are non-exhaustive. However, the CONTRACTOR is fully responsible for carrying out all the necessary painting, coating and lining job on external and internal surfaces as per the contract requirement.

2.2 Extent of work covered in this specification

2.2.1 The following surfaces and materials shall require shop, pre-erection and field painting, as applicable:

a. All Carbon Steel structures.

b. All Carbon Steel and Alloy steel piping, equipment, valves, fittings & stacks.

c. All Carbon Steel and Alloy steel tanks.

d. Tanks internal as per applicable datasheets & contract requirements.

e. All insulated CS pipes, equipment, valves, fittings & stacks.

f. All insulated SS pipes, equipment, valves, fittings, vessels & stacks.

g. All structural steel supports, walkways, handrails, ladders, platforms etc.

h. Flare lines, external surfaces of steel chimney with or without refractory lining and internal surfaces of steel chimney without refractory lining.

2.2.2 Marking and Identification of painted items:

a. Identification of color bands on all piping, as required, including cladding over insulation, SS and nonferrous piping.

b. Identification lettering/ numbering on all painted surfaces of equipment/piping, cladding over insulation, SS and non-ferrous piping.

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c. Marking / identification signs on painted surfaces of equipment and piping including hazardous service.

2.2.3 Supply and prequalification testing of all primers, paints and all other materials required for painting (other than OWNER supplied materials)

2.2.4 Application of pre-erection/fabrication and shop primer.

2.2.5 Repair work of damaged pre-erection/ fabrication and shop primer and weld joints in the field/site before and after erection.

2.2.6 Quality control, testing and inspection during all stages of work (surface preparation, application of coating and testing of applied coating).

2.2.7 Exclusions:

All metallic surfaces do require painting except for following materials. These materials are not painted unless specified by the contractual provisions and the same shall be painted as per the relevant specifications:

a. Un-insulated stainless steel.
b. Plastic and/or plastic-coated materials.
c. Galvanized Iron.
d. Aluminum.
e. Ni-Alloys.
f. Glass.
g. Ceramics.
h. Machined surfaces.
i. Label and names plates.

3.0 REFERENCE CODES & STANDARDS

3.1 Latest editions of the following codes and standards are applicable for the work covered by this standard:

Steel Structures Painting Council (SSPC)

SSPC SP-1	Solvent cleaning
SSPC Painting manual Vol.1	Good Painting practices
SSPC Painting manual Vol.2	Systems & specification
SSPC VIS 1	Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC AB1	Mineral and Slag Abrasives
SSPC PA 2	Measurement of Dry Paint Thickness with Magnetic Gauges

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American Society for Testing and Materials (ASTM):

ASTM Volume 6.01	Paint - Tests for Chemical, Physical, and Optical Properties; Appearance
ASTM Volume 6.03	Paint -- Pigments, Polymers, Resins, Naval Stores, Cellulosic Esters, and Ink Vehicles
ASTM D6677	Standard Test Method for Evaluating Adhesion by Knife
ASTM D5894	Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM D870	Standard Practice for Testing Water Resistance of Coatings Using Water Immersion
ASTM D2485	Standard Test Methods for Evaluating Coatings for High Temperature Service
ASTM D2247	Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity
ASTM D4417	Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
ASTM D4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM D4060	Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM D4752	Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
ASTM D638	Standard Test Method for Tensile Properties of Plastics
ASTM D4940	Standard Test Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blast Cleaning Abrasives
ASTM D4285	Standard Test Method for Indicating Oil or Water in Compressed Air
ASTM D543	Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
ASTM C868	Standard Test Method for Chemical Resistance of Protective Linings
ASTM G42	Standard Test Method for Cathodic Disbonding of Pipeline Coatings Subjected to Elevated Temperatures
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM D1475	Standard Test Method for Density of Liquid Coatings, Inks, and Related Products
ASTM D823	Standard Practices for Producing Films of Uniform Thickness of Paint, Coatings and Related Products on Test Panel
ASTM D2369	Standard Test Method for Volatile Content of Coatings
ASTM D1640/D1640M-14	Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings
ASTM D522/D522M	Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1044	Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion

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ASTM D1849	Standard Test Method for Package Stability of Paint
ASTM D2247	Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity
ASTM D5146	Standard Guide to Testing Solvent-Borne Architectural Coatings

National Association for Corrosion Engineer (NACE):

NACE RP 0287	Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape
NACE SP 0198	Control of Corrosion under Thermal Insulation and Fireproofing Materials
NACE SP 0188	Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates

International Organization for Standardization (ISO):

ISO 12944	Corrosion Protection of steel Structures by Protective Paint System
ISO 8501-1/ SIS-05 59 00	Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness— Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings
ISO 8502-3	Preparation of steel substrates before application of paints and related products -Tests for the assessment of surface cleanliness - Part 3: Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)
ISO 8502-9	Preparation of steel substrates before application of paints and related products — Tests for the assessment of surface cleanliness—Part 9: Field method for the conductometric determination of water-soluble salts
ISO 2808	Paints and varnishes - Determination of film thickness
ISO 2811	Paints and varnishes — Determination of density

Other Standards

NORSOK M-501	Surface preparation and protective coating
RAL CLASSIC	Color matching system

4.0 SURFACE PREPARATION

4.1 General

Adhesion of the paint film to the surface depends largely on the degree of cleanliness of the metal surface and proper surface preparation have large contribution to the success of the paint protective system. Following method shall be employed for surface preparation:

a. Abrasive blast cleaning: Applicable in all cases.

b. Mechanical or power tool cleaning: Shall be used for repair & touch up, and any other area due to practical constraints with prior permission from EIL Engineer-in charge.

4.2 Applicable Standards:

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Latest editions of the following codes and standards are applicable for the surface preparation work:

TABLE-1: SURFACE PREPARATION STANDARDS

Sl. No.	GRADE OF SURFACE CLEANLINESS	VARIOUS INTERNATIONAL STANDARDS (EQUIVALENT)		
		ISO 8501-1/ SIS-05 59 00	SSPC, USA	NACE, USA
1.	Solvent cleaning	-	SSPC-SP-1	-
2.	Manual or hand tool cleaning	St 2	SSPC-SP-2	-
3.	Mechanical or power tool cleaning	St 3	SSPC-SP-3	-
4.	White metal	Sa 3	SSPC-SP-5	NACE No.1
5.	Near white metal	Sa 2½	SSPC-SP-10	NACE No.2
6.	Commercial Blast	Sa 2	SSPC-SP-6	NACE No.3
7.	Brush-off Blast for SS, galvanized steel and non-ferrous metals	-	SSPC-SP-16	-
8.	Surface Preparation of Concrete	-	SSPC-SP-13	NACE No.6

4.3 Sequence of surface preparation:

4.3.1 Solvent Cleaning

Mill scale, rust, rust scale and foreign matter shall be removed fully to ensure that a clean and dry surface is obtained. Unless otherwise specified, surface preparation shall be done as per provisions of relevant tables given elsewhere in this specification. Before surface preparation by blast cleaning, the surface shall be cleaned to remove all grease, oil etc. as per SSPC-SP-1.

4.3.2 Blast cleaning with abrasives

The surfaces shall be blast cleaned using one of the abrasives listed below and at an appropriate distance & angle depending on nozzle size maintaining constant velocity and pressure.

a. The quality of abrasives shall be free from contaminants and impurities and shall meet the requirements of SSPC AB1.

b. The compressed air shall be free from moisture and oil.

c. On completion of blasting operation, the blasted surface shall be clean and free from any scale or rust. Blast cleaning shall not be done outdoors in bad weather without adequate protection. If there is dew on the metal surface, it shall be cleaned. If possible, a vacuum collector shall be installed to collect and recycle the abrasives.

d. Surface roughness profile: The surface roughness profile for carbon steel and low alloy steels to be coated shall be in accordance with the written recommendations of the paint Manufacturer and shall be measured as per ASTM D4417, method B. When roughness profile is not specified by the paint Manufacturer, then surface roughness profile as specified below in this specification shall be followed.

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- The surface roughness profile shall be between 40 µm and 70 µm for coatings up to thickness 500 µm and between 70 µm and 125 µm for coating systems over 500 µm thickness. In all cases, the surface roughness shall have a sharp angular profile.

- If stainless steel, hot dip galvanised or non-ferrous metal surfaces are to be painted then blast cleaning shall be carried out as per SSPC-SP-16, using a fine non-iron containing abrasive.

e. Abrasives: Abrasive for use in blast cleaning steels shall be in accordance with ISO 8504-2. Steel or iron grit is commonly used as recyclable abrasives. When steel shot is used, it shall be used together with steel grit. The shot content of such a mix shall not exceed 67 %.For blasting stainless steel, non-(free) iron containing abrasive shall be used, e.g. Garnet or aluminium oxide. Abrasives used for blast cleaning shall be free from oil, grease, moisture, chloride contamination etc. and shall have crystalline silica not more than 1%.

Test methods for abrasives shall be in accordance with the tests specified in the ISO 11125 and ISO 11127 series for metallic and non-metallic abrasives respectively. Each batch of abrasive should be tested to check that the abrasive meets the requirements as specified in the relevant ISO standard. The conductivity of non-metallic abrasives to be used for stainless steels shall be maximum 15 mS/m. For all other non-metallic abrasives, the conductivity shall not exceed 25 mS/m. OWNER/PMC shall approve the use of alternative abrasive materials. Abrasive used shall be as per following specification:

Type	**Generic Name**	**Standard**
Metallic	Iron grit	ISO 11124-2
	Steel grit	ISO 11124-3
Natural mineral	Staurolite	ISO 11126-9
	Garnet	ISO 11126-10
Synthetic mineral	Copper slag	ISO 11126-3
	Aluminium oxide	ISO 11126-7

4.3.3 Mechanical or power tool cleaning

Power tool cleaning shall be done by mechanical striking tools, chipping hammers, grinding wheels or rotating steel wire- brushes. Excessive burnish of the surface shall be avoided as it can reduce paint adhesion. On completion of cleaning, the detached rust, mill scale etc. shall be removed by clean rags and /or washed by water/steam and thoroughly dried with compressed air jet before application of paint.

4.4 General Notes for surface preparation/blasting:

a. Surface shall not be coated in rain, wind or in an environment where injurious airborne elements exist.
b. Surface shall not be coated when the steel surface temperature is less than 3 ^{0}C above dew point.

c. Surface shall not be coated, when the relative humidity is greater than 85%.

d. Surface shall not be coated when the temperature is below 10^{o}C and above 49^{o}C and the ambient/substrate temperature is below the paint manufacturers recommended temperature of application and curing.

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e. The paint application shall not be done when the wind speed exceeds 20 km per hour.

f. The illuminance during coating and inspection shall be at least 1000 Lux.

4.5 Use of Dehumidifier

In case of internal coating of storage tanks, dehumidifier shall be used to control humidity level below 60%. Dehumidifier should depress the dew point of air in the enclosed space, sufficient enough so as to maintain it more than 3ºC below the metal substrate temperature during entire period of blasting and coating application. During the interval time between application of primer coat and subsequent intermediate and top coats or between blast cleaning completion and start of application of primer coat, dehumidifier unit should be in continuous operation to ensure that no condensation occurs on the substrate.
The Engineer in-Charge shall have the right to disallow usage of dehumidifier if the performance is not meeting the specified requirements. Under such circumstances, the CONTRACTOR shall remove the equipment and replace the same with another equipment to provide satisfactory results without any additional cost to the OWNER.

4.6 Surface preparation of concrete:

The external surface of RCC to be painted shall be dry and clean. Any loose particle of sand, cement, aggregate etc. shall be removed and surface shall be prepared as per SSPC-SP-13.

5.0 COATING APPLICATION

5.1 Blast cleaned surface shall be coated with complete application of primer shall be preferably within four (4) hours but at maximum within six (6) hours of surface preparation and before flash rusting or other contamination occurs. However, at times of unfavorable weather conditions, the Engineer-In-Charge shall have the liberty to control the time period, at his sole discretion and/or to insist on re-cleaning before primer application is taken up. In general, during unfavorable weather conditions, blasting and painting shall be avoided as far as practicable.

5.2 To the maximum extent practicable, each coat of paint shall be applied as a continuous film with uniform thickness and free of probes. Any spots or areas missed in application shall be re-coated and permitted to dry before the next coat is applied.

5.3 Each coat shall be in proper state of cure or dryness before the application of succeeding coat. Material shall be considered dry for re-coating when an additional coat can be applied without the development of any detrimental film irregularities such as lifting or loss of adhesion of the under coat. Manufacturer's instructions shall be followed for inter-coat interval.

5.4 When the successive coat of the same colour have been specified, alternate coat shall be tinted, when practical, sufficiently to produce enough contrast to indicate the complete coverage of the surface. The tinting material shall be compatible with the material underneath and shall not be detrimental to its service life and shall be recommended by the original paint manufacturer.

5.5 Airless spray application shall be in accordance with steel structure paint manual Vol.1 & Vol.2 by SSPC, USA

5.6 Brush application of paint shall be in accordance with the following:

a. Brushes shall be of a style and quality that will enable proper application of paint.

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b. Round or oval brushes are most suitable for rivets, bolts, irregular surfaces, and rough/ pitted steel. Wide flat brushes are suitable for large flat areas but they shall not have width over 5 inches.

c. Paint shall be applied into all corners.

d. Any runs or sags shall be brushed out.

e. There shall be a minimum of brush marks left in the applied paint.

f. Surfaces not accessible to brushes shall be painted by spray, daubers, or sheepskin.

5.7 Applied paint should have the desired wet film thickness specified by manufacturer. For each coat, the painter should know the WFT corresponding to the specified DFT and standardize the paint application technique to achieve the desired WFT. This has to be ensured in the qualification trial.

5.8 Irregular surfaces such as sharp edges, welds, small brackets, and interstices may stripe coated to ensure specified DFT is achieved. Paint manufacturer recommendation should be followed before deciding for brush application.

5.9 Unless otherwise instructed, final coating (i.e. application of field primer, intermediate and top coats) on pre-erection/ shop primed equipment shall be applied at site, only after all welding & testing like NDT are completed as well as after completion of steam blowing.

5.10 Drying of coated surfaces

a. No coat shall be applied until the preceding coat has dried. The material shall be considered dry for re-coating when another coat can be applied without the development of any film irregularities such as lifting or loss of adhesion of undercoats. Drying time of the applied coat should not exceed maximum specified for it as a first coat. If this exceeds, the paint material has possibly deteriorated or mixing is faulty.

b. No paint shall be force dried under conditions which will cause chalking, wrinkling, blistering formation of pores, or detrimentally affect the conditions of the paint.

c. No drier shall be added to paint on the job unless specifically called for in the manufacturers' specification for the paint.

d. Paint shall be protected from rain, condensation, contamination, snow and freezing until dried to the fullest extent practicable.

5.11 Spot repair of damaged primer

a. Where pre-erection/shop primer has been damaged at isolated localized spots during handling and transportation or after erection / welding, its repair shall be done as given below and as per the Table-3 of this specification.

b. Surface preparation: Quickly remove the primer from damaged area by mechanical scraping and emery paper conforming to SSPC-SP-3 to expose the white metal. Blast clean the surface, if possible. Feather the primed surface, over the intact adjacent surface surrounding the damaged area, by emery paper.

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Primer coating: One coat of F-8/F-9/F-16 shall be applied (as per the applicable design temperature and in conjunction with Table-3) wherever damage was observed on pre-erection / pre fabrication or shop primer.

c. If damaged areas are found to be extensive and spread over large areas (as required by Engineer-in charge), then entire pre-erection/pre-fabrication/shop primer shall be removed by blasting to achieve SSPC-SP-10 and entire blasted surface shall be primed again with F-8/ F-9 or F-16, as applicable, for the intended design temperature. (See note of Table-3). If the prepared surface lies adjacent to a sound coated surface, the surface preparation shall overlap the coated surface by at least 50mm. The remainder of existing coated surface shall be properly protected with shields or screens to prevent any possible damage to the coating.

5.12 Equipment:

a. All tools, brushes, rollers, spray guns, blast material, hand power tools for cleaning, all equipment, scaffolding materials, shot & grit blasting equipment, air compressors etc. required shall be suitable for the work and shall be arranged by the CONTRACTOR in sufficient quantity at the site. The manufacturers test certificates / data sheets for all the above-mentioned items shall be reviewed by Engineer-In-Charge at site before start of the work.

b. All paint spraying equipment, including mixers, shall be thoroughly cleaned before mixing of new materials. All coating materials shall be mixed and thoroughly stirred in accordance with the instructions of the paint Manufacturer. Sufficient agitation to maintain good mixing shall be applied until the product is used. If air is entrapped in the product during mixing/stirring, sufficient time should be allowed for the air bubbles to escape before application. Only thinners specified by the paint Manufacturer shall be used.

5.13 Shop coating

a. Shop coated equipment (coated with primer & finishing coat) should not be repainted unless paint is damaged. Repair of primer shall be carried out as per Table-3 of paint systems depending upon the compatibility of paint. Intermediate and final coats over repaired primer shall be as per applicable tables mentioned in this specification.

c. Shop primed equipment and surfaces will only be 'spot cleaned' in damaged areas by means of power tool brush cleaning or hand tool cleaning and then spot primed before applying one coat of field primer, unless otherwise specified. If shop primer is not compatible with field primer, then shop coated primer should be completely removed before application of selected paint system for a particular environment.

d. For package units/Items/ OEM equipment, shop primer & coating system should be as per the paint system given in this specification. However, manufacturers' standard may be followed after review by EIL but shall adhere to the minimum DFT specified in ISO-12944-5; C5 (Very high durability). For system under insulation, minimum guidelines as per NACE RP 0198 shall be followed.

In this case, guarantee of the coating system lies with package supplier/OEM. EIL's decision in this regard is final and binding on Supplier/Contractor/manufacturer

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5.12 Guidelines for Documentation / records

a. A written quality plan with procedure for qualification trials and for the actual work including test and inspection plan & procedure for approval before start of work.

b. Daily progress report with details of weather conditions, particular of applications, no. of coats and type of materials applied, anomalies, progress of work versus program.

c. Results of measurement of temperatures, relative humidity, surface profile, film thickness, holiday detection, adhesion tests with signature of appropriate authority.

d. Particulars of surface preparation and paint application during trials and during the work.

e. Details of non-compliance, rejects and repairs.

f. Type of testing equipment and calibration.

g. Code and batch numbers of paint materials used.

Note: The coating applicator must maintain a job record consisting of all the information as per 5.12.b. to 5.12.g above as well as the approved procedure of work (5.12.a. above). The job record consisting of information in accordance to 5.12.b. to 5.12.g shall be entered on daily basis and should be daily signed by Engineer-in-charge.

6.0 PAINT MATERIALS

Typical characteristics and codes of various paint materials used in this specification are as follows.

TABLE-2: PAINT MATERIALS
(Refer to *general notes* at the end of this table)

DESCRIPTION	P-6	P-7	P-4
Technical name	Epoxy Zinc Phosphate Primer	Cold Galvanizing product	Etch Primer/Wash Primer
Type and composition	Two component polyamine cured epoxy resin medium, pigmented with zinc phosphate.	One pack synthetic resin-based zinc galvanizing containing min 92% of electrolytic zinc dust of 99.95% purity.	Two pack polyvinyl butyral resin medium cured with phosphoric acid solution pigmented with zinc tetroxy chromate.
Volume solids % Minimum	49	37	9
DFT per coat, µ	40-50	40-50	8-10
Theoretical covering capacity in m^2/coat/ litre	9.8-12.2	3.4-4.4 m^2/kg	9.0-11.2
Weight per liter in Kg/litre (min.)	1.4±0.05	2.67 kg at 15°C	1.2±0.05
Touch dry at 30°C (max.)	30 min.	10 min.	2 hrs.

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Hard dry at 30ºC (max.),Hrs.	8	24	24
Over-coating interval, hrs.	Min. 8	Min. 4	Min. 4-6
Pot life at 30ºC for two Component paints, hrs.	6 - 8	NA	NA
Adhesion (ASTM D 4541)	>7	NA	NA
Temperature resistance (min) º C (ASTM D 2485) *Note 8	80 (Method A)	50 (Method A)	NA

TABLE- 2: PAINT MATERIALS (Contd.)

DESCRIPTION	F-2	F-3	F-6A/B	F-6C
Technical name	Acrylic Polyurethane finish paint	Chlorinated rubber-based finish paint	Epoxy-High Build coating	Solvent less epoxy coating
Type and composition	Two-pack aliphatic isocynate cured acrylic finish paint (free of alkyd/polyester resins).	Single pack Plasticized chlorinated rubber based medium with chemical and weather resistant pigments.	F-6A Two-Pack Aromatic polyamine cured epoxy resin medium suitably pigmented. F-6B: polyamide cured epoxy resin medium suitably pigmented with MIO.	Two pack, cured with Amine Adduct; catalyzed epoxy resin suitably pigmented
Volume Solids % (min.)	40	36	57	98
DFT per coat, µ	30-40	30-40	100-125	300-450
Theoretical covering capacity in m^2/coat/litre	10-13.3	9-12	4.6-5.7	2-3.9
Weight per liter in Kg/litre (min.)	1.15	1.15	1.42	1.40
Touch dry at 30 °C (max)	30 min.	30 min.	3 hrs.	3 hrs.
Hard dry at 30 °C (max.).	8 hrs.	8 hrs.	16 hrs.	16 hrs.
Full cure at 30 °C (for immersion/ high temperature service)	NA	NA	5 days	5 days

Signature Not Verified
Digitally signed by P KONGUPRABAHARAN
Date: 2026.05.09 17:22:02 IST
Location: eProcure-EPROC

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