

Design and Construction of Elevated Metro Viaduct of Length 6.414 km between Ch: 18218.586 m to Ch: 24633.194 m in Reach-3A of NMRP Phase-2
Tender Notification no. : N2-009/C-03/2023
Corrigendum - 4

Date: 25.09.2023

Sr. No.	Refernce clause no.	Existing Provision	Revised Provision
1	Part-II, Works Requirement, Section VII-A, Employers Requirement - General, Cl. 7 (1)	The Key Dates are defined in Annexure IX-G to these Employer's Requirements.	Provision shall be read as: The Key Dates are defined in Part-II, Work's Requirements, Section VII : ANNEXURE - VII- 3 (APPENDICES), Appendix 2B.
2	Part-II, Works Requirement, Section VII-A, Employers Requirement - General, Cl. 10 (1) (C)	To obtain from the Interfacing Contractors information reasonably required to enable the Contractor to meet the design submission dates as identified in Appendix 2B (Annexure IX-G)	Provision shall be read as: To obtain from the Interfacing Contractors information reasonably required to enable the Contractor to meet the design submission dates as identified in Part-II, Work's Requirements, Section VII : ANNEXURE - VII- 3 (APPENDICES), Appendix 2B
3	Part-II, Works Requirement, Section VII-A, Employers Requirement - General, Cl. 10 (11)	The dates shown in Employer's Requirements Annexure IX-G are critical to the timely completion of the project. The Contractor shall commence design interface with the Interfacing Contractors as soon as he has been notified by the Engineer that such Interfacing Contract has been awarded. In the case of utility agencies and other statutory boards, interface shall commence as soon as it is practicable. Where no design interface date has been established because the Interfacing Contractors have not been identified or for whatever reason, the Contractor shall liaise with such Interfacing Contractor(s) as soon as they have been awarded	Provision shall be read as: The dates shown in Part-II, Work's Requirements, Section VII : ANNEXURE - VII- 3 (APPENDICES), Appendix 2B are critical to the timely completion of the project. The Contractor shall commence design interface with the Interfacing Contractors as soon as he has been notified by the Engineer that such Interfacing Contract has been awarded. In the case of utility agencies and other statutory boards, interface shall commence as soon as it is practicable. Where no design interface date has been established because the Interfacing Contractors have not been identified or for whatever reason, the Contractor shall liaise with such Interfacing Contractor(s) as soon as they have been awarded



4	Part-II, Works Requirement, Section VII-C, Employers Requirement - Design, Cl. 7 (6)	As-Built Drawings, endorsed by the Contractor shall be submitted to the Engineer for agreement in accordance with Annexure-IX-H of Part-3 Conditions of Contract	Provision shall be read as: As-Built Drawings, endorsed by the Contractor shall be submitted to the Engineer for agreement in accordance with Point no. 8, Section VII Annexure-VII-8 : Design Requirements of Part-2, of this document.
5	Point no. 2, Appendix - 3, Part II-Work Requirement, Section-VII Annexure-VII-3 - Appendices	Requirements for the computation of Key Dates are given in annexure IX-G of part III, Conditions of Contract, of this document	Provision shall be read as: Requirements for the computation of Key Dates are given in Part-II, Work's Requirements, Section VII : ANNEXURE - VII-3 (APPENDICES), Appendix 2B , of this document
6	Point no. 2, Appendix - 4, Part II-Work Requirement, Section-VII Annexure-VII-3 - Appendices	The Tenderer/ Contractor shall always programme his work to meet the Key Dates stated in Annexure IX-G of part III of this document and the specified interface periods for the design and installation of the Works with those of the Designated Contractors and shall during the progress of the Works constantly monitor his progress the programmes described below	Provision shall be read as: The Tenderer/ Contractor shall always programme his work to meet the Key Dates stated in Part-II, Work's Requirements, Section VII : ANNEXURE - VII-3 (APPENDICES), Appendix 2B , of this document and the specified interface periods for the design and installation of the Works with those of the Designated Contractors and shall during the progress of the Works constantly monitor his progress the programmes described below
7	Part-II, Works Requirement, Section VII-E, Annexure-VII-9 Reference Drawings (Typical-Viaduct)	TYPICAL EARTHING DETAIL FOR VIADUCT CV-PRM-TDR-PHASE-02-DRP-0010 CV-PRM-TDR-PHASE-02-DRP-0010A	Updated drawing for Typical Earthing detail for viaduct is enclosed with this corrigendum as Annexure - A. Same shall be used by the bidder.
8	Part-II, Works Requirement, Section VII-F, Technical Specifications	No technical specification for MS powder coating handrail.	Details of MS powder coating hand rail is enclosed with this corrigendum as Annexure - B. Same shall be used by the bidder.
9	Part-II, Works Requirement, Section VII-E, Annexure-VII-9 Reference Drawings (Typical-Viaduct)	TYPICAL MS HANDRAIL DETAIL FOR VIADUCT CV-PRM-TDR-PHASE-02-DRP-0006 CV-PRM-TDR-PHASE-02-DRP-0006A CV-PRM-TDR-PHASE-02-DRP-0006B CV-PRM-TDR-PHASE-02-DRP-0006C	Updated drawing for Typical Earthing detail for viaduct is enclosed with this corrigendum as Annexure - C. Same shall be used by the bidder.
10	Part-II, Works Requirement, Section VII-F, Technical Specifications	No technical specification for FRP manhole cover.	Details of FRP manhole cover is enclosed with this corrigendum as Annexure - D. Same shall be used by the bidder.
11	Point (1), Preamble, Part-IV, Financial Bid & Bill of Quantities.	The Bill of quantities consists of Four schedules as shown below	Provision shall be read as: The Bill of quantities consists of Three schedules as shown below
12	Part-3, Conditions of contract and contract formss	New Annexure	Annexure IX-C: Environment Management Plan for NMRP Phase-2 (Attached herewith)

Contractor

July'2023

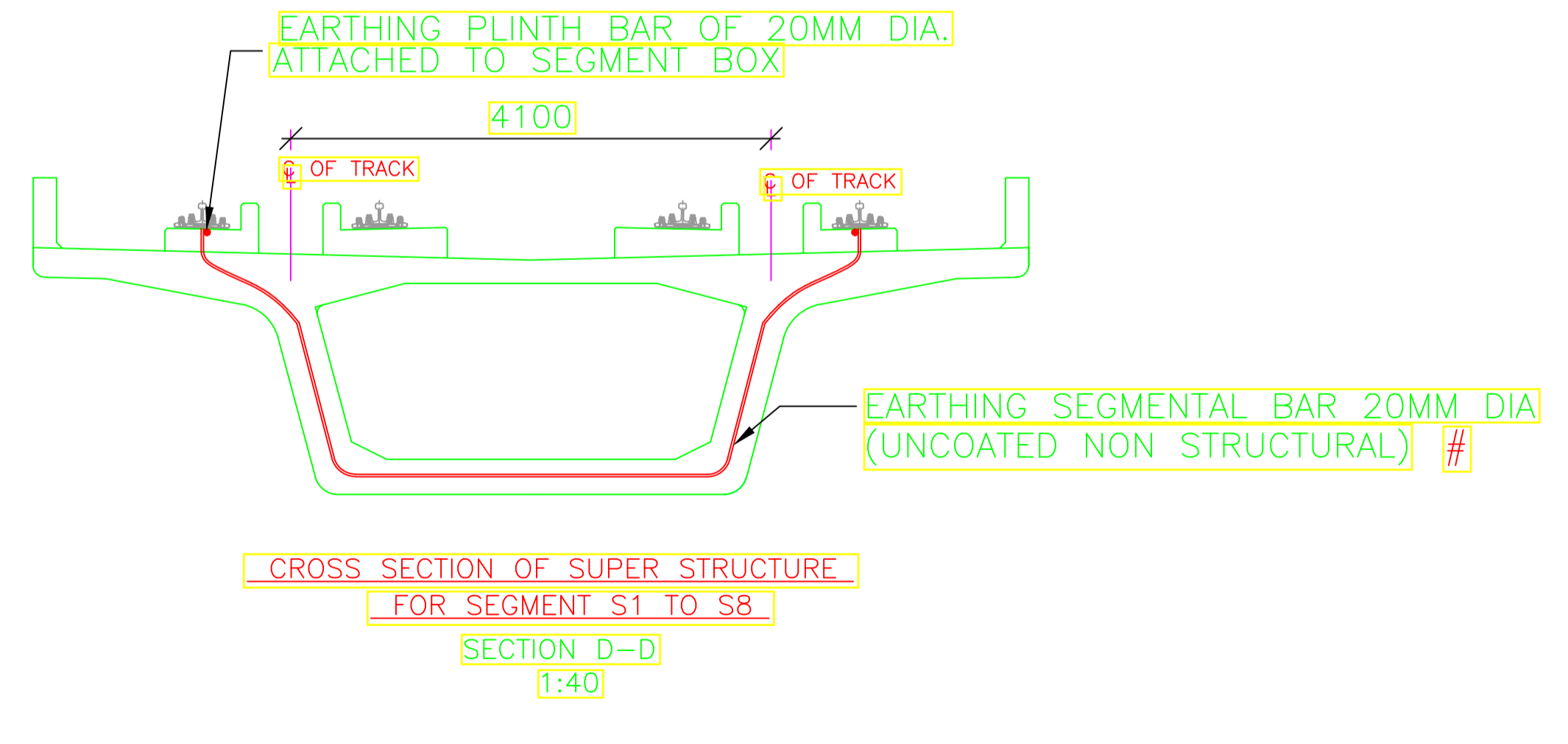
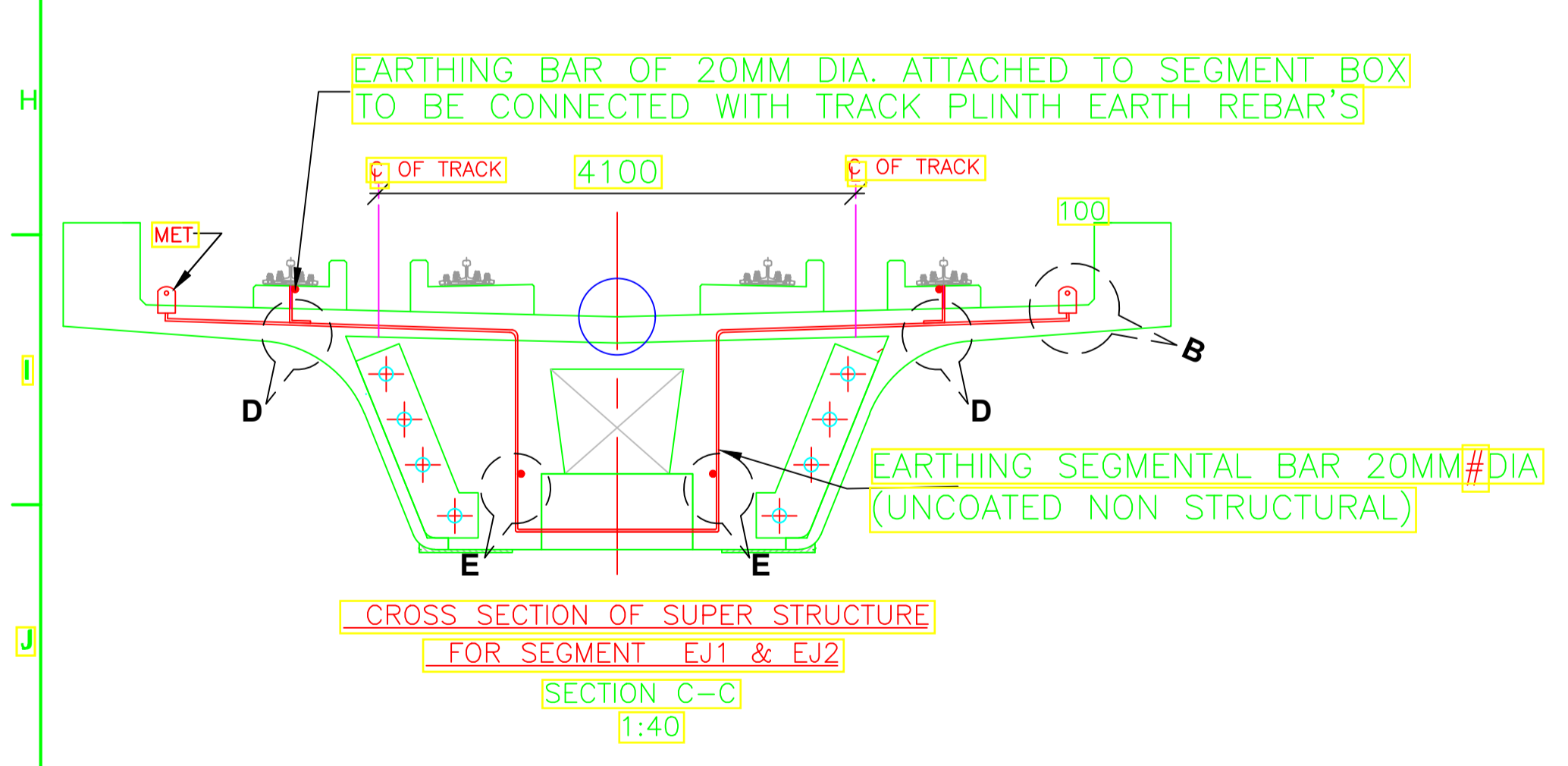
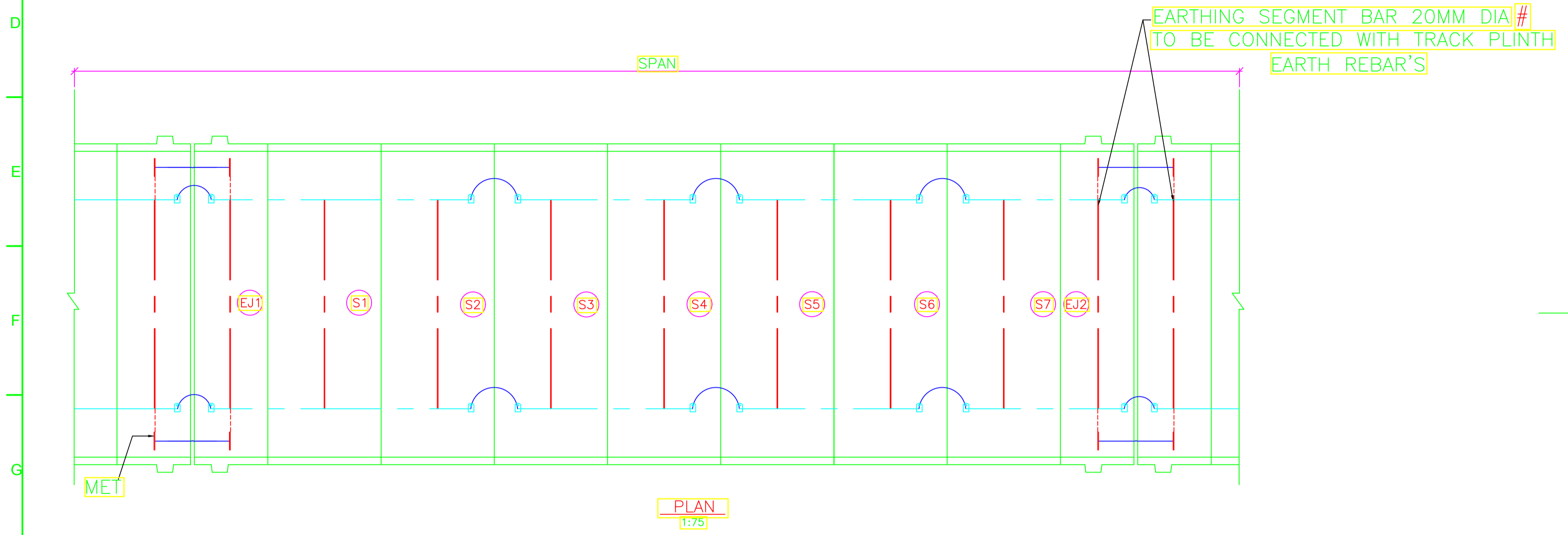
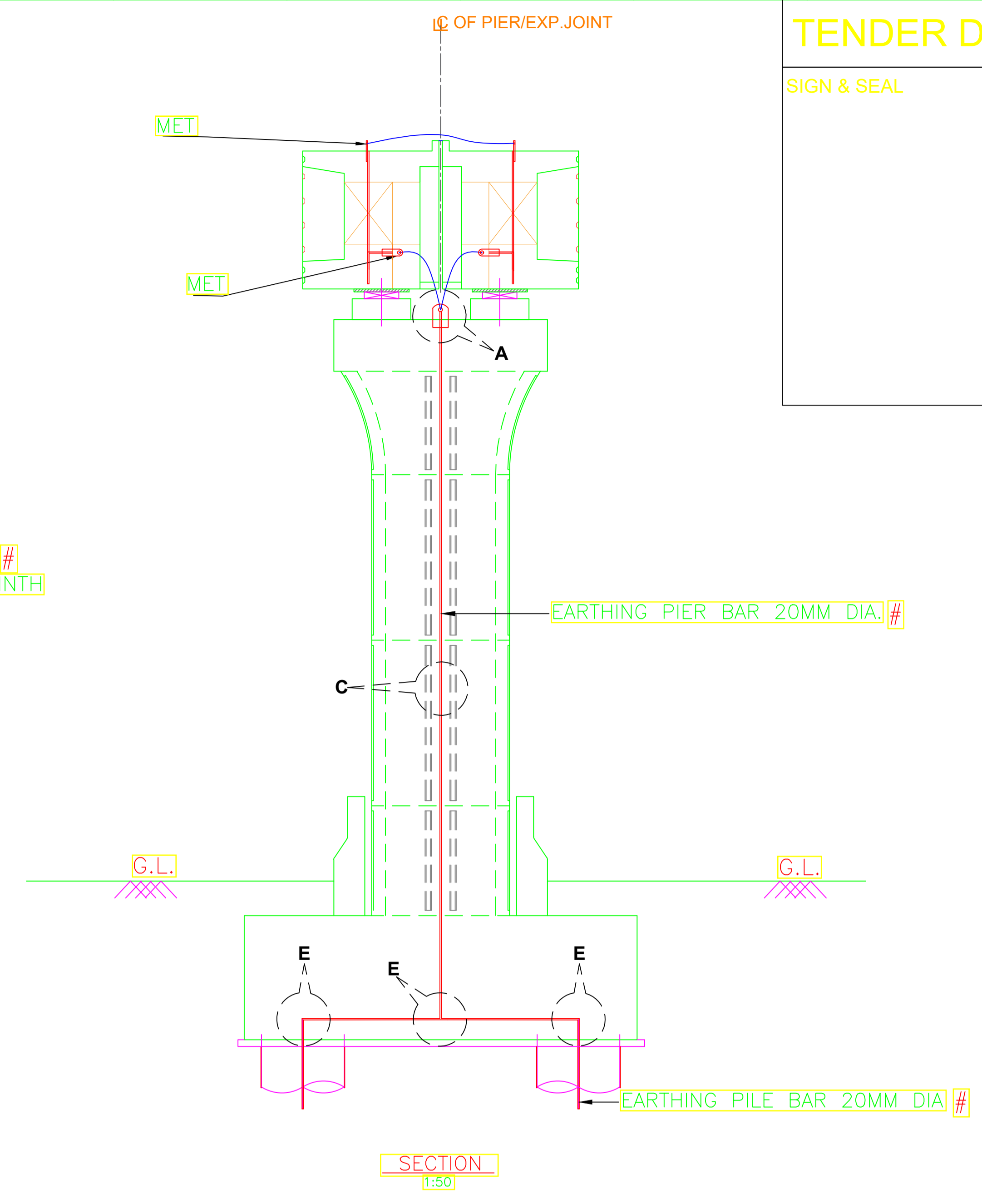
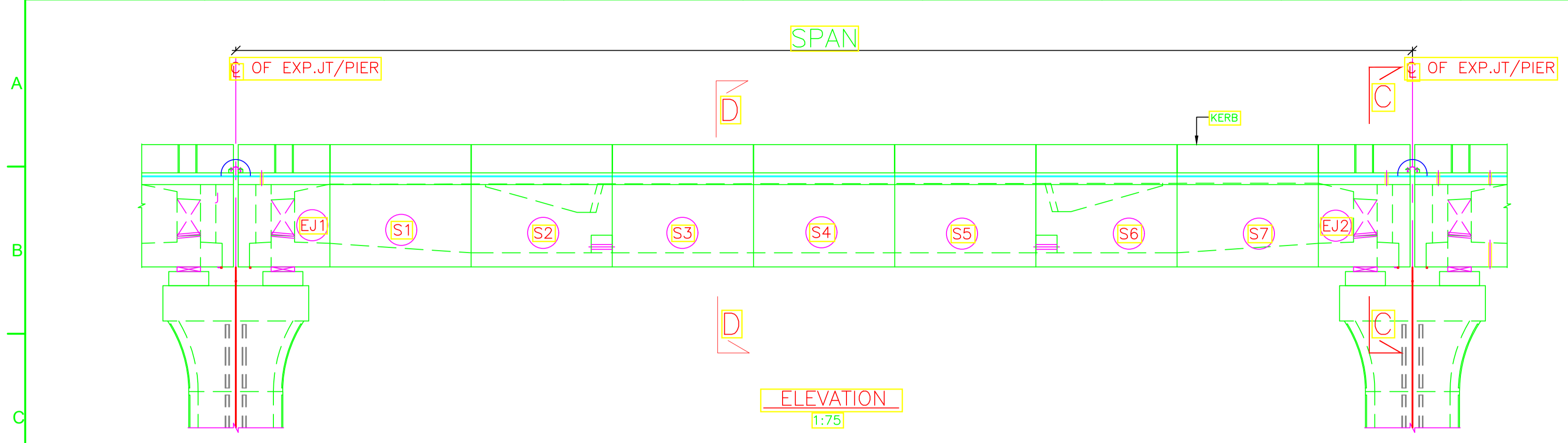


Maha-Metro

DETAILS OF MS POWDER COATING HAND RAIL

TENDER DRAWING

SIGN & SEAL



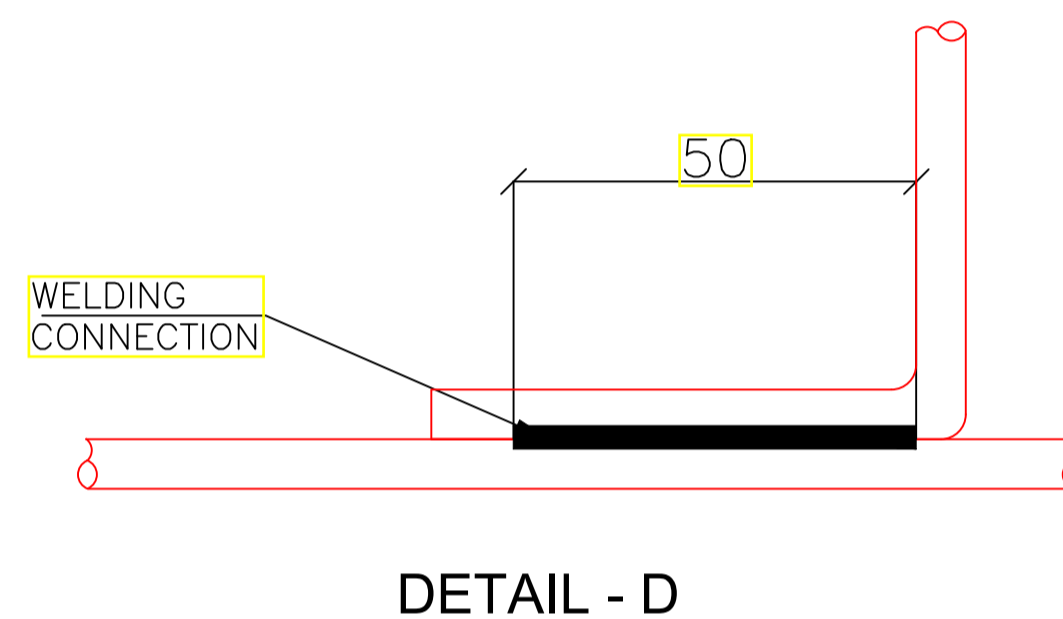
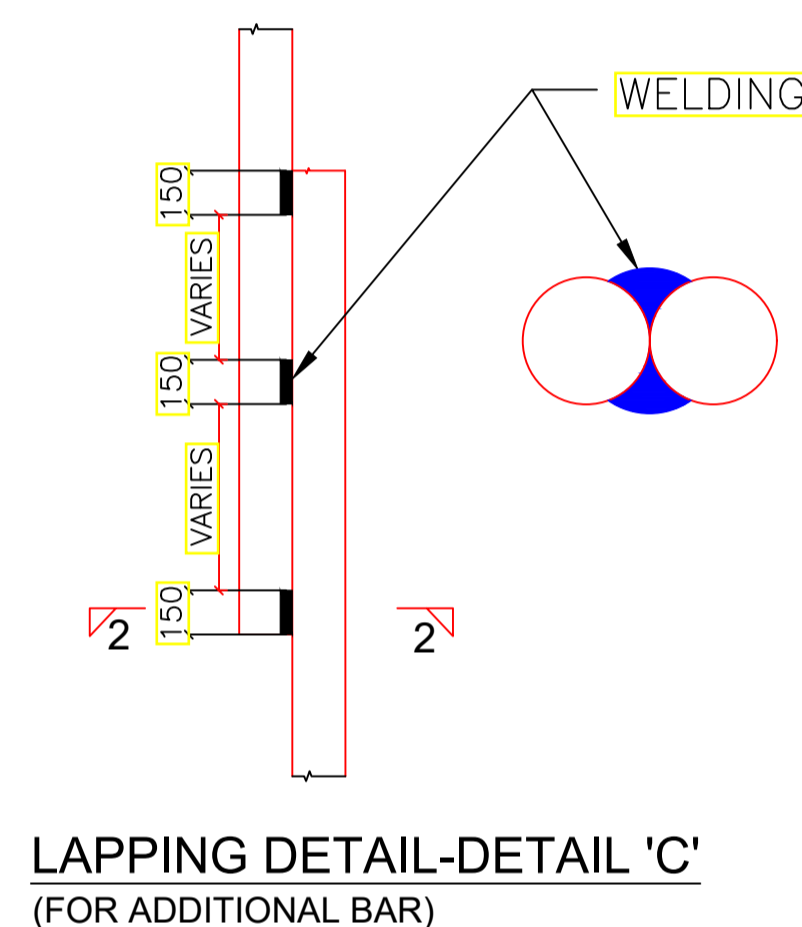
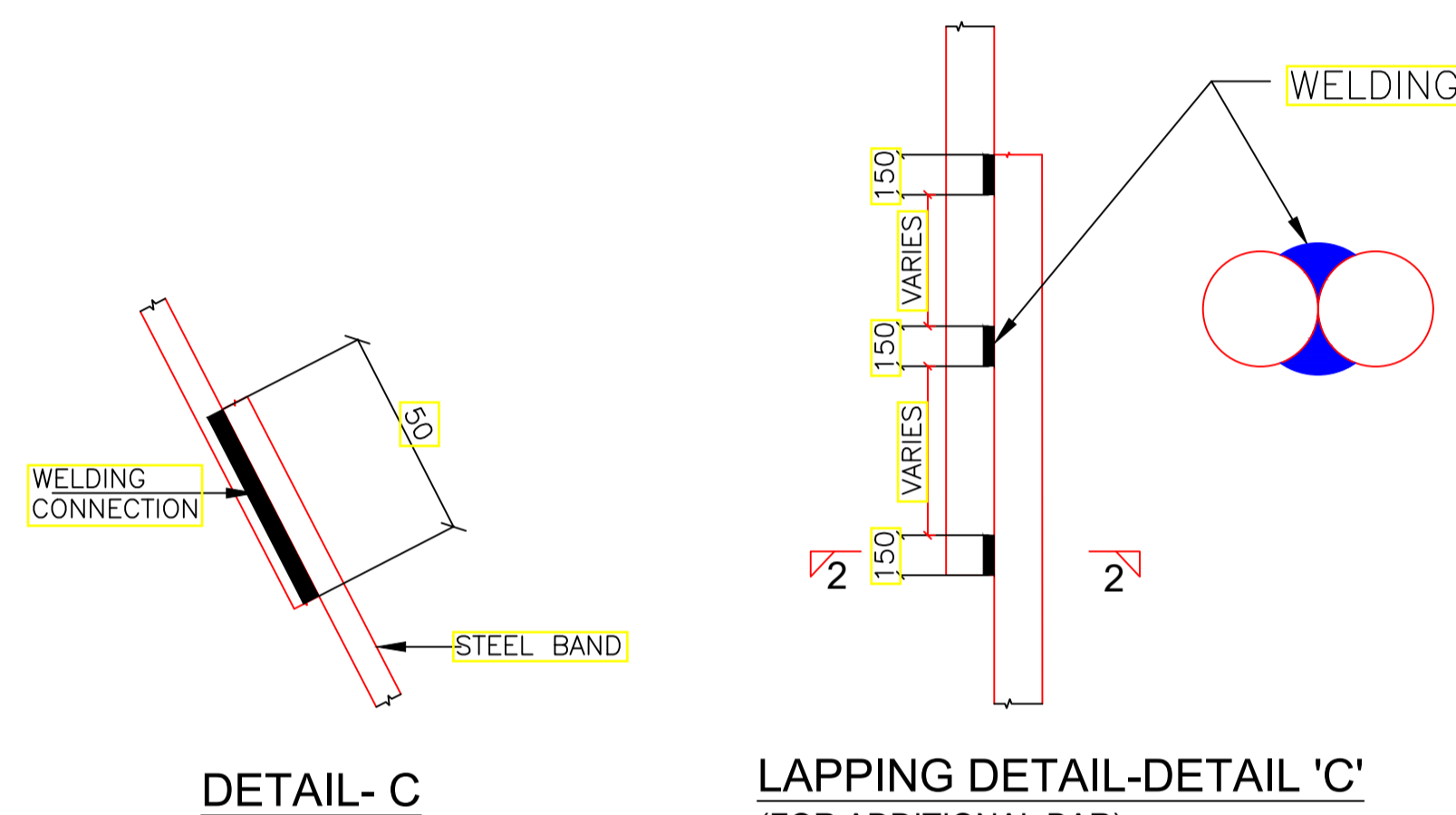
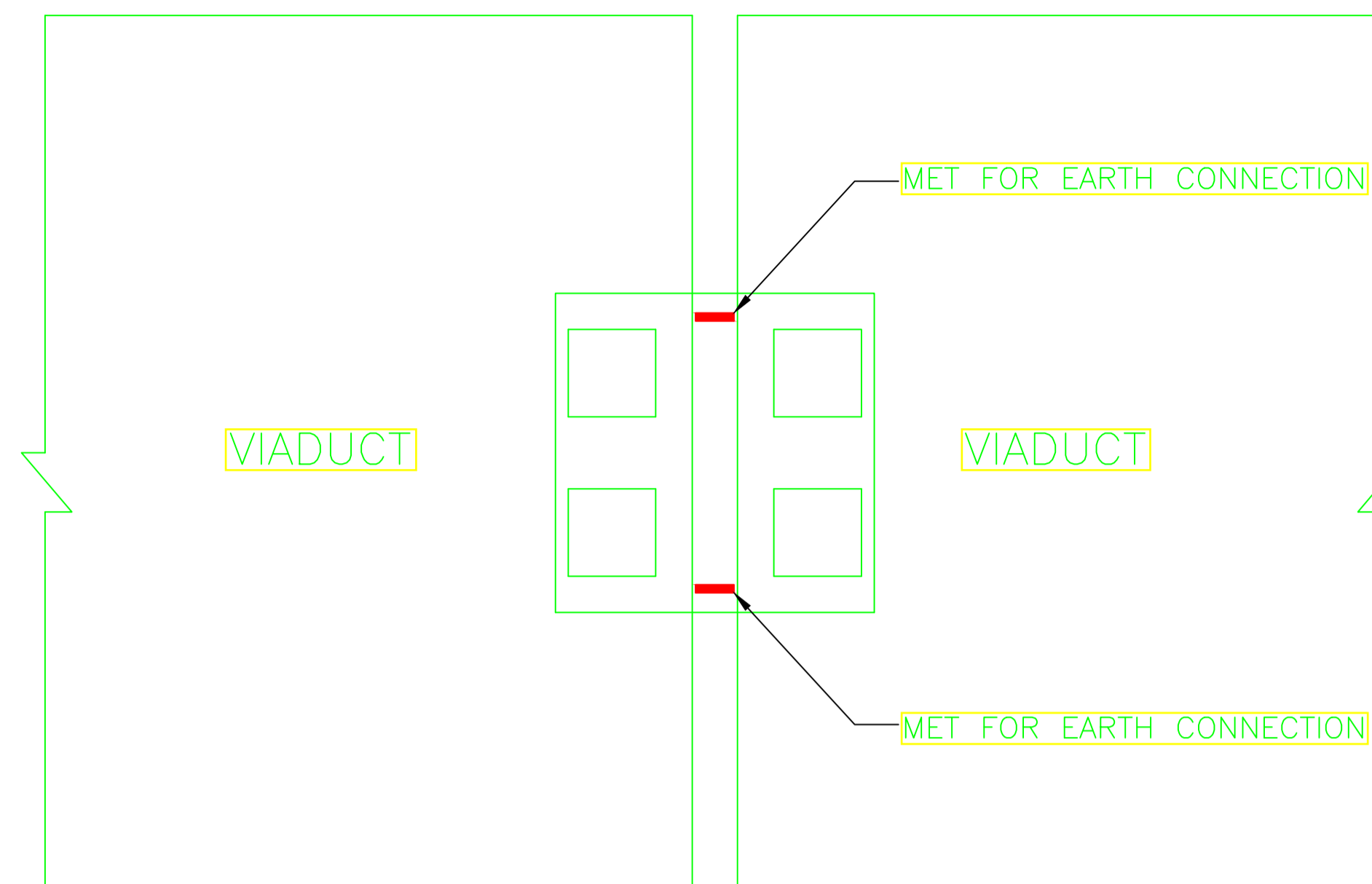
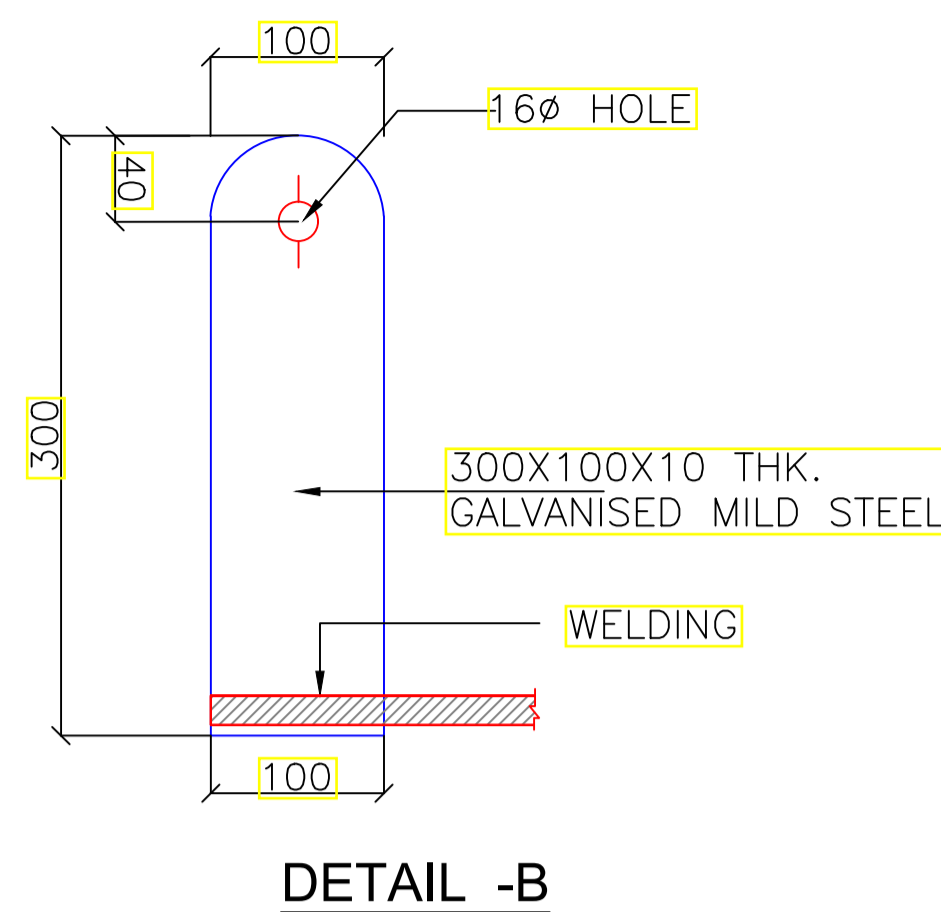
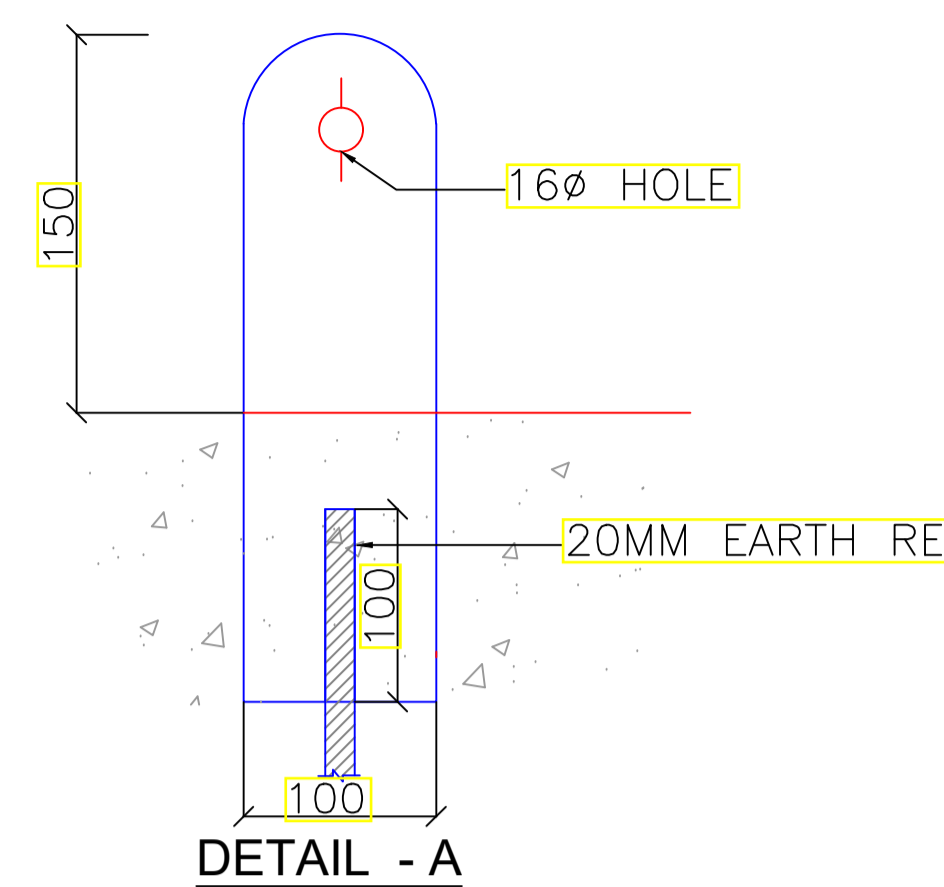
- TO BE EXECUTED BY VIADUCT CONTRACTOR
- TO BE EXECUTED BY TRACTION CONTRACTOR
- TO BE EXECUTED BY TRACK CONTRACTOR

THE RESPONSIBILITY OF CONTROL, CHECK & VERIFICATION OF ACCURACY, CORRECTNESS, COMPLETENESS, INTEGRATION & FULL COMPLIANCE OF THE CONTRACT PROVISIONS IN RESPECT OF DESIGN, ANALYSIS AND DRAWINGS RESTS WITH THE DETAILED DESIGN CONSULTANT / DETAILED DESIGN CONSULTANT & CONTRACTOR. IT IS CERTIFIED THAT THERE IS NO CHANGE IN THIS GPCD FROM THE ALREADY APPROVED CR DWG NO. * REV. * APPROVED ON DATE *				THIS DRAWING INCLUDING ITS DESIGN AND DETAILING HAS BEEN PROOF CHECKED INDEPENDENTLY AND FOUND SUITABLE FOR THE EXECUTION PURPOSE AND IS RECOMMENDED FOR GFC / NO OBJECTION.				THIS DRAWING INCLUDING ITS DESIGN AND DETAILING HAS BEEN PROOF CHECKED/REVIEWED AND FOUND SUITABLE FOR THE EXECUTION PURPOSE AND ISSUED AS "GOOD FOR CONSTRUCTION" BEING GIVEN NO OBJECTION				COUNTER SIGNED BY MAHARASHTRA METRO RAIL CORPORATION LTD.				PROJECT: NAGPUR METRO RAIL PROJECT Metro House, 28/2, CK Naidu Marg, Anand Nagar, Civil Lines, Nagpur - 440 001 Phone No: 07122554217			
DDC / CONTRACTOR				CONTRACTOR / DDC				PROOF CONSULTANT				GENERAL CONSULTANT TO NMRP				CLIENT: MAHARASHTRA METRO RAIL CORPORATION LTD.			
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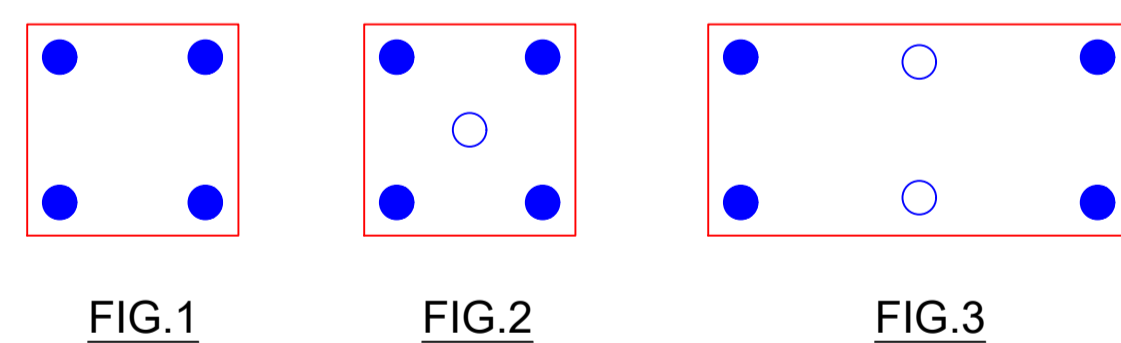
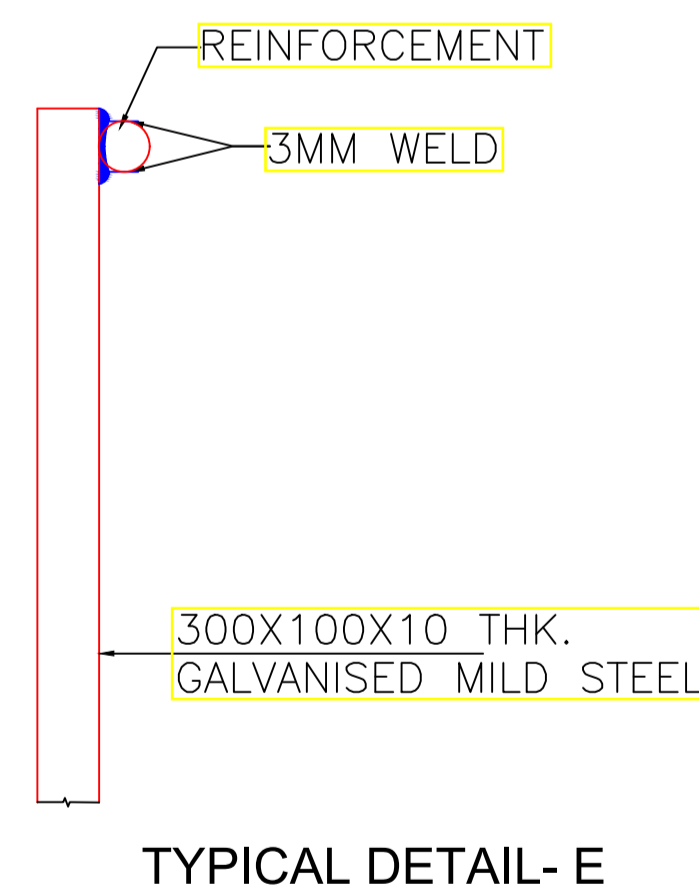
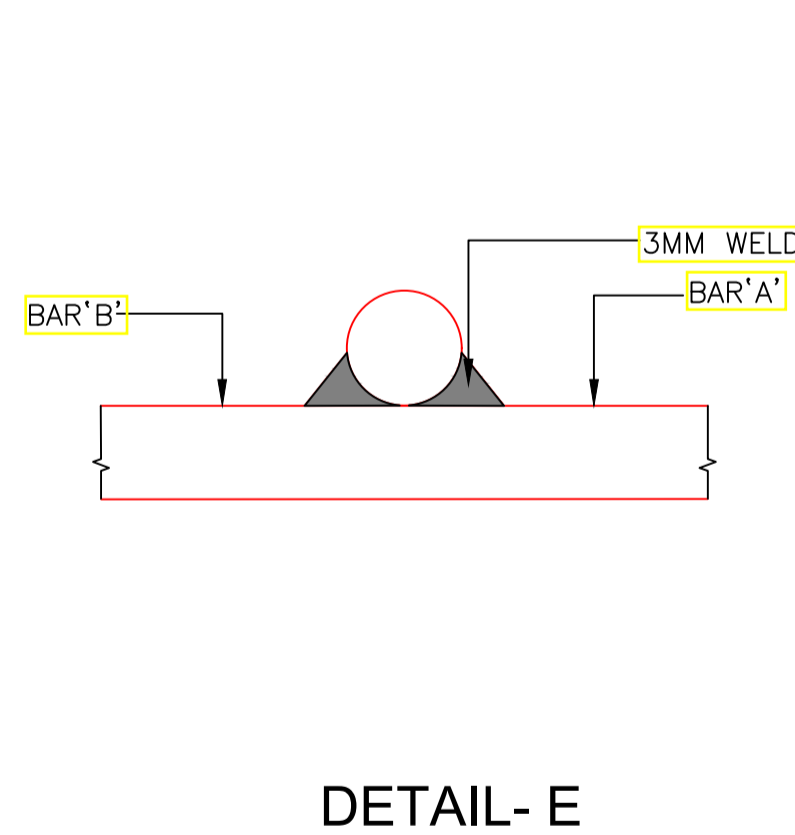
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R3	2023.09.08	END SEGMENT DETAILS UPDATED AS PER TRACTION REQUIREMENT	

TENDER DRAWING

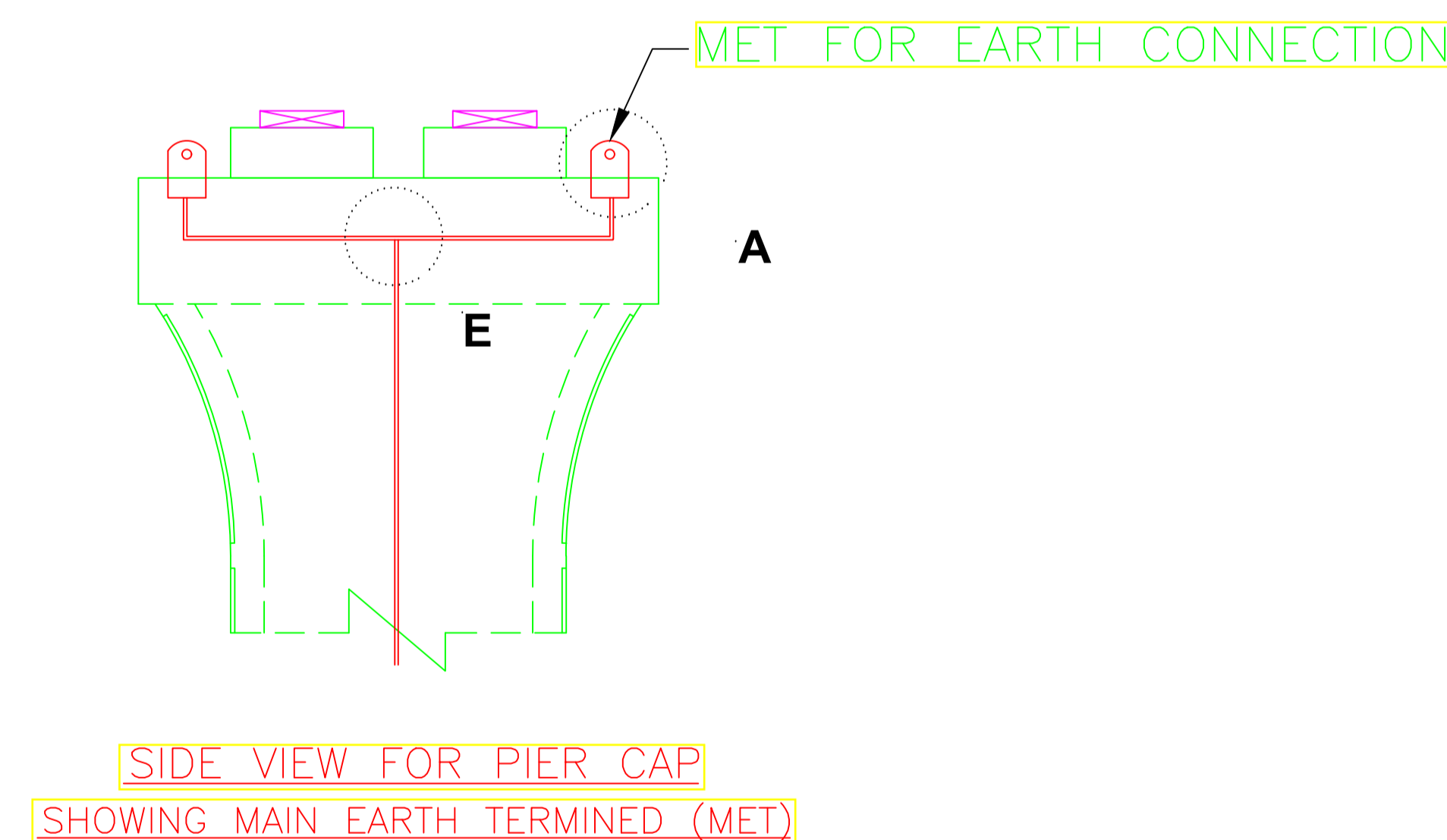
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PLAN OF PIER CAP
SHOWING MAIN EARTH TERMINED (MET)



TYPICAL EARTHING SYSTEM IN BORED PILE
(ADDITIONAL EARTHING VERTICAL BAR DB25 INSTALLED)



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DDC / CONTRACTOR			CONTRACTOR / DDC			PROOF CONSULTANT			GENERAL CONSULTANT TO NMRP			CLIENT: MAHARASHTRA METRO RAIL CORPORATION LTD.			LOCATION: PHASE - 02		
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Corrigendum-4: Annexure-B**S.15 : Specification of Powder Coating on Railing in Viaduct****1. Material Specification:**

The material used for railing shall be of MS section (as specified in tender drawing) Yst 310 confirming to IS 4923. Each lot shall be tested as per the approved frequency with respect to Indian / International standards.

2. Fabrication:

Fabrication shall be done in an approved yard/workshop. Prior to fabrication the contractor shall obtain "No Objection" from the engineer-in-charge for the workshop/yard and the design. The design shall be approved in concurrence with Engineer-In-Charge/Maha metro and no additional charges shall be given for any type of design/pattern. It's the responsibility of the contractor to coordinate with Maha-Metro and GC for obtaining relevant design/pattern approval.

Welding of all sections shall be done as per relevant codal provision. Unless otherwise stated, all welding shall be gas welded with high quality without any porosity and flaws. Further, test report for welded joints shall be submitted. Nothing extra will be paid on the account of testing.

3. Coating:

Coating of fabricated railing shall be done only after the successful inspection of the welding by the engineer in charge.

All the fabricated railing shall be powder coated with a Grade 'C' – matt finish as per IS 13871 latest revisions. Overall DFT shall be above 100 microns. Powder coating shall fulfill the requirements as detailed in table-1 of IS 13871(Latest revision).

4. Surface Preparation:

Surface preparation to be done by a variety of chemical or mechanical method as required for the structural element. Thus, the structural element (fabricated) shall be free from oil, dirt, lubrication greases, metal oxides, welding scale etc, and prior to the powder coating process, abrasive blasting or sand blasting shall be carried out as per relevant SSPC specification.

Chemical pre-treatments involve the use of phosphates or chromates in submission or spray application, if required. The pre-treatment process both cleans and improves bonding of the powder to the metal.

5. Powder Application Processes:

Application of powder coating is done by spraying the powder using an electrostatic gun using appropriate spray nozzles, to provide a uniform coating. Pre-heating provision shall be explored as and when required to deliver a uniform smooth finish. Powder can also be applied using specifically adopted electrostatic discs.

The contractor is required to submit the method statement of application prior to the commencement of work.

6. Curing:

The curing method shall be done as per the manufacture's specifications. The contractor shall adopt the latest suitable method for curing system.

7. Erection:

Fixing of handrail shall be done with the hot dip galvanized bolts provided in the segment parapet. As stated in the scope of work, providing hot dip galvanized bolt, is in the lumpsum scope of viaduct. Additional check nut shall be provided. Nothing extra will be paid on the account of above.

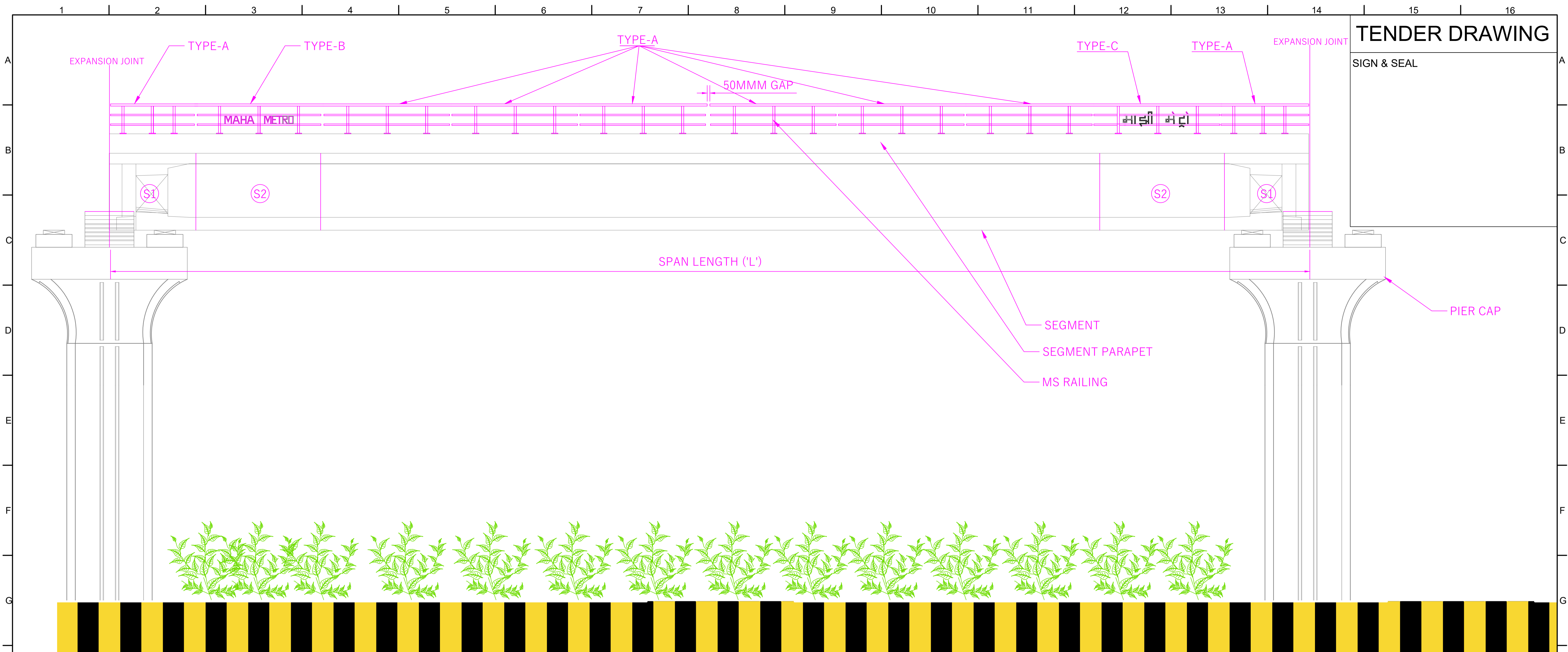
The contractor shall submit the design along with its calculation to the engineer-in-charge for approval prior to erection.

The contractor will be solely responsible for any damages happened during transportation and erection.

Updated drawing for Typical Earthing detail for viaduct

TENDER DRAWING

SIGN & SEAL



- NOTE:-**
- 'L' UPTO 31M. (50MM GAPAT L/2) MAXIMUM CONTINUOUS LENGTH AT TOPMOST PIPE SHALL BE RESTRICTED TO 18.5M.
 - 50MM EXPANSION JOINT GAP TO BE MAINTAINED IN HANDRAIL.
 - TYPE-B AND TYPE-C HANDRAIL TO BE PROVIDED AT S2 SEGMENT AS SHOWN, BOTH LEFT SIDE AND RIGHT SIDE.
 - TYPE-A HANDRAIL TO BE APPROPRIATELY MODIFIED FOR PIER DIAPHRAGM SEGMENT.
 - TYPE-A, TYPE-B & TYPE-C HANDRAIL TO BE APPROPRIATELY MODIFIED FOR CURVE SPAN.
 - SHOP DRAWINGS TO BE APPROVED BY GC.
 - THE MEMBERS USED FOR M.S. HAND RAILING SHOULD BE POWDER COATED WITH GRADE-C MATT FINISH AS PER IS 13871.

NOTES:

REV NO	DATE	DESCRIPTION	SIGN
R3	11.08.2023	SECTIONS AND FINISHING MODIFIED	

THE RESPONSIBILITY OF CONTROL, CHECK & VERIFICATION OF ACCURACY, CORRECTNESS, COMPLETENESS, INTEGRATION & FULL COMPLIANCE OF THE CONTRACT PROVISIONS IN RESPECT OF DESIGN, ANALYSIS AND DRAWINGS RESTS WITH THE DETAILED DESIGN CONSULTANT / DETAILED DESIGN CONSULTANT & CONTRACTOR. IT IS CERTIFIED THAT THERE IS NO CHANGE IN THIS GFCO FROM THE ALREADY APPROVED CR DWG NO. ".....REV....." APPROVED ON DATE				THIS DRAWING INCLUDING ITS DESIGN AND DETAILING HAS BEEN PROOF CHECKED INDEPENDENTLY AND FOUND SUITABLE FOR THE EXECUTION PURPOSE AND IS RECOMMENDED FOR GFC / NO OBJECTION.				THIS DRAWING INCLUDING ITS DESIGN AND DETAILING HAS BEEN PROOF CHECKED/REVIEWED AND FOUND SUITABLE FOR THE EXECUTION PURPOSE AND ISSUED AS 'GOOD FOR CONSTRUCTION'/BEING GIVEN NO OBJECTION				COUNTER SIGNED BY MAHARASHTRA METRO RAIL CORPORATION LTD.			
DDC / CONTRACTOR				CONTRACTOR / DDC				PROOF CONSULTANT				GENERAL CONSULTANT TO NMRP			
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PROOFCONSULTANT			
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SYSTRA-AECOM-EGIS-RITES Church House, Above SBI Bank, First floor, Civil Lines Nagpur- 440001			
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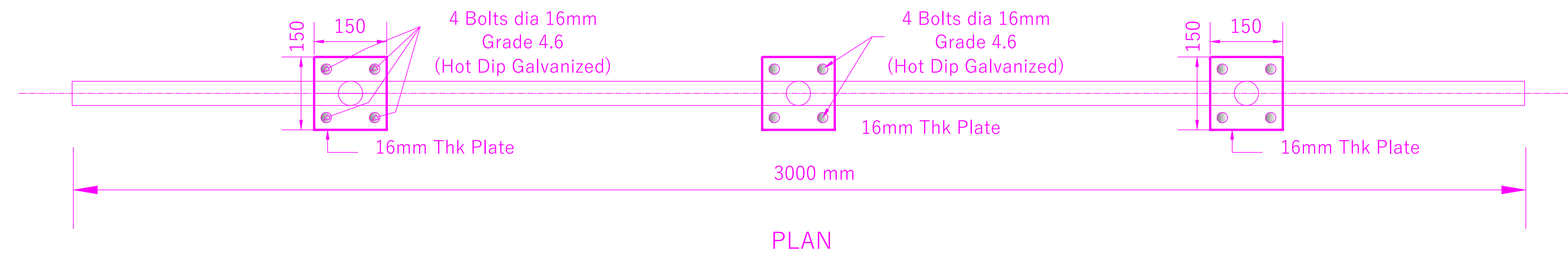
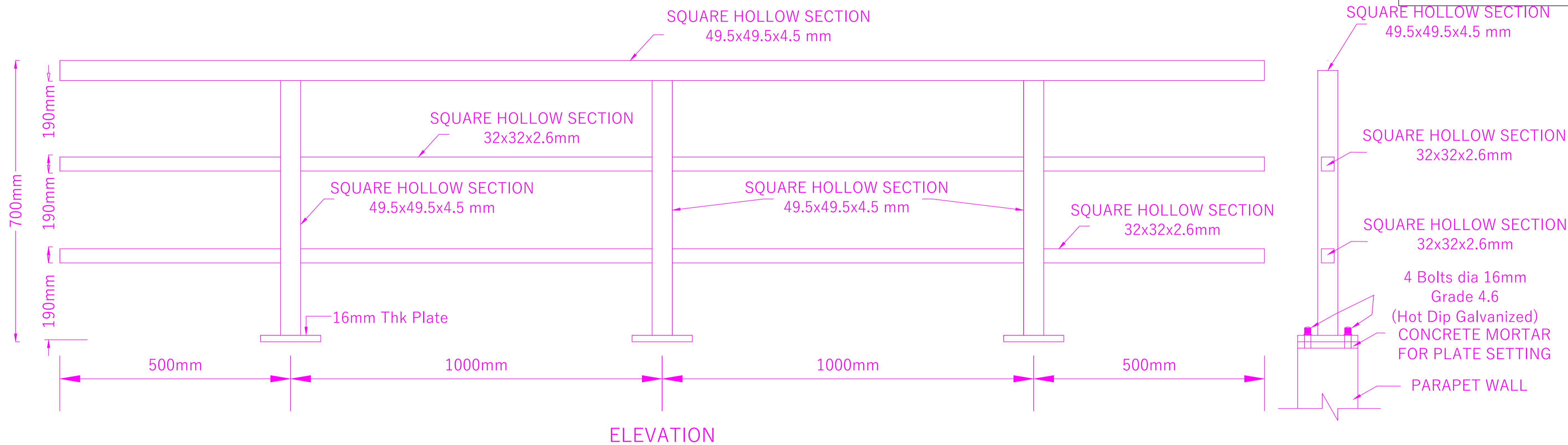
PROJECT: NAGPUR METRO RAIL PROJECT Metro House, 28/2, CK Naidu Marg, Anand Nagar, Civil Lines, Nagpur - 440 001 Phone No: 07122554217			
CLIENT: MAHARASHTRA METRO RAIL CORPORATION LTD.			
LOCATION: PHASE - 02			
TITLE: MS RAILING (SHEET-1)			
SCALE: AS SPECIFIED	DATE: 11.08.2023	STATUS: TENDER DRAWING	REVISION NO:
DRG NO: CV-PRM-TDR-PHASE-02-DRP-0006			
R3			

STRUCTURE			

TENDER DRAWING

SIGN & SEAL

MS RAILING (TYPE-A)



NOTES: THE PIPES AND HOLLOW SECTIONS USED FOR M.S. HAND RAILING SHOULD BE HOT DIP GALVANIZED.

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COUNTER SIGNED BY MAHARASHTRA METRO RAIL CORPORATION LTD.

PROJECT: **NAGPUR METRO RAIL PROJECT**
 Metro House, 28/2, CK Naidu Marg, Anand Nagar, Civil Lines, Nagpur - 440 001
 Phone No: 07122554217

CLIENT: **MAHARASHTRA METRO RAIL CORPORATION LTD.**

LOCATION: PHASE - 02

TITLE: MS RAILING (SHEET-2)

SCALE: AS SPECIFIED

DATE: 11.08.2023

STATUS: TENDER DRAWING

REVISION NO:

DRG NO: CV-PRM-TDR-PHASE-02-DRP-0006A

R3

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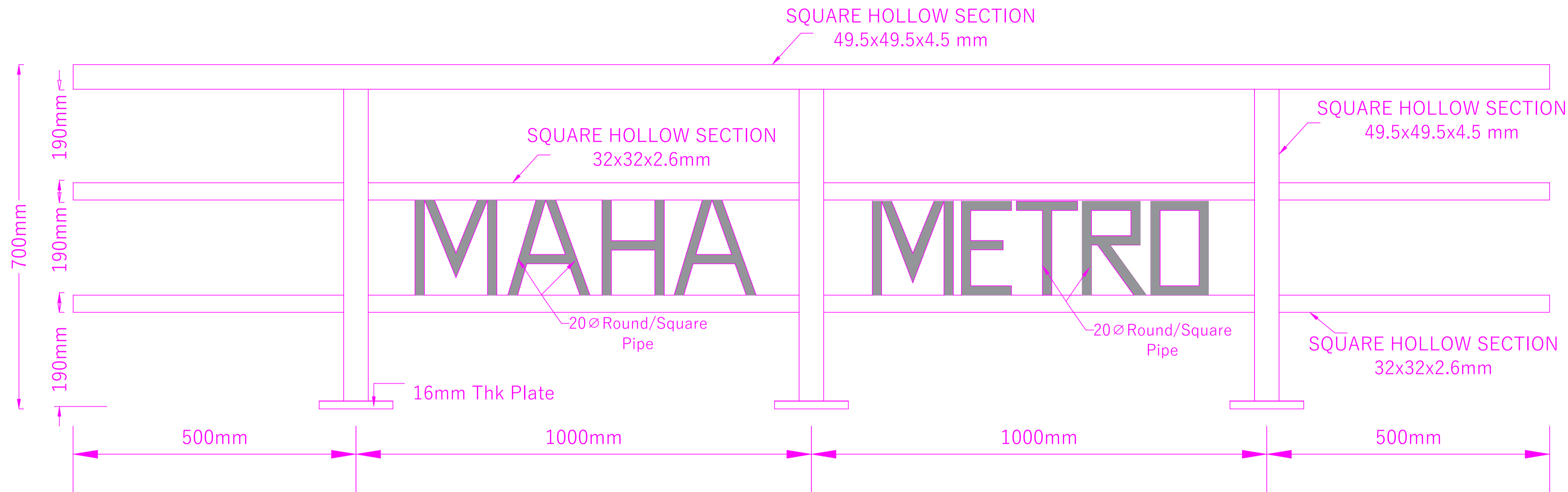
PROOF CONSULTANT	GENERAL CONSULTANT TO NMRP
SIGN:	SIGN:
DATE:	DATE:
NAME:	NAME:

PROOFCONSULTANT

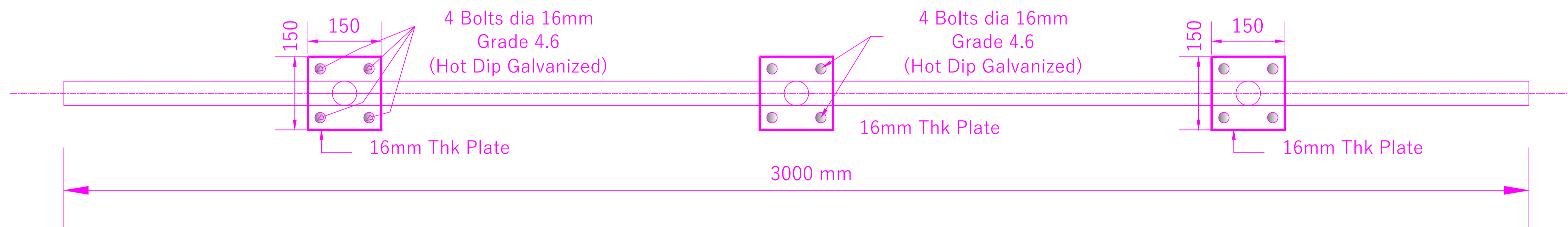
SYSTRA-AECOM-EGIS-RITES
 Church House, Above SBI Bank, First floor, Civil Lines Nagpur- 440001

STRUCTURE

MS RAILING (TYPE-B)



ELEVATION



PLAN


NOTES: THE PIPES AND HOLLOW SECTIONS USED FOR M.S. HAND RAILING SHOULD BE HOT DIP GALVANIZED.

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COUNTER SIGNED BY MAHARASHTRA METRO RAIL CORPORATION LTD.

PROJECT:  **NAGPUR METRO RAIL PROJECT**
Metro House, 28/2, CK Naidu Marg, Anand Nagar,
Civil Lines, Nagpur - 440 001
Phone No: 07122554217

CLIENT: **MAHARASHTRA METRO RAIL CORPORATION LTD.**

LOCATION: PHASE - 02

TITLE: MS RAILING (SHEET-3)

SCALE: AS SPECIFIED DATE: 11.08.2023 STATUS: TENDER DRAWING

DRG NO: CV-PRM-TDR-PHASE-02-DRP-0006B



STRUCTURE

DDC / CONTRACTOR				CONTRACTOR / DDC			
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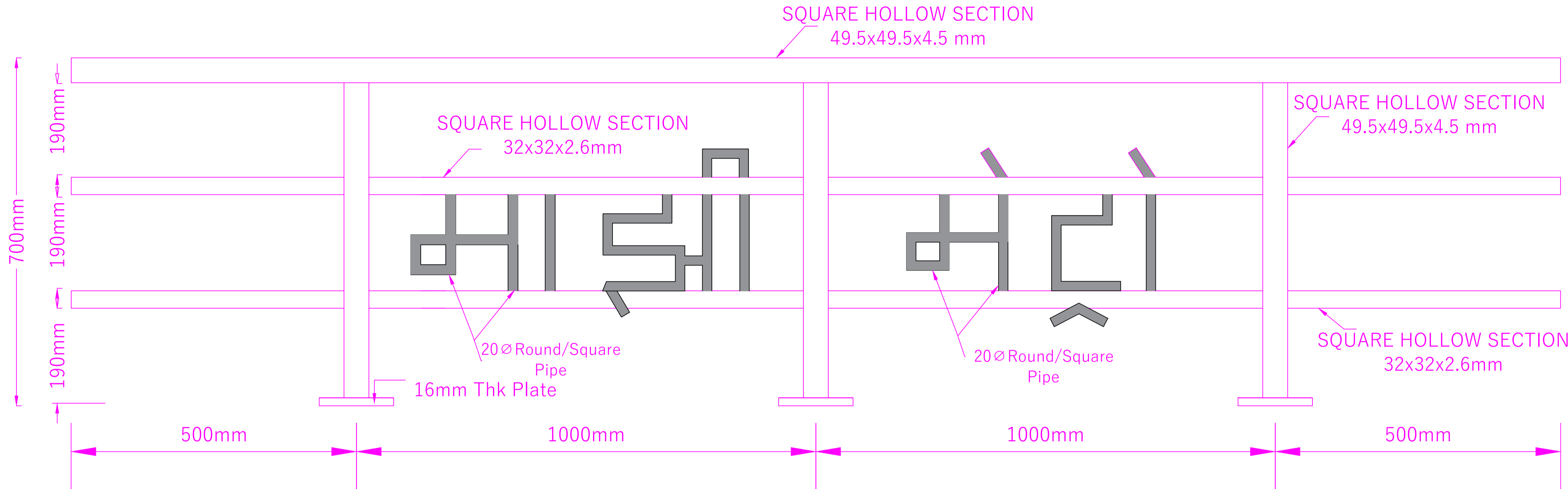
PROOF CONSULTANT		GENERAL CONSULTANT TO NMRP	
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PROOFCONSULTANT

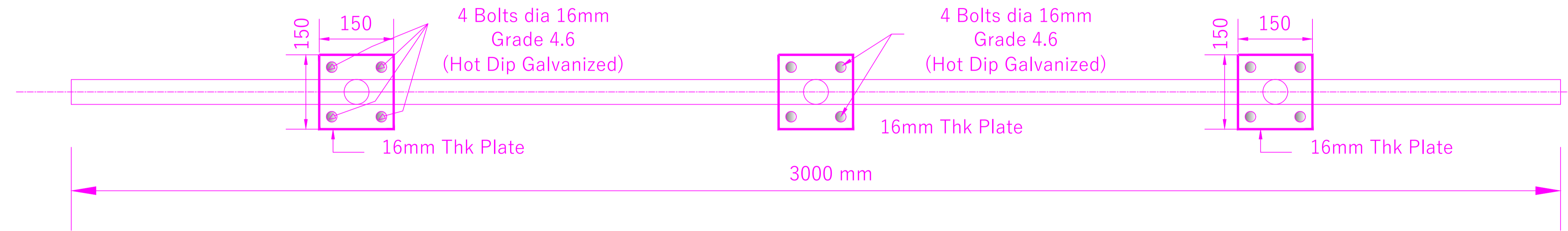
 **SYSTRA-AECOM-EGIS-RITES**
Church House, Above SBI Bank,
First floor, Civil Lines Nagpur- 440001

REV NO	DATE	DESCRIPTION	SIGN
R3	11.08.2023	SECTIONS AND FINISHING MODIFIED	

MS RAILING (TYPE-C)



ELEVATION



PLAN

NOTES: THE PIPES AND HOLLOW SECTIONS USED FOR M.S. HAND RAILING SHOULD BE HOT DIP GALVANIZED.

THE RESPONSIBILITY OF CONTROL, CHECK & VERIFICATION OF ACCURACY, CORRECTNESS, COMPLETENESS, INTEGRATION & FULL COMPLIANCE OF THE CONTRACT PROVISIONS IN RESPECT OF DESIGN, ANALYSIS AND DRAWINGS RESTS WITH THE DETAILED DESIGN CONSULTANT / DETAILED DESIGN CONSULTANT & CONTRACTOR. IT IS CERTIFIED THAT THERE IS NO CHANGE IN THIS GFCO FROM THE ALREADY APPROVED CR DWG NO.REV..... APPROVED ON DATE

THIS DRAWING INCLUDING ITS DESIGN AND DETAILING HAS BEEN PROOF CHECKED INDEPENDENTLY AND FOUND SUITABLE FOR THE EXECUTION PURPOSE AND IS RECOMMENDED FOR GFC / NO OBJECTION.

THIS DRAWING INCLUDING ITS DESIGN AND DETAILING HAS BEEN PROOF CHECKED/REVIEWED AND FOUND SUITABLE FOR THE EXECUTION PURPOSE AND ISSUED AS 'GOOD FOR CONSTRUCTION'/BEING GIVEN NO OBJECTION.

COUNTER SIGNED BY MAHARASHTRA METRO RAIL CORPORATION LTD.

PROJECT: **NAGPUR METRO RAIL PROJECT**
Metro House, 28/2, CK Naidu Marg, Anand Nagar, Civil Lines, Nagpur - 440 001
Phone No: 07122554217

CLIENT: **MAHARASHTRA METRO RAIL CORPORATION LTD.**

LOCATION: PHASE - 02

TITLE: MS RAILING (SHEET-4)

SCALE: AS SPECIFIED DATE: 11.08.2023 STATUS: TENDER DRAWING REVISION NO:

DRG NO: CV-PRM-TDR-PHASE-02-DRP-0006C

STRUCTURE

REV NO	DATE	DESCRIPTION	SIGN
R3	11.08.2023	SECTIONS AND FINISHING MODIFIED	

DDC / CONTRACTOR				CONTRACTOR / DDC			
SIGN:	SIGN:	SIGN:	SIGN:	SIGN:	SIGN:	SIGN:	SIGN:
DATE: DRAWNDATE	DATE:	DATE:	DATE:	DATE:	DATE:	DATE:	DATE:
NAME: DRAWNBY	NAME:	NAME:	NAME:	NAME:	NAME:	NAME:	NAME:
DRAWN BY	DESIGN BY	CHECKED BY	APPROVED BY	ACCEPTED BY			

PROOFCONSULTANT

SYSTRA-AECOM-EGIS-RITES
Church House, Above SBI Bank, First floor, Civil Lines Nagpur- 440001

Annexure IX-C:

Environment Management Plan for NMRP Phase-2

Attached is Environment Management Plan for NMRP Phase-2, this is under final review and an updated version will be shared prior to the start of work.

Environment Management Plan for NMRP Phase II project

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
Planning and Design Phase						
1.	Land Acquisition and resettlement	Social	Permanent acquisition of 5.78 ha private land. The final size of land to be acquired will be updated based on the optimization of project design.	<ul style="list-style-type: none"> Land Acquisition is being carried out as per the provisions of GoM, GoI and ADB policies. The affected people will be compensated and assisted as per the provisions of Resettlement Plan (RP). 	Maha-metro	GoM
2.	Change in Land use	Land	Land use will be slightly changed	<ul style="list-style-type: none"> Nagpur Improvement Trust (NIT) developed the Comprehensive Mobility Plan (CMP) for NMRDA in 2013 to identify the present and future mobility patterns of Nagpur Municipal Area (NMA), including development of NMRP Phase II corridors. Proper clearances / permissions / consents will be sought from competent authorities before construction. 	Maha-metro	Maha-metro (as SPA notified by GoM)
3.	Contractor Management	EHS	<ul style="list-style-type: none"> EHS accidents Reputational Risk 	<ul style="list-style-type: none"> Integration of EHS contractor management into broader project management, procurement, human resources, legal, and financial management. Prime contractor will be responsible for EHS practices of the subcontractor including HR policy which complies with applicable labour legislations, including decisions on material supplies and equipment given environmentally friendly priorities, and prepare subcontract agreements accordingly. Contractor management incorporates “adaptive management” to monitor and adapt over time; integration with sustainable procurement approach or concepts. Building culture and commitment by demonstrating the importance of EHS management to the president or director of project-implementing agency and president or director of subcontractor; including EHS aspects in routine senior management project contractor meetings 	Contractor / GC	Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<p>and reports, reflecting both criticisms or suggestions and praise; designating responsibilities of EHS staff (for example, work stoppage); requiring strong and consistent training and participation of managers; acknowledging managers' participation in on-site supervision and resolution of issues; and providing awards, recognition, and incentives.</p> <ul style="list-style-type: none"> • Training and Health & Safety plans 		
4.	Contractor Preparatory Works (Upon issuance of Notice to Proceed)	EHS	Non-compliance with contract conditions and regulatory requirements.	<ul style="list-style-type: none"> • The Contractor shall complete the following activities no later than 30 days upon issuance of Notice to proceed, <ol style="list-style-type: none"> appoint contractor's Safety, Health and Environmental Officer (SHEO); SHEO will engage GC-Environment Specialist to discuss EMP, seek clarification and recommend corresponding revisions if necessary; SHEO will agree with GC the monthly monitoring template and deadlines for submission; SHEO will submit for GC's approval all necessary sub-plans as listed in this EIA (Section 9.6). The plans will include a work plan to secure all permits and approvals needed to be secured during construction stage which will include but are not limited to: i) operation of crushers, ii) transport and storage of hazardous materials (e.g. fuel, lubricants, explosives), iii) waste disposal sites and disposal management plan, iv) temporary storage location, iv) water use, and v) emission compliance of all vehicles. Arrangements to link with government health programs on hygiene, sanitation, and prevention of communicable diseases including Covid-19 will also be included in the action plan; SHEO will submit for GC's approval of the construction camp layout and management plan before its establishment; and (f) SHEO will update EIA (in consultation with GC, in case of design changes) and also prepare site-specific EMPs. 	Contractor / GC	Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
5.	Labour Management	Labour	Labour rights	<ul style="list-style-type: none"> • Compliance with GoI's labour legislation, ratified with International Labour Organization (ILO) conventions. • Prohibition of child labour, including prohibition of persons under 18 years old from working in hazardous conditions (which includes construction activities) and from working at night; medical examinations required to determine that persons above 18 years old are fit to work. • Elimination of discrimination with respect to employment and occupation, to be defined as any distinction, exclusion, or preference based on race, gender, religion, political opinion, trade union affiliation, national extraction, or social origin. • Human resource policy or plans that establish (a) the rights and responsibilities of project company employees and any contractor employee working in the project regarding remuneration, working conditions, benefits, disciplinary and termination procedures, occupational safety and health, promotion procedures, and training and (b) the rights, responsibilities, and requirements in contractor or subcontractor agreements related to worker rights. • Grievance Redress Mechanism (GRM) for workers should be established as early as possible to function no later than construction commencement. • There will be provision for group accidental and medical insurance for the workers. 	Contractor	GC / Mahametro
		Health and Safety	Accidents / illness	<ul style="list-style-type: none"> • Make mandatory the use of safety gears (helmets, safety belts, masks, gloves, Ear plugs/ muffs and boot) by workers depending on nature of work. • Necessary planning and safety approach will be made for rescue during emergency. • Use of dust controls (exhaust ventilation) for dust control • Workers will be provided with first aid and health facilities at the site. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> • There should have facility to deal with medical aspects of HIV/AIDS treatment with specialized services • Maha-metro Covid-19 protocols forming part of the SHE Requirements contained in the contract document shall be followed; labour shall be trained and informed of precautions such as social distancing, sanitizing, avoiding groups; arrangements for thermal scanners; provision of sanitisers, face masks, gloves etc.; site record of Covid-19 hospitals; daily disinfection of site, equipment and vehicles. 		
6.	Obtaining Clearance, Permission and Consents	Regulatory Compliance	Tree felling information, Consents to establish labour camps, pre-casting and material yards, depots, establish and operate hot mix plant, crushers, batching plant, DG sets, etc. C&D waste (muck) disposal	<ul style="list-style-type: none"> • Consultation and coordination with relevant authorities to prepare the documents to obtain clearance, permission and consents. • Conditions set in permission and consents to be incorporated into the site-specific EMPs, with dedicated officers to maintain the regulatory compliance tracker. 	Maha-metro / Contractor	Tree Authority (NMC), Maharashtra Forest Dept. / MPCB
7.	Site Clearance and Demolition	Tree felling	About 538 trees will be affected on viaduct and stations. Additionally, in some areas, pruning will be required. Other existing structures may need to be demolished	<ul style="list-style-type: none"> • Maha-metro and the Contractor need to conduct a final tree inventory survey (number, type, height) with the final designs of alignment and station. Trees with conservation value should be transplanted, if possible. Plan to avoid cutting trees, including adjustments in project design to minimize effect on such trees. • Revisit the works in public parks or green spaces and potential tree removal, especially involving patrimonial trees of special significance, so minimize the impacts as much as possible. • If unavoidable, implementation of acceptable plans for transplanting (to the extent technically and economically viable) or replacing such trees and for their short-term maintenance and care. 	Maha-metro / Contractor	Tree Authority (NMC), Maharashtra Forest Dept., GoM and NMRDA

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> • Adequate coordination with applicable government regulatory authorities. As alignment passes through built-up land use, green belt development along elevated section is not feasible. Compensatory plantation of 10 saplings for every tree felled will be done in sites to be identified in consultation with Nagpur Municipal Corporation (NMC) and Maharashtra Forest Dept. Maha-metro to allocate sufficient tree replantation budget. • Stakeholder communication to avoid or minimize public concerns or protests. • Definition of adequate budget and contingencies as well as financial resources to cover all related costs. This will be finalized before work on relevant section is commenced between Maha-metro and the Contractor. • Families impacted due to fully affected (displaced/demolished) structures and partially affected structures will be compensated in accordance with the approved Resettlement Plan. • To avoid negative impact on herbaceous vegetation, vehicle & Construction machinery movement should have restricted to designated roads. Similarly, it is suggested to avoid dumping of muck, excessive site clearance, leveling etc. in the river/<i>nallah</i> basin. • Proper management of waste material will be ensured. No Excavated material should not be store near river/<i>nallah</i> basin • Vegetation clearing by chemicals / herbicides will not be permitted • Workers should be briefed about do's and don'ts like "No hunting / poaching", "No burning of vegetation for firewood, or any other purpose", "No collection of eggs or any other forest resources", not causing any disturbances to any habitat, etc. 		

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> Sedimentation of storm water will be minimized by avoiding stockpiling of excavated material. Portable sanitation, treatment and disposal facility shall be provided at construction site. 		
		Noise	Noise will be generated by the use of hand tools such as jackhammers, sledgehammers and picks etc.	<ul style="list-style-type: none"> The procedure of demolition will be conducted as per the demolition plan prepared by the Contractor in consultation with Maha-metro. The existing structures should be demolished one after another cautiously. 	Contractor	GC / Maha-metro
		Physical Cultural Resources	Historic and Cultural Value Loss	<ul style="list-style-type: none"> Contractor to conduct pre-construction structural integrity inspections if there are known or a significant likelihood of archaeological and / or culturally valuable sites or finds in the project's direct area of influence. Prepare a monitoring scheme prior to construction based on the above inspections, with a focus on pre-identified receptors comprising educational, medical and physical cultural buildings located within recommended screening distance of 62m (for Category 2) on either side of alignment, or finds in the project's direct area of impact. Compliance with applicable legislation (permits and procedures) and good international practice. Adaptive management in site-specific EMP during final design, including site locations (stations and construction staging areas). Chance finds procedure to be prepared by Contractor and reviewed by GC/Maha-metro before submitting to all lenders. 	Contractor	GC / Maha-metro / NMRDA
8.	Severance of utilities	Social EHS	The proposed alignments will cross drains and utility services such as sewer, storm water drains, water and wastewater	<ul style="list-style-type: none"> Assets and utilities will be maintained without affecting and damages by shifting temporary/ permanently where it is necessary. Based on utility maps and network information, Maha-metro and Contractor in collaboration with utility owners oversees an investigation of existing utility Maha-metro 	Maha-metro / Contractor	Maha-metro / NMC, NMRDA, MSEB, MNGL, Telecon

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
			pipes, roadside lights, telephone cables, electricity power lines, electric poles, natural gas lines and traffic signals etc.	<p>and Contractor to conduct on-site inspections and a topographic survey. Even when utilities are far enough below the surface, to avoid damage from construction, they may need to be diverted so that their maintenance will not affect the safe and efficient operations of the train system once construction is completed. Utility owners will be involved in providing any new utilities needed for the rail system and in designing the necessary diversions and protection measures to minimize the risk to existing utilities from ground movement and surface settlement.</p> <ul style="list-style-type: none"> • For gas pipeline, Contractor will conduct the hazardous operation study to ensure the smooth and safe shifting. • Utility shifting plan will be developed by Maha-metro and Contractor in coordination with concerned authorities and shifting of utilities will be done as per agreed utility shifting plan prior to construction commenced. The plan will include required EHS management measures, supervision and monitoring of implementation, and final report and confirmation that construction works will be properly closed (for example, all waste will be removed or re-pavement will be completed as required). In case public utilities are required to be shifted to private land in exceptional circumstances, then adequate compensation shall be made by Maha-metro to the property owner on the same principles as temporary land acquisition. Following completion of construction of metro, such utilities shall be rehabilitated on public land. 		companies, etc.
9.	Noise and Vibration Impacts Related Design	Environmental Nuisance and possible structural damages due to vibration.	Noise and vibration from construction and train operation	<ul style="list-style-type: none"> • The detailed noise and vibration analysis (mathematical modeling) at pre-identified receptors comprising educational, medical and physical cultural buildings and other fragile buildings located within recommended screening distance of 62m (RRT, Cat.2) for vibration and 100m (RRT, intervening buildings) for noise on either side of alignment based on final engineering designs 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<p>should be carried out, based on which, a set of mitigations should be prepared and shared with all lenders for review, prior to commencement of construction.</p> <ul style="list-style-type: none"> • Visual inspections of these buildings shall be done by the contractor so as to serve as baseline to monitor progression of building damage if any due to vibration. • Ballast less track structure is supported on two layers of rubber pads to reduce noise and vibrations, wherever required. In addition, baffle wall as parapets will be constructed up to the rail level so as reduce sound levels. Noise at source will be controlled or reduced by incorporating suitable feature in the design of structures and layout of machines and by use of resilient mounting and dampers etc. • Noise barriers made of suitable polycarbonate will be installed at identified sensitive receptor locations, where required. 		
10.	Coordinate with the Traffic Department on Traffic Management Plan	Land, Occupational safety, Community safety	Nuisance from traffic congestion	<ul style="list-style-type: none"> • The Contractor shall develop detailed and robust traffic management plans consistent with the Indian Guidelines on Traffic Management in work zones (IRC:SP:55-2014), prior to mobilization for respective sections with site- or station-specific plans and measures to minimize the overall impact on traffic throughout the construction and operation periods. • At congested sections, the temporary traffic coordinators will be engaged by Maha-metro to facilitate the traffic management. • At the minimum, the traffic management plans will have the following components: construction traffic, ensuring access to properties, accommodating pedestrians, parking, access by construction vehicles, faulty traffic lights and problem interchanges, use of public roads, parking provision during construction, use of residential 	Contractor	GC / Maha-metro / Traffic Police Dept.

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<p>streets and traffic diversion due to temporary road closures, and construction and use of temporary access roads.</p> <ul style="list-style-type: none"> • Strengthening impact and risk prevention measures, such as establishing construction site works to minimize the entrance and exit of vehicles at stations during peak traffic. • The logistics should be considered to manage transport materials from storage areas outside of the dense urban core to worksites and to return excavated soil and other materials to disposal locations. If needed, construction traffic may be confined to certain routes (based on infrastructure capacity) or restricted to certain off -peak hours (that is, to reduce noise pollution at night or to avoid commuting and school hours during the day). • Any diversions of traffic will cause considerable confusion for pedestrians and drivers as they rearrange their itineraries, hence, to minimize the effects of the diversion or reorganization, it is necessary to conduct communication campaigns and disseminate appropriate information to urban residents and taxi and bus drivers in advance of disruptions. Efforts will be given to divert traffic to roads wide enough to accommodate extra traffic. Compliance with scheduled deadlines for the detour is essential. If necessary, bus service and other public and private transport services in the area should be improved to meet residents' transportation needs. • Maha-metro and local authorities continue to play an oversight role in approving these plans during construction, evaluating their cumulative impact with other infrastructure projects in the region, and ensuring their dissemination to all relevant stakeholders. 		

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
11.	Construction method, construction material and sites selection	Environment	Pollution and nuisance	<ul style="list-style-type: none"> Contractor is committed to use environmentally friendly construction methods and materials, including cement, asphalt, and other construction materials etc. Construction material shall be sourced from legalized and approved quarries. Energy saving technologies will be embedded into the Project design wherever possible. For instance, solar panels, rainwater harvesting, etc. Update of plan based on final contractor-defined estimated volumes and timing for groundwater pumping with intension of minimizing the groundwater consumption. The primary objective shall be to avoid extraction of groundwater for construction. However, use of groundwater which has been generated by dewatering of excavations can be used in construction activities. In those instances, where extraction of groundwater becomes unavoidable, contractor shall, with consent of Maha-metro and the respective Water Authority, resort to such extraction. In such instances contractor-defined estimated volumes and timing for groundwater pumping with intention of minimizing the groundwater consumption. Procedures for minimizing waste segregation, reuse, temporary storage, recycling, donation, and disposal. Selection of waste disposal service providers (transport, recycling, and disposal) based on EHS criteria (including compliance with all regulatory requirements, no documented EHS issues related to materials at operation or site facilities, and agreement to provide access for site visits to discuss EHS management). Final selection of disposal or reuse sites for extracted soils from construction and assessment and determination of truck routes from project sites to disposal or reuse site. 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> Focus will be placed on reuse of the extracted soil for enhancement of green space, waste recycle, and storm water runoff. Construction yards with aggregate crushing and screening, pre-casting, material and fuel storage and ready-mix concrete plants will be located away from habituated or ecologically sensitive areas. Locations will be decided by Maha-metro and GC before construction commencement in consultation with NMC and NMRDA. Sites for disposal of excavated soil and C&D waste (muck) will be decided by Maha-metro before start of construction in consultation with MPCB, Nagpur Municipal Corporation and NMRDA, to ensure a safe distance from residential areas, water bodies and ecologically sensitive locations as to avoid disrupting natural drainage. The muck shall be filled in the dumping site in layers and compacted mechanically. Suitable slopes will be maintained on the stockpile. Once the filling is complete, it will be protected by low walls, provided with a layer of good earth on the top and covered with vegetation. A muck disposal plan will be prepared by Contractor and approved by Maha-metro. Hazardous waste will be taken away by licensed vendors who will be responsible for due disposal at permitted sites. 		
12.	Climate Designs	Health and Safety	Natural disasters generated health and safety accidents Maintenance Cost	<ul style="list-style-type: none"> Disaster management plan will pay special attention to road drainage during any natural disaster. Other climate adaptation designs will be embedded in the final design, such as (a) Increase in capacity of storm water drainage will be made so as to deal with extreme flooding in addition to demand of future land use growth along this alignment. Increased number of pits for RWH from elevated metro to cater to flood waters and heavy rains. 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> Climate change mitigation measures shall be implemented, such as solar panels on station buildings and roofs to reduce the extensive use of grid-generated electricity supplied to the station for operation and maintenance. 		
13.	Site-specific Environmental Baseline Collection and Assessment	Environment	Benchmark of assessing project impacts	<ul style="list-style-type: none"> Prior to mobilization, contractor to collect a full set of baseline data of air, water (surface and ground), noise and vibration and soil quality. Additional investigations in areas identified as having contaminated soil or groundwater to define the degree and extent of contamination and alternatives for soil and groundwater disposal. Assessment of potentially contaminated soil at site locations where soil work and excavations will be performed to examine the site situation. If there is a reasonable likelihood of contamination, then a specific management plan that includes (a) monitoring during construction consisting of visual inspections, on-site and in-situ monitoring to detect and confirm levels of contamination (and supplemented as needed by laboratory analysis), (b) on-site temporary storage and treatment, (c) final disposal (both for water and soil), and (d) worker health and safety procedures. Assessment and site-specific measures for controlling noise, dust, and illumination during construction (for example, when working 24 hours a day). Contractor to prepare site-specific EMPs for Maha-metro to approve before mobilization, if required. Based on detailed construction work plan and associated occupational health and safety risks, strengthening the contractor health and safety management system in site-specific EMPs. Maha-metro and GC to provide EMP orientation to contractor. 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
14.	Documents Review and Information Disclosure	Environment	Unanticipated impacts management	<ul style="list-style-type: none"> With the assistance of GC, Maha-metro will review the above said data collections, surveys and pre-construction plans prepared by Contractor. Maha-metro will submit to all lenders to review the documents and disclose in a timely and meaningful manner prior to construction. 	Maha-metro	GoM
15.	Establishment of Grievance Redress Mechanism	EHS	Complaints not resolved in time	<ul style="list-style-type: none"> Grievance Redress Mechanism for workers and project affected people should be established as early as possible to function no later than ground work commencement. The GRM information and focal should be disseminated to public through the Maha-metro website or other media as approved by Maha-metro 	Maha-metro	GoM
16.	Community Liaison	Social	Complaints	<ul style="list-style-type: none"> To ensure that the GRM functions effectively for affected people on construction nuisance at ground level with well documented grievance log. Contractor to develop a community communication plan as per the construction plan, including important measures to reduce community risk, such as fence and related protection around work sites (including strength and visual protection), education and awareness signs and information, and placement of safety risks (explosive and flammable materials, generators). 	Contractor	GC / Maha-metro
Construction Phase						
17.	Construction Monitoring	EHS	Breach of legislation, EIA, EMP, Contracts Accidents	<ul style="list-style-type: none"> Contractor to collect and monitor the Ambient environmental data of air, water (surface and ground), noise & vibration, soil quality and submit monitoring reports to GC / Maha-metro on monthly basis. GC / Maha-metro to review the data compared to baseline data and urge Contractor to take immediate actions over any project generated pollution / contamination. 	Contractor / GC	Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> GC to submit monitoring reports on quarterly basis to Maha-metro. If any unanticipated EHS impacts arise during construction, implementation or operation of the Project that were not considered in the EIA / EMP, Contractor and GC to promptly inform Maha-metro of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan. Maha-metro will report to all lenders accordingly. Maha-metro to engage qualified and experienced third party monitor, if required, to verify information produced through the Project monitoring process, and facilitate the carrying out of any verification activities by such third party monitor. Maha-metro to submit the semi-annual monitoring reports (GC's and third party's) using the agreed the template to all lenders. Maha-metro to report all lenders any actual or potential breach of compliance with the measures and requirements set forth in the EMP promptly after becoming aware of the breach. 		
18.	Community Liaison	Social	Complaints	<ul style="list-style-type: none"> GRM for affected people should function effectively with well documented grievance log. Contractor will provide a minimum of two (2) weeks notification to directly affected residents, businesses and other relevant groups of the intended construction commencement date. In providing a mechanism for communication between the contractor and the community and informing the public of construction details (timing, expected impacts), Maha-metro will undertake consultations. Adaptive management that monitors, adjusts, or adds measures to reflect actual community risks. 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> • Important measures to reduce community risk, such as fence and related protection around work sites (including strength and visual protection), education and awareness signs and information, and placement of safety risks (explosive and flammable materials, generators) 		
19.	Construction Vehicle Management	Environment Social	Community disruption Accidents Reputational risk	<ul style="list-style-type: none"> • Contractor's transport vehicles and other equipment shall conform to emission standards. • Control, inspection, and documentation of trucks prior to leaving site, including removal of soil on tires. Contractor will provide a wash pit or a wheel washing and/or vehicle wheel facility at the exits from construction depots and batching plants. At such facility, high-pressure water jets will be directed at the wheels of vehicles to remove all spoil and dirt. Used water shall be collected and re-used after settling in a settling basin or tank. • Definition of allowable routes, speeds, and times (day or week). • Driver requirements and controls, including pre-work medical (and blood tests) and physical inspections, ongoing monitoring (of visual and alcohol or drug use), driver training, daily total allowable work time, and allowable deviations. • Driver contracts with clearly specified requirements and remedies for noncompliance. • Procedure for truck maintenance, including selection of service providers considering environmental aspects, application of low-Sulphur fuel, no idling of trucks, routine maintenance (including assurance of proper engine operations related to emissions and noise), and disposal of used oil and other fluids, batteries, and tires etc. 	Contractor	GC / Maha-metro
20.	Levelling of Site	Land	Surface levelling will alter the soil texture and	<ul style="list-style-type: none"> • Interim drainage system will be installed prior to construction. 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
			compactness, which will affect the infiltration and soil ecology. Also levelling will involve alteration of natural drainage	<ul style="list-style-type: none"> Where feasible, infiltration losses will be countered by installing Rainwater Harvesting pits away from construction site 		
21.	Mechanical piling	Noise	During mechanical piling operations, noise will be generated which may go up to 88-90 dB (A) at a distance of 5m	<ul style="list-style-type: none"> At sensitive locations, auger piling will be carried out in place of mechanical (by driven) piling which will generate less noise than mechanical piling (around 70-75 dB(A)). Also 2m high barricade of GI sheet will be installed on all sides of piling operations. This could effectively cut down noise levels by 10-15 dB (A). Piling operations will be restricted during day time hours only. Efforts should be made to keep the noise levels under control by appropriate noise attenuation and adopting employee safety measures. Use of low-noise equipment and ensuring good maintenance, and trying to avoid using high-noise equipment simultaneously at the same section. Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. Information dissemination to local residents and shop owners about the nature and duration of intended activities including the construction method, probable effects, safety measures and precautions prior to commencement and kept updated as to changes in the management and mitigation plan. Enclose especially noisy activities if above the noise limits and employ transportable noise screens between noise sources and identified noise sensitive areas for the duration of noisy construction activities. Monitoring required during construction, including field observations and measurements. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Vibration	Pile driving for viaduct piers and buildings driving generate vibrations	<ul style="list-style-type: none"> • Cast-in-situ piling will be deployed at locations with sensitive receptors so as to reduce vibration. • At pre-identified receptors comprising educational, medical and physical cultural buildings and other fragile buildings located within recommended screening distance of 62m (for cat. 2) on either side of each alignment, the contractor shall implement the pre-construction structural integrity inspections, if required. • Contractor to ensure that vibration levels will not exceed 5.0 mm/s • Information dissemination to local residents and shop owners about the nature and duration of intended activities including the construction method, probable effects, quality control measures and precautions prior to commencement and kept updated as to changes in the management and mitigation plan. • Monitoring during construction including field observations and measurements. 	Contractor	GC / Maha-metro
		Physical Cultural Resources	Historic and Cultural Value Loss Conflicts with community	<ul style="list-style-type: none"> • On-site training shall be provided to site workers if any historical or cultural artefact is noticed during piling. • The work shall be immediately stopped and information will be delivered to the higher authority. • All workers will undergo a briefing with the Archaeology Department to ensure safeguarding of heritage resource and / or cultural / religious practices. • A proof of compliance to this requirement to include the name of participants and date and location of briefing will form part of the monthly report to Maha-metro. • The project will implement, where required, chance finds procedure contained in ESS8 of WBG ESF. It includes requirement to notify relevant authorities; to fence-off the area of finds or sites to avoid further disturbance; to conduct an assessment of found objects or sites by cultural heritage experts; to identify and implement 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				actions consistent with the requirements of this ESS and national law; and to train project personnel and project workers on chance find procedures.		
		Health & Safety	Noise and vibration generated during piling will affect the health and safety of the workers	<ul style="list-style-type: none"> • Auger piling methods will be used to reduce the impacts of noise. 2m tall screens of GI sheets will be installed between source (pile driver) and receptors (workers & nearby populations). • To reduce the harmful effects, personnel working at high noise levels would be provided with noise protective gears such as ear muffers, sound barriers, job rotations per occupational exposure limits etc. • Procedure to receive, evaluate, and compensate (if applicable) damages due to construction and establishment of financial resources to cover this expense. 	Contractor	GC / Maha-metro
22.	Excavation	Air	Excavation will result into fugitive dust generation	<ul style="list-style-type: none"> • Fugitive dust could be controlled using water sprinkling. Water sprinkling to be carried out by Contract at regular interval (to be mutually decided by the contractor and Maha-metro). Surface runoff, wastewater from construction sites, construction yards and treated water will be used. • Imposition of speed controls for vehicles on unpaved site roads. 10-30 kmph is the recommended limit. • Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction sites. Used water shall be collected and re-used after settling in a settling basin or tank. Water for sprinkling and tire washing will be sourced from treated effluent from ETPs located nearby, seawater or surface runoff; use of municipal treated water shall be minimized. • Excavation machinery will be topped up by low-Sulphur fuel. 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Noise and Vibration	Nuisance	<ul style="list-style-type: none"> • Efforts should be made to keep the noise levels under control by appropriate noise attenuation and adopting employee safety measures. • Use of low-noise equipment and ensuring good maintenance, and trying to avoid using high-noise equipment simultaneously at the same section. • Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. • Information dissemination to local residents and shop owners about the nature and duration of intended activities including the construction method, probable effects, quality control measures and precautions prior to commencement and kept updated as to changes in the management and mitigation plan. • Enclose especially noisy activities if above the noise limits and employ transportable noise screens between noise sources and identified noise sensitive areas for the duration of noisy construction activities. • Monitoring required during construction, including field observations and measurements. • Construction activities shall be scheduled such that demolition, earthmoving and ground-impacting operations do not occur in the same time period. At locations, where the alignment is close to sensitive structures, the contractor shall prepare a monitoring scheme prior to construction at such locations. In case of sensitive structures, vibration mitigation measures will be implemented. • Vibratory rollers near sensitive receptors shall be avoided. • The contractor should prepare a mitigation plan and implement the same during the final design and construction phase of the project. This scheme shall include: 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> a. Monitoring requirements for vibrations at sensitive receptors during the construction period; Pre-construction structural integrity inspections of sensitive structures, if required. b. Information dissemination about the construction method, probable effects, quality control measures and precautions to be used. c. vibration monitoring plan during final design and the implementation of a compliance monitoring program during construction • Contractor to ensure that vibration levels at receptors comprising educational, medical and physical cultural buildings and other fragile buildings located within recommended screening distance of 62m (for cat. 2) on either side of each alignment will not exceed 5.0 mm/s. 		
		Surface water	Dumping of construction waste like concrete, bricks, waste material etc. cause surface water pollution.	<ul style="list-style-type: none"> • Proper drainage systems using contour information will be constructed around active and & large construction sites. After settling, it shall be discharged into public sewers; it will be treated by municipal agencies to Environment Protection Rules (EPR) 1986 Schedule VI standards of discharge of general effluents into surface water. • To avoid water pollution and soil erosion due to flooding, earthwork will be limited during monsoon season. 	Contractor	GC / Mahametro
		Groundwater	Dewatering (if done) will adversely affect the groundwater regime	<ul style="list-style-type: none"> • Proper drainage systems using contour information will be constructed around active and & large construction sites. After settling, it shall be discharged into public sewers; it will be treated by municipal agencies to Environment Protection Rules (EPR) 1986 Schedule VI standards of discharge of general effluents into surface water. • To avoid water pollution and soil erosion due to flooding, earthwork will be limited during monsoon season. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Soil	Excavation will adversely affect the soil	<ul style="list-style-type: none"> Soil erosion by runoff will be controlled by installing proper drainage systems using contour information It is suggested to avoid bringing soil from outside the project boundary and to use the excavated mounds for filling low lying area where it is necessary. The topsoil should be preserved (by storing it at appropriate places) so that same can be restored after completion of work. 	Contractor	GC / Maha-metro
		Physical Cultural Resources	Historic and cultural value loss Conflicts with community	<ul style="list-style-type: none"> If any artefacts of archaeological importance are noticed, work should be stopped and information to be given to the higher authorities. All workers will undergo a briefing with the Archaeology Department to ensure safeguarding of heritage resource and cultural/religious practices. A proof of compliance to this requirement to include the name of participants and date and location of briefing will form part of the monthly report to Maha-metro. The project will implement, where required, chance finds procedure contained in ESS8 of WBG ESF. It includes requirement to notify relevant authorities; to fence-off the area of finds or sites to avoid further disturbance; to conduct an assessment of found objects or sites by cultural heritage experts; to identify and implement actions consistent with the requirements of this ESS and national law; and to train project personnel and project workers on chance find procedures 	Contractor	GC / Maha-metro
		Health and Safety	Accidents	<ul style="list-style-type: none"> To specify the number and length of shifts for each worker. Where a site boundary adjoins roads, streets or other areas accessible to the public, hoarding should be provided along the entire length except for a site entrance or exit. If there is a reasonable likelihood of contamination, then a specific management plan that includes (a) monitoring 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				during construction consisting of visual inspections, on-site and in-situ monitoring to detect and confirm levels of contamination (and supplemented as needed by laboratory analysis), (b) on-site temporary storage and treatment, (c) final disposal (both for water and soil), and (d) worker health and safety procedures.		
		Aesthetics	Temporary loss of aesthetics value due to excavation and related activities.	<ul style="list-style-type: none"> The excavation sites will be barricaded on all sides using GI sheets. Hauling will be carried out in non-peak hours. Aesthetic value of the site will be restored after completion of the works. 	Contractor	GC / Mahametro
23.	Hauling of excavated material	Air	During transportation of excavated material, fugitive dust will be generated from two sources, (1) from re-suspension of dust from road surface, (2) from the movement of air, against the excavated material being hauled	<ul style="list-style-type: none"> The traffic management plan will be stringently implemented with regular monitoring and inspections. Trucks / dumpers carrying the excavated material will be covered using tarpaulin/similar covering materials. Sprinkling of water should be carried out. Truck tyres will be washed to excess remove soil clinging to it. Contractor will provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from construction depots and batching plants. At such facility, high-pressure water jets will be directed at the wheels of vehicles to remove all spoil and dirt. Used water shall be collected and re-used after settling in a settling basin or tank. Water for sprinkling and tire washing will be sourced from treated effluent from ETPs located nearby, seawater or surface runoff; use of municipal treated water shall be minimized. Groundwater will not be used in construction or operation of the project. Haul roads will be kept in good state of maintenance. 	Contractor	GC / Mahametro / Traffic Police Dept.
		Noise	Dumper trucks carrying excavated material will result into high noise (typically in excess of 85 dB (A) at one m	<ul style="list-style-type: none"> The routing, timing and logistics of the haul truck movement should be planned to have minimal impacts on noise level. The route selection will avoid any sensitive receptors. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
			distance, or 57 dB (A) at 10 m distance). The adverse impacts of noise will be most intense in the residential / urban areas.	<ul style="list-style-type: none"> • Efforts should be made to keep the noise levels under control by appropriate noise attenuation and adopting employee safety measures. • Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. • Information dissemination to local residents and shop owners about the nature and duration of intended activities including the construction method, probable effects, quality control measures and precautions prior to commencement and kept updated as to changes in the management and mitigation plan. • Enclose especially noisy activities if above the noise limits and employ transportable noise screens between noise sources and identified noise sensitive areas for the duration of noisy construction activities. • Monitoring required during construction, including field observations and measurements. 		
		Social	Incessant movement of trucks could create social issues.	<ul style="list-style-type: none"> • The local community has to be taken into confidence before the construction commences. Their advice must be taken and incorporated in decision making. • GRM for affected people should function effectively with grievance log well documented. 	Contractor	GC / Maha-metro
		Health & Safety	The movement of trucks will increase the traffic risk of the commuters.	<ul style="list-style-type: none"> • The routing, timing and logistics of the haul truck movement should be planned to have minimal impact on occupational and community health and safety. 	Contractor	GC / Maha-metro
24.	Dumping of excavated materials	Air	The dumping operation of excavated material will generate fugitive dust in the nearby areas	<ul style="list-style-type: none"> • Site of dumping will be selected in consultation with authorities. • The disposal plan will be stringently implemented with site monitoring and inspections. • It will be located outside of urban habitation. • Sprinkling of water should be carried out. Water shall be sourced from surface runoff, wastewater from 	Contractor	Maha-metro / NMRDA / MPCB

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				construction sites, and construction yards. Use of municipal treated water shall be minimized.		
		Soil	Dumping may increase the height of the land and affect the natural drainage pattern of the area	<ul style="list-style-type: none"> The dumping will be done in pre-designated low lying areas identified by NMRDA/NMC, MPCB, and Mahametro for this specific purpose. The disposal plan will be stringently implemented with regular monitoring and inspections. Field inspections, monitoring, and documentation of dumping excavated materials. 	Contractor	GC / Mahametro
25.	Traffic diversion	Air	The under construction areas will be restricted for human and vehicular movements. This will result in detouring of vehicles and/or pedestrians, on the project line which passes through busy urban areas. This may also result into traffic congestion and air pollution from stagnated vehicles in urban areas. Primary pollutants will be NO _x , CO, NMHC, and VOCs.	<ul style="list-style-type: none"> Permission from Nagpur Traffic Police will be sought before commencement of work. Detours will be properly planned and enacted during non-peak hours only, if possible. Traffic marshals will be posted near such detours. Proper signage has to be posted informing motorists about detours following IRC norms. Adaptive management with field inspections and monitoring during plan implementation and adjustments, as needed, to reflect actual traffic congestion or related issues The Contractor will discuss and coordinate the implementation of the traffic re-routing scheme particularly at station area when it starts the cut and cover activities and the hauling and disposal of excavated materials to the project sites. 	Contractor	GC / Mahametro / Traffic Police Dept.
		Noise	Barricading & detouring may result into traffic congestion in the urban areas. This will result into (a) noise from vehicular movement and (b)	<ul style="list-style-type: none"> Permission from Nagpur Traffic police will be sought before commencement of work. Detours will be properly planned and enacted during non-peak hours only, if possible. Traffic marshals could be posted near busy intersections, to oversee the smooth flow of traffic. Detour route selection to avoid sensitive receptors to noise. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
			honking noise due to congestion.	<ul style="list-style-type: none"> Adaptive management with field inspections and monitoring during plan implementation and adjustments, as needed, to reflect actual traffic congestion or related issues. 		
		Social	Traffic diversion (esp. for public transport) will create inconvenience	<ul style="list-style-type: none"> Implement the traffic management plan. Plans will be made to spare traffic diversion during peak hours (morning and evening peaks). Also separate arrangements for bus, auto and taxi parking bays will be made. Street furniture for pedestrians will be provided wherever possible. Real-time communication to public prior to site-specific work (for example, via signs, radio, and newspaper) and during key periods of traffic interference or peak traffic. Adaptive management with field inspections and monitoring during plan implementation and adjustments, as needed, to reflect actual traffic congestion or related issues. 	Contractor	GC / Maha-metro
		Resource consumption	Detouring will increase the road length to be travelled by a car, thus, increasing the overall fuel consumption.	<ul style="list-style-type: none"> The detour will be planned to be optimum in terms of road length. The faster completion of works will also tend to reduce enhanced fuel consumption. 	Contractor	GC / Maha-metro
26.	Restricted pedestrian movement	Social	Restricted pedestrian movement will cause social uproar, esp. in people living near metro stations	<ul style="list-style-type: none"> Safe passage for pedestrians with proper sunshade / fall protection and signage will be planned. Public consensus will be built. Representatives of non-governmental organisations and volunteers from local communities at respective sections of the project shall be invited to participate in meetings with Maha-metro, GC, and Traffic Police where joint decision on diversion measures will be arrived at. GRM for affected people should function effectively with grievance log well documented. 	Contractor	GC / Maha-metro
		Health & Safety	Movement though constricted space may	<ul style="list-style-type: none"> Movement through construction area shall be prohibited. 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
			cause potential health & safety issues amongst pedestrians	<ul style="list-style-type: none"> Safe passage for pedestrians with proper fall protection and signage will be planned. This applies to movement along existing roads on which elevated metro is constructed. It is clarified that their movement through construction areas shall be prohibited. 		
27.	C&D waste (muck) generation & disposal (incl. spent drill fluid and polymer slurry)	Surface water	Muck generated including spent polymer slurry from auger drilling operations will drain with surface runoff and pollute nearby water bodies	<ul style="list-style-type: none"> Muck disposal plan will be stringently implemented with regular monitoring and inspections. The construction sites will be provided with garland drains with intercepting pits to trap silt & muck. Muck will be stored in lined tanks / ponds. Such tank/ ponds could be covered during monsoon to control runoff. The temporary muck storage areas will be maintained by the Contractor at all times until the excavate is re-utilized for backfilling or disposed of as directed by Employer. Dust control activities will continue even during any work stoppage Transportation of muck will be scheduled by time and route to minimize air pollution in habitat areas. 	Contractor	GC / Maha-metro
		Groundwater	Muck, spent polymer slurry & drill fluids may settle down from pond / tanks and will affect groundwater	<ul style="list-style-type: none"> The tanks / ponds holding muck will be lined to prevent infiltration into groundwater. It will be passed through settling chambers and discharged into public sewers; it will be treated by municipal agencies to Environment Protection Rules (EPR) 1986 Schedule VI standards of discharge of general effluents into surface water. Upon discharge of general wastewater into municipal sewers by Maha-metro, the municipal agencies are required by law to treat it appropriately before disposal. Maha-metro shall duly consult with the agencies before start of construction. Groundwater quality monitoring before, during and after the use of muck tanks/ponds. 	Contractor	GC / Maha-metro
		Aesthetics	Muck generation will create an aesthetic issue	<ul style="list-style-type: none"> The construction site will be covered from all sides to reduce visual impacts. 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
28.	Steel structure preparation	Soil	Steel structure preparation will create steel scraps	<ul style="list-style-type: none"> Steel scrap will be collected, sorted by diameter and sold to scrap dealers at regular intervals. 	Contractor	GC / Mahametro
		Health & safety	Bar bending & other activities (inc. working at heights) might pose a H&S threat to workers	<ul style="list-style-type: none"> Workers will be provided appropriate hand gloves and other personal protective equipment (PPE) such as fall protection when working at height. Skilled workers working at height or doing hot work will be required to seek permission from site 	Contractor	GC / Mahametro
29.	Stacking & warehousing of raw material	Surface water	Washed out raw material could pose serious threat to surface water bodies	<ul style="list-style-type: none"> Small dykes and garlanding drains along the periphery of the yard and ploy boundary could be constructed. This will control runoff and washing out of finer material. 	Contractor	GC / Mahametro
		Soil	Spillage of materials / mix products on the ground could pollute soil	<ul style="list-style-type: none"> Proper care will be taken. Such spills will be cleared by scraping and disposing the products as road sub-grade material. 	Contractor	GC / Mahametro
		Health & Safety	Fine products like cement/ silt/ sand could cause harm to respiratory system.	<ul style="list-style-type: none"> Cement and sand will be stacked under tarpaulin and secured by GI sheet barricading (working & wind break). Shorter work shift and daily medical check-ups of workers will be implemented. Dust filters atop cement silos, wet suppression for aggregate crushing and screening will be employed 	Contractor	GC / Mahametro
		Aesthetics	Stacking of raw material will cause aesthetic issues for residential areas located nearby	<ul style="list-style-type: none"> The height of walls between the residential area and RM yard / construction area will be raised using GI sheets. 	Contractor	GC / Mahametro
30.	RCC pouring (using concrete pump)	Noise	RCC pouring using concrete pump will generate low frequency rumbling noise. This will be more perceived and irritating in residential areas.	<ul style="list-style-type: none"> Timing of using RCC pumps will be planned and specified by the Engineer. RCC pumps will be covered from all sides. Bends and excessive head will be avoided. Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Soil	Spillage from concrete pouring may contaminate soil	<ul style="list-style-type: none"> The spoils from pouring concrete will be collected and reused as sub-grade material in road construction. 	Contractor	GC / Mahametro
		Aesthetics	Spoils from concrete pouring will create unpleasant looking visuals	<ul style="list-style-type: none"> After each pouring cycle, the spoils will be manually collected and reused as sub-grade material in road construction. 	Contractor	GC / Mahametro
31.	Setting of concrete (using needle vibrator)	Noise	Needle vibrators generate low frequency noise when dipped in concrete and high frequency noise when raised. Sound level varies between 82-93 dB (A).	<ul style="list-style-type: none"> If the consistency of concrete could be altered, the need for use of vibrator (esp. in low temperature & low thickness casting) could be reduced. Damping could be used to reduce high frequency noise, and thereby reducing the noise levels. Workers should be provided with suitable PPEs. Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. 	Contractor	GC / Mahametro
		Soil	During setting, spillage from cast could take place.	<ul style="list-style-type: none"> The spoils from pouring concrete will be collected and reused as sub-grade material in road construction. 	Contractor	GC / Mahametro
32.	Curing of concrete (use of water)	Surface water	Curing water will drain to the low lying areas and pollute water courses	<ul style="list-style-type: none"> Garland drainage is proposed to be constructed around the construction yard. This will intercept the runoff generated from site. After settling it shall be discharged into public sewers; it will be treated by municipal agencies to Environment Protection Rules (EPR) 1986 Schedule VI standards of discharge of general effluents into surface water. Curing needs will be met from municipal supply, water resulting from dewatering during piling and surface runoff water. Rainwater harvesting (as a compensatory measure) will be practiced. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Groundwater	Curing water will drain to the low lying areas and pollute water courses	<ul style="list-style-type: none"> Excess curing water shall be channelled properly in to the nearest public drain. 	Contractor	GC / Maha-metro
		Aesthetics	Curing will create water impounding and may lead to vector propagation	<ul style="list-style-type: none"> Garlanding drain will be constructed around the construction area. The curing water impounded will be reused for curing. 	Contractor	GC / Maha-metro
33.	Use of Crane & Launchers	Noise	Operation of launchers and crane will generate noise which in times may go up to 85-90 dB (A). Legris & Poulin has found that the average daily noise exposure was approx. 84 to 99 dB (A) for heavy equipment, and 74 to 97 dB (A) for the crane operators.	<ul style="list-style-type: none"> The sensitive receptors (workers & external parties, if applicable) have to be isolated from heavy construction noise generated. This is possible by erecting reinforced 2 m tall GI sheet barrier around the area where heavy construction works is undertaken. Workers working inside or near construction equipment should be provided with proper PPEs like ear plugs / muffs complying with IS 4869. Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. Information dissemination to local residents and shop owners about the nature and duration of intended activities including the construction method, probable effects, quality control measures and precautions prior to commencement and kept updated as to changes in the management and mitigation plan. Enclose especially noisy activities if above the noise limits and employ transportable noise screens between noise sources and identified noise sensitive areas for the duration of noisy construction activities. 	Contractor	GC / Maha-metro
		Health & Safety	Cranes and launchers are a major safety concern.	<ul style="list-style-type: none"> As per Maha-metro's SHE Manual, operation of launchers and cranes should be only done under the strict supervision of a qualified engineer and a safety supervisor. Only qualified & trained crane/ launcher operators should be allowed. Proper examination of 	Contractor	GC / Maha-metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				crane, launchers, labours & operators must take place before commencement of work.		
34.	Construction of labour camp(s) and associated environmental issues	Surface water	Sewage from labour camps may be discharged into open slopes thus contaminating surface water	<ul style="list-style-type: none"> Labour camps will be constructed in semi urban set-up or outskirts of the city. Sewage shall be discharged into public sewers; it will be treated by municipal agencies to Environment Protection Rules (EPR) 1986 Schedule VI standards of discharge of general effluents into surface water. Alternately, the contractor shall install small STP/Bio-digester for treatment of sewage from workers' camps. This treated water shall be used for gardening & sprinkling on roads. 	Contractor	GC / Mahametro
		Groundwater	Surface water on flat terrain could percolate and contaminate groundwater.	<ul style="list-style-type: none"> Contractor to collect the groundwater baseline data prior to construction. Disposal in compliance with applicable regulatory requirements. Groundwater quality monitoring. Water abstracted must be measured / recorded periodically. After Construction, Contractor will conduct groundwater analysis and be obliged to reinstate the used sites no worse than the conditions of pre-construction. 	Contractor	GC / Mahametro
		Soil	Solid waste generated from the labour camps will cause soil pollution	<ul style="list-style-type: none"> Contractor to collect the soil baseline data prior to construction. Municipal solid waste will be collected and taken away and disposed by municipality. Solid waste will have to be disposed in compliance with Municipal Solid Waste (Management & Handling) Rules, 2000, as amended to date. After Construction, Contractor will conduct soil analysis and be obliged to reinstate the used sites no worse than the conditions of pre-construction. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Social	Influx of non-local labours will create a social issue	<ul style="list-style-type: none"> Mixing of skilled non-local labours with local unskilled people will reduce social frictions. To avoid labor influx risk, sensitizing of local community and the non-local workers separately as well as jointly will be done regularly. 	Contractor	GC / Mahametro
		Health & safety	Living in congested condition, make-shift temporary arrangement; the labours are prone to diseases.	<ul style="list-style-type: none"> Regular counselling, medical checkups and treatment at separate clinics, coordination with local health authorities will be conducted. As per the Building & Other Construction Workers (BOCW) (Regulation of Employment and Conditions of Service) Act, 1996 the employer (contractor) is liable to arrange for sanitation, health care facilities of labourers, free of charge. Labour camps will be in full compliance of BOCW Act. Covid-19 protocols for construction forming part of the Environmental Social Health and Safety Requirements shall be fine-tuned to be adopted for labour camps; camp residents shall be trained and informed of precautions such as social distancing, sanitizing, avoiding groups; arrangements for thermal scanners; provision of sanitisers, face masks, gloves; record of Covid-19 hospitals; protected ambulances at camp; daily disinfection of site, equipment and camp. 	Contractor	GC / Mahametro
		Resources	Labours will consume resources like wood for cooking	<ul style="list-style-type: none"> Liquid Petroleum Gas (LPG) cylinders will be made available free of cost to the labourers by the Contractor. Labour camps are provided with canteen systems. They shall be provided with treated water suitable for drinking, bathing and other needs. 	Contractor	GC / Mahametro
35.	Loading /unloading of construction material	Air	Loading & unloading of construction material will generate fugitive dust	<ul style="list-style-type: none"> The traffic management plan will be stringently implemented with regular monitoring and inspections. The trucks/dumpers carrying the material will be covered using tarpaulin/similar covering materials. Fugitive dust could be controlled using water sprinkling. Contractors should carry out water sprinkling. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> Truck tyres will be washed to excess remove soil clinging to it. Contractor will provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from construction depots and batching plants. At such facility, high-pressure water jets will be directed at the wheels of vehicles to remove all spoil and dirt. Used water shall be collected and re-used after settling in a settling basin or tank. Water for sprinkling and tyre washing will be sourced from treated effluent from ETPs located nearby, or surface runoff. 		
		Noise	Loading & unloading of construction material will generate noise	<ul style="list-style-type: none"> The RM storage yard will be separately built and enclosed from all sides. This will reduce noise generation at site. Concrete preparation will only take place in casting yards (away from habitation). Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. Information dissemination to local residents and shop owners about the nature and duration of intended activities including the construction method, probable effects, quality control measures and precautions prior to commencement and kept updated as to changes in the management and mitigation plan. Enclose especially noisy activities if above the noise limits and employ transportable noise screens between noise sources and identified noise sensitive areas for the duration of noisy construction activities. 	Contractor	GC / Mahametro
		Health & safety	Fugitive dust and noise generation will have potential health & Safety implications.	<ul style="list-style-type: none"> Cement and sand will be stacked under tarpaulin and secured by GI sheet barricading (working & wind break). Shorter work shifts and regular health check-ups will be implemented. The RM storage yard will be separately built and enclosed from all sides. The worker will be 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				provided with suitable PPEs. Also they will be trained and encouraged in using PPEs.		
36.	Use of batching plant	Air	Loading & unloading of construction material into batching plant will generate fugitive dust	<ul style="list-style-type: none"> High GI sheet screens and water sprinkling will be employed. Batching plant / casting yard shall be barricaded and made as a compulsory PPE zone. This will effectively reduce the fugitive dust generation. 	Contractor	GC / Mahametro
		Noise	Operation of batching plant will generate noise	<ul style="list-style-type: none"> GI sheet barricading around batching area and worker PPE like ear muffs will be used. Batching plant / casting yard shall be barricaded and made as a compulsory PPE zone. This will reduce the impacts of noise generation. Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. 	Contractor	GC / Mahametro
		Soil and Groundwater	Runoff of waste can contaminate soil and groundwater	<ul style="list-style-type: none"> Contractor to collect baseline soil and groundwater quality data prior to operate the plants. Municipal water will be used. In view of fragile groundwater status, extraction will be avoided. The construction sites will be provided with drains with intercepting pits in which the cement and sand will settle. After settling it shall be discharged into public sewers; it will be treated by municipal agencies to Environment Protection Rules (EPR) 1986 Schedule VI standards of discharge of general effluents into surface water. Soil and Groundwater quality monitoring. After Construction, Contractor will conduct soil and groundwater analysis and be obliged to reinstate the used sites no worse than the conditions of pre-construction. 	Contractor	GC / Mahametro
		Hazardous waste	Health impacts and soil and groundwater pollution from hazardous water at batching/casting yards	<ul style="list-style-type: none"> The use and storage of hazardous materials at the casting yard and batching plant should adhere to SPCB requirements. The transport, handling and storage of hazardous waste will be done in accordance with the provisions of Hazardous and Other Wastes (Management and 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<p>Transboundary Movement) Amendment Rules 2019. Hazardous wastes from construction activity and equipment are labeled, recorded, stored in impermeable containment and for periods not exceeding mandated periods and in a manner suitable for handling storage and transport.</p> <ul style="list-style-type: none"> • The contractor shall maintain a record of sale, transfer, storage of hazardous waste and make these records available for inspection. • The contractor shall get Authorized Recyclers to transport and dispose Hazardous Waste. • Proper collection and storage facilities will be provided especially for hazardous waste. 		
		Resources	<p>If the batching plant will get its power from DG sets, substantial diesel will be consumed. (A 30 m³/hr. batching plant will require approx. 60 KW/hr. (or, approx. 75 KVA, assuming PF = 0.8) energy. In most cases the Contractor has used DG sets (from 100 – 250 kVA) for batching plant & ancillary facilities. Thus, the diesel req. will range from 30 - 45L/hr, at 100% load)</p>	<ul style="list-style-type: none"> • As a primary source, power from the grid shall be used with prior permission from power supply company obtained by the Contractor. • DG sets, if used, should: (a) conform to height of stack norms as per CPCB rules; (b) conform to emission norms as per E (P) Act, 1986; (c) noise level at 1 m distance from enclosure should not be >75 dB(A). • The required permissions from local Environmental Authorities/Pollution Control Board/ CEIG or any other relevant Authority shall be obtained by the Contractor for using DG sets for power supply. • Diesel storage if done beyond threshold limit (1000 L) permission should be obtained from Chief Controller of Explosives. Diesel should be stored on pukka platforms and spillages should be avoided. • Refer to Activity 42 “Use of DG sets” and Activity 44 “Storage of Diesel” for further measures. 	Contractor	GC / Mahametro
37.		Groundwater	Casting will require use of water	<ul style="list-style-type: none"> • Municipal water will be used. In view of fragile groundwater status, extraction will be avoided. The 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
	Casting of segments and I-beams			<p>construction sites will be provided with drains with intercepting pits in which the cement and sand will settle. After settling it shall be discharged into public sewers; it will be treated by municipal agencies to Environment Protection Rules (EPR) 1986 Schedule VI standards of discharge of general effluents into surface water.</p> <ul style="list-style-type: none"> • Groundwater quality monitoring. 		
		Resources	Casting (incl. operation of gantry and hydraulic pre-stressing units) will consume lot of energy	<ul style="list-style-type: none"> • Pre-stressing and casting are basic requirements. However, whenever possible of the power should be drawn from approved lines, not from DG sets. 	Contractor	GC / Mahametro
38.	Curing of segments & I-beams	Groundwater	Curing will require a significant amount of water	<ul style="list-style-type: none"> • Garland drainage is proposed to be constructed around the construction yard. This will intercept the runoff generated from site. Stagnation of water (and resultant vector propagation) should be avoided. • Groundwater quality monitoring. • After precipitation, it shall be discharged into public sewers; it will be treated by municipal agencies to EPR 1986 standards of discharge of general effluents into surface water. • Groundwater will not be used. Water will be sourced from municipal supply, surface runoff or water from dewatering. 	Contractor	GC / Mahametro
39.	Hauling of segments to site	Air	During transportation of segments, fugitive dust will be generated from re-suspension of dust from road surface. Plus, there will be air emission from trucks	<ul style="list-style-type: none"> • The traffic management plan will be stringently implemented with regular monitoring and inspections. • Sprinkling of water should be carried out. • Truck tyres will be washed to excess remove soil clinging to it. Contractor will provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from construction depots and batching plants. At such facility, high-pressure water jets will be directed at the wheels of vehicles to remove all spoil and dirt. Used water shall be collected and re-used after settling in a settling basin or tank. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> Water for sprinkling and tire washing will be sourced from treated effluent from ETPs located nearby, or surface runoff. Haul roads will be kept in good state of maintenance. 		
		Noise	Trucks carrying segments will result into high noise (typically in excess of 85 dB(A) at 1 m distance, or 57 dB(A) at 10 m distance). The adverse impacts of noise will be most intense in the residential/urban areas	<ul style="list-style-type: none"> The routing, timing and logistics of the haul truck movement should be planned to have minimal impacts on noise level. The route selection will avoid any sensitive receptors. Efforts should be made to keep the noise levels under control by appropriate noise attenuation and adopting employee safety measures. Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. Information dissemination to local residents and shop owners about the nature and duration of intended activities including the construction method, probable effects, quality control measures and precautions prior to commencement and kept updated as to changes in the management and mitigation plan. Enclose especially noisy activities if above the noise limits and employ transportable noise screens between noise sources and identified noise sensitive areas for the duration of noisy construction activities. Monitoring required during construction, including field observations and measurements. 	Contractor	GC / Mahametro
		Social	Incessant movement of trucks could create social issues	<ul style="list-style-type: none"> The local community has to be taken into confidence before the construction commences. Their advice has to be taken and incorporated in decision making. GRM for affected people should function effectively with well documented grievance log. 	Contractor	GC / Mahametro
		Health & safety	The movement of trucks will increase the traffic risk of the commuters	<ul style="list-style-type: none"> The routing, timing and logistics of the haul truck movement will be planned to have minimal impacts on occupational and community health and safety. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Aesthetics	Movement of trucks will create an aesthetic problem	<ul style="list-style-type: none"> Proper housekeeping activities have to be undertaken near the casting yard and nearby areas. 	Contractor	GC / Mahametro
40.	Use of DG sets	Air	Emission of NO _x , SO _x , CO, PM ₁₀ , PM _{2.5} from DG sets will create air pollution problems	<ul style="list-style-type: none"> Primary power source will be power distribution company; DG sets will be used only for power back-ups for stations. The required permissions from local Environmental Authorities / MPCB or any other relevant Authority shall be obtained by the Contractor if using DG sets for power supply. DG sets compliant with CPCB norms will be used. Specification no. GSR 520(E) dt. 1-7-2003 for DG sets rating < 800 KW, and GSR 489(E) dt. 09-07-2002 for DG sets > 800 KW under E (P) Rules, 1986. Stack height of DG sets will be as per CPCB requirement [stack ht. = 0.2*(rating in kVA)0.5] Stack monitoring of the criteria pollutants will be conducted monthly, if the DG set is operated regularly. Compliance monitoring will be done to the regularly and check the monitoring instruments. Fuels used for DG will be High Speed Diesel with low-sulfur content. 	Contractor	GC / Mahametro
		Noise & Vibration	Noise & vibration will be generated from the use of DG sets	<ul style="list-style-type: none"> DG sets compliant with CPCB norms will be used. Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. Monitoring required during construction, including field observations and measurements. DG sets will be enclosed type, with noise levels approx. 75 dB (A) at a distance of 1m in compliance with GSR 371(E) dt. 17-05-2002. Noise will be controlled using acoustic enclosure. The DG sets will be mounted on damping skids, which will reduce the vibration generated from DG sets. 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Resources	DG sets will consume Diesel (and in effect reduce the levels of a non-renewable resource)	<ul style="list-style-type: none"> DG sets should always be use as a power back up, and not the primary sources of power. This should be made mandatory for all Contractors. Refer to Activity 42 “Storage of Diesel” for further measures. 	Contractor	GC / Mahametro
		Aesthetics	Operation of DG sets will cause an aesthetic issue	<ul style="list-style-type: none"> Enclosures will be used to keep them off from public views. PM content of DG sets smoke will be as pert the CPCB norms, thus the DG will emit dark smokes only during start-up & shut-down (b) Noise will be controlled using acoustic enclosure. 	Contractor	GC / Mahametro
41.	All Construction Activities	Environment	Construction and Demolition (C&D) waste results from land clearing, excavation, construction, demolition, remodelling and repair of structures, roads and utilities	<ul style="list-style-type: none"> Records of movement and loading/unloading of C&D waste and records of waste loaded by vendors. C&D waste will be reused/recycled as it has the potential to save natural resources (stone, river sand, soil etc.) and energy. C&D waste generated from metro construction has potential use after processing and grading. The contractor will segregate and temporarily store the C&D waste till the vendor takes it away for recycling and disposal at authorized facilities. Contractor will adhere with the C&D Waste Management Rules. 	Contractor	GC / Mahametro
		Occupational Health and Safety	Accidents All parties’ reputation	<ul style="list-style-type: none"> Worker safety is important on all construction projects. It is important to consider the effects of staffing on worker safety and to provide appropriate training in safety awareness for all labour. The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A) 	Contractor	GC / Mahametro
42.	Storage of Diesel	Groundwater	Diesel spillage (from underground or above	<ul style="list-style-type: none"> Before it percolates into the groundwater, contaminated runoff water can be run through adsorbents such as 	Contractor	GC / Mahametro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Health & safety	ground storage facility) will affect groundwater quality adversely	<p>polymer slurry to remove the diesel. The diesel will be quickly collected into steel trays and disposed to authorized recyclers.</p> <ul style="list-style-type: none"> All bulk diesel tanks shall be properly supported in an elevated position to facilitate gravity discharge. Spillage will be controlled using methods mentioned in the environmental contingency plan, to be included in the emergency response plan. Groundwater quality monitoring before installation of the tanks and after demobilization. 		
			Storage of Diesel will attract the provisions of Hazardous Chemicals (Management & Handling) Rules and Petroleum Rules; as amended to date. It could cause serious damage to health & safety of workers / property if ignited	<ul style="list-style-type: none"> Proper onsite emergency plan will be prepared and will be approved through Maha-metro. If the diesel storage crosses the threshold limits permissions, proper fire protection norms have to be undertaken as per National Building Code, 2005 (if building) / Oil Industry Safety Directorate Standard 117 (if installation). 	Contractor	GC / Maha-metro
43.	Cleanup Operations, Restoration and Rehabilitation	Environment	Aesthetics	<ul style="list-style-type: none"> The clean-up and restoration operations are to be implemented by the Contractor prior to demobilization. All spaces excavated and not occupied by the foundation or other permanent works shall be refilled with earth up to surface of surrounding ground. 	Contractor	GC / Maha-metro
Operation Phase						
44.	Operation of metro trains	Noise and Vibration	The most significant source of noise will be rolling noise from contact between wheel and rail including noise from contact between the brake pad and	<ul style="list-style-type: none"> To minimize operation stage impacts, measures such as Ballast less track structure is supported on two layers of rubber pads to reduce noise and vibrations, if required. In addition, baffle wall as parapets will be constructed up to the rail level so as reduce sound levels. Noise at source will be controlled or reduced by incorporating suitable 	Maha-Metro through Third Party Agency for Noise & vibration Monitoring	Maha-Metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
			wheel, followed by engine noise and aerodynamic noise.	<p>feature in the design of structures and layout of machines and by use of resilient mounting and dampers etc.</p> <ul style="list-style-type: none"> • Since the rakes will be air conditioned and enclosed from all side, the impacts of noise on the travellers will be nominal. • Noise barriers will be installed at sensitive receptor locations based on final design noise prediction analysis, if required. • Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. If baseline noise is below the CPCB and IFC-EHS standards, the operation noise has to meet these standards that is, operation noise level has to be less than level prescribed in these standards. • The mitigations suggested based on the detailed noise and vibration analysis carried out prior to commencement of construction, should be strictly followed. • Detailed vibration modelling is needed if sensitive receptors are located within the reported distances from the track in order to determine if the negative impacts can be fully mitigated through the following mitigation measures: <ul style="list-style-type: none"> a. Ballasted tie-welded track with elastic steel fastenings and plastic or rubber absorbing pad will reduce noise and vibration levels. Surface irregularities on the wheel and rail will be minimized by good maintenance of wheel and rail condition. b. Elastic pad between seat of the rail and the track slab as well as between track slab and the superstructure beneath it will reduce vibration will be installed to reduce transmission of vibration from the track and superstructure. 		

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
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				<p>c. Using floating slab and high resilience fasteners to reduce the vibration at the point of emission.</p> <ul style="list-style-type: none"> • Vibration monitoring and building condition surveys is required to determine if there are negative impacts and annoyance post mitigation implementation. • In cases, especially at Hospitals, additional mitigation measures shall be provided to ensure that vibration and annoyance impacts are below the threshold criteria. 		
		Health and Safety	Accidents Reputational risks	<ul style="list-style-type: none"> • Detailed specification of equipment e.g. power cables, rectifiers, transformer, E&M equipment etc. shall be framed to reduce conducted or radiated emissions as per appropriate international standards. • The Metro system as a complete vehicle (trains, signalling & telecommunication, traction power supply, E&M system etc.) shall comply with the Electromagnetic compatibility (EMC) requirements of international standards viz. EN50121-3-1, EN50123, IEC61000 series etc. EMC requirements of international standards for whole railway system to the outside world shall comply with EN50121-2. • Automatic Train Protection and Automatic Train Supervision sub-systems will be installed to provide a high level of safety. • CCTV system will be installed for local and centralized monitor of operation. • In view of the potential hazards from system failure resulting to accidents, both on- site and off-site emergency measures will be implemented. All trains will have public address systems to warn the passengers of any emergency. • Emergency team, ambulance, contact number and hospital should be available. Emergency response plan should be implemented during operation periods. 	O&M -Maha-Metro	Maha-Metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
			Operating Personnel Health risks	<ul style="list-style-type: none"> Operating staff such as drivers and Control Centre staff shall be administered regular medical check-ups for musculo-skeletal disorders, fatigue, eye strain. Well-designed workstations, lighting in Control Centre. Emotional resilience training, counselling for recovery and rehabilitation. 		
		Health of metro staff and commuters	Severely contagious diseases such as Covid-19 can impact health of staff thereby affecting operations; can cause economic loss to the country and loss of reputation to the project.	<ul style="list-style-type: none"> National Covid-19 SOP shall be implemented; staff shall be trained; staff and commuters shall be informed of precautions such as social distancing, sanitizing; arrangements for stationary and hand-held thermal scanners; provision of sanitizer pedestals, vending machines of face masks and gloves etc. shall be provided in stations; site record of Covid-19 hospitals; daily disinfection of operating rooms, circulation spaces, equipment and vehicles; protected ambulances at stations. 	O&M -Maha-Metro	Maha-Metro
		Aesthetics	Metro rail will increase the aesthetics of Nagpur	<ul style="list-style-type: none"> A proper housekeeping routine will be followed to enhance the aesthetics of metro rail station. 	O&M -Maha-Metro	Maha-Metro
45.	Track repair	Environment	Spill accidents	<ul style="list-style-type: none"> Maha-metro to ensure no illegal disposal of solid waste or wastewater. 	O&M -Maha-Metro	Maha-Metro
46.	Use of DG sets	Air	Emission from DG sets will create air pollution problems	<ul style="list-style-type: none"> DG sets compliant with CPCB norms will be used. Monitoring of air quality shall be done as per CPCB norms. Compliance monitoring will be undertaken as specified in the EMoP. Fuel used for DG sets will have a low-sulphur content 	O&M -Maha-Metro	Maha-Metro
		Noise & Vibration	Noise & vibration will be generated from the use of DG sets	<ul style="list-style-type: none"> DG sets compliant with CPCB norms will be used. Noise enclosures will be used and will be in compliance with GSR 371(E) dt. 17-05-2002. Wherever baseline noise already exceeds the standards, only 3dB of noise increase is allowed. If baseline noise is below the CPCB and IFC-EHS standards, the operation noise has to meet these standards that is, noise level has to be less than level prescribed in these standards. 	O&M -Maha-Metro	Maha-Metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
				<ul style="list-style-type: none"> The DG sets will be mounted on damping skids, which will reduce the vibration generated from the use of the DG sets 		
		Groundwater	Diesel spillage (from underground or above ground storage facility) will affect groundwater quality adversely	<ul style="list-style-type: none"> Storage of diesel shall be done in designated areas paved with concrete floors and with an arrangement of oil interceptors to prevent oil entering the groundwater. Precautions shall be taken to avoid any spillage of diesel. Oil that is mixed in water will be removed in the ETP operated by municipal authorities or by other approved methods to EPA 1986 standards before disposal into surface- or ground-water 	O&M -Maha-Metro	Maha-Metro
		Health & safety	Storage of Diesel will attract the provisions of Hazardous Chemicals (Management & Handling) Rules and Petroleum Rules; as amended to date. It could cause serious damage to health & safety of workers / property if ignited	<ul style="list-style-type: none"> Diesel should be stored in designated sites prior to final disposal. If the diesel storage crosses the threshold limits permissions from Chief Controller of Explosives (CCoE), proper fire protection norms shall be undertaken as per National Building Code, 2005. Proper onsite emergency plan will be prepared by GC and will be approved through Maha-metro. 	O&M -Maha-Metro	Maha-Metro
		Resources	DG sets will consume Diesel (and in effect reduce the levels of a non-renewable resource)	<ul style="list-style-type: none"> DG sets compliant with CPCB norms will be used only as backup. 	O&M -Maha-Metro	Maha-Metro
		Aesthetics	Operation of DG sets will cause an aesthetic issue	<ul style="list-style-type: none"> Enclosures for DG Sets will be used. 	O&M -Maha-Metro	Maha-Metro
47.	Development of feeder routes	Social	Along with Metro routes, metro feeder routes will be developed. This will	<ul style="list-style-type: none"> Maha-metro will work with bus operators to implement metro feeder routes along major arterial and sub-arterial routes to reduce travel time to the nearest station. Better 	O&M -Maha-Metro	Maha-Metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
			have a positive impact in terms of enhanced connectivity and inclusion in the social mainstream.	quality coaches & comfortable rides should be planned to enhance acceptability.		
		Health & safety	Better & frequent transport system will reduce risk of traffic accidents	<ul style="list-style-type: none"> The new feeder routes should: <ol style="list-style-type: none"> follow proper timetable; should have frequent services during the morning & evening peak; should have a limited carrying capacity. The feeder buses should arrive and depart from designated bus bays or similar structures. Proper arrangements for road crossing should be established. The appointed personnel should assist passengers to reach their destinations. An easily accessible grievance Redressal system should be established by Maha-metro 	O&M -Maha-Metro	Maha-Metro
		Aesthetics	Better designed coaches will enhance ride pleasure and aesthetics	<ul style="list-style-type: none"> The buses should be properly maintained from time to time in order to enhance the aesthetic value. 	O&M -Maha-Metro	Maha-Metro
48.	Generation of employment	Social	The proposed project will result into generation of employment	<ul style="list-style-type: none"> The project will cause direct and indirect employment generation. Economic activity will be stimulated by easier movement of passengers thus leading to indirect employment generation. 	O&M -Maha-Metro	Maha-Metro
49.	Ancillary development along metro routes	Land	Ancillary developments will take place along with metro corridor	<ul style="list-style-type: none"> Provision for increased density of development along project corridor is available through existing byelaws as well as new TOD norms. Mixed land use of TOD tends to reduce non-work trip length and its higher density promotes increased use of metro for work trips on long distances. Implementation of increased densities is decided by State Government and managed by NMRDA in accordance with demand. 	O&M -Maha-Metro	Maha-Metro

Sr. No	Activity	Aspect / Parameter affected	Impact	Mitigation Measures	Responsibility	
					Implementation	Supervision
		Social	Ancillary development along the metro alignment will have positive effect on the social environment	<ul style="list-style-type: none"> There should be positive participation of the common people in the ancillary development process. An open, transparent & people-centric outlook has to be adopted 	O&M -Maha-Metro	Maha-Metro