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Tender No.: HORC/HRIDC/C-23/2022 **Date: 30.12.2022**

Reference: Specific Procurement Notice dated 09.11.2022.

CORRIGENDUM NO. 2

Name of Work: C-23: Design and Construction of Civil Works (Earthwork, Bridges, Station Buildings, Retaining Walls and other miscellaneous Works) from km 29.68 to km 49.70 & from km 55.60 to km 61.50 and its connectivities to IR network from New Patli to Patli station & New Patli to Sultanpur station including modifications/civil works at Sultanpur Station in connection with laying of New BG Double Railway line of HORC Project.

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
1.	Part 1, Section II, TDS, Sub-Clause ITT 7.2	**Add the following at the end of Para 7.2:** No Site visit will be arranged by the Employer.	**Add the following at the end of Sub-Clause 7.2** *The Tenderer must obtain for themselves information related to site conditions, traffic, location, surroundings, climate, hydrology, meteorological conditions, weather data, availability of power, water, other utilities for construction, access and approach roads to the Site, handling and storage of materials, Waste disposal, applicable laws and regulations and any other matter considered relevant and necessary by them required for submitting their Tender and performance of all of its obligations in accordance with the requirements of Tender Documents.* No Site visit will be arranged by the Employer.
2.	Part 1, Corrigendum No.1, Item No. 11, Section III, EQC, Sub-Clause 3.4.2 (a)	Specific Construction & Contract Management Experience	The existing Sub-Clause 3.4.2 (a), Specific Construction & Contract Management Experience is replaced and annexed as **"Attachment 1"** of this Corrigendum No. 2.

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
3.	Part 1, Section IV, Tender Forms, Appendix B to Financial Part: Price Schedule 'A'	Appendix B to Financial Part: Price Schedule	The existing Appendix B to Financial Part: Price Schedules is replaced and annexed as **"Attachment 2"** of this Corrigendum No. 2.
4.	BQQ Excel Sheet – Price Schedule	Price Schedule-MS Excel file for quoting rate against each Schedule	The existing Price Schedule-MS Excel file for quoting rate against each Schedule is replaced through this Corrigendum No. 2
5.	Section VII-1: General, Sub-Clause 1.2	**Forest and Environmental Clearance** It is mentioned that for railway projects no prior environmental clearance is required as per Environment Impact Assessment (EIA) Notification, 2006. Further, the Forest (Conservation) Act, 1980 is not applicable to the Project in terms of Ministry of Environment, Forest and Climate Change (MoEFCC's) OM No.11-37/2016 FC dated 10.03.2022. However, certain part of the Project falls in specified area of Aravalli range. The clearance for specified area of Aravalli range is under process and is likely to be obtained before the award of contract.	**Forest and Environmental Clearance** It is mentioned that for railway projects no prior environmental clearance is required as per Environment Impact Assessment (EIA) Notification, 2006. Further, the Forest (Conservation) Act, 1980 is not applicable to the Project in terms of Ministry of Environment, Forest and Climate Change (MoEFCC's) OM No.11-37/2016 FC dated 10.03.2022. *However, a small portion of approximately 150m length between km 49.3 to km 49.45 of the Project falls in specified area of Aravalli plantation. The clearance for this area of Aravalli plantation is under process. This is likely to be obtained within 180 days of the Commencement Date. This being a small isolated patch will not effect the progress of work at any of the other locations and as such no claims on these grounds by the Contractor shall be accepted. The Contractor shall plan his works taking this aspect into consideration.*
6.	Part 2, Employer's Requirements, Section VII-1: General, Abbreviations	RL: Rail Level	RL: *Reduced* Level
7.	Part 2, Employer's Requirements, Section VII-1: General, Clause 10	The contractor shall perform all billing processes through the software-based billing system as and when introduced by HORC. The Contractor shall also introduce appropriate	The Contractor shall perform all billing processes through the software-based billing system as and when introduced by HORC *free of cost*. The Contractor shall also introduce

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		Project Management Systems during the project execution phase.	appropriate Project Management Systems during the project execution phase.
8.	Part 2, Employer's Requirements, Section VII-1: General, Clause 3, Relevant Documents		**Add the following at the end of Sub-Clause 3:** *All relevant RDSO Standards/drawings required by the Contractor for performance of its obligations under the Contract shall be obtained by the Contractor at their own cost from the office of RDSO. RDSO drawings can also be purchased online from RDSO website.*
9.	Part 2, Employer's Requirements, Section VII-1: General, Clause 4, Phases (Design and Construction)	e) Notwithstanding Clause 4 (iv) (b) above, for those elements identified under Clause 2(vi) of the Employer's Requirements - Design, the Construction Phase may commence immediately upon the issue of the Notice in respect of the Definitive Design Submission in respect of each such element subject to availability of the site in accordance with agreed programme.	e) Notwithstanding Clause *4 (b) (iv)* above, for those elements identified under Clause *2.6* of the Employer's Requirements - Design, the Construction Phase may commence immediately upon the issue of the Notice in respect of the Definitive Design Submission in respect of each such element subject to availability of the site in accordance with agreed programme.
10.	Part 2, Employer's Requirements, Section VII-2: Functional	Section VII- 2: Employer's Requirements (ER) – Functional	The existing Section VII- 2: Employer's Requirements (ER) – Functional is replaced and annexed as **Attachment 3** of this Corrigendum No. 2
11.	Part 2, Employer's Requirements, Section VII-3: Design(civil), Clause 4	**DESIGN INTERFACES WITH INTERFACING CONTRACTORs** The Contractor shall co-ordinate all design and installation work with the Interfacing Contractors, i.e. C-1, T-1, C-4, C-6 and ST-1. The Contractor shall co-ordinate with all Interfacing Contractors to produce a detailed programme of access dates, equipment delivery routes and occupation periods for each work area.	**DESIGN INTERFACES WITH INTERFACING CONTRACTORs** The Contractor shall co-ordinate all design and installation work with the Interfacing Contractors, i.e. C-1, T-1, C-4, C-6, *E-1* and ST-1. The Contractor shall co-ordinate with all Interfacing Contractors to produce a detailed programme of access dates, equipment delivery routes and occupation periods for each work area.
12.	Part 2, Employer's Requirements, Section VII-3: Design – (Civil), Sub-Clause 10.3	The Contractor shall submit the Design Submission Programme to the Engineer within thirty (30) days of the date of commencement., and thereafter up-dated versions thereof at intervals of not more than one (1) month throughout the Design Phase.	*Deleted*

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13.	Part 2, Employer's Requirements, Section VII-3: Design – (Civil), Sub-Clause 13.4	The contractor to provide two licensed working software copy being used by its DDC to Employer/Engineer's design department maintained for the entire contract period.	The contractor to provide *one* licensed working software copy being used by its DDC to Employer/Engineer's design department maintained for the entire contract period.
14.	Part 2, Employer's Requirements, Section VII-3: Design – (Civil), Minimum Requirement of the DDC's Organizational Structure, S. No. 2, Column 4, Experience	Graduate degree in Civil Engineering and minimum 05 years of relevant experience in the concerned field and would have handled minimum 01 project involving railway bridge involving deep foundation.	Graduate degree in Civil Engineering *with total experience of 10 years* and minimum 05 years of relevant experience in the concerned field and would have handled minimum 01 project involving railway bridge involving deep foundation.
15.	Part 2, Employer's Requirements, Section VII-4: Construction (Civil), Attachment C-1	**Attachment C-1:** Minimum Organisation Structure Required	The existing "**Attachment C-1:** Minimum Organisation Structure Required" is revised and annexed as **Attachment 4** of this Corrigendum No. 2.
16.	Part 2, Employer's Requirements, Section VII-4: Construction (Civil), Attachment C-2	**Attachment C-2:** Minimum Qualification & Experience of Project Personnel	The existing "**Attachment C-2:** Minimum Qualification & Experience of Project Personnel" is revised and annexed as **Attachment 4** of this Corrigendum No. 2.
17.	Part 2, Employer's Requirements, Section VII-4: Construction (Civil), Attachment C-3	**Attachment C-3:** Minimum Resources required for the Project- Plants & Equipment	The existing "**Attachment C-3:** Minimum Resources required for the Project- Plants & Equipment" is revised and annexed as **Attachment 4** of this Corrigendum No. 2.
18.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 2.2	The Employer shall furnish following documents to the Contractor: - a) Plan and L-section of the main line b) Plan and L-section of the connectivities c) ESP of station yards d) Conceptual GAD of bridges e) Conceptual layout plan for station f) Preliminary Geo-technical investigation reports	The Employer shall furnish following documents to the Contractor: - a) *Conceptual* Plan and L-section of the main line b) *Conceptual* Plan and L-section of the connectivities c) *Conceptual* ESP of station yards d) Conceptual GAD of bridges e) Conceptual layout plan for station f) Preliminary Geo-technical investigation reports

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19.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 2.4	**c) Mechanical, Electrical and Plumbing (MEP)** The design life of MEP services including water supply, drainage services and fire protection services etc. shall be 20 years.	**c) Mechanical, Electrical and Plumbing (MEP)** The design life of MEP services including water supply, drainage services and fire protection services etc. shall be *30* years.
20.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 2.8	d) The Contractor shall refer to the Standard Specifications and Code of Practice published by the Indian Roads Congress and/or consult with the competent authority to maintain the appropriate clearance over the road as required accordingly.	*d) Deleted*
21.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 2.8	e) Horizontal and vertical alignment has been given in the Alignment Drawings. Proposed Right of Way (ROW) has been also marked on the Alignment Drawings. The Contractor should check the feasibility at site and may propose any minor modification, if required.	e) Horizontal and vertical alignment has been given in the *Conceptual Plan and Longitudinal Section* Drawings. Proposed Right of Way (ROW) has been also marked on *these* Drawings. The Contractor should check the feasibility at site and may propose any minor modification*s*, if required.
22.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 2.8	i) Backfill on bridge approaches shall be placed in accordance with IRS Substructure Code.	i) Backfill on *approaches* of *Minor* Bridge shall be placed in accordance with IRS Substructure Code. *Approaches of Major Bridges (i.e. bridges having span equal to or more than 12.2m) shall be provided transition system as per RDSO report GE:R-50 as shown in Sketch No. GC-HRIDC-SK-GEN-019.*
23.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 2.8	j) The data like bridge length, size, barrel length, type of crossing, high flood level (HFL), total waterway and indicative span configuration etc. in respect of the proposed road/ waterway bridges has been shown in the conceptual GAD of the bridges. While designing the bridges, it shall be obligatory that in case of parallel section, the total bridge length, Box opening and/or HFL for an individual bridge for HORC tracks shall not be less than that of the corresponding KMP/DFC bridge. Also, the span configuration for the proposed bridges shall match the span configuration of the corresponding KMP/DFC bridge, to the maximum extent	j) The data like bridge length, size, barrel length, type of crossing, total waterway and indicative span configuration etc. in respect of the proposed road/ waterway bridges has been shown in the conceptual GAD of the bridges. *The bridge opening (Horizontal and Vertical) shall not be less than that indicated in the Conceptual GADs.*

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		possible, to avoid obstruction and to bring the abutment/piers in line with the existing abutment/piers. Deviation from above shall be in consultation and with approval of the Engineer.	
24.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 2.8	t) In station area 100m on both side of station building, general earth filling of about 1m height shall be done in complete ROW. This standard of earth filling shall be similar to that of earthwork in formation.	*t) Compensated Ruling Gradient for the Section is 1 in 150. Station yard gradients shall be as shown in the ESPs.*
25.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 3.2	e) Design of hume pipe (NP-4)/RCC box crossings for utilities	e) Design of *Pre-Cast RCC box of size 500x500 clear* for crossing *future* utilities
26.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 3.3.2	d) Width of berm shall be adequate to suit the mechanical compaction of earth with heavy rollers. However, berm width shall be kept minimum 2m.	d) Width of berm shall be adequate to suit the mechanical compaction of earth with heavy rollers. However, berm width shall be kept minimum 2m *on banks and 4m in cuttings.*
27.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 3.3.2, e)	vi. The contractor shall water and maintain the vegetation cover provided on slopes for a period of 12 months.	vi. The contractor shall water and maintain the vegetation cover provided on slopes for a period of 12 months *from Taking Over*.
28.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 3.3.3	ii. In the double track section, the longitudinal drain between two tracks shall not be provided.	ii. In the double track section, the longitudinal drain between two tracks shall not be provided *outside station yards*.
29.	Part 2, Employer's Requirements, Section	iv. In cuttings, a system of catch water drains of adequate capacity on both sides shall be designed to intercept the	iv. In cuttings, a system of catch water drains of adequate capacity on both sides shall be designed to intercept the

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	VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 3.3.3	surface runoff of adjoining areas from entering into the cutting and to lead the surface runoff safely away from cutting. In addition, longitudinal side drains of adequate capacity on both sides of formation shall be designed to cater to the surface runoff from slopes and formation.	surface runoff of adjoining areas from entering into the cutting and to lead the surface runoff safely away from cutting. In addition, longitudinal side drains of adequate capacity on both sides of formation shall be designed to cater to the surface runoff from slopes and formation. *Typical Section of cuttings has been shown in Tender drawings*
30.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 3.3.3	vii All the drains shall slope towards the nearest culvert or natural low ground or natural outlets existing nearby where the water shall be discharged with appropriately designed outfall arrangement duly consented by the Engineer.	vii *Generally,* all the drains shall slope towards the nearest culvert or natural low ground or natural outlets existing nearby where the water shall be discharged with appropriately designed outfall arrangement duly consented by the Engineer.
31.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 3.3.4	**Trolley Refuge** Trolly refuge shall be designed as shown in tender drawing. It shall be provided at 100m center to center on both Up and Dn tracks in a staggered manner.	**Trolley Refuge** Trolly refuge shall be designed as shown in tender drawing. It shall be provided at 400m center to center on each Up and Dn tracks in a staggered manner in case of double line section *except platform area. In case of single line connectivities, Trolley Refuge shall be provided at an interval of 200m* center to center.
32.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 3.3.5	NP-4 pipe of 450mm diameter, conforming to IS 458, shall be provided at about 500m interval throughout the alignment in embankments having fill heights upto 5m. In embankments having fill heights more than 5m precast RCC box of 500mmx500mm clear size shall be provided for the purpose of future utilities. Installation conditions for the pipe shall be designed as per the IS-783, according to the fill height.	*Deleted*
33.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.2 a),	**Note: The above drawings are available in the office of the Engineer for reference.**	*Deleted*

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	Bridges with superstructure of Steel Open Web Girder (OWG)		
34.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.2 a), Bridges with superstructure of Steel Open Web Girder (OWG), 3rd para	Spherical bearings shall be used instead of roller rocker bearings.	Spherical bearings shall be used instead of roller rocker bearings. *The Contractor shall design and shall carry out modifications to RDSO drawing of L0 joint of OWG for accommodating spherical bearings and shall get it approved from Chief Bridge Engineer (CBE), Northern Railway .*
35.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.2 a), Bridges with superstructure of Steel Open Web Girder (OWG)	vii. Provision of supports for placing OHE mast for traction system	vii. Provision of supports for placing OHE mast for traction system *of 2x25kV*
36.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.2 b), Bridges with superstructure of Composite Girder (CG)	vii. Provision of supports for placing OHE mast for traction system	vii. Provision of supports for placing OHE mast for traction system *of 2x25kV*

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37.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.2 c), Bridges with superstructure of PSC U-slab	vii. Provision of supports for placing OHE mast for traction system	vii. Provision of supports for placing OHE mast for traction system *of 2x25kV*
38.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.2 d), RCC Box Bridges, 3rd para	Standard RDSO drawing for box culvert shall be followed to the maximum extent. If standard RDSO drawing is not available for desired sizes/fill height, box shall be designed by the Contractor. However, thickness and reinforcement of the box shall not be less than the closest available box size & fill height of RDSO drawing.	Standard RDSO drawing for box culvert shall be followed *if available*. If standard RDSO drawing is not available for desired sizes/fill height, box shall be designed by the Contractor. However, thickness and reinforcement of the box shall not be less than the closest available box size & fill height of RDSO drawing.
39.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3 a), Railway Bridges	i. Superstructure and bearings shall conform to standard RDSO drawings for "25t Loading-2008" except for OWG bridges and CG bridges of 30.5m span. Standard RDSO drawings for "DFC loading (32.5t Axle load)" shall be used for OWG.	i. Superstructure shall conform to standard RDSO drawings for "25t Loading-2008" except for OWG bridges. Standard RDSO drawings for "DFC loading (32.5t Axle load)" shall be used for OWG.
40.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3 a), Railway Bridges		**Add new para xii) at the end of para xi.)** *xi. Minimum depth of foundation of waterway bridges shall be scour depth plus 1.75m below the bed level.*

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41.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3 b) RCC Box Bridges	ii. Size of the Box openings (minimum required) has been shown in the conceptual GADs. Height of box shown includes clear height and wearing coarse of 150mm. Overall height of box may vary as per site requirement and actual road/ground profile. Any variation, due to site constraints, shall be done with the consent of the Engineer.	ii. Size of the Box openings (minimum required) has been shown in the conceptual GADs. Height of box shown includes clear height and wearing coarse of 150mm. Overall height of box may vary as per site requirement and actual road/ground profile.
42.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3 b) RCC Box Bridges	iv. The clear inner dimension of the box shall cater to the requirements of type of crossing. The height of box shall include the thickness of wearing coat provided inside the box.	iv. *Top of bottom slab of RCC box shall not be kept above the natural ground level beside the road. However, road level and vertical clearance above the road shall be maintained as shown in Tender drawings. Any variation due to site conditions as mentioned above shall be got approved from the Engineer.*
43.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3 b) RCC Box Bridges	vi. All waterway bridges shall be protected by a well-designed flooring system. The concrete floor shall be protected by curtain wall at upstream side and drop wall at downstream side, wherever applicable.	vi. All waterway bridges shall be protected by a well-designed flooring system. The concrete floor shall be protected by curtain wall at upstream side and drop wall at downstream side. *The minimum depth of the curtain wall and drop wall shall be scour depth plus 1.75m below the bed level.*
44.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3 b), RCC Box Bridges, vii	a) All RUBs shall be provided with 1m wide walkway on one side of the carriageway.	*a) Deleted*
45.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3 b), vii	b) The approaches / approach ramps to the RUBs shall be of concrete of M25 grade.	b) The approach *roads* to the RUBs shall be *provided from RCC box to ROW of HORC for the width equal to clear opening of RCC box in* concrete of *M35* grade.
46.	Part 2, Employer's Requirements, Section	f) Provision for lighting shall be kept.	f) *Deleted*

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	VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3 b), vii		
47.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3 b), RCC Box Bridges, vii	h) Suitable drainage system including sump and discharge arrangement (as required) and protection works / ancillary works shall be designed.	h) Drainage and rain water harvesting system shall be designed for RUBs where the road level in RUB is below the natural ground level in accordance with Section VII-6,Outline Construction Specifications, Part-2 Employer's Requirements. Protection works / ancillary works shall be designed for all RUBs as shown in the Tender drawings.
48.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.4 b)	**CLEARANCES FOR ROAD TRAFFIC** Vertical clearance for road traffic shall generally be as per clause 104.4.2 of IRC-5 plus 100 mm. General Arrangement Drawings at road crossings shall be approved by the relevant authorities/stake holders.	**CLEARANCES FOR ROAD TRAFFIC** Vertical clearance for road traffic shall be higher of the values as per clause 104.4.2 of IRC-5 plus 100 mm *or as per Conceptual GAD.* General Arrangement Drawings at road crossings shall be approved by the relevant authorities/stake holders.
49.	1.Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause ODS 4.4 d), Material Parameters, iii, 1. Structural Steel for Miscellaneous Use, fourth para	Steel for General Structural Purposes (Grade E250, E350 – B0) shall be as per IS: 2062.	Steel for General Structural Purposes (Grade E250 – *B0*, E350 – B0) shall be as per IS: 2062.
50.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause, 4.4 d)	2 Structural Steel for Open Web/Composite Bridges (a) General Structural steel conforming to IS: 2062(Grade E250, E350 – B0) shall be adopted.	2 Structural Steel for Open Web/Composite Bridges (a) General Structural steel conforming to IS: 2062(Grade E250 – *B0*, E350 – B0) shall be adopted.

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
	iii, Structural Steel (For Open Web /Composite Bridges & Other Structures If Any)		
51.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause, 4.4 d) iii, Structural Steel (For Open Web /Composite Bridges & Other Structures If Any), 2	(e)Thermal Expansion Coefficient: 12x10-6 as per IRC: 24-2010	(e) Thermal Expansion Coefficient: $12x10^{-6}$ as per IRC: 24-2010
52.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.6	(a) Type of Bearing System Spherical bearings for OWGs or any non-standard superstructure shall be designed as per IRC: 83 part-IV. In case of other RDSO girders, standard bearing drawings shall be followed.	(a) Type of Bearing System Spherical bearings for OWGs *and Composite Girders of span 30.5 m and above* shall be designed as per IRC: 83 part-IV. In case of other RDSO girders, standard bearing drawings shall be followed.
53.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause, 4.7 b)	(b) Piers The effective length of a cantilever pier for the purpose of slenderness ratio calculation will be taken as per IRS-CBC. Ductile detailing is mandatory. The design of pier shall be done as per IRS CBC. Shear reinforcement & ductile detailing shall be done as that of RCC column. In all SLS combinations, column shall remain in compression.	(b) Piers The effective length of a cantilever pier for the purpose of slenderness ratio calculation will be taken as per IRS-CBC. Ductile detailing is mandatory. The design of pier shall be done as per IRS CBC. Shear reinforcement & ductile detailing shall be done as that of RCC column.
54.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)–	Sub-Clause, 5.2 and 5.3	The existing Sub-Clause 5.2 and 5.3 are replaced and annexed as **Attachment 5** of Corrigendum No. 2.

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	Civil, Sub-Clause, 5.2 and 5.3		
55.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause, 5.4 q)	vi. UNDERGROUND SUMP COMBINED WITH WTP/OVERHEAD WATERTANK Underground water tank would be designed to sustain the following two cases- (a) Tank full and No earth fill (b) Tank empty and active earth pressure acting from outside. The walls and base slab would be designed as per the provisions of IS: 3370 (Part1- Part4)-1965 using the working stress method. Overhead water tank would be designed to sustain the water load at full tank condition as per the provisions of IS: 3370 (Part 1- Part4) -1965 using the working stress method.	vi. *DESIGN OF OVERHEAD WATER STORAGE TANKS* Overhead *water storage tanks shall* be designed to sustain the water load at full tank condition as per the provisions of IS: 3370 (Part 1- Part4).
56.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause, 5.4, r)	**Design of water retaining structures** The underground tank in a station shall be designed as a water retaining structure based on IS: 3370. Various types of loadings shall be considered in the design of the underground tank. The side walls shall be subjected to earth pressure. Wherever encountered, horizontal pressure due to water table shall also be considered. Stability of water tank shall be checked against buoyancy and foundation raft shall be designed for the worst of buoyant force and soil pressure. The tank shall also be designed for surcharge loading if any. Water proofing treatment shall be done on the external surface as well as in the internal surface.	**Design of underground water storage tanks** Underground *water storage tanks* at stations shall be designed as a water retaining structure based on IS: 3370. *Underground water tank would be designed to sustain the following two cases-* *(a) Tank full and No earth fill* *(b) Tank empty and active earth pressure acting from outside.* Various types of loadings shall be considered in the design of the underground tank. The side walls shall be subjected to earth pressure. Wherever encountered, horizontal pressure due to water table shall also be considered. Stability of water tank shall be checked against buoyancy and foundation raft

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
			shall be designed for the worst of buoyant force and soil pressure. The tank shall also be designed for surcharge loading if any. Water proofing treatment shall be done on the external surface as well as in the internal surface.
57.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause, 5.4, t)	**SUBWAY FOR INTER-PLATFORM TRANSFER** Subway shall be designed to cater to DFC loading (32.5T) from the tracks along with the other loads from the platform. It shall be placed on firm bed (strata)/pile foundation to avoid the settlement/differential settlement. The requirements/criteria laid down in clause 4.1 & 4.2 for the design of Box bridges shall be followed for the design of Subway. Lift well in the subway shall be founded on firm strata below the ground level.	**SUBWAYS, *LIFT WELLS AND BUILDINGS*** Subway shall be designed to cater to DFC loading (32.5T) from the tracks along with the other loads from the platform. The requirements/criteria laid down in clause 4.1 & 4.2 for the design of Box bridges shall be followed for the design of Subway. *Supporting arrangements for subways, lift wells and buildings shall be provided as shown in Tender drawings.*
58.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 6.2	**Details of Structures to be designed** The Contractor shall design the retaining walls of various heights that are required in C23 Package. Retaining wall is required to be provided at some of the locations along the alignment due to limited availability of ROW. Retaining wall shall be located at the edge of ROW. On Left Hand Side (i.e. on KMP side) of main line, no retaining wall shall be provided except at locations where private land falls between HORC ROW and KMP ROW. Further, some additional land is proposed to be acquired along the alignment. In case additional land is made available before undertaking the construction, provision of retaining wall shall be deleted and earthen slope shall be	**Details of Structures to be designed** The Contractor shall design the retaining walls of various heights that are required in C23 Package. Retaining wall is required to be provided at some of the locations along the alignment due to limited availability of ROW. Retaining wall shall be located at the edge of ROW. On Left Hand Side (i.e. on KMP side) of main line, no retaining wall shall be provided except at locations where private land falls between HORC ROW and KMP ROW. Precast RCC retaining walls shall be used upto minimum 2m height above ground level. The Contractor may use cast in-situ retaining wall for more heights. Minimum grade of concrete for precast retaining wall shall be M 40. Grade of

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		provided at that location. Cost of additional earthwork due to provision of slope shall be paid under the Schedule B. Precast RCC retaining walls shall be used upto minimum 2m height above ground level. The Contractor may use cast in-situ retaining wall for more heights. Minimum grade of concrete for precast retaining wall shall be M 40. Grade of concrete for cast in-situ retaining wall shall be M 35. Reinforced Earth wall (RE wall) shall not be permitted in railway embankments.	concrete for cast in-situ retaining wall shall be M 35. Reinforced Earth wall (RE wall) shall not be permitted in railway embankments.
59.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 6.3	**Design Criteria** a) Wherever sufficient land is not available to provide a stable slope for the formation along the alignment without infringing ROW, suitable earth retaining structure as per the IRS-Bridge Substructure & Foundation Code shall be provided. b) Earth retaining structure if required at any other critical location, shall be proposed by the Contractor and shall be subject to approval of the Engineer. c) The earth retaining structures, if required, shall be designed as per the following criteria: i. In case the location of the earth retaining structure is within Axle Load Impact Line, it shall be designed for earth pressure as well as surcharge due to DFC loading (32.5T axle load). ii. ii. In case the location of the earth retaining structure is beyond the Axle-Load Impact Line, it shall be designed for retaining the earth.	**Design Criteria** *a) Deleted* *b) Deleted* c) The earth retaining structures, if required, shall be designed as per IRS Bridge Substructure and Foundation Code *as per the following criteria*: i. In case the location of the earth retaining structure is within Axle Load Impact Line, it shall be designed for earth pressure as well as surcharge due to DFC loading (32.5T axle load). ii. ii. In case the location of the earth retaining structure is beyond the Axle-Load Impact Line, it shall be designed for retaining the earth. d) Design and reinforcement detailing shall suit the lifting and handling requirements of the segments of precast retaining wall. e) Joints between the segments shall be properly designed for required lap length also.

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		d) Design and reinforcement detailing shall suit the lifting and handling requirements of the segments of precast retaining wall. e) Joints between the segments shall be properly designed for required lap length also. f) Expansion joints shall be provided at an interval not exceeding 30m.	f) Expansion joints shall be provided at an interval not exceeding 30m.
60.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 6.5, first Para	Apart from the basic data and specific requirements listed in the Employer's Requirement, all items of the Works shall be governed by the latest versions of the following codes and specifications as revised/corrected/amended (with latest correction slip) till the date of approval of design/drawings by the Engineer. In case of contradiction in various codal provisions, the order of precedence shall be as follows:- i. Specific provisions in the Employer's Requirements. ii. IRS Codes and specifications iii. IS Codes iv. IRC Codes and specifications v. International Codes However, in case of ROBs and other highway loading related structures, IRC Codal provisions shall prevail over IRS Codal provisions. Notwithstanding the precedence specified above, the Contractor shall always seek advice from the Engineer in the event of any conflict for a final decision.	Apart from the basic data and specific requirements listed in the Employer's Requirement, all items of the Works shall be governed by the latest versions of the following codes and specifications as revised/corrected/amended (with latest correction slip) till the date of *opening of the Tender*. In case of contradiction in various codal provisions, the order of precedence shall be as follows:- i. Specific provisions in the Employer's Requirements. ii. IRS Codes and specifications iii. IS Codes iv. IRC Codes and specifications v. International Codes However, in case of ROBs and other highway loading related structures, IRC Codal provisions shall prevail over IRS Codal provisions. Notwithstanding the precedence specified above, the Contractor shall always seek advice from the Engineer in the event of any conflict for a final decision.
61.	Part 2, Employer's Requirements, Section VII-5: Outline Design	v. Fabrication Specification (B1)	v. *B1- Specification for fabrication and erection of Steel girder bridges*

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
	Specifications (ODS)– Civil, Sub-Clause 6.5, b)		
62.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 6.5, c)		**Add new item (ix)** *BS110 (R) -RDSO guidelines for steel girders*
63.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 1.1.2	e) Indian Railways Unified Standard Specification (Formation Works, Bridge Works and P.Way Works)	e) Indian Railways Unified Standard Specification (Formation Works, Bridge Works and P.Way Works) *and Indian Railways Unified Standard Schedule of Rates* 2019
64.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 1.1.2	CPWD Specifications, Vol 1&2 – 2019 for building works	*CPWD Specifications, Vol 1&2 – 2019 for building works and Delhi Schedule of Rates (DSR) 2021.*
65.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 1.2.9	Wherever there are tension / suspended concrete members which are suspended from upper-level structural members, the shuttering / scaffolding of such members at lower level shall have to be kept in place till the time the upper level supporting members gain minimum required strength. Cost of such larger duration of keeping in place the shuttering/scaffolding shall be deemed to be included in the price quoted for respective structural members.	*Deleted*
66.	Part 2, Employer's Requirements, Section VII-6: Outline Construction	Casting yard to have following minimum facilities: i. Casting beds as required. ii. All handling facilities for precast elements. iii. Curing arrangements as required. iv. Stacking arrangements for precast elements.	*Deleted*

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
	Specifications (OCS)– Civil, Sub-Clause 1.2.12	v. Storing of materials. vi. Proper drainage and approach roads.	
67.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 2.2	NP-4 pipe of 450mm diameter, conforming to IS 458, shall be provided at about 500m interval throughout the alignment in embankments having fill heights upto 5m. In embankments having fill heights more than 5m precast RCC box of 500mmx500mm clear size shall be provided for the purpose of future utilities. Installation conditions for the pipe shall be designed as per the IS-783, according to the fill height.	NP-4 pipe of 450mm diameter, conforming to IS 458, shall be provided at about 500m interval throughout the alignment in embankments having fill heights upto 5m *including ballast cushion of 350 mm*. In embankments having fill heights more than 5m *including ballast cushion of 350 mm* precast RCC box of 500mmx500mm clear size shall be provided for the purpose of future utilities. Installation conditions for the pipe shall be designed as per the IS-783, according to the fill height.
68.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 3.7.1, f)		**Add new para g) at the end of para f)** *g) Transitional system on approach road bridges as per guidelines of RDSO Report No. GE:R-50 shall be provided in bridge approaches of ballasted and non ballasted deck bridges having span equal to or more than 12.2m.*
69.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 4.1.1	**Earthwork** Earthwork in excavation and filling/backfilling in station buildings shall be carried out as per CPWD specifications. Soil for filling shall be arranged by the Contractor from outside the ROW. No Earth is to be taken from the Railway premises except surplus earth from excavation for the building.	**Earthwork** Earthwork in excavation and filling/backfilling in station buildings shall be carried out as per CPWD specifications. Soil for filling shall be arranged by the Contractor from outside the ROW. No Earth is to be taken from the Railway*/HORC* premises except surplus earth from excavation for the building.
70.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 4.1.6	**Masonry work** Masonry work has to be in well burnt clay bricks of class designation 7.5 in general and class 12.5 for external walls which are neither plastered nor rendered on the outer face, free standing walls, and parapets, as approved by the Engineer. All outer and load bearing walls shall be of minimum 230 mm thickness or more as per design, in	**Masonry work** Fly ash bricks or cement concrete blocks (hollow/solid) confirming to the BIS or stone masonry *will* be used. All outer and load bearing walls shall be of minimum 230 mm thickness or more as per design, in cement mortar 1:6, all partition walls shall be 115 mm thick in cement mortar 1:4 as per Clause 6 of CPWD Specification Volume-I 2019.

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		cement mortar 1:6, all partition walls shall be 115 mm thick in cement mortar 1:4 as per Clause 6 of CPWD Specification Volume-I 2019. Fly ash bricks or cement concrete blocks (hollow/solid) confirming to the BIS or stone masonry can be used as per local availability in lieu of clay bricks, but nothing shall be paid extra on this account.	
71.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 4.2.6	**Water proofing and heat insulation of roofs:** Water proofing of roof shall be carried out by the Contractor as approved by the Engineer. Heat treatment as approved by the Engineer shall be provided for roof of buildings.	***Water proofing of roofs:*** Water proofing of roofs shall be carried out by the Contractor as approved by the Engineer.
72.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 4.3	**EI Building**	***S&T Building/Rooms/Huts***
73.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 4.4.4	f) Foot Over Bridge (FOB) Steel FOB shall be fabricated as per Specification No. B-2 for Steel Structures (other than Girder Bridges)- Part 3. Flooring of FOB shall be of Chequered terrazzo tile 22mm thick with graded marble chips size up to 6mm fixed with neat cement slurry mixed with pigment to match the shade of tile including rubbing polishing complete on 20mm thick cement sand mortar 1:4 over 100mm thick CC M-10 over 100mm thick sand filling on well rammed and consolidated earth filling as per Clause 11.12 & 11.13 of CPWD Specification Volume-I 2019.	*f) Elevated approach to Pachgaon station* *Elevated approach* shall be fabricated as per Specification No. B-2 for Steel Structures (other than Girder Bridges)- Part 3. Flooring of e*levated approach* shall be of Chequered terrazzo tile 22mm thick with graded marble chips size up to 6mm fixed with neat cement slurry mixed with pigment to match the shade of tile including rubbing polishing complete on 20mm thick cement sand mortar 1:4 over 100mm thick CC M-10 over 100mm thick sand filling on well rammed and consolidated earth filling as per Clause 11.12 & 11.13 of CPWD Specification Volume-I 2019.

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
74.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 4.4.5	**e) Covering for Stairs & Ramp** Roofing with Galvalume Sheets pre painted Al-Zn alloy coated sheeting CRCA (Cold Rolled Close Annealed) steel, minimum thickness shall be 0.90 mm and steel shall comply with requirement of Gr.60 as per ASTM A 792 M.	**e) Covering for Stairs & Ramp** *Self supported roofing system of colour coated Galvalume sheet shall be provided as approved by the Engineer. Material shall be of following specification, BMT 0.90mm to 1.00mm, APT 0.95mm Tolerance +/- 0.02mm thick, 605 mm width or as approved by the Engineer (Tolerance +/- 2mm.* *The roofing system shall be without trusses, purlins or any ancillary support and shall be designed by the contractor and shall be got proof checked at his own cost from Govt. approved agencies.*
75.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 4.4.5		**Add new para f) at the end of para e)** ***Waterproofing of Subway*** *New para f), Waterproofing of Subway is added at the end of para e) and is annexed as* ***Attachment 6*** *of this Corrigendum No. 2*
76.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 4.4.6	**a) Main Platform Shelter** Main Platforms Shelters of length 40 m and covering entire platform width shall be provided on each platform at New Patli and on end platform at Dhulawat station as per approved drawings. It shall be fabricated from rolled steel sections conforming to IS:2062/4923. Roof shelter shall have arrangement for collection and safe outlet of rain water. Shelter roofing shall consist of Galvalume Sheets pre painted Al-Zn alloy coated sheeting CRCA (Cold Rolled Close Annealed) steel thickness shall be 0.90 mm (+- 0.2 mm) and steel shall comply with requirement of Gr.60 as per ASTM A 792 M.	**a) Main Platform Shelter** Main Platforms Shelters shall be fabricated from rolled steel sections conforming to IS:2062/4923. Roof shelter shall have arrangement for collection and safe outlet of rainwater. Shelter roofing shall be *of aluminium sheet of 0.9 mm thickness*.
77.	Part 2, Employer's Requirements, Section VII-6: Outline	**c) Shelter Flooring** Kota Stone 25 mm thick to be provided in flooring laid on with neat cement slurry mixed with pigment to match the	**c) Shelter Flooring** *VDC flooring shall be provided under PF shelter as per Sub-Clause 4.4.7 of these specifications.*

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
	Construction Specifications (OCS)– Civil, Sub-Clause 4.4.6	shade of kota stone including rubbing polishing complete on 20mm thick cement and sand mortar 1:3 as per Clause 11.22 of CPWD Specification Volume-I 2019.	
78.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 4.4.8	**c) Duct For Utilities-** Two underground ducts of about 100mm size with manholes at about 30 m interval shall be provided along the entire length of platform to carry electrical and S&T cables.	***c)* Duct For Utilities-*HDPE pipes for Electrical and S&T*** *These pipes shall be provided by the side of the drains. HDPE pipes shall conform to IS 4984.*
79.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Annexure-OCS 2, Reinforcement Steel, Clause 1	a) High strength deformed steel bars for concrete reinforcement used in the works shall be Fe 500D TMT, conforming to IS 1786 and manufactured by SAIL/TATA STEEL /JSW STEEL/RINL/IISCO. No rerolled steel shall be used. The Contractor shall produce copy of original challan or voucher as a proof of having purchased the steel reinforcement from manufacturers or their authorized distributors having approval of the Engineer. Reinforcement steel shall be stored as per IS 4082.	a) High strength deformed steel bars for concrete reinforcement used in the works shall be Fe 500D TMT, conforming to IS 1786 and manufactured by SAIL/TATA STEEL /JSW STEEL/RINL/*JSPL*. No rerolled steel shall be used. The Contractor shall produce copy of original challan or voucher as a proof of having purchased the steel reinforcement from manufacturers or their authorized distributors having approval of the Engineer. Reinforcement steel shall be stored as per IS 4082.
80.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Annexure-OCS 3, Fabrication and Erection of Steel Bridge Girder		Additional Clause has been inserted after Clause 7 and numbered as Clause 8 and existing Clauses 8,9,10,11,12 have been renumbered as Clause 9,10,11,12,13. "**8.0 Launching** Before taking up launching, the Contractor shall prepare and submit launching scheme along with design and methodology of launching including details of equipment proposed to be used for the approval of the Engineer. a) Rail Flyovers (RFO) After approval of the Engineer, launching scheme shall be got approved from Chief Bridge Engineer/Northern

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
			Railway. CRS application shall be prepared by the Contractor and submitted to the Commissioner of Railway Safety (CRS) through the Engineer, HRIDC and CBE/NR. Work of launching shall be started only after receipt of sanction of CRS. b) Road Under Bridges After approval of the Engineer, launching scheme shall be got approved from concerned road authorities. Work of launching shall be started only after receipt of approval of concerned road authority. During erection of plate/composite steel girder by crane special care shall be taken to support the girder by wooden blocks & temporary bracing to ensure stability against toppling till permanent bracings are provided."
81.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Sub-Clause 5.2.8	The Contractor shall provide rainwater harvesting system as per the drawings approved by the Engineer. The Contractor shall follow provisions of "Manual for Rainwater Harvesting and Conservation" (CPWD), IS: 15792 (Guidelines for artificial recharge to ground water) and guidelines issued by CGWB and local authorities.	Sub-Clause 5.2.8, *Rainwater Harvesting is replaced and is annexed as* ***Attachment 7*** *of this Corrigendum No. 2*
82.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil, Annexure-OCS 3, Fabrication and Erection of Steel Bridge Girder		**Add new Clause 13 at the end of Clause 12** *"13. All third Party (RDSO/RITES/Any other nominated agency) Inspections charges for Open Web Girders and Composite Girders etc. shall be paid by the Employer."*

<table>
<tr><th>S. No.</th><th>Tender Document Part / Section/ Clause No.</th><th>Description of Existing Clause</th><th>Modified Description of Existing Clause / New Clause</th></tr>
<tr><td>83.</td><td>Part 2, Employer's Requirements, Section VII-7: General Electrical Services</td><td>Section VII-7: General Electrical Services</td><td>The existing Section VII- 7: Employer's Requirements (ER)-General Electrical Services is replaced and annexed as Attachment 8 of this Corrigendum No. 2</td></tr>
<tr><td>84.</td><td>Part 2, Section VII-8, Employer's Requirements-Tender Drawings and Documents</td><td>List of Documents
4. List of Charted Utilities</td><td>The existing List of Charted Utilities is replaced with List of Charted Utilities and annexed as Attachment 9 of this Corrigendum No. 2</td></tr>
<tr><td>85.</td><td>Part 2, Section VII-9, Employer's Requirements-Appendices, Appendix 5, Sub-Clause 5.11.5,</td><td>Interface Table between C-23 and ST-1<table><tr><th>S. No</th><th>Description</th><th>Remarks</th></tr><tr><td>1</td><td>Provide access to site for ST-1 contractor for OHE and S&T works</td><td>C-23 Contractor shall complete the work of formation and bridges as per drawings and hand over site to ST-1 Contractor for OHE and S&T works</td></tr></table></td><td>Interface Table between C-23, E-1 and ST-1<table><tr><th>S. No</th><th>Description</th><th>Remarks</th></tr><tr><td>1</td><td>Provide access to site for E-1 and ST-1 contractor for OHE and S&T works</td><td>i) C-23 Contractor shall complete the work of formation and bridges as per drawings and hand over site to E-1 and ST-1 Contractor for OHE and S&T works
ii) C-23 Contractor shall complete the work of Signalling & Telecom structures at Dhulawat, New Patli and Sultanpur Stations and Hand Over to ST-1 Contractor for S&T works.</td></tr></table></td></tr>
<tr><td>86.</td><td>Part 2, Section VII-9, Employer's Requirements-Appendices, Appendix 10, Sub-Clause 10.2.2</td><td>The Contractor shall make its own arrangements, subject to the consent of the Engineer, for access required to the Site. The Contractor shall negotiate with the landowners or other appropriate government agencies to seek temporary</td><td>The Contractor shall make its own arrangements for access required to the Site. The Contractor shall negotiate with the landowners or other appropriate government agencies to seek</td></tr>
</table>

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		occupation of land and seeking necessary permission for construction of temporary access roads.	temporary occupation of land and seeking necessary permission for construction of temporary access roads.
87.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix 10, Sub-Clause 10.14	The contractor shall clear the Site as required by demolishing all buildings, structures (above and below ground such as brick, concrete, steel, etc.) and removing all rubbish as agreed by the Engineer. The Site shall also be cleared of vegetation, trees, stumps roots, etc. Cutting of trees within ROW wherever required for execution of the Works shall be done by the Contractor. Permission for cutting of trees will be obtained by the Employer. Compensatory plantation is not included in the Scope of the Works. All material so cleared from the site shall be disposed off by the Contractor outside the ROW as directed by the Engineer.	The contractor shall clear the Site as required by demolishing all buildings, structures (above and below ground such as brick, concrete, steel, etc.) and removing all rubbish as agreed by the Engineer. *If any payment/compensation is payable to the structures owner, the same shall be paid by the Employer to the structures owner.* The Site shall also be cleared of vegetation, trees, stumps roots, etc. Cutting of trees within ROW wherever required for execution of the Works shall be done by the Contractor. Permission for cutting of trees will be obtained by the Employer. Compensatory plantation is not included in the Scope of the Works. All material so cleared from the site shall be disposed off by the Contractor outside the ROW as directed by the Engineer. *The list of structures to be demolished is given in Section VII:8-Tender Drawings and Documents, Part-2 Employer's Requirements*.
88.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix 10, Sub-Clause 10.19.12	The Contractor shall provide 04 SUV type vehicles having make not later than 2022 for use of the Engineer's Staff from the Commencement Date till completion of the Contract. The Contractor shall also bear the expenditure of deploying experienced drivers along with fuel and other incidental expenses associated with the operation of the vehicle. Only experienced drivers shall be deployed.	The Contractor shall provide 04 SUV type vehicles having make not later than 2022 for use of the *Employer's* Staff from the Commencement Date till completion of the Contract. The Contractor shall also bear the expenditure of deploying experienced drivers along with fuel and other incidental expenses associated with the operation of the vehicle. Only experienced drivers shall be deployed.
89.	Part 2, Section VII-9, Employer's Requirements-Appendices, Appendix	(1) The Contractor shall establish a horizontal and vertical control system (x, y, z) at the Site and establish Haryana Orbital Rail Corridor (HORC) benchmarks using the TBMs provided by the Employer and locate/ confirm the ROW	(1) The Contractor shall *revalidate/derive the elevations of Secondary Control Points (SCPs) and Tertiary Control Points (TCPs) using the Reduced Level (RL) of the Standard Benchmark (Type M) at SDC Quarters, Palwal with MSL*

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
	10, Sub-Clause 10.20.1 (b)	marks given by the Employer. The scaling factor shall be as approved by the Engineer.	*value of 195.41 metres. Survey and levelling should be done using Total Station and Digital level. Thereafter,* the Contractor shall establish a horizontal and vertical control system (x, y, z) at the Site which shall be approved by the Engineer. *Final drawings and profiles shall be prepared based on the above Reduced Levels.*
90.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix 10, Sub-Clause 10.20.2 (a)	A set of the benchmarks comprising a horizontal control system (x, y) and vertical control system (z) shall be established at the Site based on the Temporary Bench Marks which are established and maintained by the Employer and the Global Navigation Satellite System (GNSS) Survey, applying the Universal Transverse Mercator (UTM) coordinate system and World Geodetic System 84 (WGS 84). A description of the various benchmarks along the route alignment has been provided by the Employer along with their height above Mean Sea Level. The Contractor shall ensure that the horizontal and vertical position (x, y. z) of each HORC benchmark shall not be subject to any interference and that they shall not be affected by any of the Permanent and Temporary Works.	A set of the benchmarks comprising a horizontal control system (x, y) and vertical control system (z) shall be established at the Site based on the Temporary Bench Marks which are established and maintained by the Employer *only after revalidation is done as per Sub-Clause 10.20.1 (b) of Appendix 10, Section VII-9: Appendices* and the Global Navigation Satellite System (GNSS) Survey, applying the Universal Transverse Mercator (UTM) coordinate system and World Geodetic System 84 (WGS 84). A description of the various benchmarks along the route alignment has been provided by the Employer along with their height above Mean Sea Level. The Contractor shall ensure that the horizontal and vertical position (x, y. z) of each HORC benchmark shall not be subject to any interference and that they shall not be affected by any of the Permanent and Temporary Works.
91.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix 10, Sub-Clause 10.20.4 (a)	The Contractor shall establish a vertical control system at the Site by Direct Levelling, providing each HORC Benchmark with a vertical coordinate (z). The vertical coordinate (z) shall be checked with reference to as many of the GTS Benchmarks of the Survey of India as practical, to ensure the entire vertical control system is consistent, including the equivalent system of adjacent Interfacing	The Contractor shall establish a vertical control system at the Site by Direct Levelling, providing each HORC Benchmark with a vertical coordinate (z). The vertical coordinate (z) shall be *established using the Reduced Level (RL) of the Standard Benchmark (Type M) at SDC Quarters, Palwal with MSL value of 195.41 metres,* to ensure the entire vertical control system is consistent, including the equivalent system

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		Contractor(s). The Contractor shall include the survey results and the description in the Survey Report as described in the following paragraphs. Upon consent of the Engineer the system shall be the sole vertical control system for the Works under this Contract.	of adjacent Interfacing Contractor(s). The Contractor shall include the survey results and the description in the Survey Report as described in the following paragraphs. Upon consent of the Engineer the system shall be the sole vertical control system for the Works under this Contract.
92.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix 10, Sub-Clause 10.22 (a)	The Horizontal Alignment defined by the coordinates (x, y) of the centerline of the track of Priority Section shall be staked at an interval of twenty (20) meters in addition to TPTC, TP, TPCC points along the proposed alignment. While staking the Horizontal alignment at Site, the Contractor shall confirm the Right of Way (ROW) staking already done by the Employer at Site and provide and install any missing stakes. The Contractor shall ensure that staking of the ROW is carried out as per the relevant provisions of Indian Railways Engineering Code.	The Horizontal Alignment defined by the coordinates (x, y) of the centerline of the track shall be staked at an interval of twenty (20) meters in addition to TPTC, TP, TPCC points along the proposed alignment. While staking the Horizontal alignment at Site, the Contractor shall confirm the Right of Way (ROW) staking already done by the Employer at Site and provide and install any missing stakes. The Contractor shall ensure that staking of the ROW is carried out as per the relevant provisions of Indian Railways Engineering Code.
93.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix 10, Sub-Clause 10.22 (b)	The Contractor shall consistently use the TBMs provided by the Employer in addition to the benchmarks established by the Contractor for staking the alignment. The proposed formation level shall also be also marked on stakes to indicate embankment height or excavation depth.	The Contractor shall use the TBMs provided by the Employer *only after revalidation is done as per Sub-Clause 10.20.1 (b) of Appendix 10, Section VII-9: Appendices,* in addition to the benchmarks established by the Contractor for staking the alignment.
94.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix 10, Sub-Clause 10.26	**Other Related Surveys** The Contractor shall be responsible for carrying out validation of any Site data provided by the Employer and any other surveys considered necessary by the Contractor for the execution of the Works. Such surveys may include, but are not limited to, the following:	**Other Related Surveys** The Contractor shall be responsible for carrying out validation of any Site data provided by the Employer and any other surveys considered necessary by the Contractor for the execution of the Works. Such surveys may include, but are not limited to, the following:

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		a) Topographic Survey b) Utilities Survey including Adjacent Structures and Works with Works Areas c) Environmental Survey	a) Topographic Survey b) Utilities Survey including Adjacent Structures and Works with Works Areas c) Environmental Survey *d) Hydrological/ Hydro-Meteorological Survey*
95.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix 10, Sub-Clause 10.45.1 (c)	Contractor shall be responsible for relocation/diversion/shifting/modification of all charted/uncharted utilities infringing the Works.	Contractor shall be responsible for relocation/diversion/shifting/modification of all charted *(except specified otherwise) and* uncharted utilities infringing the Works.
96.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix, Sub-Clause 10.46.2, i.	**Charted Utility** The Charted Utilities identified by the Employer are enclosed in Part 2, Section VII-8-Employer's Requirements, Tender Drawings and Documents. These are further categorised as discussed under: **i.** Type A –Overhead Electrical Crossings a. These are Overhead Electrical Crossings, traversing the proposed HORC alignment and likely to infringe during execution of the work primarily due to inadequate ground clearance. The Employer has already taken action to remove these infringements by either raising or laying underground cables. The infringements due to LT and HT (up to 33 KV) utilities shall be removed by the Employer within 90 days of the award of Contract. The Crossings shifted underground shall normally be laid within ten (10)	**Charted Utility** The Charted Utilities identified by the Employer are enclosed in Part 2, Section VII-8-Employer's Requirements, Tender Drawings and Documents. These are further categorised as discussed under: **i.** Type A –Overhead Electrical Crossings a. These are Overhead Electrical Crossings, traversing the proposed HORC alignment and likely to infringe during execution of the work primarily due to inadequate ground clearance. The Employer has already taken action to remove these infringements by either raising or laying underground cables. *75% of infringements due to LT and HT (up to 33 KV) utilities shall be removed by the Employer within 90 days of the Commencement Date. Balance 25% shall be removed in a phased manner within 180 days of the Commencement Date . It*

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		metres of the chainages given in the list of Overhead Electrical Crossings except at locations where stations and buildings of HORC are proposed. At the stations and HORC buildings, the utility will be shifted beyond the structure area. For cables crossing the HORC alignment, extra length of 3m to 5m is being provided on both sides, so that cable can be slewed if required during construction. The Contractor shall consider the effect of these shifted utilities in his work planning and price. The coordinates of the new locations where utilities have been shifted will be shared with the Contractor once the shifting is completed. Electrical utilities which have been laid underground, will be considered as charted utilities. The Contractor shall design the span in such a way that further utility shifting is avoided unless inescapable. b. The infringements due to EHT (above 33 KV) Utilities will be progressively removed and is likely to be completed within 12 months of the award of the Contract. However, these utilities will not infringe the working of Contractor. The Contractor shall plan his works taking this aspect into consideration.	*is pertinent to point that these infringements are of minor nature and are unlikely to significantly hamper the progress of the work. Hence, for any delay in removal of any of these utilities, no claims on these grounds by the Contractor shall be accepted. The Contractor shall plan his works taking this aspect into consideration.* The Crossings shifted underground shall normally be laid within ten (10) metres of the chainages given in the list of Overhead Electrical Crossings except at locations where stations and buildings of HORC are proposed. At the stations and HORC buildings, the utility will be shifted beyond the structure area. For cables crossing the HORC alignment, extra length of 3m to 5m is being provided on both sides, so that cable can be slewed if required during construction. The Contractor shall consider the effect of these shifted utilities in his work planning and price. The coordinates of the new locations where utilities have been shifted will be shared with the Contractor once the shifting is completed. Electrical utilities which have been laid underground, will be considered as charted utilities. The Contractor shall design the span in such a way that further utility shifting is avoided unless inescapable. *However, in case such utilities are not dismantled by the Employer and which may affect execution of work, the Contractor will be asked for relocation/diversion/shifting/modification of utilities. The cost of relocation/diversion/shifting/modification of*

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
			utilities shall be payable by the Employer as per Conditions of the Contract. If any payment/compensation is payable to the utility owner, the same shall be paid by the Employer to the Utility owner. b. The infringements due to EHT (above 33 KV) Utilities will be progressively removed *by the Employer* and is likely to be completed within 12 months *from the Commencement Date. It is pertinent to point that these infringements are of minor nature and are unlikely to significantly hamper the progress of the work. Hence, for any delay in removal of any of these utilities, no claims on these grounds by the Contractor shall be applicable.* The Contractor shall plan his works taking this aspect into consideration.
97.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix, Sub-Clause 10.46.2, ii	**ii.** Type B – Overground Utility These are various utilities which existed on ground at the time of acquiring the land by the Employer and may affect the execution of the work. The Employer takes the responsibility to dismantle these utilities up to ground level and hand over the land to the Contractor free of these encumbrances. Removal of remaining portion below ground level, wherever required, shall be responsibility of the Contractor. The Accepted Contract Amount shall be deemed to include all such works and risks.	*Deleted*

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
98.	Part 2, Employer's Requirements, Section VII-9: Appendices, Appendix, Sub-Clause 10.46.2, iii	**iii.** Type C- Underground Utilities These are various charted underground utilities which are existing and Contractor shall consider and take into account the effect of these in his price.	*Deleted*
99.	Part 2, Employer's Requirements, Section VII -9: Appendices, Appendix 12	**Appendix 12- Contractor's Site Laboratory**	The existing Appendix 12-Contractor's Site Laboratory is revised and annexed as **Attachment 10** of this Corrigendum No. 2.
100.	Part 2, Employer's Requirements, Section VII -9: Appendices, Appendix 13, Sub-Clause 6.2.4, Table, Last Row	Cutting of trees | Punjab Land Preservation Act, 1900(PLPA, 1900) | Forest Department, Haryana	*Deleted*
101.	Part 2, Employer's Requirements, Section VII -9: Appendices, Appendix 13, Attachment -5 Safe Work Procedure for Work Near Railway Track, Sub-Clause 2.3 (B)	c) Suitable speed restriction shall be imposed, or Traffic block shall be ensured as required.	c) Suitable speed restriction shall be imposed, or Traffic block shall be ensured as required. *The requirement of Traffic and Power Blocks shall be submitted by the Contractor to the Engineer for approval. The Traffic and Power blocks will be finalised in consultation with Delhi Division of Northern Railway. No cost shall be charged for Traffic and Power blocks from the Contractor.*
102.	Part 3, Section IX, Conditions of Contract, Part B – Specific Provisions, Sub-Clause 1.5	**Priority of Documents** (m) Contractor's Proposal and any other documents forming part of the Contract	**Priority of Documents** (m) any other documents forming part of the Contract

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
103.	Part 3, Section IX, Conditions of Contract, Part A - Contract Data Sub-Clause 2.1,	1. 90% length of length of the formation shall be handed over to the Contractor within 7 days after the Commencement Date. 2. The balance length of formation shall be handed over within 120 days after the commencement Date.	***Land for Formation*** *i. Land for formation for about 60% of the project length (main line and connectivities) will be handed over within 7 days after the Commencement Date.* *ii. In the balance 40% of the project length, LT/HT lines run parallel to the HORC. Action for shifting of the same has been taken by the Employer. The land in this portion shall be handed over in a phased manner within 180 days of the Commencement Date.* *iii. In case, the Employer is not able to hand over the complete land at a few isolated locations due to any reasons within 180 days of the Commencement Date and such isolated patches do not affect the progress of work at other locations, no claims shall be accepted by the Employer for delay in handing over of such isolated patches of land. The Contractor shall plan his works taking this aspect into consideration.*
104.	Part 3, Section IX, Conditions of Contract, Part B: Specific Provisions, PCC, Sub-Clause 13.3.1, A.(I) (b)	**Following is added to GC Clause 13.3.1** **Variation in the accepted Contract Amount & deriving rates of new items** **A.** The quantities of items shown in Price Schedule 'B' and estimated cost shown in Price Schedule 'C' are approximate, and are liable to vary during the actual execution of the work. Some items may have to be added or deleted. The Contractor shall be bound to carry out and complete the stipulated Work as instructed by the Engineer, irrespective of the magnitude of variations including additions or deletion in the Price Schedule. Variations in Price Schedule 'A', Price Schedule 'B' and Price Schedule 'C' shall be paid as follows: **(I)Price Schedule 'A'**	**Following is added to GC Clause 13.3.1** **Variation in the accepted Contract Amount & deriving rates of new items** **A.** The quantities of items shown in Price Schedule 'B' and estimated cost shown in Price Schedule 'C' are approximate, and are liable to vary during the actual execution of the work. Some items may have to be added or deleted. The Contractor shall be bound to carry out and complete the stipulated Work as instructed by the Engineer, irrespective of the magnitude of variations including additions or deletion in the Price Schedule. Variations in Price Schedule 'A', Price Schedule 'B' and Price Schedule 'C' shall be paid as follows: **(I)Price Schedule 'A'**

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		a) For Bridges involving pile foundations, the quoted price of Schedule 'A' shall include providing piles, upto a pile depth of 20 m (below bottom of pile cap). Any increase or decrease in pile depth above/below the value of 20 m shall be payable/recoverable at the accepted rate of relevant item in Schedule 'D'. **b**) For any variation in the Scope of the Works in Schedule 'A', cost of additional quantities/items shall be worked out based on the accepted rates of items provided in Schedule 'B' or Schedule 'C' or Schedule 'D'. In case, items involving variation are not covered in Schedule 'B' or Schedule 'C' or Schedule 'D', rates of such items shall be taken from North Western Railway Unified Standard Schedule of Rates (NWR USSOR)-2019 (for Formation and Bridge works) duly adjusted for escalation @5% per annum from Nov' 2019 and Delhi Schedule of Rates (DSR)-2021 Vol I & II (for items other than Formation and Bridge works) duly adjusted for escalation @ 5% per annum from Apr' 2021. In cases where items involving variation are not covered in DSR or NWR USSOR, the rates of such items shall be worked out based on the rates available for similar items in DSR/NWR USSOR.	**a)** For Bridges involving pile foundations, the quoted price of Schedule 'A' shall include providing piles, upto a pile depth of 20 m (below bottom of pile cap). Any increase or decrease in pile depth above/below the value of 20 m shall be payable/recoverable at the accepted rate of relevant item in *Schedule 'B'.* **b**) For any variation in the Scope of the Works in Schedule 'A', cost of additional quantities/items shall be worked out based on the accepted rates of items provided in Schedule 'B' or Schedule 'D'. In case, items involving variation are not covered in Schedule 'B' or Schedule 'D', rates of such items shall be taken from North Western Railway Unified Standard Schedule of Rates (NWR USSOR)-2019 (for Formation and Bridge works) duly adjusted for escalation @5% per annum from Nov' 2019 and Delhi Schedule of Rates (DSR)-2021 Vol I & II (for items other than Formation and Bridge works) duly adjusted for escalation @ 5% per annum from Apr' 2021. In cases where items involving variation are not covered in DSR or NWR USSOR, the rates of such items shall be worked out based on the rates available for similar items in DSR/NWR USSOR.
105.	Part 3, Section IX, Conditions of Contract, Part B: Specific Provisions, PCC, Sub-Clause 21.6.1 B (b)	b) The disputes so referred to arbitration shall be settled in accordance with the Indian Arbitration & Conciliation Act, 1996 and amended by the Arbitration and Conciliation (Amendment) Act, 2015 and any statutory modification or re-enactment thereof. Further, it is agreed between the parties as under: Number of Arbitrators - The Arbitral tribunal shall consist of: (i) Sole Arbitrator (or)	The disputes so referred to arbitration shall be settled in accordance with the Indian Arbitration & Conciliation Act, 1996 and amended by the Arbitration and Conciliation (Amendment) Act, 2015 and any statutory modification or re-enactment thereof. Further, it is agreed between the parties as under: Number of Arbitrators - The Arbitral tribunal shall consist of *3 (three) arbitrators*

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		(ii) 3 (three) arbitrators **1. Procedure for Appointment of Arbitrators** The arbitrators shall be appointed as per following procedure: (i) In case of Sole Arbitrator: Within 30 days from the day when a written and valid demand for Arbitration is received by MD/HRIDC, the Employer will forward a panel of 03(three) names to the Contractor. The Contractor shall have to choose one Arbitrator from the panel of three, to be appointed as Sole Arbitrator within 30 days of dispatch of the request by the Employer. In case the Contractor fails to choose one Arbitrator within 30 days of dispatch of the request by the Employer, then MD/HRIDC shall appoint any one Arbitrator from the panel of Arbitrators as sole Arbitrator. (ii) In case of 03 Arbitrators: a) Within 30 days from the day when a written and valid demand for Arbitration is received by MD/HRIDC, the Employer will forward a panel of not fewer than five (05) nominees to the Contractor. The Contractor will then give his consent for any one name out of the panel to be appointed as one of the arbitrators within 30 days of dispatch of the request by the Employer. b) The Employer will decide the second Arbitrator. MD/HRIDC shall appoint the two Arbitrators, including the name of one Arbitrator for whom consent was given by the Contractor, within 30 days from the receipt of the consent for one name of the Arbitrator from the Contractor. In case the Contractor fails to give his consent within 30 days of the	**1. Procedure for Appointment of Arbitrators** The arbitrators shall be appointed as per following procedure: a) Within 30 days from the day when a written and valid demand for Arbitration is received by MD/HRIDC, the Employer will forward a panel of not fewer than five (05) nominees to the Contractor. The Contractor will then give his consent for any one name out of the panel to be appointed as one of the arbitrators within 30 days of dispatch of the request by the Employer. b) The Employer will decide the second Arbitrator. MD/HRIDC shall appoint the two Arbitrators, including the name of one Arbitrator for whom consent was given by the Contractor, within 30 days from the receipt of the consent for one name of the Arbitrator from the Contractor. In case the Contractor fails to give his consent within 30 days of the request of the Employer, MD/HRIDC shall nominate both the Arbitrators from the panel. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the parties out of the panel of Arbitrators provided to Contractor or from the larger panel of Arbitrators to be provided to them by the Employer at the request of two appointed Arbitrators (if so desired by them) and who shall act as presiding Arbitrator. In case of failure of the two appointed Arbitrators to reach upon consensus within a period of 30 days from their appointment, then, upon the request of either or both parties, the presiding Arbitrator shall be appointed by the MD/HRIDC within 14 days of receipt of request from either party or both parties. c) If one or more of the Arbitrators appointed as above refuses to act as Arbitrator, withdraws from his office as Arbitrator, or vacates his/their office/offices or is/are unable

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		request of the Employer, MD/HRIDC shall nominate both the Arbitrators from the panel. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the parties out of the panel of Arbitrators provided to Contractor or from the larger panel of Arbitrators to be provided to them by the Employer at the request of two appointed Arbitrators (if so desired by them) and who shall act as presiding Arbitrator. In case of failure of the two appointed Arbitrators to reach upon consensus within a period of 30 days from their appointment, then, upon the request of either or both parties, the presiding Arbitrator shall be appointed by the MD/HRIDC within 14 days of receipt of request from either party or both parties. c) If one or more of the Arbitrators appointed as above refuses to act as Arbitrator, withdraws from his office as Arbitrator, or vacates his/their office/offices or is/are unable or unwilling to perform his functions as Arbitrator for any reason whatsoever or dies or in the opinion of the MD/HRIDC fails to act without undue delay, the MD/HRIDC shall appoint new Arbitrator/Arbitrators to act in his/their place except in case of new presiding Arbitrator who shall be chosen following the same procedure as mentioned in para (b) above. Such reconstituted Tribunal may, at its discretion, proceed with the reference from the stage at which it was left by the previous Arbitrator(s). d) The Employer at the time of offering the panel of Arbitrator(s) to be appointed as Arbitrator shall also supply the information with regard to the qualifications of the said Arbitrators nominated in the panel along with their professional experience, phone nos. and addresses to the Contractor. The minimum qualification and experience of	or unwilling to perform his functions as Arbitrator for any reason whatsoever or dies or in the opinion of the MD/HRIDC fails to act without undue delay, the MD/HRIDC shall appoint new Arbitrator/Arbitrators to act in his/their place except in case of new presiding Arbitrator who shall be chosen following the same procedure as mentioned in para (b) above. Such reconstituted Tribunal may, at its discretion, proceed with the reference from the stage at which it was left by the previous Arbitrator(s). d) The Employer at the time of offering the panel of Arbitrator(s) to be appointed as Arbitrator shall also supply the information with regard to the qualifications of the said Arbitrators nominated in the panel along with their professional experience, phone nos. and addresses to the Contractor. The minimum qualification and experience of the arbitrators which may be appointed by the Parties in accordance with the contract is set out below: (i) A working/retired officer (not below E-8 grade in a central public sector undertaking in India, with which the Employer has no direct business relationship), of engineering or accounts/finance discipline, having experience in management of construction contracts; or (ii) A retired officer (not below the SAG level in Indian Railways) of any Engineering Services of Indian Railways or Indian Railway Accounts Service, having experience in management of construction contracts;

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
		the arbitrators which may be appointed by the Parties in accordance with the contract is set out below: (i) A working/retired officer (not below E-8 grade in a central public sector undertaking in India, with which the Employer has no direct business relationship), of engineering or accounts/finance discipline, having experience in management of construction contracts; or (ii) A retired officer (not below the SAG level in Indian Railways) of any Engineering Services of Indian Railways or Indian Railway Accounts Service, having experience in management of construction contracts;	
106.	Part 2, Section VII-8, Tender Drawings and Documents	Section VII-8A: Tender Drawings	The existing Section VII-8A: Tender Drawings is replaced and annexed as **Attachment 11** of this Corrigendum No. 2.
107.	Part 2, Section VII-8, Tender Drawings and Documents	Section VII-8B: List of Documents 4. Geotechnical Investigation Reports	Geotechnical Investigation Reports for six Nos. of Boreholes namely, BH-P1, BH-P7, BH-P9, BH-P10, BH-P11 and BH-P12 is added to the existing Geotechnical Investigation Reports and is annexed as **Attachment 12** of this Corrigendum No. 2.
108.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.1		**Add the following at the end of Sub-Clause 4.1** *All the bridges shall be provided with bridge number plaque, painting of HFL and bridge boards, where required. Approach embankment of minor bridge approaches shall be provided protection measures for a length of 15m on either side as shown in Tender drawings.* *Approach embankment of major bridge approaches shall be provided protection measures for a length of 30m on either side as shown in Tender drawings.*

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
109.	Part 2, Employer's Requirements, Section VII-5: Outline Design Specifications (ODS)– Civil, Sub-Clause 4.3, a)	v. Side pathway with hand railing shall be provided on bridges on outer side of Up & Down track.	v. Side pathway with hand railing shall be provided on bridges on outer side of Up & Down track *as per RDSO drawing No. CBS-0045*.
110.	Part 3, Section IX, Conditions of Contract, Part B: Specific Provisions, PCC, Sub-Clause 1.1.88	"**Variation**" means any change to the works which is instructed as a variation under Clause 13 [Variations and Adjustments].	**Following new para is added at the end of Sub-Clause 1.1.88:** *"Conceptual Tender drawings have been furnished in the Contract in good faith and to enable the Contractor to carry out design of the Works. The Contractor shall design the Works in accordance with Employer's Requirements based on which the Notice shall be issued by the Engineer. No claim shall be entertained from the Contractor for executing the Works as per drawings for which Notice has been given by the Engineer. If any additional opening is required due to agitation by land owners or due to demand by road authority or due to any other reason not attributable to the Contractor after award of the Contract, the same will constitute Variation and shall be dealt with as per the conditions of the Contract. If there is a change in the clear opening area of Road Under Bridges (RUBs) and canal crossings by more than (+/-) 10% over the opening area shown in conceptual Tender drawings due to agitation by land owners or due to demand by road authority or due to any other reason after award of the Contract, the same will constitute Variation and shall be dealt with as per conditions of the Contract"*
111.	Part 2, Section VII-8, Employer's Requirements-Tender Drawings and Documents, List of Documents		New Document **"List of Existing Structures to be Dismantled" is** added at S. No. 6 under List of Documents and is annexed as **Attachment 13** of this Corrigendum No. 2

S. No.	Tender Document Part / Section/ Clause No.	Description of Existing Clause	Modified Description of Existing Clause / New Clause
112.	Part 2, Employer's Requirements, Section VII-6: Outline Construction Specifications (OCS)– Civil		"Chapter 7: Items Included in Schedule-B" is added at the end of Chapter 6 and is annexed as **Attachment 14** of this Corrigendum No. 2
113.	Part 2, Section VII-8, Employer's Requirements-Tender Drawings and Documents, List of Documents	1. List of Curve and Gradients	List of Curve and Gradients is revised and annexed as **Attachment 15** of this Corrigendum No. 2
114.	Part 2, Section VII-8, Employer's Requirements-Tender Drawings and Documents, List of Documents	5. Approved Manufacturer/ Supplier list	Approved Manufacturer/Suppliers list is revised and annexed as **Attachment 16** of this Corrigendum No. 2.

List of Attachments to Corrigendum No. 2

S. No.	Attachment	Description
1.	Attachment 1	Section III, EQC- Sub-Clause 3.4.2 (a): Specific Construction & Contract Management Experience
2.	Attachment 2	Section IV: Tender Forms-Appendix B to Financial Part: Price Schedules/R1
3.	Attachment 3	Section VII-2: Employer's Requirements-Functional/R1
4.	Attachment 4	Section VII-4: Construction (Civil) 1. Attachment C-1/R1: Minimum Organisation Structure Required & Penalty for Non-Deployment 2. Attachment C-2/R1: Minimum Qualification & Experience of Project Personnel 3. Attachment C-3/R1: Minimum Resources Proposed for the Project- Plants & Equipment
5.	Attachment 5	Section VII-5: Outline Design Specifications (ODS)-Civil 1. Sub-Clause 5.2-Details of Structures to be Designed 2. Sub-Clause 5.3-Design Requirements
6.	Attachment 6	Section VII-6: Outline Construction Specifications (Civil)- New Sub-Clause 4.4.5, f)- Waterproofing of Subway
7.	Attachment 7	Section VII-6: OCS (Civil)- Sub-Clause 5.8: Rainwater Harvesting
8.	Attachment 8	Section VII-7: Employer's Requirements - General Electrical Services
9.	Attachment 9	Section VII-8: Tender Drawings and Documents List of Charted Utilities
10.	Attachment 10	Section VII-9: Appendices, Appendix 12/R1
11.	Attachment 11	Part 2, Section VII-8: Tender Drawings and Documents Tender Drawings
12.	Attachment 12	Section VII-8: Tender Drawings and Documents Geotechnical Investigation Report for Six Nos. of Boreholes (BH-P1, Bh-P7, BH-P9, BH-P10, BH-P11 and BH-P12
13.	Attachment 13	Section VII-8: Tender Drawings and Documents List of Existing Structures to be Dismantled
14.	Attachment 14	Section VII-6: OCS (Civil)- Chapter 7: Items Included in Schedule-B
15.	Attachment 15	Section VII-8: Tender Drawings and Documents List of Curve and Gradients
16.	Attachment 16	Section VII-8: Tender Drawings and Documents Approved Manufacturer/Suppliers list

Tender No. HORC/HRIDC/C-23/2022
Attachment 1
to
Corrigendum No. 2

Part 1, Section III, Evaluation and Qualification Criteria

1. Sub-Clause 3.4.2 (a): Specific Construction & Contract Management Experience

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Members Combined	Each Member	Lead Member	
3.4 Experience							
3.4.2 (a)	Specific Construction & Contract Management Experience	Participation, as a Prime contractor, Joint venture[5] member or Management Contractor[6] or Sub-Contractor[7] in at least (i) one "similar work"* of value of **INR 5200 million (USD 63 million** or more.	Must meet requirement	Must meet requirement	Must have the experience of executing at least one "similar work" of value **INR 2600 million (USD 31 million)** or more involving minimum **1.00**	Must have the experience of executing at least one "similar work" of value **INR 2600 million (USD 31 million)** or more involving minimum **1.00**	

[5] Value of completed work done by a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for purpose of satisfying his/her experience criteria mentioned in 3.4.2(a).

[6] A management contractor is a firm which takes on the role of contract management as a "general" contractor of sort could do. It does not normally perform directly the work(s) associated with the Contract. Rather, it manages the work of other Contractors/Sub-Contractors while bearing full responsibility for quality, and timely performance of the contract. If the Tenderer or any of the JV/Consortium member submits experience certificate as a Management Contractor, then the documents issued by the Employer (owner of the work) in support of his being appointed as Management Contractor shall only be considered for evaluation and qualification purpose. In case the Tenderer fails to submit such document(s) issued by the Employer (owner of the work), the offer of the Tenderer shall be summarily rejected.

[7] If a tenderer has successfully completed a work as Sub-Contractor, the work experience certificate issued only by the Employer (owner of the work) for such work to Sub-Contractor shall be considered for the purpose of fulfillment of credentials. Tenders submitted without this documentary proof shall be summarily rejected.

For example: Entity **'A'** is the owner of the work and awards a contract for execution of work to Contractor **'X'**. Thereafter, Contractor **'X'** sublets part of the work to Sub-Contractor **'Y'**. In this case, experience certificate of Sub-Contractor **'Y'** issued only by Entity **'A'** shall be considered for the purpose of evaluation of the Tender. Experience certificate issued by Contractor **'X'** to Sub-Contractor **'Y'** shall not be considered and the offer submitted based on such certificate shall be summarily rejected.

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Members Combined	Each Member	Lead Member	
		The above contract must involve minimum **1.8 million cum** earthwork[8] and execution of bridges of minimum *cumulative* length[9] **630 m** **OR** (ii) two "similar works"* each of value of **INR 3500 million (USD 42 million)** or more. Both the above contracts combined together must involve minimum **2.4 million cum** earthwork and execution of bridges of minimum *cumulative* length **840 m.** **OR**			**million cum** of earthwork or bridges of minimum **350 m** *cumulative* length that has been successfully or substantially completed since 1st April 2015 till 28 days prior to deadline of Tender submission.	**million cum** of earthwork or bridges of minimum **350 m** *cumulative* length that has been successfully or substantially completed since 1st April 2015 till 28 days prior to deadline of Tender submission.	

[8] Earthwork in formation/cutting, Blanketing, GSB/WMM in "Railway Projects"[11] or road projects will be considered as part of Earthwork.

[9] Evaluation of length of spans for multitrack/ multilanes bridges shall be done as under:

(a) In case of Railway bridges/Metro viaduct, accommodating multiple tracks, the length of span for each track shall be taken into consideration. In case of Road bridges accommodating multilanes, the credit for length of one span shall be given for every two lanes.

(b) The credit for multiple tracks/multilanes (exceeding two lanes) shall be given only if the number of tracks or number of lanes is specifically mentioned in the certificate of the Employer.

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Members Combined	Each Member	Lead Member	
		(iii) three "similar works"* each of value of **INR 2600 million (USD 31million)** or more. All the above three contracts combined together must involve minimum **3.0 million cum** earthwork and execution of bridges of minimum *cumulative* length **1050 m.** The Contracts mentioned in (i) or (ii) or (iii) above must have been successfully completed or substantially completed[10] since 1st April 2015 till 28 days prior to deadline of Tender submission and that are similar to the proposed works.					

[10] Substantial completion shall be based on 80% or more of the original value of works completed under the contract.

No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Members Combined	Each Member	Lead Member	
		*"Similar work" shall be "Railway Projects"[11] or road projects involving earthwork in formation or bridge works or both.					

[11] "Railway Projects" includes projects of Railway/ Metro Rail/ RRTS/High Speed Rail

Notes:

1. Exchange Rate for Qualification Criteria

Wherever a Form in Section IV, Tender Forms, requires a Tenderer to state a monetary amount, Tenderers shall indicate the INR equivalent as indicated in the respective form using the rate of exchange determined as follows:

(i) For construction turnover or financial data required for each year – Exchange rate prevailing on the last day of the respective financial year.

(ii) Value of single contract - Exchange rate prevailing on the date of the ContractAward i.e. the date of issue of Letter of Acceptance.

(iii) Exchange rates shall be taken from reference rate published by the Reserve Bank of India (RBI) on its website https://www.rbi.org.in. In case the exchange rate of particular currency on given date is not available on RBI web site, it will be as per the web site https://www.fbil.org.in of Financial Benchmark India Private Limited (FBIL). Any error in determining the exchange rates may be corrected by the Employer. In the case, where a Tenderer is required to convert a monetary amount from a currencyother than those currencies for which the RBI/FBIL reference rate is not published, the INR equivalent shall be worked out using the rate of exchange as published by the central bank of the country issuing the said currency. In case the exchange rate of that currency is not directly available in INR on the website of the central bank of the country issuing the said currency then the currency will be first converted to USD as per that web site and then converted from USD to INR as Per RBI or FBIL reference rates.

2. *Value of completed work done by a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for purpose of satisfying his/her experience criteria mentioned in 3.4.2(a).*

3. *For past experience of a firm in earlier JV for specified activity in sub clause 3.4.2 (a) credit shall be given for execution of that quantity of the specified activity executed by the firm as part of a JV, duly certified by the Employer. If the Employer's Certificate does not indicate the quantity of specified activity executed by each member, in such a case credit for quantity of specified activity shall be given as per following provisions in order of priority:*

(i) As per details given in JV agreement forming part of the relevant Contract Agreement.

(ii) If JV agreement does not provide such details, then credit shall be given in proportion of the percentage share of the firm in that JV mentioned in the Employer's Certificate/ JV Agreement.

4. *In case a JV quoting for the Tender has executed similar work specified in 3.4.2(a) with the same constitution of JV, the requirement specified to be met under Sub-Clause 3.4.2(a) and Sub-Clause 3.4.2(b) shall be considered to have been met treating the JV as a single entity for this purpose.*

5. *For Sub-Clause 3.3.2, Average Annual Construction Turnover, the Tenderer should submit*

actual construction turnover figures for the specified financial years. For Evaluation purposes the figures of previous years shall be updated @ 5% per year compounded annually based on Rupee value to bring them to the level of the last Financial Year specified in Sub-Clause 3.3.2. If the figure for turnover in an individual year is in a currency other than INR, then the same shall first be converted to INR based on the exchange rates derived as mentioned in Note 1 above and then the figures in INR shall be updated.

6. *For Sub-Clause 3.4.2 (a) Specific Construction & Contract Management Experience, the Tenderer should submit actual Value of Work completed/ substantially completed. Value of Work for Evaluation purposes shall be updated @ 5% per year compounded annually based on Rupee value to bring them to the price level of date of deadline for submission of Tenders. Updated value shall be calculated as per formula given below:-*

$P=Qx\ [1.05]^{N/365}$

Where

P = updated value of work on deadline for submission of Tenders.

Q = value of work on the date of completion/substantial completion as indicated in the Employer's certificate.

N = Number of days between date of completion and deadline for submission of Tenders.

Tender No. HORC/HRIDC/C-23/2022
Attachment 2
to
Corrigendum No. 2
Part 1, Section IV, Tender Forms

Appendix B to Financial Part: Price Schedules/R1

Appendix B to Financial Part: Price Schedules/R1

1 Preamble

1.1. The Price Schedules shall be read in conjunction with the Instructions to Tenderers, the General Conditions, the Particular Conditions and the Employer's Requirements (*General, Functional, Design (Civil), Construction (Civil), Outline Design Specifications (ODS)- Civil, Outline Construction Specifications (OCS)-Civil, General Electrical Services, Tender Drawings and Documents*) and the Addenda (if any).

1.2. **Schedule 'A'** comprises scope of work to be executed under lump sum contract as detailed in Part 2- Employers' Requirements of Tender Document. *Cost of Schedule 'A' also includes cost of tree cutting for entire package C-23 as per Sub-Clause 10.14 of Appendix 10, Section VII-9: Appendices, Part 2 - Employer's Requirements of Tender Documents.* The Tenderer has to quote a single lump sum amount against Schedule 'A'. Payment to the Contractor will be made in accordance with payment stages/Milestones defined for each Cost Centre detailed in Clause 5.0 below unless otherwise specified in the Contract.

1.3. **Schedule 'B' -**Retaining Wall, Bridges and other civil works:

Schedule 'B' comprises *of four parts i.e. Schedule B1, B2, B3 and B4. Schedule 'B1' comprises items based on NWR USSOR-2019. Schedule B2 comprises items based on NR USSOR-2010 mainly for building works. Schedule B3 comprises items based on DSR 2021. Schedule B4 contains Non-Schedule items. Cost of design and drawings of all the temporary works, temporary road diversion is deemed to be included in the rates quoted for the relevant item of Schedule 'B' unless otherwise specified in the Contract.* The Tenderer has to quote the percentage Excess (+) or Less (-) over the total Estimated amount of Schedule 'B' *(which is shown as "Estimated Rate" against Schedule 'B' in BOQ2 of MS excel file on e- procurement portal)*. The payment against this Schedule 'B' will be made on the basis of quantities executed, measured and certified. Under this Schedule, the Contractor is required to carry out all works of retaining walls, bridges and other civil works, which are not covered in Schedule 'A', as per site requirements and as per the direction of the Engineer.

1.4. **Schedule 'C'** comprises of percentage rate for "General Electrical Services works". The Tenderer has to quote the percentage Excess (+) or Less (-) over the total Estimated amount of Schedule 'C' *(which is shown as "Estimated Rate" against Schedule 'C' in BOQ2 of MS excel file on e procurement portal). The quoted rate includes the cost of design and drawings of relevant systems and items as specified in the Contract Documents.* The payment against this Schedule 'C' will be made on the basis of quantities executed, measured and certified. Under this Schedule, the Contractor is required to carry out all works of General Electrical Services works, which are not covered in Schedule 'A' or Schedule 'B', as per site requirements and as per the direction of the Engineer.

1.5. **Schedule 'D'** ccomprises "Item rates for miscellaneous works". Under this Schedule, the Contractor has to undertake items or works not covered in Schedule ´A' or Schedule ´B' or Schedule ´C'. Execution of items under this Schedule shall be carried out only after specific instructions of the Engineer. This Schedule consists of items for Civil works. The work has to be carried out as per Schedule of items given in this Schedule 'D'. This Schedule contains only Rate and Unit of items of the works. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices quoted in the Price Schedules. The Tenderer

has to quote the percentage (%) Excess (+) or Less (-) *over the total Estimated Cost of Schedule 'D' (which is shown as "Estimated Rate" against Schedule 'D' in BOQ2 of MS excel file on e procurement portal)* for items to be executed against this head.

1.6. The Schedules may not generally give a full description of the works to be performed and the plant or equipment to be supplied under each item. Tenderers shall be deemed to have read the Employer's Requirements and the other sections of the Tender Documents and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling the rates and prices.

1.7. The price quoted in the Price Schedules for Schedule 'A', Schedule 'B' Schedule 'C' and Schedule 'D' are for complete and finished items of the work in all respects. The Price quoted in the Price Schedules shall, except otherwise specifically provided, shall include all design, include all necessary survey work, plants , tools, machinery, Contractor's equipment, labour, compliance of labour laws, supervision, materials, transportation, handling, loading & unloading, storage, sampling, testing, fuel, oil, consumables, electric power, water, all leads & lifts, dewatering, all temporary works including temporary accesses, staging, form works and false works, stacking, provision and maintenance of all temporary works area, construction of temporary store and buildings, fencing, barricading, lighting, drainage arrangements, erection & maintenance of inspection facilities above and below ground such as brick, concrete and steel etc., reinstatement, remedy of any defects during the Defects Notification Period, safety measures for workmen and road users, preparation of design and drawings pertaining to permanent and temporary works, & *temporary diversion works, temporary road widening,* traffic diversion works, mobilisation and demobilisation, establishment and overhead charges, labour camps, insurance cost for labour and works, contractor's profit, all taxes including Goods and Service Tax (GST), insurance, royalties, duties, cess, octroi, other levies and other charges together with all general risks, liabilities and obligations set out or implied in the Contract.

The price and rates quoted by Tenderer shall be deemed to have included GST at the rate of 18% as notified by 47th GST Council on 29th June 2022 ***and Item 18.5 of Circular No. 177/09/2022-TRU dated 03rd August 2022 issued by Ministry of Finance, Government of India.***

1.8. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the Price Schedules, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Work.

1.9. To the extent acceptable to the Employer for the purpose of making payments or partial payments, valuing variations or evaluating claims, or for such other purposes as the Engineer may reasonably require, the Contractor may provide the Engineer with a breakdown of any composite or lump sum items included in the Schedules.

1.10. The Provisional Sums included and so designated in the Price Schedules shall be expended in whole or in part at the direction and discretion of the Engineer. The Provisional Sum shall be used to cover the Employer's share of the DAAB members' fees and expenses, in accordance with Clause 21. No prior instruction of the Engineer shall be required with respect to the work of the DAAB in accordance with Sub-Clause 13.4 of Part B-Specific Provisions - Particular Conditions of Contract. The Contractor shall submit the DAAB members' invoices and satisfactory evidence of having paid 100% of such invoices as part of the substantiation of those statements submitted under Sub-Clause 14.3. in accordance with Sub-Clauses 13.4 of the General Conditions.

1.11. The prices shall be quoted against Schedule 'A', Schedule 'B', Schedule 'C' and Schedule 'D' in the Price Schedule (Excel Workbook) uploaded on the e-Procurement portal.

1.12. The prices quoted shall be comprehensive and must include for complying in all respects with the Price Schedules, Instruction to Tenderers, the General Conditions, the Particular Conditions, Employer's

Requirements, Specifications and Drawings and for all matters and things necessary for the proper construction, completion, and making good of any defect in part or of the whole of the Works.

1.13. No claims for additional payment shall be allowed for any error or misunderstanding by the Contractor of the work involved.

1.14. The rates quoted by the Tenderer are for design and construction of the Works as per approved Alignment Plan & L-Section , approved GADs of bridges and approved drawings of other structures as per Scope of the Works.

2 Variations in Price Schedule 'A', Schedule 'B' Schedule 'C' and Schedule 'D'

2.1 Variations in Price Schedules shall be dealt in accordance with Sub Clause 13.3.1 of Part B- Specific Provisions, Section IX- Particular Conditions of Contract.

2.2 The through Chainages mentioned in the Scope of the Works/Tender Drawings can undergo some minor corrections, without any impact on the overall length/Scope of the Works.

3 Measurement and Payment

3.1 The measurement shall be made as per Price Schedules i.e. Schedule 'A'. Schedule 'B' Schedule 'C' and Schedule 'D' and other relevant provisions of the Contract such as Employer's Requirements and the Drawings.

3.2 If during execution of the Contract, it is decided by the Employer/Engineer that one or more items of Work/Milestone of a Cost Centre in a particular Price Schedule is not required to be executed, the proportionate amount against that particular Item of Work/Milestones shall not be paid. The Engineer's decision in this regard shall be final.

3.3 The Payment shall be made as per Clause 14 [Contract Price and Payment] of the General Conditions and Particular Conditions.

3.4 The Employer shall make interim payments to the Contractor in accordance with the provisions of Sub-Clause 14.6 [Issue of Interim Payment Certificates] of the General Conditions and Particular Conditions, as certified by the Engineer on the basis of the progress achieved for the items of works/stages/Milestones of the works.

3.5 The Contractor shall base its claim for interim payment in accordance with Sub-Clause 14.3 [Application for Interim Payment] of the General Conditions and Particular Conditions for each stage for various items of work on the basis of actual progress of work executed (i.e. Milestones achieved) till the end of the month for which the payment is claimed in relation to the Contractor's total executed quantity, supported with documents and updated programme in accordance with the Employer's Requirements.

3.6 The Employer may carry out necessary tests, either directly or through an independent agency, of the Works done by the Contractor for which payment has been accepted and certified by the Engineer. The payment shall depend upon the outcome of such tests.

3.7 Format for the Contractor's application for payment shall be agreed between the Engineer and the Contractor.

3.8 All necessary supplementary details to support progress claims, including all certified Request for Inspection in hard bound copy, shall be included with application for payment. Sketches, drawings, approvals, calculations, test reports etc. shall accompany an application for payment to be substantiated and certified by the Engineer and submitted to the Employer.

3.9 Even if no work is executed during the month, or the Contractor does not choose to issue an application for payment, a 'NIL' application shall be submitted.

3.10 For the purposes of payment, the Contractor shall submit to the Engineer a detailed Price Schedule indicating a further breakdown for each stage of payment contained in the Price Schedules within forty-two (42) days after the receipt of the Letter of Acceptance. Such cost breakdowns shall be subject to approval of the Engineer who shall review and evaluate with comments and/or issue approval within twenty-eight (28) days of receipt of same. The Contractor shall resubmit the cost breakdown structure corresponding to the Engineer's comments for review, if required.

3.11 The Engineer is not obliged to issue an Interim Payment Certificate until such breakdown structure of payment schedule has been submitted and accepted by the Engineer.

4 Methodology for Claiming Payment

4.1 The Contractor shall prepare his monthly application for payment in the agreed format in two hard copies and one soft copy. This shall be accompanied by supplementary details in accordance with Sub-Clause 14.3 [Application for Interim Payment Certificates] of the General Conditions. All hard copies shall bear the original signatures of the Contractor's Representative and be submitted to the Engineer.

4.2 If these are found in order, in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates] of the General Conditions, then the Engineer shall forward two certified copies of the application along with certified supplementary details to the Employer, with his recommendation for payment; otherwise, all documents shall be returned to the Contractor for rectification and resubmission.

5 Price Schedule

5.1 Schedule "A'- Breakup of Lump Sum cost of Works under various Sub-Heads shall be as follows:

Sub-Head	Description	Percentage of the quoted lump sum cost of Schedule 'A'	No. of Cost Centre	Total Cost of each Sub-Head
1	2	3	4	5
C	Civil works	100	4	C= 1xLS*

*LS = Total lump sum accepted cost of Works for Schedule 'A'

5.2 Apportionment of Contract Price for payments under various Cost Centre for Sub-Head 'C'- Civil Works

Cost Centre	Description of Cost Centre	Percentage of Cost Centre 'C'	Total Cost of Cost Centre	Total Cost of Sub-Head 'C'
1	2	3	4	5
CD	Design and As Built Drawing & Documents	*01.00%*	CD= *0.01*x 'C'	100% of SCH 'A'
CE	Earthwork and Blanketing	*51.00%*	CE=*0.51*x 'C'	
CB	Bridges	*41.00%*	CE=*0.41*x 'C'	
CS	Station	*07.00%*	CE=*0.07*x 'C'	
	Total	100%		

Note: Value of 'C' shall be as defined in Sub-Clause 5.1 above.

The percentage figures as filled in column (3) for the apportionment of the Contract Price for completion of the Works corresponding to the various Sub-Heads and Cost Centres are fixed and payment will be released for different Cost centre as per above percentage break-up of Contract Price.

5.2.1 Stages of Payment i.e. Milestones of Cost Centre 'CD'- Design and As Built Drawing & Documents

Cost Centre			**CD- Design and As Built Drawing & Documents**	
Weightage of Cost Centre 'CD', (Y)			**1%**	
Sub Cost Centre	**Item of Work**		**Milestone**	**Weightage (X)**
	No.	**Description**		
1	2	3	4	5
CD1- Design	**CD1.1**	**Preliminary design**	Preliminary Design	7%
	CD1.2	**Formation**	Definitive design & Good for Construction Drawings (GFC)	7%
	CD1.3	**Minor Bridges**		
	CD1.3.1		Preparation & approval of GADs	10%
	CD1.3.2		Definitive Design	8%
	CD1.3.3		Good For Construction (GFC) Drawings	10%
	CD1.4	**Major Bridges**		
	CD1.4.1		Preparation & approval of GADs	6%
	CD1.4.2		Definitive Design	7%
	CD1.4.3		Good For Construction (GFC) Drawings	8%
	CD1.5	**Retaining Walls**		
	CD1.5.1		Definitive Design	3.5%
	CD1.5.2		Good For Construction (GFC) Drawings	3.5%
	CD1.6	**Stations**		
	CD1.6.1		Preparation & approval of Architectural Drawings	4%
	CD1.6.2		Definitive Design	3%
	CD1.6.3		Combined Services Drawings & MEP Drawings	5%
	CD1.6.4		Good For Construction (GFC) Drawings	3%
CD2- As Built Drawing & Documents	CD 2.1	As Built Drawings	Submission of As Built Drawings	10%
	CD 2.2	As Built Documents	Submission of As Built Documents	5%
			Total	**100%**

Note:

1. The value of each Milestones will be total lump sum accepted cost of Works for Schedule 'A' (LS) multiplied by X * Y. For example, the value of Milestone CD 1.3.2 will be equal to LS*X*Y= LSx0.08x0.01.
2. Adjustment to Contract Price pursuant to GCC 13.7 shall **NOT** be applicable to the payments of Works executed under this Cost Centre.
3. All minor bridges shall have equal weightage. Payment of each stage/Milestones shall be made on pro rata basis on completion of a stage for a bridge.

4. All major bridges shall have equal weightage. Payment of each stage/Milestones shall be made on pro rata basis on completion of a stage for a bridge.
5. All stations shall have equal weightage. Payment of each stage/Milestones shall be made on pro rata basis on completion of a stage for a station.
6. Payment will be made on Completion of each Milestones as per weightage given in this Cost Centre
7. *The Cost of Milestones include cost of design of the formation, Bridges, retaining wall, Structure, included in Schedule 'A' and Schedule 'B' as mentioned in Section VII-2, Employer's Requirements.*

5.2.2 Stages of Payment i.e. Milestones of Cost Centre 'CE'- Earthwork and Blanketing

Cost Centre			**CE-Earthwork and Blanketing**	
Weightage of Cost Centre 'CE', (Y)			**51.0%**	
Sub-Cost Centre	**Item of Work**		**Milestone**	**Weightage (X)**
	No.	**Description**		
1	2	3	4	5
CE.1-Earthwork	CE.1.1	Earthwork in formation from Ch 55600 to 56000 for double main line track.		
	CE.1.1.1		Earthwork in embankment / cutting including compaction.	2.16%
	CE.1.1.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.3%
	CE.1.1.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.2	Earthwork in formation from Ch 56000 to 57000 for double main line track.		
	CE.1.2.1		Earthwork in embankment/ cutting including compaction.	7.0%
	CE.1.2.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.7%
	CE.1.2.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.18%
	CE.1.3	Earthwork in formation from Ch 57000 to 58000 for main line, loop line, connecting lines & platform area in New Patli station yard.		
	CE.1.3.1		Earthwork in embankment / cutting including compaction.	6.14%
	CE.1.3.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting*	0.4%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
			(where specified) and drainage arrangement complete in all respects.	
	CE.1.3.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.2%
	CE.1.4	Earthwork in formation from Ch 58000 to 58700 in New Patli yard for main, loop & connecting lines and platform area		
	CE.1.4.1		Earthwork in embankment / cutting including compaction.	5.05%
	CE.1.4.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.3%
	CE.1.4.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.15%
	CE.1.5	Earthwork in formation from Ch 58700 to 60000 for double main line & connecting line track.		
	CE.1.5.1		Earthwork in embankment / cutting including compaction.	4.21%
	CE.1.5.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.3%
	CE.1.5.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.15%
	CE.1.6	Earthwork in formation from Ch 60000 to 61000 for double main line track.		

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.1.6.1		Earthwork in embankment / cutting including compaction.	3.21%
	CE.1.6.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.3%
	CE.1.6.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.7	Earthwork in formation from Ch 61000 to 61500 for doble main line track.		
	CE.1.7.1		Earthwork in embankment / cutting including compaction.	1.67%
	CE.1.7.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.25%
	CE.1.7.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.8	Earthwork in formation from Ch 29600 to 30000 for double main line track.		
	CE.1.8.1		Earthwork in embankment / cutting including compaction.	0.5%
	CE.1.8.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.36%
	CE.1.8.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.09%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.1.9	Earthwork in formation from Ch 30000 to 31000 for double main line track.		
	CE.1.9.1		Earthwork in embankment / cutting including compaction.	0.4%
	CE.1.9.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.65%
	CE.1.9.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.13%
	CE.1.10	Earthwork in formation from Ch 31000 to 32000 for double main line track.		
	CE.1.10.1		Earthwork in embankment / cutting including compaction.	0.04%
	CE.1.10.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0%
	CE.1.10.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0%
	CE.1.11	Earthwork in formation from Ch 32000 to 33000 for main line, loop lines, including platform area in Dhulawat station yard.		
	CE.1.11.1		Earthwork in embankment / cutting including compaction.	0.9%
	CE.1.11.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.05%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.1.11.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.12	Earthwork in formation from Ch 33000 to 34000 for main line, loop lines, including platform area in Dhulawat station yard.		
	CE.1.12.1		Earthwork in embankment / cutting including compaction.	1.62%
	CE.1.12.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.2%
	CE.1.12.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.13	Earthwork in formation from Ch 34000 to 35000 for main line track.		
	CE.1.13.1		Earthwork in embankment / cutting including compaction.	1.16%
	CE.1.13.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.15%
	CE.1.13.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.14	Earthwork in formation from Ch 35000 to 36000 for main line track.		

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.1.14.1		Earthwork in embankment / cutting including compaction.	0.75%
	CE.1.14.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.1%
	CE.1.14.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.15	Earthwork in formation from Ch 36000 to 37000 for main line track.		
	CE.1.15.1		Earthwork in embankment / cutting including compaction.	1.36%
	CE.1.15.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.15%
	CE.1.15.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.16	Earthwork in formation from Ch 37000 to 38000 for main line track.		
	CE.1.16.1		Earthwork in embankment / cutting including compaction.	1.39%
	CE.1.16.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.15%
	CE.1.16.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and*	0.1%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
			after ensuring that vegetative cover is properly rooted .	
	CE.1.17	Earthwork in formation from Ch 38000 to 39000 for main line track.		
	CE.1.17.1		Earthwork in embankment / cutting including compaction.	1.2%
	CE.1.17.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.14%
	CE.1.17.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.18	Earthwork in formation from Ch 39000 to 40000 for main line track.		
	CE.1.18.1		Earthwork in embankment / cutting including compaction.	0.87%
	CE.1.18.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.1%
	CE.1.18.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.19	Earthwork in formation from Ch 40000 to 41000 for main line track.		
	CE.1.19.1		Earthwork in embankment / cutting including compaction.	0.92%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.1.19.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.1%
	CE.1.19.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.20	Earthwork in formation from Ch 41000 to 42000 for main line track.		
	CE.1.20.1		Earthwork in embankment / cutting including compaction.	1.24%
	CE.1.20.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.15%
	CE.1.20.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.21	Earthwork in formation from Ch 42000 to 43000 for main line including platform area in Chandla Dungerwas station.		
	CE.1.21.1		Earthwork in embankment / cutting including compaction.	1.95%
	CE.1.21.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.4%
	CE.1.21.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.1.22	Earthwork in formation from Ch 43000 to 44000 for main line track.		
	CE.1.22.1		Earthwork in embankment / cutting including compaction.	2.15%
	CE.1.22.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.4%
	CE.1.22.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.15%
	CE.1.23	Earthwork in formation from Ch 44000 to 45000 for main line track.		
	CE.1.23.1		Earthwork in embankment / cutting including compaction.	4.94%
	CE.1.23.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.4%
	CE.1.23.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.15%
	CE.1.24	Earthwork in formation from Ch 45000 to 46000 for main line track.		
	CE.1.24.1		Earthwork in embankment / cutting including compaction.	1.6%
	CE.1.24.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting*	0.3%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
			(where specified) and drainage arrangement complete in all respects.	
	CE.1.24.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.25	Earthwork in formation from Ch 46000 to 47000 for main line including platform area in Panchgaon station.		
	CE.1.25.1		Earthwork in embankment / cutting including compaction.	6.42%
	CE.1.25.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.55%
	CE.1.25.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.2%
	CE.1.26	Earthwork in formation from Ch 47000 to 48000 for main line track.		
	CE.1.26.1		Earthwork in embankment / cutting including compaction.	4.31%
	CE.1.26.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.45%
	CE.1.26.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.15%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.1.27	Earthwork in formation from Ch 48000 to 49000 for main line track.		
	CE.1.27.1		Earthwork in embankment / cutting including compaction.	1.47%
	CE.1.27.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.2%
	CE.1.27.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.28	Earthwork in formation from Ch 49000 to 49700 for main line track.		
	CE.1.28.1		Earthwork in embankment / cutting including compaction.	0.2%
	CE.1.28.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.04%
	CE.1.28.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.03%
	CE.1.29	Earthwork in formation from Ch 0614 to 1000 for New Patli - Patli connecting line		
	CE.1.29.1		Earthwork in embankment / cutting including compaction.	0.34%
	CE.1.29.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.15%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.1.29.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.05%
	CE.1.30	Earthwork in formation from Ch 1000 to 2000 for New Patli - Patli connecting line.		
	CE.1.30.1		Earthwork in embankment / cutting including compaction.	1.15%
	CE.1.30.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.2%
	CE.1.30.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.31	Earthwork in formation from Ch 2000 to Ch 2700 for New Patli-Patli connecting line		
	CE.1.31.1		Earthwork in embankment / cutting including compaction.	0.15%
	CE.1.31.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.02%
	CE.1.31.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.0%
	CE.1.32	Earthwork in formation from Ch 0703 to 2000 for New Patli-Sultanpur connecting line		
	CE.1.32.1		Earthwork in embankment / cutting including compaction.	1.52%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.1.32.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.2%
	CE.1.32.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.33	Earthwork in formation from Ch 2000 to 3000 for New Patli-Sultanpur connecting line		
	CE.1.33.1		Earthwork in embankment / cutting including compaction.	0.98%
	CE.1.33.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.1%
	CE.1.33.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.1%
	CE.1.34	Earthwork in formation from Ch 3000 to 4190 for New Patli-Sultanpur connecting line and Sultanpur station yard (Km 0861 towards Garhi Harsaru side & Km 0530 towards Badsa side & Km 0689 towards Farukhnagar side)		
	CE.1.34.1		Earthwork in embankment / cutting including compaction.	0.3%
	CE.1.34.2		On cutting of extra width & dressing of slopes in profile, compaction, *providing vegetative cover including coir netting (where specified) and* drainage arrangement complete in all respects.	0.06%

Cost Centre			**CE-Earthwork and Blanketing**	
Weightage of Cost Centre 'CE', (Y)			**51.0%**	
Sub-Cost Centre	**Item of Work**		**Milestone**	**Weightage (X)**
	No.	**Description**		
1	2	3	4	5
	CE.1.34.3		On completion of maintenance *of slopes, drainage system & vegetative cover* for a period of 12 months *and after ensuring that vegetative cover* is properly rooted .	0.06%
CE.2-Blanketing	**CE.2.1**	Blanketing from Ch 55600 to 56000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.27%
	CE.2.2	Blanketing from Ch 56000 to 57000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.57%
	CE.2.3	Blanketing from Ch 57000 to 58000 for main line, loop lines & connecting lines in New Patli station yard.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	1.03%
	CE.2.4	Blanketing from Ch 58000 to 58700 for main line, loop lines & connecting lines in New Patli station yard.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.88%
	CE.2.5	Blanketing from Ch 58700 to 60000 for main line & connecting line.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	1.2%
	CE.2.6	Blanketing from Ch 60000 to 61000 for double main line track	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.56%
	CE.2.7	Blanketing from Ch 61000 to 61500 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.29%
	CE.2.8	Blanketing from Ch 29600 to 30000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.27%
	CE.2.9	Blanketing from Ch 30000 to 31000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.56%
	CE.2.10	Blanketing from Ch 31000 to 32000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.6%
	CE.2.11	Blanketing from Ch 32000 to 33000 for main line & loop lines in Dhulawat station yard.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.81%
	CE.2.12	Blanketing from Ch 33000 to 34000 for main line & loop lines	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.69%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
		in Dhulawat station yard.		
	CE.2.13	Blanketing from Ch 34000 to 35000 for main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.58%
	CE.2.14	Blanketing from Ch 35000 to 36000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.56%
	CE.2.15	Blanketing from Ch 36000 to 37000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.56%
	CE.2.16	Blanketing from Ch 37000 to 38000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.56%
	CE.2.17	Blanketing from Ch 38000 to 39000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.56%
	CE.2.18	Blanketing from Ch 39000 to 40000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.57%
	CE.2.19	Blanketing from Ch 40000 to 41000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.57%
	CE.2.20	Blanketing from Ch 41000 to 42000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.56%
	CE.2.21	Blanketing from Ch 42000 to 43000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.48%
	CE.2.22	Blanketing from Ch 43000 to 4400 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.57%
	CE.2.23	Blanketing from Ch 44000 to 45000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.57%
	CE.2.24	Blanketing from Ch 45000 to 46000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.62%
	CE.2.25	Blanketing from Ch 46000 to 47000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.49%
	CE.2.26	Blanketing from Ch 47000 to 48000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.57%
	CE.2.27	Blanketing from Ch 48000 to 49000 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.51%

Cost Centre			CE-Earthwork and Blanketing	
Weightage of Cost Centre 'CE', (Y)			51.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CE.2.28	Blanketing from Ch 49000 to 49700 for double main line track.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.45%
	CE.2.29	Blanketing from Ch 0614 to 1000 for New Patli - Patli connecting line	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.06%
	CE.2.30	Blanketing from Ch 1000 to 2000 for New Patli - Patli connecting line.	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.36%
	CE.2.31	Blanketing from Ch 2000 to Ch 2700 for New Patli-Patli connecting line	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.24%
	CE.2.32	Blanketing from Ch 0703 to 2000 for New Patli-Sultanpur connecting line	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.3%
	CE.2.33	Blanketing from Ch 2000 to 3000 for New Patli-Sultanpur connecting line	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	0.35%
	CE.2.34	Blanketing from Ch 3000 to 4119 for New Patli-Sultanpur connecting line and in Sultanpur Station yard (Km 0861 towards Garhi Harsaru side & Km 0530 towards Badsa side& Km 0689 towards Farukhnagar side)	Blanketing on subgrade/ prepared subgrade as per design profile including compaction complete in all respects.	1.00%
			Total	**100%**

Notes:

1. *The value of each Milestones will be total lump sum accepted cost of Works for Schedule 'A' (LS) multiplied by X * Y. For example, the value of Milestone CE1.1.1 will be equal to LS*X*Y= LSx0.0216 x 0.51.*
2. Adjustment to Contract Price pursuant to GCC 13.7 shall be applicable to the payments of Works executed under this Sub Heads / Price Schedule.
3. Payment will be made on Completion of each Milestones as per weightage given in this schedule.
4. *If owing to site conditions or any other reasons, locations of retaining walls are changed or new retaining walls are constructed or retaining walls are eliminated & normal bank is provided, the variation caused in quantity of earthwork in embankment on this account shall be payable/ recoverable under Item no. NS-1 of Schedule 'B4'.*

5.2.3 Milestones of Cost Centre 'CB'- for Bridges

Cost Centre			CB- Bridges	
Weightage of Cost Centre 'CB', (Y)			41%	
Sub-cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
CB1- Minor Bridges	CB1.1	Construction of minor bridge No. Nil between Ch 55600 to 56000 for main line track.		0%
	CB.1.2	Construction of minor bridge Nos. 137,138, 139 & 140 between Ch 56000 to 57000 for main line track.	On completion of bridge works in all respects	7.34%
	CB1.3	Construction of minor bridge No. 141, 141A,142, 143 & 144 between Ch 57000 to 58000 for main line and New Patli - Patli connecting line.	On completion of bridge works in all respects	9.85%
	CB1.4	Construction of minor bridge No. 145 & 146 between ch 58000 to 58700 in New Patli yard.	On completion of bridge works in all respects	2.58%
	CB.1.5	Construction of minor bridge No. 148 between ch 58700 to 60000 for main & New Patli-Sultanpur connecting lines.	On completion of bridge works in all respects	1.20%
	CB.1.6	Construction of minor bridge No. 149 & 149A between Ch 60000 to 61000 for main line.	On completion of bridge works in all respects	1.35%
	CB1.7	Construction of minor bridge No. 154 between Ch 61000 to 61500 for main line track.	On completion of bridge works in all respects	0.36%
	CB1.8	Construction of minor bridge No. Nil between ch 29600 to 30000 for main line track.	-	0%
	CB1.9	Construction of minor bridge No. Nil between Ch 30000 to 31000 for main line track.	-	0%
	CB1.10	Construction of minor bridge No. 77 between Ch 31000 to 32000 for main line track.	On completion of bridge works in all respects	1.64%
	CB1.11	Construction of minor bridge No. 78 between Ch 32000 to 33000 for main line, loop line & platform.	On completion of bridge works in all respects	0.33%
	CB1.12	Construction of minor bridge No. 80, 81, 82 & 83 between ch 33000 to 34000 for main line, loop line & platform.	On completion of bridge works in all respects	2.25%

Cost Centre			CB- Bridges	
Weightage of Cost Centre 'CB', (Y)			41%	
Sub-cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CB1.13	Construction of minor bridge No. Nil between Ch 34000 to 35000 for main line track.	-	0%
	CB1.14	Construction of minor bridge No. 87 & 88 between Ch 35000 to 36000 for main line track.	On completion of bridge works in all respects	3.23%
	CB1.15	Construction of minor bridge No. Nil between Ch 36000 to 37000 for main line track.	-	0%
	CB1.16	Construction of minor bridge No. 90 & 91 between Ch 37000 to 38000 for main line track.	On completion of bridge works in all respects	0.99%
	CB1.17	Construction of minor bridge No. Nil between Ch 38000 to 39000 for main line track.	-	0%
	CB1.18	Construction of minor bridge No. 94 between Ch 39000 to 40000 for main line track.	On completion of bridge works in all respects	0.68%
	CB1.19	Construction of minor bridge No. 96 & 97 between Ch 40000 to 41000 for main line track.	On completion of bridge works in all respects	0.55%
	CB1.20	Construction of minor bridge No. 98, 99 & 100 between Ch 41000 to 42000 for main line track.	On completion of bridge works in all respects	0.92%
	CB1.21	Construction of minor bridge No. 102 & 103 between Ch 42000 to 43000 for main line track.	On completion of bridge works in all respects	0.79%
	CB1.22	Construction of minor bridge No. 106 between ch 43000 to 44000 for main line track.	On completion of bridge works in all respects	0.62%
	CB1.23	Construction of minor bridge No. 108, 109 & 110 between Ch 44000 to 45000 for main line track.	On completion of bridge works in all respects	2.22%
	CB1.24	Construction of minor bridge No. Nil between Ch 45000 to 46000 for main line track.	-	0%
	CB1.25	Construction of minor bridge No. 114, 115 & 116 between Ch 46000 to 47000 for main line track.	On completion of bridge works in all respects	2.91%
	CB1.26	Construction of minor bridge No. 117, 118 & 119 between Ch 47000 to 48000 for main line track.	On completion of bridge works in all respects	0.78%
	CB1.27	Construction of minor bridge No. 120, 121, 122 & 124 between Ch 48000 to 49000 for main line track.	On completion of bridge works in all respects	2.02%

Cost Centre			CB- Bridges	
Weightage of Cost Centre 'CB', (Y)			41%	
Sub-cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CB1.28	Construction of minor bridge No. 125 & 126 between Ch 49000 to 49700 for main line track.	On completion of bridge works in all respects	3.04%
	CB1.29	Construction of minor bridge No. Nil between Ch 0614 to 1000 for New Patli to Patli connecting line.	-	0%
	CB1.30	Construction of minor bridge No. 1, 2 & 3 between Ch 1000 to 2000 for New Patli to Patli connecting line.	On completion of bridge works in all respects	1.63%
	CB1.31	Construction of minor bridge No. 4 & 5 between Ch 2000 to 2700 for New Patli to Patli connecting line	On completion of bridge works in all respects	1.63%
	CB1.32	Construction of minor bridge No. 2 between Ch 0703 to 2000 for New Patli to Sultanpur connecting line	On completion of bridge works in all respects	0.21%
	CB1.33	Construction of minor bridge Nos. 4 & 5 between Ch 2000 to 3000 for New Patli to Sultanpur connecting line	On completion of bridge works in all respects	0.83%
	CB1.34	Construction of minor bridge No. Nil between Ch 3000 to 4119 for New Patli-Sultanpur connecting line and in Sultanpur Station yard (Km 0861 towards Garhi Harsaru side & Km 0530 towards Badsa side& Km 0689 towards Farukhnagar side)	-	0%
CB.2- Major Bridges	CB.2.1	Foundation	On completion of the foundation work including pile caps/ well caps and foundations for wing and return walls, and testing.	13.0%
	CB.2.2	Substructure	On Completion of Abutment/Piers including Abutment/Pier Cap without bearings.	
	CB.2.2.1		Pier/Abutment	3%
	CB.2.2.2		Pier/Abutment cap	1%
	CB.2.2.3		Completion of the wing walls, return walls in all respects	4%
	CB.2.3	Superstructure		
	CB.2.3.1		On completion of superstructure including launching in position.	18.5%
	CB.2.3.2		On fixing of bearings in position true to line & level and placement	1.5%

Cost Centre			CB- Bridges	
Weightage of Cost Centre 'CB', (Y)			41%	
Sub-cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
			of superstructure on bearings including grouting of holding down bolts complete.	
	CB.2.4	Installation of Track on OWG	On completion of installation of track on H-beam sleepers including fixing of guard rails, gang pathway complete and supply of 10% spare fittings.	1.0%
	CB.2.5	Miscellaneous works		
	CB.2.5.1		On completion of Trolley refuge, Pathway on the sides, Inspection arrangement including access ladder etc.as per approved drawings and Employer's requirement,	2.0%
	CB.2.5.2		On completion of balance works as per drawing like- Protection works including Toe wall, Pitching, inspection steps, Bridge plaque, Bridge board, painting of HFL, Height Gauge, drainage arrangement in RUBs, and Testing on completion, if any, complete in all respect and fit for use.	6.05%.
			Total	**100%**

Note:

1. *The value of each Milestones will be total lump sum accepted cost of Works for Schedule 'A' (LS) multiplied by X * Y. For example, the value of Milestone CB1.2 will be equal to LS*X*Y= LSx*0.0734 x 0.41.
2. Adjustment to Contract Price pursuant to GCC 13.7 shall be applicable to the payments of Works executed under this Sub Head / Price Schedule.
3. Payment will be made on Completion of each Milestones as per weightage given in this schedule.
4. CB2.2-Major Bridges:
   (i) For the purpose of stage payment/Milestones, cost of a bridge shall be taken in proportion to its linear length measured along the alignment to the total linear length of all major bridges.
   (ii) Payment of each stage/Milestones for a bridge will be made on completion of the relevant stage as per the weightage given in this schedule in proportion to the cost of the bridge.
5. Stages CB.2.1 to CB.2.2 will further be subdivided into the number of piers + 2 abutments, as applicable as per approved drawing by the Engineer, and Milestones for completed work for each pier and abutment shall be made as per the requirement of the stages stated above.
6. For steel Open Web Girder (OWG) and Composite girders payment against Cost centre CB.2.3.1 shall be released as per following schedule-
   (i) Receipt of material at approved location: 40%
   (ii) Fabrication of girder and transportation to site: 25%

(iii) Erection/launching and completion of all other balance works: 35%,

and for PSC girder/slabs payment against sub cost centre 2.3.1 shall be released as per following schedule-

(i) On casting of PSC girder/slabs: 50%

(ii) On first stage prestressing: 20%

(iii) On completion in all respect: 30%

7. *The Cost of Milestones include cost of all temporary works and temporary diversion of roads wherever required, for all bridges included in Schedule 'A' section VII-2, Employer's Requirements.*

8. *The Cost of Milestones include cost of all permanent roads diversion and regrading of roads, wherever required, for all bridges included in Schedule 'A' except for Br. No 150 & 153 which shall be paid under Schedule 'B'.*

5.2.4 Stages of Payment i.e. Milestones of Cost Centre 'CS'- Stations

Cost Centre			'CS'- Stations	
Weightage of Cost Centre 'CS', (Y)			7.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
CS.1- Sultanpur Station	**CS.1.1**	**Station building and service buildings**	*Construction of station buildings and S&T huts complete in all respects.*	3.0%
	CS.1.2	**Platform & *Passenger amenities***		
	CS.1.2.1		Dismantling of existing platform and construction of new platform including earthwork in filling above formation level and *cast-in-situ platform face wall* as per the Employer's requirements.	4.0%
	CS.1.2.2		Surfacing of platform, Precast *coping, tactile tiles, fencing at end platform etc*.	2.0%
	CS.1.2.3		PF shelters, Mini PF shelters.	0.9%
	CS.1.2.4		*Passenger amenities*	0.9%
	CS.1.3	**Subway**	*No work of Subway included in Schedule 'A'*	0%
	CS.1.4	**Water Supply System**	*Water supply works including bore well, pump house, underground & overhead water storage tanks, water supply distribution system*	1.2%
	CS.1.5	***Drainage, Sewerage and rainwater harvesting system***	On completion of drainage, s*ewerage and rainwater harvesting system.*	1.0%
	CS.1.6	**Miscellaneous works**	On completion of *station name boards at station building and platform, platform number boards* and other incidental works in station area.	0.7%
CS.2 New Patli Station	**CS.2.1**	**Service buildings**		
	CS.2.1.1		Construction of *S&T service building and S&T huts* complete in all respects.	5.25%

Cost Centre			**'CS'- Stations**	
Weightage of Cost Centre 'CS', (Y)			**7.0%**	
Sub-Cost Centre	**Item of Work**		**Milestone**	**Weightage (X)**
	No.	**Description**		
1	2	3	4	5
	CS.2.2	**Platform &** *Passenger amenities*		
	CS.2.2.1		Construction of platforms including earthwork in filling above formation level and *cast-in-situ platform face wall* as per the Employer's requirements.	3.0%
	CS.2.2.2		Surfacing of platforms, Precast *coping, tactile tiles, fencing at end platform etc*.	4.0%
	CS.2.2.3		PF shelters, Mini PF shelters.	1.5%
	CS.2.2.4		*Passenger amenities*	1.1%
	CS2.3	**Subway (Bridge No. 144A)**		
	CS2*.3.1*		On completion of barrel of RCC box.	4.2%
	CS2.3.2		On completion of stairs to platforms including shed and lift wells.	1.7%
	CS2.3.3		On completion of subway including flooring, dado, water proofing, drainage complete in all respects.	1.0%
	CS.2.4	**Water Supply System**	On completion of *water supply works including bore well, pump house, underground & overhead water storage tanks, water supply distribution system*	2.0%
	CS.2.5	***Drainage, Sewerage and rainwater harvesting system***	On completion of drainage, s*ewerage and rainwater harvesting system.*	2.5%
	CS.2.6	**Miscellaneous works**	On completion of *station name boards at station building and platforms, platform number boards* and other incidental works in station area.	0.89%
CS.3- Panchgaon Station	**CS.3.1**	**Station building and service buildings**	*No work of Station building and service buildings included in Schedule 'A'*	0%
	CS.3.2	**Platform &** ***Passenger amenities***		
	CS.3.2.1		Construction of platforms including earthwork in filling above formation level and *cast-in-situ platform face wall* as per the Employer's requirements.	2.5%

Cost Centre			'CS'- Stations	
Weightage of Cost Centre 'CS', (Y)			7.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CS.3.2.2		Surfacing of platforms, Precast *coping, tactile tiles, fencing at end platform etc*.	3.0%
	CS.3.2.3		PF shelters, Mini PF shelters.	1.20%
	CS.3.2.4		*Passenger amenities*	0.75%
	CS.3.3	**Subway (Bridge No. 113)**		
	CS3.*3.1*		On completion of barrel of RCC box.	2.90%
	CS3.3.2		On completion of covered stairs and ramps to platforms.	2.25%
	CS3.3.3		On completion of subway including flooring, dado, water proofing, drainage complete in all respects.	1.0%
	CS.3.4	**Water Supply System**	On completion of *water supply works including bore well, pump house, underground & overhead water storage tanks, water supply distribution system*	1.0%
	CS.3.5	***Drainage, Sewerage and rainwater harvesting system***	On completion of drainage, s*ewerage and rainwater harvesting system.*	1.40%
	CS.3.6	**Miscellaneous works**	On completion of *station name boards at station building and platforms, platform number boards* and other incidental works in station area.	0.85%
CS.4 Chandla Dungerwas station	**CS.4.1**	**Station building & Service buildings**	*No Work of Station building & Service building in Schedule 'A'.*	0.00%
	CS.4.2	**Platform &** *Passenger amenities*		
	CS.4.2.1		Construction of platforms including earthwork in filling above formation level and *cast-in-situ platform face wall* as per the Employer's requirements.	2.5%
	CS.4.2.2		Surfacing of platforms, Precast *coping, tactile tiles, fencing at end platform etc*.	3.0%
	CS.4.2.3		PF shelters, Mini PF shelters.	0.50%
	CS.4.2.4		*Passenger amenities*	0.75%
	CS4.3	**Subway (Bridge No. 104)**		

Cost Centre			**'CS'- Stations**	
Weightage of Cost Centre 'CS', (Y)			**7.0%**	
Sub-Cost Centre	**Item of Work**		**Milestone**	**Weightage (X)**
	No.	**Description**		
1	2	3	4	5
	CS4.*3.1*		On completion of barrel of RCC box.	2.90%
	CS4.3.2		On completion of covered stairs and ramps to platforms.	2.25%
	CS4.3.3		On completion of subway including flooring, dado, water proofing drainage complete in all respects.	1.0%
	CS.4.4	**Water Supply System**	On completion of *water supply works including bore well, pump house, underground & overhead water storage tanks, water supply distribution system*	1.0%
	CS.4.5	***Drainage, Sewerage and rainwater harvesting system***	On completion of drainage, s*ewerage and rain water harvesting system.*	1.20%
	CS.4.6	**Miscellaneous works**	On completion of *station name boards at station building and platforms, platform number boards* and other incidental works in station area.	0.70%
CS.5 Dhulawat Station	**CS.5.1**	**Station building & Service Buildings**		
	CS.5.1.1		Construction of Station Building *and S&T huts* complete in all respects.	5.25%
	CS.5.2	**Platform &** *Passenger amenities*		
	CS.5.2.1		Construction of platforms including earthwork in filling above formation level and *cast-in-situ platform face wall* as per the Employer's requirements.	2.8%
	CS.5.2.2		Surfacing of platforms, Precast *coping, tactile tiles, fencing at end platform etc*.	4.20%
	CS.5.2.3		PF shelters, Mini PF shelters.	1.5%
	CS.5.2.4		*Passenger amenities*	1.0%
	CS5.3	**Subway (Bridge No. 79)**		
	CS5.*3.1*		On completion of barrel of RCC box.	4.2%
	CS5.3.2		On completion of stairs and ramps to platforms including shed.	1.7%

Cost Centre			'CS'- Stations	
Weightage of Cost Centre 'CS', (Y)			7.0%	
Sub-Cost Centre	Item of Work		Milestone	Weightage (X)
	No.	Description		
1	2	3	4	5
	CS5.3.3		On completion of subway including flooring, dado, water proofing, drainage complete in all respects.	1.0%
	CS.5.4	**Water Supply System**	On completion of *water supply works including bore well, pump house, underground & overhead water storage tanks, water supply distribution system*	1.26%
	CS.5.5	***Drainage, Sewerage and rainwater harvesting system***	On completion of drainage, s*ewerage and rain water harvesting system.*	2.75%
	CS.5.6	**Miscellaneous works**	On completion of *station name boards at station building and platforms, platform number boards* and other incidental works in railway station area.	0.85%
			Total	**100%**

Notes:

1. The value of each Milestones will be total lump sum accepted cost of Works for Schedule 'A' (LS) multiplied by X * Y. For example, the value of Milestone CS1.1-will be equal to LS*X*Y= LSx 0.003 x 0.07
2. Adjustment to Contract Price pursuant to GCC 13.7 shall be applicable to the payments of Works executed under this Sub Head / Price Schedule.
3. Station Building- Unit of measurement is plinth area in square meters. For the buildings having more than one storey, the total area shall be found out by adding the area of each storey. Unit cost shall be determined on pro rata basis with respect to the total area of all stations and service buildings.
   - 50% Payment shall be paid after completion of structural works i.e beam, columns & slab in case of framed structure or walls & slabs in case of other buildings and
   - 30% Payment shall be paid after completion of finishing and
   - 20% Payment on final completion of works in all respects ready for use.
4. Platform- Unit of measurement is *area measured in square meter*. Unit cost shall be determined on pro rata basis with respect to the total area of all *platforms at the* station.
5. Payment will be made on Completion of each Milestones as per weightage given in this schedule.
6. Variation in 'Station *building*':
   In case of variation in the plinth area of any station *and service building* on either side i.e. increase or decrease with respect to the area shown in the Tender Drawings, the total value of

station as mentioned in respective Sub-Cost Centres as applicable will get modified accordingly on pro rata basis of floor area.

6 Schedule 'B'/R1: Retaining Wall, Bridges & other civil works

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
Schedule B1:- NWR-USSOR 2019 BASED ITEMS (From S. No. 1 to 39)							
Chapter 1-Earthwork							
1	**011010**	Earthwork in cutting (classified) in formation, trolley refuges, side drains, level crossing approaches, platforms, catch water drains, diversion of nallah & finishing to required dimension and slopes to obtain a neat appearance to standard profile inclusive of all labour, machine & materials and removing & leading all cut spoils either to make spoil dumps beyond 10m from cutting edge or for filling in embankment with leads within 2 km on either side of cutting edge, lifts, ascent, descent, loading, unloading, all taxes / royalty, clearance of site and all incidental charges, bailing & pumping out water, if required, etc. complete as per directions of the Engineer-in-Charge. The work is to be executed as per latest / updated edition of "Guidelines for Earthwork in Railway Projects" issued by RDSO, Lucknow. Cut trees shall be property of HRIDC and to be deposited in the Employers' godown unless specified otherwise in the Special Conditions of Contract. {Note - (i) All usable earth arising from cut spoils shall be led into bank formation and Unusable spoils shall be dumped / stacked (ii) All hard rock /and boulders not fit					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		for filling will be stacked by the contractor and will be property of HRIDC.}					
1a	**011011**	In all conditions and classifications of soil except rock	10,000	Cum	152.47	**172.32**	**17,23,200.00**
1b	**011012**	Soft rock not requiring blasting in all conditions	500	Cum	347.68	**392.94**	**1,96,470.00**
2	**012040**	Extra for mechanical compaction of soil in embankment with contractor's rollers of suitable capacity, type and size to achieve specified density as per specification, testing as per IS codes including cost of water, T&P, consumable and all labour as a complete job. The work is to be executed as per Latest edition of "Guidelines for Earthwork in Railway Projects" issued by RDSO, Lucknow.	5,000	Cum	17.23	**19.47**	**97,350.00**
3	**013100**	Providing and removing barricading with the help of portable fencing along running track where work is to be done in close vicinity of track. Fencing shall consist of self supporting steel angles of size 50mm x 50mm x 6mm, 1.5m long provided with hooks etc. and embedded in CC 1:2:4 block of size 0.23m x 0.23m x 0.23m placed at c/c distance of 2m along track. 12mm dia rods in three horizontal layers shall be tack welded with angle posts. {Note : Released material will be property of the contractor after completion of work. Cost of cement to be paid separately}					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
3a	**013101**	With provision of one 50mm wide retro-reflective tape in horizontal direction, duly secured/tight with vertical posts	3,000	Meter	225.23	**254.55**	**7,63,650.00**
3b	**013102**	With provision of painting verticals & horizontals with red luminous paints / strips of 30cm each with a gap of 30 cm	700	Meter	110.43	**124.80**	**87,360.00**
4	**013130**	Shoring with 'Z' section MS sheet piles side by side in all kinds of soil mechanically or manually as per approved drawing with contractor's own arrangement complete in all respects and removal of sheet piles after completion of the work as directed by engineer in-charge. {Note - Payment will be made as per actual driven length of pile}	400	Sqm	868.29	**981.32**	**3,92,528.00**
Chapter 2-Bridge Work Substructure							
5	**022010**	Earthwork in excavation by mechanical means (Hydraulic Excavator)/Manual Means for foundations and floors of the bridges, retaining walls etc. including setting out, dressing of sides, ramming of bottom, getting out the excavated material, back filling in layers with approved material and consolidation of the layers by ramming and watering etc. including all lift, disposal of surplus soil upto a lead of 300m, all types of shoring and strutting with all labour and material complete as per drawing and technical specification as directed by Engineer.					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		Note: This item will be used for excavation work in connection with other miscellaneous works also like side drains, foundation for OHE masts and other miscellaneous structures in connection with Gauge Conversion, Doubling, New lines.					
5a	**022011**	All kinds of soils	60,013	Cum	195.57	**221.03**	**1,32, 64,673.39**
6	**022040**	Providing and laying in position machine batched, machine mixed and machine vibrated Design Mix Cement Concrete of specified grade **(M-20** Cast in-Situ) using 20mm graded crushed stone aggregate and coarse sand of approved quality in RCC raft foundation & Pile cap including finishing, using Admixtures in approved proportions (as per IS:9103), to modify workability & other properties without impairing strength and durability complete as per specifications and direction of the Engineer in charge. Payment for cement, reinforcement and shuttering shall be paid extra. **Note**-Cement concrete in levelling coarses, drainage and other miscellaneous works shall be paid under this item.	13,809	Cum	2,840.33	**3,210.06**	**4,43,27,718.54**
7	**022070**	Providing and fixing Weep Holes in Abutments, Wing walls and Return walls etc. of new bridges with 110mm dia UPVC pipe (IS :13592) Type A ISI marked with all contractor's men, material, transportation, all taxes as per specifications and as directed by Engineer-in-Charge.	20,000	Rmt	242.28	**282.92**	**56,58,400.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
8	**022100**	Providing, fabricating and installing permanent casing pipe for bored piles for all diameters with specified thickness of steel plate including all labour, materials, pumping and bailing out water wherever required, complete as per technical specifications as directed by Engineer in charge. This will include the weight of plate only and no cognizance will be given for the fittings, i.e. rivets and welding etc	52	MT	86,647.55	**97,926.63**	**50,92,184.76**
9	**022120**	Conducting load testing of a single pile upto following capacity in accordance with IS:2911 (Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. with all labour, material, tool & plants, equipment, machinery, etc. complete as per drawing and specification, as directed by the Engineer					
9a	**022123**	Initial load test above 100 ton capacity upto 250 ton capacity pile	2	Each	92,300.97	**1,04,315.97**	**2,08,631.94**
9b	**022124**	Extra for every increase of 50 ton in pile capacity or part thereof over 250 ton	52	Each	9,087.94	**10,270.94**	**5,34,088.88**
9c	**022127**	Routine Load Test above 100 ton capacity upto 250 ton capacity pile	8	Each	62,036.82	**70,112.28**	**5,60,898.24**
10	**022130**	Lateral load testing of single pile in accordance with "IS Code of practice IS:2911 (Part-IV) for determining safe allowable lateral load of pile" with all labour, material, tool & plants, equipment, machinery, etc complete as per drawing and specification as directed by the Engineer					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
10a	**022131**	Piles with lateral load capacity of upto 50 ton	8	Each	23,066.05	**26,068.60**	**2,08,548.80**
11	**022140**	Pulse Echo Test (PET) for integrity testing of piles with contractor's men, materials and machines. The rate includes cost of Inspection of site, preparation of pile head and any other unforeseen cost required for the test, submission of reports in triplicate as per satisfaction of the Engineer in Charge at site.	100	Each	3,291.33	**3,719.77**	**3,71,977.00**
12	**025020**	Providing and applying two coats of coal tar or bitumen confirming to IS:3117– latest version on the top and sides of RCC box/slabs @ 1.70 kg/sqm after cleaning the surface with all labour and materials complete job as directed by the Engineer	38,257	Sqm	155.67	**175.93**	**67,30,554.01**
13	**025030**	centering and shuttering including strutting, propping etc. and removal of form for :					
13a	**025031**	All types of bridge sub-structures, e.g. pier, abutment, wing wall, retaining wall, RCC box type foundations, Abutment cap, Pier Cap, Inspection Platform & Pedestal over Pier cap, Fender wall, Diaphragm wall etc. upto 5m above ground level	1,97,164	Sqm	671.94	**759.41**	**14,97,28,313.20**
13b	**025032**	All types of bridge super-structures, e.g. slabs, I-girders, T-girders, Box girders etc. upto 5m above ground level	8,352	Sqm	874.49	**988.32**	**82,54,448.64**
13c	**025033**	Extra for additional height over item no. 025031 & 025032 wherever required with adequate bracing,	14,020	Sqm	110.17	**124.51**	**17,45,630.20**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		propping etc. over initial height of 5 metres for every additional height of 1 metre or part thereof					
14	**025060**	Supply and using Cement at Worksite					
14a	**025062**	Ordinary Portland Cement 53 grade	1,500	MT	7,398.80	**9,019.52**	**1,35,29,280.00**
14b	**025063**	Pozzolana Portland Cement	4,035	MT	6,905.10	**7,657.41**	**3,08,97,649.35**
15	**025070**	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete	-				
15a	**025072**	Thermo-Mechanically Treated bars of grade Fe-500D or more.	75,49,462	Kg	78.01	**87.70**	**66,20,87,817.40**
Chapter 3- Bridge Work Super Structure -RCC							
16	**031020**	Providing and laying in position machine batched, machine mixed and machine vibrated Design Mix Cement Concrete of specified grade using 20mm graded crushed stone aggregate and coarse sand of approved quality for the Precast Prestressed (Post tensioned) concrete girder/Box (spans upto 30.5m) in contactor's casting yard, including finishing, using Admixtures in approved proportions (as per IS:9103), to modify workability & other properties without impairing strength and durability, complete as per drawings, specifications and direction of the Engineer. Payment for Shuttering, Cement, reinforcement, HTS cables,	37	Cum	2,840.33	**3,210.06**	**1,18,772.22**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		anchorage cones, stressing of cables and grouting of the ducts will be done extra. Launching of girder/slab in position is not included in this item.					
16a	**031021**	Deduct from 0310220 for casting of Slab in place of Girder/Box	-37	Cum	42.48	**48.01**	**-1,776.37**
17	**031040**	Providing, fabricating & fixing in position to exact design profiles, prestressing H.T.S. cables of all classification made from Low Relaxation strands conforming to IS:14268– latest version in Prestressed (Post tensioned) Concrete girders/slabs etc. including supplying, cutting, making into cables with necessary spacers, colour coding, protecting with water soluble oil at all time, anchoring of cables, supplying and placing spiral corrugated type galvanized metal steel ducts sheathing made up of Cold Rolled Cold Annealed (CRCA) mild steel conforming to IS:513 of required diameter/ thickness, vent pipe, placing, bending, routing, fixing, stressing & grouting of cable ducts with cement grout, Anchorage sets in required number with provision for future prestressing if any including all lead and lift with contractor's own materials, labour, equipments etc. complete as per drawings & specifications. Rate also includes covering anchorage pads with epoxy mortar of approved quality to avoid corrosion. Cement for grouting	2	MT	1,79,099.63	**2,02,413.39**	**4,04,826.78**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		to be paid separately. Payment shall be made in terms of weight of HTS cables as per drawing.					
18	**031090**	Design, manufacturing, supplying and fixing in position elastomeric bearing true to line and level conforming to IS:3400, IS:226, BS-5400 under prestressed concrete girders/ Steel Girders, for Precast as well as cast-in-situ girders as per approved drawing. The rate shall include cost of load test of one no. bearing from Railway approved firms and all fixing materials, equipments, machineries, labour, taxes, loading, unloading, leading, lifting etc. complete. Rates include getting the drawing approved from Railway and cost of inspection during manufacturing from railway approved organization. Notes: 1. The rate is for finished item complete and paid only after fixing in position below the girder. 2. The volume shall be given in the drawing and no deduction shall be made for inserted	37,56,245	Cu.Cm.	1.61	**1.82**	**68,36,365.90**
19	**031140**	Providing and fixing in position GI Drainage Spouts of required length with Grating in RCC slab and filling bitumen along kerb as shown in drawing with contractor's pipes, bitumen, tools, equipment, lead, lifts etc. complete as per specifications and as directed by Engineer in-charge					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
19a	**031142**	100mm dia. Drainage Spouts	882	Meter	1,202.50	**1,359.03**	**11,98,664.46**
Chapter 4- Bridge Work Super Structure -Steel							
20	**041010**	Supplying, fabrication, assembling of all types of steel girders of specified spans with structural steel conforming to Quality "B0" Grade Designation E250 conforming to IS:2062, erection / slewing / end launching of steel girders with cranes or any other approved launching methods as per site conditions (not requiring traffic block) on sub-structure including provision of trolley refuges etc., complete as per approved QAP and drawings conforming to IRS-B1-2001 and other relevant codes and specifications. Note: 1. Detailed fabrication and erection drawings & launching methodology will be prepared by the contractor and got approved from Railway. 2. The item includes fabrication of all types of battens, bracings, ties, stiffeners, packing, diaphragms, shop rivets / welding, T&F bolts, drifts, SAW, templates, jigs, fixtures, accessories, transporting various components from fabrication shop to site including loading & unloading, assembly of girders with drifts/bolts, field riveting /welding /HSFG Bolting, assembling of temporary support for side slewing, raising of girders to the bed block level, providing sliding					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		arrangements and slewing the girder in position, lowering of girder on bearings and bed plates with all temporary arrangements or any other method of launching complete. 3. The bearing sets to be provided with the girders will be paid separately as per relevant item. 4. Payment for addition in weight for rivets / welds shall be made as per clause 45 of IRS B-1-2001. 5. In case of composite work (welding and HSFG bolts), addition in weight shall be 1% for					
20a	**041013**	Open Web Girder above 45.7m clear Span	1,593	MT	1,68,004.82	**1,89,874.34**	**30,24,69,823.62**
21	**041020**	Supplying, fabrication, assembling of all types of steel Composite girders of specified spans with structural steel conforming to Quality "B0" Grade Designation E250 conforming to IS:2062, erection / slewing / end launching of steel girders with cranes or any other approved launching methods as per site conditions on sub-structure including provision of stud bolts / shear connectors, complete as per approved QAP and drawings conforming to IRS-B1-2001 and other relevant codes and specifications. Note:1. Detailed fabrication and erection drawings & launching methodology will be prepared by thecontractor and got approved from Railway. 2. Rate includes fabrication of all types of battens, bracings, ties, stiffeners, packing, diaphragms, shop rivets / welding,					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		T&F bolts, drifts, SAW, templates, jigs, fixtures, accessories, transporting various components from fabrication shop to site including loading & unloading, assembly of girders with drifts/bolts, field riveting /welding /HSFG Bolting, assembling of temporary supportfor side slewing, raising of girders to the bed block level, providing sliding arrangements and slewing the girder in position, lowering of girder on bearings and bed plates with all temporary arrangements or any other method of launching complete. 3. The bearing sets to be provided with the girders will be paid separately as per relevant item. 4. Payment for addition in weight for rivets / welds shall be made as per clause 45 of IRS B-1- 2001. 5. In case of composite work (welding and HSFG bolts), addition in weight shall be 1% for					
21a	**041021**	Composite steel girder of span length up to 36.0m	1,364	MT	1,23,733.20	**1,39,839.80**	**19,07,41,487.20**
22	**041030**	Supplying and fixing HSFG bolts of any dia and any length with suitable nuts including DTI washers conforming to IRS-B1-2001 for bridges and steel structures with contractors labour, tools and plants and lead and lift etc., complete.	62,106	Kg	305.32	**345.06**	**2,14,30,296.36**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
23	**041050**	Metalizing of steel work of girders with sprayed aluminium after surface preparation by Sand/grit blasting, followed by one coat of etch primer (IS:5666) & one coat of Zinc Chrome primer (IS:104)and two coats of aluminium paint (IS:2339) with all labour, T&P and material as a complete job duly conforming to all relevant specifications and process given under Clause 39 of IRS-B1-2001 Note: Nominal Thickness of Aluminium coating shall be 150 microns. DFT of Zinc chrome primer shall be 25-30 microns and DFT of each coat of Aluminium paint shall be 12-14 microns.	27,931	Sqm	905.47	**1,023.34**	**2,85,82,909.54**
24	**041060**	Providing and fixing railing used in rows for footpath or anti-crash barrier railing with B class G.I. pipe 65/50 mm nominal dia including cost of M.S. angle and channels in vertical posts, welding / bolting, priming painting with one coat ready mix Zinc Chromate conforming to IS:104 with DFT of 25-30Microns, followed by one coat of Zinc Chrome red oxide conforming to IS:2074 with DFT of 25 Microns with all material, labour, T&P as a complete job.	40,090	Kg	96.09	**108.60**	**43,53,774.00**
25	**041080**	Providing and fixing various size HTS holding down bolts conforming to IS:1364 in concrete column or in other structures with proper nuts, bolts, washers/plates, grouting of holes with all material, labour, T&P as a complete job.	334	Kg	149.66	**169.14**	**56,492.76**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		Note: Cement used in grouting will be paid separately under relevant item.					
26	**041180**	Design, supply and fixing 300MT capacity Spherical Bearing in position true to line and level consisting of set of concave and convex mating steel backing plate with a low friction sliding interface, flat sliding elements ,guides and restraining rings; with all components conforming to approved drawing and technical specifications & Bridge Code including grouting of holes for anchor bolts and underside of baseplate with approved non-shrink epoxy grout with all material, labour, T&P as a complete job. Note: Sliding surface with PTFE or UHMWPE low friction thermoplastic material and steel for backing plate of Mild steel in accordance to IS:2062 grade-B. Cast steel in accordance with IS 1030 Grade 280-520W. Stain less steel in accordance with AISI 304/316.Low friction thermo -plastic sliding PTFE material either pure polytetrafluroethalyne (PTFE) Or Ultra High Molecular weight Polythylene (UHMWPE). Austanitic steel is of stainless steel for the sliding interface shall be in accordance with AISI 316L or O2 Cr17 NI12 of IS-6911. The thickness of the stain less steel sheet shall be 3mm minimum. The stainless steel sheet shall be attached to its backing plate either by screwing/riveting or by					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		continuous fillet weld. Hard chromium plated surface shall be entire curved surface of the convex steel plate mating with hard chromium plated concave sliding surface. The thickness of the hard chromium plating shall be at least 100 microns and the final surface roughness of the plated surface shall not exceed 3 microns. Bearing manufacturer shall give the guarantee for satisfactory performance of bearing for period specified					
26a	**041181**	Spherical Fixed Bearing	4	Each	1,16,994.18	**1,32,223.55**	**5,28,894.20**
26b	**041182**	Spherical Free Float Bearing	4	Each	1,27,739.32	**1,44,367.40**	**5,77,469.60**
26c	**041183**	Spherical Slide Guide (L) Bearing	4	Each	1,28,212.55	**1,44,902.23**	**5,79,608.92**
26d	**041184**	Spherical Slide Guide (T) Bearing	4	Each	1,27,962.01	**1,44,619.08**	**5,78,476.32**
27	**041240**	Surface preparation for painting of bridge plate/composite girders and other steel structures where the finishing coat shows signs of deterioration; but primer coat of paint is sufficiently in good condition and there are no signs of rusting etc. Surface shall be cleaned free from oil grease, scaling and other foreign matters without disturbing the primer coat {Rate includes cost of labour, consumables, tools & plants, scaffolding, jhoola, ladder etc.}	5,000	Sqm	25.53	**28.85**	**1,44,250.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
28	**041260**	Painting cleaned bridge plate/composite girders including all scaffolding, shuttering and strutting along with provision of Jhoola/hanging scaffolding ladders etc. where required					
28a	**041261**	With one coat ready mix Zinc Chromate conforming to IS:104 with DFT of 25-30 Microns followed by one coat of Zinc Chromate red oxide conforming to IS:2074 DFT of 25 Microns	5,000	Sqm	96.30	**108.84**	**5,44,200.00**
29	**041330**	Launching & fixing in specified Bridge location all types of Steel Plate girders / PSC girders / Slabs including loading/unloading and transport to the site of launching with a lead of five kilometres & lifting to any height as per site requirement, provision of approaches for leading, cleaning of bed block and minor repairs to bed block with epoxy if required, as directed by Engineer in charge with all labour, tools and plant, equipment etc., complete					
29a	**041331**	PSC girders / slabs	94	MT	6,346.14	**7,172.23**	**6,74,189.62**
30	**041390**	Supplying fabricating and erecting welded and/or bolted and/or riveted steel work in built up sections, trusses and framed work, staging, racks etc. for Steel Structures other than bridge girders, using RSJ, tees, angles and channels/flats, plates, gussets, round or square bars, cleats, bolts etc., with contractors own steel including cutting, bending, straightening, drilling, riveting, hoisting, fixing, erecting, welding, bolting etc., with	475	MT	86,019.71	**97,217.07**	**4,61,78,108.25**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		Providing stiffeners wherever required as per approved drawing including applying a priming coat of a approved steel primer with all contractor's materials, labour, tools & plants, lead & lift including crossing of tracks if required etc., complete as per specification and as directed by Engineer-in-charge.					
Chapter 5- Bridge Works- Misc.							
31	**051120**	Stenciling of Girders with black / blue lettering over yellow background with ready mix paint w.r.t. details of executed inspection, greasing and painting, other details as directed by Engineer in charge	3,550	Each	41.09	**46.44**	**1,64,862.00**
32	**051170**	Providing and laying of filter media consisting of granular materials of GW, GP, SW groups as per IS:1498 (latest) in required profile behind boulder filling of abutments, wing walls / return walls etc. above bed level with all labour and material complete job as per drawing and technical specification of RDSO Guidelines.	1,25,900	Cum	2,658.72	**2,190.33**	**27,57,62,547.00**
33	**052220**	Painting the HFL mark and Danger level mark, year of HFL on bridge abutments and piers with ready mixed paint as per standard in two coats over one coat of primer with all materials, labour, tools, scaffolding, all lead and lift etc. including writing complete	3,550	Each	283.91	**320.87**	**11,39,088.50**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
34	**052230**	Providing cast in situ bridge number plaques as per Railway drawing in cement concrete 1:2:4 mix using 20mm hard stone aggregate embedded in 30mm notch in Bridge parapet coping duly engraving the letter and figures and an arrow indicating the direction of flow and finishing the top exposed surface with cement mortar 1:3, painting letters and figures with two coats of black enamel paint on two coats of white background with all labour, tools, cement, paint etc. with all leads and lifts.	6	Each	801.69	**906.05**	**5,436.30**
35	**052240**	Providing cast in-situ plaques for bridge foundations details of size 45cmx45cmx5cm in cement concrete 1:2:4 mix using 20mm hard stone aggregate embedded in 30mm deep notch over abutment & piers, engraving the letters & figures with CM 1:3 and finished smooth including painting letters and figures with 2 coats of black enamel and plaque with white enamel with all labour, tools, cement, paint, curing etc. as a complete job.	21	Each	1,049.88	**1,186.54**	**24,917.34**
36	**052250**	Providing & laying non pressure NP-4 Class RCC pipe with collars, jointing with 1:2 cement and ordinary sand mortar including testing of joints, but excluding earthwork with all labour and material as a complete job. Cement for mortar will be paid separately. (Pipes of 600mm dia and above will be laid using crane/hydra).					
36a	**052252**	450mm dia.	282	Meter	2,609.92	**2,949.66**	**8,31,804.12**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
37	**052260**	Supplying, spreading and filling coarse sand (no cohesive materials to be used) of approved quality including watering and ramming in foundation, plinth, behind the abutment, wing wall, retaining wall in layers not exceeding 150mm thick including its compaction as per direction of Engineer-incharge. The rate includes all lead, lift, ascent, descent, crossing of Railway line etc. complete with contractor's labour, materials, tools and plant.	2,921	Cum	2,194.63	**2,480.31**	**72,44,985.51**
Chapter 19- Bridge Related Activities							
38	**191260**	Supplying & fixing MS chequered plates 6 to 8mm thick between guard rails on unballasted deck bridge for gang pathway, overlapping at regular intervals of 2m to 2.5m with rail screws or bolts duly drilling holes in chequered plate, as directed [Note : Overlapping of chequered plates shall not fall in between sleepers]	26,000	Kg	80.87	**91.69**	**23,83,940.00**
39	**191310**	Fabrication, supplying and fixing 600mm x 450mm Bridge Board made from 16 SWG MS Sheet duly welded or rivited to back support of two 600mm long horizontal angles of size 25mm x 25mm x 3mm & two 2.5 metre long vertical support of MS Angle of size 50mm x 50mm x 5mm, welded /rivited to board. Vertical supports shall have split ends for proper fixing in ground. Vertical supports of board shall be embedded in ground in M 20 Cement Concrete blocks of size 300mm x300mm x	12	Each	2,571.26	**2,905.97**	**34,871.64**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		300mm, complete job including painting & writing of subject matter on bridge board, as directed by Engineer – In charge {Note : Excavation & concrete work will be paid separately}					
Schedule B2:- USSOR 2010 BASED ITEMS(For Building Works)- (From S. No. 40 to 124)							
Chapter -1 : Earth Work							
40	**012050**	Supplying and filling sand in plinth and under floors including watering, ramming, consolidating and dressing complete	45	cum	725.00	**1,158.13**	**52,115.85**
Chapter -2: Carriage of materials							
41	**021150**	Leading miscellaneous materials such as iron work, rails, fittings & fastenings, pipes, wooden logs, stones over pitching stone size, RCC/PCC beams/slabs etc. and all similar articles (each individual article or bundle being not more than 3.5m long in the longest direction) including all loading, unloading and stacking, lead over 500m and upto 10 km. Note: Lead under this item is payable when the same exceeds 500m.	80	MT	177.74	**271.85**	**21,748.00**
41a	**021151**	Additional lead for every subsequent km or part thereof, over 10 km and upto 100 km over item no. 021150	400	MT/Km	8.02	**12.27**	**4,908.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
Chapter -3: Plain Concrete except item no. 033060 to 033064							
42	**031010**	Providing and laying in position cement concrete of specified proportion excluding cost of cement, centering and shuttering - All works upto Plinth level :					
42a	**031012**	1:3:6 (1 cement : 3 sand : 6 graded stone aggregate 40mm nominal size)	425	Cum	1,882.49	**4,203.39**	**17,86,440.75**
43	**031060**	Centering and shuttering including strutting, propping etc. and removal of form work for :					
43a	**031061**	Foundations, footings, bases of columns	46	Sqm	121.03	**270.25**	**12,431.50**
43b	**031063**	Columns, pillars, posts and struts & miscellaneous parts	40	Sqm	240.45	**536.90**	**21,476.00**
44	**032050**	Providing and laying cement concrete 1:2:4 in damp-proof course (1 cement : 2 sand : 4 graded stone aggregate 12.5mm nominal size - excluding the cost of cement and including providing, fixing and removal of forms:.					
44a	**032053**	50mm thick (20 mm coarse aggregate instead of 12.5mm)	16	Sqm	155.36	**346.90**	**5,550.40**
Chapter -4 : Reinforced cement concrete (except item no. 045016)							
45	**041010**	Providing and laying in position M-20 Grade concrete for reinforced concrete structural elements, but excluding cost of centering, shuttering, reinforcement and Admixtures in recommended proportion (as per IS:9103) to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer in charge					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
45a	**041011**	All work upto plinth level, including raft foundation of washable aprons, HS tank, pile cap, footings of FOB, and Platform shelter etc.	338	cum	2,422.38	**5,263.83**	**17,79,174.54**
45b	**041012**	All work in buildings above plinth level upto floor two level.	447	cum	2,645.23	**5,748.08**	**25,69,391.76**
46	**042010**	Centering and shuttering including strutting, propping etc. and removal of form for :					
46a	**042013**	Suspended floors, roofs, landings, balconies, FOB slabs, walkway slabs and access platform	838	Sqm	185.57	**403.24**	**3,37,915.12**
46b	**042014**	Lintels, beams, plinth beams, bed blocks, girders, bressumers and cantilevers	28	Sqm	163.20	**354.63**	**9,929.64**
46c	**042015**	Columns, pillars, posts and struts	1,012	Sqm	240.50	**522.61**	**5,28,881.32**
47	**042020**	Centering and shuttering including strutting, propping etc. and removal of form for special shapes					
47a	**042029**	Weather shade, Chajjas, corbels etc. including edges	40	Sqm	331.42	**720.18**	**28,807.20**
48	**042030**	Extra for additional height in centering, shuttering wherever required with adequate bracing, propping etc. including cost of de-shuttering and de-centering at all levels, over a height of 3.5m for every additional height of 1 metre or part thereof in suspended floors, roofs, landing, beams and balconies (plan area to be measured)	13,263	Sqm	74.40	**161.67**	**21,44,229.21**
49	**046010**	Extra for RCC work in superstructure above floor two level for every floor or part thereof	452	cum	280.18	**608.83**	**2,75,191.16**
50	**048100**	Keeping holes for holding down bolts in foundation blocks or bed blocks	100	Each	32.89	**71.47**	**7,147.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
51	**048110**	Grouting of holding down bolts with cement mortar in foundation blocks or bed blocks	100	Each	31.69	**68.86**	**6,886.00**
Chapter -5 : Brick Work							
52	**051010**	Brick work with non-modular (FPS) bricks of class designation 7.5 in foundation and plinth in :					
52a	**051018**	Cement Mortar 1:6 (1cement : 6 coarse sand)	683	cum	2,218.87	**4,469.74**	**30,52,832.42**
53	**051040**	Extra over items 051010 & 051020 for brick work in superstructure beyond plinth level upto floor two level.	112	Cum	133.42	**268.76**	**30,101.12**
54	**051050**	Extra for brick work in superstructure beyond second floor level for every 3m or part thereof :	283	cum	264.82	**533.46**	**1,50,969.18**
Chapter -7 : Wood Work							
55	**071010**	Providing wood work in frames of doors, windows, clerestory windows and other frames and trusses, wrought, framed and fixed in position:					
55a	**071013**	Hollock wood or locally available comparable species of country wood (to be listed by respective railway) - Kiln seasoned & chemically treated	3,727	Cudm	44.47	**72.99**	**2,72,033.73**
56	**072020**	Providing and fixing panelling/glazing or panelling & glazing in panelled/glazed or panelled & glazed shutters for doors, windows & clerestory windows (area of opening for panel inserts excluding portion inside grooves or rebates to be measured). Panelling/glazing for panelled/glazed or panelled & glazed shutters 25mm to 40mm thick					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
56a	**072022**	Hollock wood or locally available comparable species of country wood (to be listed by respective railway). - Kiln seasoned & chemically treated - 15mm thick	124	Sqm	750.56	**1,231.98**	**1,52,765.52**
57	**072030**	Providing and fixing paneling and/or glazing in panelled and/or glazed shutters for doors, windows and clerestory windows (area of opening for panel inserts excluding portion inside grooves or rebates to be measured). Panelling/glazing for panelled/ glazed or panelled and glazed shutters 25mm to 40mm thick :					
57a	**072037**	Glazing with float glass panes 4mm thick (10kg/sqm)	40	Sqm	260.07	**426.88**	**17,075.20**
58	**074230**	Providing and fixing M.S. grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. all complete					
58a	**074232**	Fixed to opening / wooden frames with rawl plugs screws etc.	600	Kg	66.17	**108.61**	**65,166.00**
59	**074280**	Providing 40mmx5mm flat iron hold fast 40cm long including fixing to frame with 10mm diameter bolts, nuts and wooden plugs and embeddings in cement concrete block 30cmx10cmx15cm 1:3:6 mix (1 cement : 3 coarse sand : 6 graded stone aggregate-20mm nominal size)	90	Each	58.54	**96.09**	**8,648.10**
60	**076010**	Providing and fixing ISI:12817 marked stainless steel butt hinges with stainless steel screws etc. complete of size :					
60a	**076012**	100mmx58mmx1.9mm	80	Each	46.06	**75.60**	**6,048.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
60b	**076013**	75mmx47mmx1.8mm	68	Each	25.63	**42.07**	**2,860.76**
61	**077090**	Providing and fixing bright finished brass 100mm mortice latch and lock with 6 levers and a pair of lever handles with necessary screws etc. complete (best make of approved quality)	101	Each	560.08	**919.32**	**92,851.32**
62	**077140**	Providing and fixing bright finished brass hanging type floor door stopper with necessary screws etc. complete	26	Each	69.75	**114.49**	**2,976.74**
63	**077180**	Providing and fixing IS:3564 marked aluminium die cast body tubular type universal hydraulic door closer, hardwyn make (Classic Queen) or equivalent with necessary accessories and screws etc. complete	26	Each	669.45	**1,098.84**	**28,569.84**
64	**078020**	Providing and fixing aluminium sliding door bolts ISI marked anodised (anodic coating not less than grade AC 10 as per IS:1868) transparent or dyed to required colour or shade with nuts and screws etc. complete :					
64a	**078021**	300mmx16mm	34	Each	178.83	**293.53**	**9,980.02**
65	**078030**	Providing and fixing aluminium tower bolts ISI marked anodised (anodic coating not less than grade AC 10 as per IS:1868) transparent or dyed to required colour or shade with necessary screws etc. complete :					
65a	**078033**	200mmx10mm	34	Each	48.55	**79.69**	**2,709.46**
65b	**078035**	100mmx10mm	33	Each	29.60	**48.59**	**1,603.47**
66	**078060**	Providing and fixing aluminium handles ISI marked anodised (anodic coating not less than grade AC 10 as					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		per IS:1868) transparent or dyed to required colour or shade with necessary screws etc. complete :					
66a	**078061**	125mm	58	Each	38.04	**62.44**	**3,621.52**
66b	**078062**	100mm	58	Each	33.96	**55.74**	**3,232.92**
66c	**078063**	75mm	38	Each	30.14	**49.47**	**1,879.86**
Chapter -8 : Steel and Aluminium Work							
67	**081420**	Providing and fixing hand rail by welding etc. to steel ladders railing, balcony railing and staircase railing including applying a priming coat of approved steel primer					
67a	**081423**	G.I. pipes 40mm nominal bore (class B)	288	Kg	107.57	**178.55**	**51,422.40**
68	**082010**	Providing and fixing anodised aluminium work for doors, windows, ventilators and partitions with extruded built-up standard tubular and other sections of approved make conforming to IS:733 and IS:1285, anodised transparent or dyed to required shade according to IS:1868 (Minimum anodic coating of grade AC 15), fixed with rawl plugs and screws or with fixing clips, or with expansion hold fasteners including necessary filling up of gaps at junctions, at top, bottom and sides with required PVC/neoprene felt etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle. Aluminium snap beading for glazing/panelling, C.P.					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		brass/stainless steel screws, all complete as per architectural drawings and directions of Engineer-in-charge. (Glazing & panelling to be paid for separately)					
68a	**082011**	for Fixed portion	80	Kg	305.87	**507.70**	**40,616.00**
68b	**082012**	For openable/sliding portions and fixing hinges / pivots, PVC/neoprene gasket required and making provision for fixing of fittings. (Fittings shall be paid for separately)	80	Kg	317.67	**527.29**	**42,183.20**
Chapter -9 : Flooring, Paving & Dado							
69	**092010**	Cement concrete flooring 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate) finished with a floating coat of neat cement including cement slurry, but excluding the cost of nosing of steps etc. complete :					
69a	**092012**	40mm thick with 20mm nominal size stone aggregate	141	Sqm	120.99	**196.77**	**27,744.57**
70	**094070**	Providing and fixing 10mm thick heavy duty acid and/or alkali resistant factory made tiles conforming to Group V-RD series of approved make and colour using acid and/or alkali resisting mortar bedding and joints filled with acid and/or alkali resisting cement as per IS:4457 complete including cost of acid/alkali resistant cement					
70a	**094071**	In flooring on a bed of 10mm thick mortar 1:4 (1 appropriate cement : 4 coarse sand)	10	Sqm	1,252.14	**2,036.43**	**20,364.30**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
71	**095010**	Providing and fixing Ist quality ceramic tiles conforming to Group B-III (Ceramic Wall Tiles) of IS:15622 of manufacturers approved by railway in all colours, shades, and design as approved by the Engineer-in-Charge in skirting, risers of steps and dado over 12mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand) including pointing in white cement mixed with pigment of matching shade complete					
71a	**095011**	200x200 mm	175	Sqm	498.16	**810.19**	**1,41,783.25**
72	**095020**	Providing and fixing ceramic tiles conforming to IS:15622 of manufacturers approved by railway in all colours, shades, design and abrasion resistance class as approved by the Engineer-in-Charge in floors and landings over 20mm thick bed of cement mortar 1:4 (1 cement : 3 coarse sand) including pointing in white cement mixed with pigment of matching shade complete					
72a	**095024**	Providing and fixing ceramic tiles conforming to IS:15622 of manufacturers approved by railway in all colours, shades, design and abrasion resistance class as approved by the Engineer-in-Charge in floors and landings over 20mm thick bed of cement mortar 1:3 (1cement: 3coarse sand) including pointing in white cement mixed with pigment ofmatching shade complete: Of Group B-I-b of IS : 15622 (Ceramic Tiles) of size above 400x400mm	60	Sqm	754.29	**1,226.75**	**73,605.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
72b	**095026**	Providing and fixing ceramic tiles conforming to IS:15622 of manufacturers approved by railway in all colours, shades, design and abrasion resistance class as approved by the Engineer-in-Charge in floors and landings over 20mm thick bed of cement mortar 1:3 (1cement: 3coarse sand) including pointing in white cement mixed with pigment of matching shade complete: Of Group B-I-a of IS : 15622 (Vitrified tiles) of size above 400x400mm upto 600x600 mm	487	Sqm	932.87	**1,517.18**	**7,38,866.66**
73	**096070**	40mm thick Kota stone slab flooring of size up to 60x60cm over 20mm (average) thick base of 1:4 cement mortar (1cement: 4coarse sand) and jointed with grey cement slurry mixed with pigment to match the shade of the slab including rubbing and polishing complete :					
73a	**096074**	40mm thick	174	Sqm	1,499.02	**2,437.94**	**4,24,201.56**
74	**096080**	Kota stone slabs 25mm thick in risers of steps, skirting, dado and pillars laid on 12mm (average) thick cement mortar 1:3 (1cement: 3coarse sand) and jointed with grey cement slurry mixed with pigment to match the shade of the slab, including rubbing and polishing complete	166	Sqm	655.12	**1,065.46**	**1,76,866.36**
75	**099080**	Polished stone tile work for wall lining (dado) over 12mm thick bed of cement mortar 1:3 including pointing in white cement with an admixture of pigment to match the stone shade with tiles of all size upto 300mm x 300mm					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
75a	**099082**	8mm thick superior quality black granite tiles	188	Sqm	1,351.62	**2,198.22**	**4,13,265.36**
76	**099210**	Providing and fixing 10mm (± 0.2mm) thick heavy duty, full-body homogeneous, anti-algal, all weather resistant, exterior use Paving vitrified tiles of size upto 400mmx400mm in approved shade, colour & quality, having anti-skid matt finish surface with plain or projected texture. Tiles to be laid on 20mm average thick cement mortar bed of 1:4 (1 cement : 4 coarse sand) with all labour, material complete job	677	Sqm	670.49	**1,090.46**	**7,38,241.42**
Chapter -10 : Roof and Ceilings							
77	**106100**	Providing and fixing at all height false ceiling of 12.5mm thick tapered edge gypsum board conforming to IS:2095-Part I, including providing and fixing of frame work made of special sections power pressed from M.S. sheet and galvanised with zinc coating of grade 350 as per IS:277 and consisting of angle cleats of size 25mm x 1.6mm with flanges of 22mm and 37mm at 1200mm centre to centre one flange fixed to the ceiling with stener 12.5mm dia x 40mm long with 6mm dia bolts to the angle hangers of 25mmx25mmx0.55mm of required length and other end of angle hanger being fixed with nut and bolts to G.I. channels 45mmx15mmx0.9mm running at the rate of 1200mm centre to centre to which the ceiling section 0.5mm thick bottom wedge of 80mm with tapered flanges of 26mm each having clips of 10.5mm at	295	Sqm	561.22	**916.49**	**2,70,364.55**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		450mm centre to centre shall be fixed in a direction perpendicular to G.I. channel with connecting clips made out of 2.64mm dia x 230mm long G.I. wire at every junction including fixing the gypsum board with ceiling section and perimeter channels 0.5mm thick 27mm high having flanges of 20mm and 30mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450mm centre to centre with 25mm long drive-all screws @ 230mm interval including jointing and fixing to a flush finish of tapered and square edges of the gypsum board with recommended filler, paper tapes, finisher and two coats of primer suitable for gypsum board as per manufacturers specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed all complete as per drawing and specification and direction of the Engineer-in-Charge but excluding the cost of painting.					
78	**106110**	Providing 10mm thick Plaster of Paris (gypsum anhydrous) ceiling upto a height of 5m above floor level over 1st class kail or similar wood strips 25mmx6mm with 10mm gap in between and reinforced with rabbit wire mesh fixed to wooden frame (frame work to be paid separately)					
78a	**106111**	Flat surfaces	490	Sqm	562.62	**918.78**	**4,50,202.20**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
79	**108190**	Providing and fixing unplasticised-PVC pipe clips of approved design to unplasticised-PVC rain water pipes by means of 50mmx50mmx50mm hard wood plugs, screwed with M.S. screws of required length including cutting brick work and fixing in cement mortar 1:4 (1 cement : 4 coarse sand) and making good the wall etc. complete					
79a	**108192**	110mm	6	Each	164.34	**268.37**	**1,610.22**
80	**108200**	Providing and fixing to the inlet mouth of rainwater pipe cast iron grating 15cm dia and weighing not less than 440 grams	6	Each	120.98	**197.56**	**1,185.36**
Chapter -11 : Finishing Masonary							
81	**111040**	12 mm cement plaster of mix -					
81a	**111042**	1:6 (1 cement : 6 coarse sand)	833	Sqm	61.86	**108.04**	**89,997.32**
82	**111070**	12mm cement plaster finished with a floating coat of neat cement of mix -					
82a	**111072**	1:4 (1 cement : 4 fine sand)	11	Sqm	68.05	**118.85**	**1,307.35**
83	**111120**	18mm cement plaster in two coats under layer 12mm thick cement plaster 1:5 (1 cement : 5 coarse sand) and a top layer 6mm thick cement plaster 1:3 (1 cement : 3 coarse sand) finished rough with sponge/rubber pad	1,967	Sqm	92.68	**161.86**	**3,18,378.62**
84	**112040**	Providing and applying plaster of Paris putty of 2mm average thickness over plastered surface to prepare the surface even and smooth complete	2,589	Sqm	62.28	**108.77**	**2,81,605.53**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
85	**115050**	Distempering two or more coats on new work with 1st quality acrylic washable distemper (ready mixed) of approved manufacturer and of required shade and colour complete as per manufacturer's specification	2,822	Sqm	30.45	**53.18**	**1,50,073.96**
86	**115110**	Finishing walls with water proofing cement paint of required shade two or more coats on new work applied @ 3.84 kg/10 sqm	1,294	Sqm	38.40	**67.06**	**86,775.64**
Chapter -12 : Painting, Polishing & Varnishing							
87	**121010**	Applying Priming Coat :					
87a	**121011**	With ready mixed pink or grey primer of approved brand and manufacture on woodwork (hard and soft wood)	363	Sqm	19.08	**35.81**	**12,999.03**
87b	**121013**	With ready mixed red oxide zinc chromate primer of approved brand and manufacture on steel galvanized iron/steel works	474	Sqm	14.97	**28.09**	**13,314.66**
88	**121150**	Painting two coats (excluding priming coat) with chocolate, red, grey or buff ready mixed paint of approved quality on steel or wood work	286	Sqm	38.79	**72.80**	**20,820.80**
Chapter -13 : Water Supply							
89	**131150**	Providing and fixing medium grade G.I Pipes complete G.I fittings including trenching and refilling etc External work					
89a	**131151**	15mm dia nominal bore	72	Meter	128.42	**192.52**	**13,861.44**
89b	**131153**	25mm dia nominal bore	72	Meter	214.91	**322.18**	**23,196.96**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
89c	**131156**	50mm dia nominal bore	232	Meter	384.78	**576.85**	**1,33,829.20**
89d	**131157**	65mm dia nominal bore	4	Meter	484.87	**726.90**	**2,907.60**
89e	**131158**	80mm dia nominal bore	4	Meter	629.12	**943.15**	**3,772.60**
90	**131160**	Making connection of medium grade G.I. distribution branch with G.I. main of following sizes by providing and fixing tee, including cutting and threading the pipe etc. complete					
90a	**131161**	Making connection G.I. of size 25 to 40 mm	26	Each	208.98	**313.29**	**8,145.54**
90b	**131162**	Making connection G.I. of size 50 to 80 mm	68	Each	610.28	**914.91**	**62,213.88**
91	**132010**	Providing & fixing brass bib cock of approved quality					
91a	**132011**	15 mm nominal bore	21	Each	154.55	**231.69**	**4,865.49**
91b	**132013**	25mm nominal bore	10	Each	300.36	**450.29**	**4,502.90**
92	**132020**	Providing and fixing brass stop cock of approved quality					
92a	**132021**	15 mm nominal bore	23	Each	151.88	**227.69**	**5,236.87**
93	**136040**	Constructing masonry Chamber 120x120x100 cm, inside with 7.5 class designation brick work with FPS Bricks in cement mortar 1:4 (1 cement : 4 coarse sand) for sluice valve, with C.I. surface box 100mm top diameter, 160mm bottom diameter and 180mm deep (inside) with chained lid and RCC top slab 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate-20 mm nominal size) necessary excavation foundation concrete 1:5:10 (1 cement : 5 fine sand :10 graded stone aggregate 40mm nominal size) and inside plastering with cement mortar 1:3 (1 cement : 3 coarse sand) 12mm thick finished with	2	Each	5,887.89	**8,826.88**	**17,653.76**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		a floating coat of neat cement complete as per standard design.					
Chapter -14 : Drainage and sewerage							
94	**142010**	Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes including bends etc with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete upto 800mm dia.					
94a	**142014**	300mm dia. R.C.C. pipe	20	Meter	721.21	**1,542.42**	**30,848.40**
Chapter -15 : Sanitary Installations							
95	**151010**	Providing and fixing water closet squatting pan (Indian type W.C. pan) with 100mm sand cast iron 'P' or 'S' trap, 10 litres low level white P.V.C. flushing cistern with manually controlled device (handle lever) conforming to IS:7231, with all fittings and fixtures complete including cutting and making good the walls and floors wherever required					
95a	**151011**	White Vitreous China Orissa pattern W.C. pan of size 580mmx440mm with integral type foot rests	3	Each	3,057.59	**4,439.91**	**13,319.73**
96	**151020**	Providing and fixing white vitreous china pedestal type water closet (European type W.C. pan) with seat and lid, 10 litres low level white, P.V.C. flushing cistern with manually controlled device (handle lever) conforming to IS:7231, with all fittings and fixtures complete including					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		cutting and making good the walls and floors wherever required					
96a	**151021**	W.C. pan with ISI marked white solid plastic seat and lid	11	Each	2,856.65	**4,148.12**	**45,629.32**
97	**151040**	Providing and fixing white vitreous china flat back or wall corner type lipped front urinal basin of 430mmx260mmx350mm and 340mmx410mmx 265mm sizes respectively with automatic flushing cistern, with standard flush pipe and C.P. brass spreaders with brass					
97a	**151041**	One urinal basin with 5 litres white P.V.C. automatic flushing cistern	5	Each	2,377.03	**3,451.67**	**17,258.35**
98	**151050**	Providing and fixing white, vitreous china flat back half stall urinal of 580mmx380mmx350mm with white P.V.C. automatic flushing cistern, with fittings, standard size C.P. brass flush pipe, spreaders with unions and clamps (all in C.P. brass) with waste fitting as per IS:2556, C.I. trap with outlet grating and other coupling in C.P. brass including painting of fittings and cutting and making good the walls and floors, wherever required					
98a	**151051**	Single half stall urinal with 5 litres P.V.C. automatic flushing cistern	5	Each	3,798.11	**5,515.21**	**27,576.05**
99	**151070**	Providing and fixing wash basin with C.I./M.S. brackets, 15mm C.P. brass pillar taps, 32mm C.P. brass waste of standard pattern, including painting of fittings and					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		brackets, cutting and making good the walls, wherever required :					
99a	**151071**	White, vitreous china wash basin size 630mm x 450mm with a pair of 15mm C.P brass pillars.	15	Each	1,942.55	**2,820.77**	**42,311.55**
100	**152020**	Providing and fixing Stainless Steel AISI-304 (18/8) kitchen sink with drain board as per IS:13983 with C.I. brackets and stainless steel plug 40mm including painting of fittings and brackets, cutting and making good the walls, wherever required:					
100a	**152021**	510mmx1040mm bowl depth 250mm	2	Each	2,558.56	**3,715.27**	**7,430.54**
101	**152080**	Providing and fixing P.V.C. waste pipe for sink or wash basin including P.V.C. waste fittings complete					
101a	**152084**	Flexible pipe 40mm dia.	40	Each	92.92	**134.93**	**5,397.20**
102	**152110**	Providing and fixing 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with C.P. brass screws and washers complete.	9	Each	706.70	**1,026.19**	**9,235.71**
103	**152120**	Providing and fixing mirror of 5.5mm thickness of float Glass (of approved Quality) required shape and size with plastic moulded frame of approved make and shade with 6mm thick hard board backing					
103a	**152124**	Rectangular shape 1500mmx450mm (outer dimension)	6	Each	1,750.45	**2,541.82**	**15,250.92**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
104	**153010**	Providing and fixing soil, waste and vent pipes					
104a	**153012**	100mm dia. centrifugally cast (spun) iron S&S pipe as per IS:3989	56	Meter	599.73	**870.86**	**48,768.16**
105	**153300**	Providing and fixing PTMT liquid soap container 109 mm wide, 125 mm high and 112 mm distance from wall of standard shape with bracket of the same materials with snap fittings of approved quality and colour, weighing not less than 105 gms.	8	Each	185.84	**269.86**	**2,158.88**
106	**153410**	Providing and fixing Towel rail (C.P.) brass 15mm dia. x 600mm long having approx. weight 500 gm	11	Each	413.49	**600.43**	**6,604.73**
107	**154010**	Providing and fixing 110mm dia PVC soil, waste and vent pipes including jointing and cost of spun yarn and sand etc. complete	100	Meter	205.50	**298.41**	**29,841.00**
108	**154100**	Providing and fixing 110mm PVC Plain bend of the required degree with access door inclusive of 3mm thick bitumastic felt washer, bolts and nuts, complete, including jointing and cost of spun yarn and sand etc. complete	100	Each	77.54	**112.60**	**11,260.00**
109	**154130**	Providing and fixing 110mm PVC collar (loose socket) including jointing and cost of spun yarn and sand etc. complete	20	Each	73.17	**106.25**	**2,125.00**
110	**154140**	Providing and fixing 75mm PVC soil, waste and vent pipes including jointing and cost of spun yarn and sand etc. complete	60	Meter	128.17	**186.11**	**11,166.60**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
111	**154150**	Providing and fixing brackets comprising of aluminium painted steel clips and cast iron base for 75mm PVC pipes including cost of screws etc. and drilling of holes and making good the walls, including cost of sand etc. complete	40	Each	52.17	**75.76**	**3,030.40**
112	**155060**	Supplying and fixing pipe as outlet or waste pipe to wash basins sink and bowl type urinals etc. complete including providing clamps to hold the pipe, making holes in masonry and making it good to original condition when not included in the item					
112a	**155063**	PVC 50 mm bore 1.7mm thick	12	Meter	109.06	**158.37**	**1,900.44**
113	**155070**	Supplying and fixing granite stone superior quality black 20mm to 25mm thick in masonry or concrete as a Purdah to urinal range etc. stone to be machine cut & well polished on all faces and the edges to be moulded by semi-circular rounding and polishing. NOTE : The following percentage is to be added / deducted in case of granites other than superior quality black : i) For superior quality Red like "RBI" red add 15% extra; ii) For pink coloured granite deduct 25%; iii) For gray coloured granite deduct 18%.	40	sqm	2,449.89	**3,557.47**	**1,42,298.80**
114	**155200**	Providing and fixing Flush valve (C.P.) 25mm with 25mm size control cock having approx. weight 2.75 kg conforming to IS:9758-1981	10	Each	1,529.70	**2,221.27**	**22,212.70**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
115	**156010**	Cutting chases in brick masonry walls for following diameter sand cast iron/centrifugally cast (spun) iron or any other types of pipes and making good the same with cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 12.5mm nominal size) including necessary plaster and pointing in cement mortar 1:4 (1 cement : 4 coarse sand)					
115a	**156011**	100mm dia.	108	Meter	129.28	**187.73**	**20,274.84**
115b	**156012**	75mm dia.	68	Meter	92.25	**133.96**	**9,109.28**
115c	**156013**	50mm dia.	48	Meter	58.94	**85.59**	**4,108.32**
Chapter -17 : Misc Building Works							
116	**171100**	Providing and fixing 16mm MS Fan clamps of standard shape and size in existing R.C.C. slab including cutting chase and making good with 1:2 C:S mortar and painting (two coats) exposed portion of the clamps complete	20	Each	123.05	**186.41**	**3,728.20**
117	**171690**	Providing & applying Pre-Construction Anti-Termite treatment to proposed structure, with application of Imidacloprid 30.5% SC @ o.075% concentration mixed with water in ratio of 1:475, as per detailed specifications given in Indian Railways Standard Specifications, so as to create a chemical barrier below and around the structure by an approved agency. (plinth	38	Sqm	70.81	**107.27**	**4,076.26**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		area/basement floor area shall be considered for payment)					
Chapter -18 : Dismantling and Demolishing							
118	**181030**	Demolishing R.C.C. work including cutting and stacking of steel bars and disposal of unserviceable material within 50m lead. (Extra payment for scraping, cleaning and straightening of bars to be made separately)	340	cum	603.12	**1,026.92**	**3,49,152.80**
119	**182010**	Demolishing brick work including stacking of serviceable material and disposal of unserviceable material within 50m lead					
119a	**182013**	In cement mortar	260	cum	348.90	**594.06**	**1,54,455.60**
120	**182030**	Demolishing stone rubble masonry including stacking of serviceable material and disposal of unserviceable material within 50m lead					
120a	**182033**	In cement mortar	20	cum	416.29	**708.81**	**14,176.20**
121	**182040**	Dismantling dressed stone work, ashlar face stone work, marble work, including stacking of serviceable and disposal of unserviceable material within 50m lead					
121a	**182042**	In cement mortar	20	cum	486.91	**829.05**	**16,581.00**
122	**185010**	Dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave,	8	Each	84.12	**143.23**	**1,145.84**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		holdfasts in CC or masonry etc. complete and stacking within 50m lead					
123	**186010**	Dismantling steel work in single sections including dismembering & stacking within 50m lead in					
123a	**186011**	Dismantling steel work in single sections including dismembering & stacking within 50m lead in R.S. joists./ Rails	10,240	Kg	0.57	**0.97**	**9,932.80**
123b	**186012**	Channels, angles, tees and flats/ rounds or any other rolled shape	10,912	Kg	0.41	**0.70**	**7,638.40**
Chapter -25 : Supply of Material							
124	**257050**	Polyethylene Vinyl Chloride water storage tank with cover and suitable locking arrangement	4,000	litre	5.75	**8.70**	**34,800.00**
Schedule B3:- DSR-2021 BASED ITEMS (from S. No. 125 to 152)							
125	**3.8**	1:3 (1 Cement : 3 coarse sand (zone-III)) cement sand levelling mortar. Item will be used as below precast item. Note:- cost of cement is included in the item.	220	Cum	5,024.15	**5,502.88**	**12,10,633.60**
126	**10.16**	Steel work in built up tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete.					
126a	**10.16.2**	Hot finished seamless type tubes	2,088	Kg	168.95	**185.05**	**3,86,384.40**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
127	**11.20**	Chequerred precast cement concrete tiles 22 mm thick in footpath & courtyard, jointed with neat cement slurry mixed with pigment to match the shade of tiles, including rubbing and cleaning etc. complete, on 20 mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand).					
127a	**11.20.1**	Light shade pigment using white cement	500	Sqm	1,233.05	**1,350.54**	**6,75,270.00**
128	**16.30**	Providing and applying tack coat using hot straight run bitumen of grade VG - 10, including heating the bitumen, spraying the bitumen with mechanically operated spray unit fitted on bitumen boiler, cleaning and preparing the existing road surface as per specifications					
128a	**16.30.2**	On bituminous surface @ 0.50 Kg / sqm	9,750	Sqm	36.60	**40.09**	**3,90,877.50**
129	**16.33**	2.5 cm premix carpet surfacing with 2.25 cum and 1.12 cum of stone chippings of 13.2 mm and 11.2 mm size respectively per 100 sqm and 52 kg and 56 kg of hot bitumen per cum of stone chippings of 13.2 mm and 11.2 mm size respectively, including a tack coat with hot straight run bitumen, including consolidation with road roller of 6 to 9 tonne capacity etc. complete (tack coat to be paid for separately).					
129a	**16.33.2**	With paving Asphalt grade VG - 30 with no solvent	9,750	Sqm	254.80	**279.08**	**27,21,030.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
130	**16.55**	Providing and laying bituminous macadam using crushed stone aggregates of specified grading premixed with bituminous binder, transported to site by tippers, laid over a previously prepared surface with paver finisher equipped with electronic sensor to the required grade, level and alignment and rolling with smooth wheeled, vibratory and tandem rollers as per specifications to achieve the desired compaction and density, complete as per specifications and directions of Engineer-in-Charge.					
130a	**16.55.1**	50 to 100 mm average compacted thickness with bitumen of grade VG-30 @ 3.50% (percentage by weight of total mix) prepared in Batch Type Hot Mix Plant of 100-120 TPH capacity.	2,100	Cum	7,756.40	**8,495.47**	**1,78,40,487.00**
131	**16.69**	Providing and laying at or near ground level factory made **kerb stone** of M-25 grade cement concrete in position to the required line, level and curvature, jointed with cement mortar 1:3 (1 cement: 3 coarse sand), including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5mm), including making drainage opening wherever required complete etc. as per direction of Engineer-in-charge (length of finished kerb edging shall be measured for payment). (Precast C.C. kerb stone shall be approved by Engineer-in-charge).	72	Cum	8,613.55	**9,434.29**	**6,79,268.88**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
132	**16.75**	Providing and laying C.C. pavement of mix M-25 with ready mixed concrete from batching plant. The ready mixed concrete shall be laid and finished with screed board vibrator , vaccum dewatering process and finally finished by floating, brooming with wire brush etc. complete as per specifications and directions of Engineer-in-charge. Note:- Cement content considered in this item is @ 330 kg/cum. Excess/less cement used as per design mix is payable/ recoverable separately).	4,000	Cum	8,277.55	**9,066.28**	**3,62,65,120.00**
133	**16.78**	Construction of granular sub-base by providing close graded Material conforming to specifications, mixing in a mechanical mix plant at OMC, carriage of mixed material by tippers to work site, for all leads & lifts, spreading in uniform layers of specified thickness with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per specifications and directions of Engineer-in-Charge.					
133a	**16.78.2**	With material conforming to Grade-II (size range 53 mm to 0.075 mm) having CBR Value-25	11,500	Cum	2,775.65	**3,040.13**	**3,49,61,495.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
134	**16.79**	Providing, laying, spreading and compacting graded stone aggregate (size range 53 mm to 0.075 mm) to wet mix macadam (WMM) specification including premixing the material with water at OMC in for all leads & lifts, laying in uniform layers with mechanical paver finisher in sub- base / base course on well prepared surface and compacting with vibratory roller of 8 to 10 tonne capacity to achieve the desired density, complete as per specifications and directions of Engineer-in-Charge.	4,500	Cum	2,803.65	**3,070.80**	**1,38,18,600.00**
135	**16.80**	Construction of dry lean cement concrete sub base over a prepared sub-grade with coarse and fine aggregate conforming to IS:383, the size of coarse aggregate not exceeding 25 mm, aggregate cement ratio not to exceed 15:1, aggregate gradation after blending to be as per specifications, cement content not to be less than 150 Kg/cum, optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant, transported to site, for all leads & lifts, laid with a mechanical paver, compacting with 8-10 tonne vibratory roller, finishing and curing etc. complete as per direction of Engineer-in- charge	3,000	Cum	4,130.55	**4,524.13**	**1,35,72,390.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
136	**16.90**	Providing and laying tactile tile (for vision impaired persons as per standards) of size 300x300x9.8mm having with water absorption less than 0.5% and conforming to IS:15622 of approved make in all colours and shades in for outdoor floors such as footpath, court yard, multi modals location etc., laid on 20mm thick base of cement mortar 1:4 (1 cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. complete as per direction of Engineer-in-Charge.	500	Sqm	1,719.00	**1,882.79**	**9,41,395.00**
137	**16.91**	Providing and laying factory made chamfered edge Cement **Concrete paver blocks** in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength, thickness & size/ shape, made by table vibratory method using PU mould, laid in required colour & pattern over 50mm thick compacted bed of sand, compacting and proper embedding/laying of inter locking paver blocks into the sand bedding layer through vibratory compaction by using plate vibrator, filling the joints with sand and cutting of paver blocks as per required size and pattern, finishing and sweeping extra sand. complete all as per direction of Engineer-in-Charge.					
137a	**16.91.1**	60 mm thick C.C. paver block of M-30 grade with approved color design and pattern.	1,840	Sqm	932.35	**1,021.19**	**18,78,989.60**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
137b	**16.91.2**	80 mm thick C.C. paver block of M-30 grade with approved color design and pattern.	300	Sqm	1,011.20	**1,107.55**	**3,32,265.00**
138	**18.8**	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, i/c fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and the cost of cutting chases and making good the same including testing of joints complete as per direction of Engineer in Charge. Concealed work, including cutting chases and making good the walls etc					
138a	**18.8.1**	15 mm nominal dia Pipes	50	Meter	441.15	**483.18**	**24,159.00**
138b	**18.8.2**	20 mm nominal dia Pipes	50	Meter	513.75	**562.70**	**28,135.00**
138c	**18.8.3**	25 mm nominal dia Pipes	50	Meter	626.05	**685.70**	**34,285.00**
138d	**18.8.4**	32 mm nominal dia Pipes	50	Meter	712.75	**780.66**	**39,033.00**
139	**19.1**	Providing, laying and jointing glazed stoneware pipes class SP-1 with stiff mixture of cement mortar in the proportion of 1:1 (1 cement : 1 fine sand) including testing of joints etc. complete :					
139a	**19.1.2**	150 mm diameter	53	Rmt	591.40	**647.75**	**34,330.75**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
140	**20.2**	Boring, providing and installation bored cast-in-situ reinforced cement concrete piles of grade M-25 of specified diameter and length below the pile cap, to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. by percussion drilling using Direct mud circulation (DMC) or Bailer and chisel technique by tripod and mechanical Winch Machine all complete, including removal of excavated earth with all its lifts and leads (length of pile for payment shall be measured up to bottom of pile cap). **Note:** Truck Mounted rotary/TMR/Tubewell boring machine shall not be used .					
140a	**20.2.1**	450 mm dia piles	1,174	Meter	1,916.40	**2,099.00**	**24,64,226.00**
141	**23.1**	Boring/drilling bore well of required dia for casing/ strainer pipe, by suitable method prescribed in IS: 2800 (part I), including collecting samples from different strata, preparing and submitting strata chart/ bore log, including hire & running charges of all equipments, tools, plants & machineries required for the job, all complete as per direction of Engineer-in-charge, upto 90 metre depth below ground level.					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
141a	**23.1.1**	All types of soil					
141aa	**23.1.1.1**	300 mm dia	400	Meter	592.05	**648.46**	**2,59,384.00**
142	**23.3**	Supplying, assembling, lowering and fixing in vertical position in bore well, unplasticized PVC medium well casing (CM) pipe of required dia, conforming to IS: 12818, including required hire and labour charges, fittings & accessories etc. all complete, for all depths, as per direction of Engineer -in-charge.					
142a	**23.3.2**	150 mm nominal size dia	400	Meter	668.50	**732.20**	**2,92,880.00**
143	**23.4**	Supplying, assembling, lowering and fixing in vertical position in bore well unplasticized PVC medium well screen (RMS) pipes with ribs, conforming to IS: 12818, including hire & labour charges, fittings & accessories etc. all complete, for all depths, as per direction of Engineer-in-charge.					
143a	**23.4.2**	150 mm nominal size dia	50	Meter	681.90	**746.87**	**37,343.50**
144	**23.8**	Gravel packing in tubewell construction in accordance with IS: 4097, including providing gravel fine/ medium/ coarse, in required grading & sizes as per actual requirement, all complete as per direction of Engineer-in-charge.	100	CUM	1,479.25	**1,620.20**	**1,62,020.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
145	**23.9**	Providing and fixing factory made precast RCC perforated drain covers, having concrete of strength not less than M-25, of size 1000 x 450x50 mm, reinforced with 8 mm dia four nos longitudinal & 9 nos cross sectional T.M.T. hoop bars, including providing 50 mm dia perforations @ 100 to 125 mm c/c, including providing edge binding with M.S. flats of size 50 mm x 1.6 mm complete, all as per direction of Engineer-in-charge.	100	each	1,213.25	**1,328.85**	**1,32,885.00**
146	**23.11**	Supplying, assembling, lowering and fixing in vertical position in bore well, ERW (Electric Resistance Welded) FE 410 plain slotted (having slot of size 1.6/3.2 mm) mild steel threaded and socketed/ plain bevel ended pipe (type A) of required dia, conforming to IS: 8110, of reputed and approved make, having wall thickness not less than 5.40 mm, including painted with outside surface with two coats of anticorrosive bitumestic paint of approved brand and manufacture, including hire & labour charges, fittings & accessories, all complete, for all depths, as per direction of Engineer -in-charge.					
146a	**23.11.2**	150 mm nominal size dia	50	Meter	1,790.00	**1,960.56**	**98,028.00**
147	**23.12**	Development of tube well in accordance with IS : 2800 (part I) and IS: 11189, to establish maximum rate of usable water yield without sand content (beyond permissible limit), with required capacity air compressor, running the compressor for required time till well is fully	200	Hour	916.80	**1,004.16**	**2,00,832.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		developed, measuring yield of well by "V" notch method or any other approved method, measuring static level & draw down etc. by step draw down method, collecting water samples & getting tested in approved SUB HEAD: 23- RAIN WATER HARVESTING & TUBEWELLS 2022 laboratory, i/c disinfection of tubewell, all complete, including hire & labour charges of air compressor, tools & accessories etc., all as per requirement and direction of Engineer-in-charge.					
148	**23.13**	Providing and fixing suitable size threaded mild steel cap or spot welded plate to the top of bore well housing/ casing pipe, removable as per requirement, all complete for borewell of:					
148a	**23.13.2**	150 mm dia	4	each	210.75	**230.83**	**923.32**
149	**23.14**	Providing and fixing M.S. clamp of required dia to the top of casing/ housing pipe of tubewell as per IS: 2800 (part I), including necessary bolts & nuts of required size complete.					
149a	**23.14.2**	150 mm clamp	4	each	1,609.25	**1,762.59**	**7,050.36**
150	**23.15**	Providing and fixing Bail plug/ Bottom plug of required dia to the bottom of pipe assembly of tubewell as per IS:2800 (part I).					
150a	**23.15.2**	150 mm dia	4	each	281.75	**308.60**	**1,234.40**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
151	-	Items included in Delhi Schedule of Rate-(Horticulture & Landscaping) 2020		LS			**10,00,000.00**
152	-	Any Other Items related to DSR		LS			**1,00,00,000.00**
Schedule B4:- NS BASED ITEMS (From S. No. 153 to 174)							
153	**NS-1**	Earthwork in embankment for 32.5t axle load and as per RDSO specification No. RDSO/2020/GE:004 September 2020 "Comprehensive Guidelines and Specification for Railway Formation" with contractor's own earth from borrow areas including all lead, lift, ascent, descent, royalty, taxes, cess, compensation, crossing of nallahs /stream and other obstructions including mechanical compaction in layers with watering, handling, re-handling, dressing of banks to the final profile with all labour, material, tools, plant, machinery and equipment, taxes, cess etc. as a complete job in accordance with the specification and drawings.Note: 10% of payment shall be withheld till the slopes are dressed to the required profile and compacted mechanically with vibratory rollers as per RDSO guidelines	1,04,400	Cum	-	**342.37**	**3,57,43,428.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
154	**NS-2**	Supplying and laying blanketing material produced through mechanical means using crushers and pug mill for 32.5 T axle load as per RDSO specification No. RDSO/2020/GE:004 September 2020 "Comprehensive Guidelines and Specification for Railway Formation" over the top of subgrade including all lead, lift, ascent, descent, royalty, taxes, cess, crossing of nallahs /stream and other obstructions including mechanical compaction in layers not exceeding 300 mm thick with vibratory rollers, watering, handling, re-handling and dressing of formation to the final profile with all labour, material, tools, plants, machinery and equipment, taxes, cess, etc. as a complete job in accordance with the specification and drawings. Note: 10% of payment shall be withheld till the slopes are dressed to the required profile and compacted mechanically with vibratory rollers as per RDSO guidelines.	522	Cum	-	**2,480.58**	**12,94,862.76**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
155	**NS-3**	Supplying and laying in position **M-35 RCC** as per approved design mix with admixtures and manufactured in fully automatic batching plant and transported to site of work in transit mixer for all lifts & leads, having continuous agitated mixer, pumping concrete from transit mixer to site of laying, compacting, finishing & curing, with all labour, material, tools, plants, machinery and equipment, taxes, cess etc., as a complete job ,but excluding supplying & fixing form work (centring & shuttering),in accordance with the specification and drawings. Note –(i) Cost of cement is included in the above item. (ii) Cost of Reinforcement steel is not included in the above item and will be paid separately under relevant item of Schedule B1. (iii) Cost of supplying & fixing form work (centring & shuttering) is not included in the above item (except pile cap & open foundation) and will be paid separately under relevant item of Schedule B1					
155a	**NS-3A**	In Pile caps, open foundation & RCC Box/Sub way, well steining, well cap	21,657	Cum	-	**8,327.88**	**18,03,56,897.16**
155b	**NS-3B**	In Piers, abutments, box	804	Cum	-	**8,673.84**	**69,73,767.36**
155c	**NS-3C**	Abutment cap & Pier Cap, pedestals, approach slab, Deck slab	2,704	Cum	-	**9,020.24**	**2,43,90,728.96**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
155d	**NS-3D**	Retaining walls, wing walls, return walls, drop walls, curtain walls, toe walls etc. of all heights	23,775	Cum	-	**8,449.01**	**20,08,75,212.75**
156	**NS-4**	Boring 1200 mm diameter piles using Hydraulic Rig in all kinds of strata including boulder studded soil, underground structure like channel, sewer manholes, old foundation or any other obstruction, irrespective of sub-soil water level in all conditions whether dry or under water, shoe and temporary casing pipe, if required, with contractor plant, machinery & equipment for pile boring, use of bentonite slurry including all operations, cleaning of bore holes, supplying and laying in-situ with tremie pipe M-35 RCC in piles as per approved design mix with admixtures and manufactured in fully automatic batching plant and transported to site of work in transit mixer for all lifts & leads, having continuous agitated mixer, pumping concrete from transit mixer to site of laying including supplying & fixing form work (centering & shuttering), compacting, finishing, curing, chipping off pile top to remove laitance concrete above cut off level, removal and disposal of surplus excavated earth/debris/muck outside ROW including all lead, lift, ascends, descends, loading, unloading handling, re-handling, crossing of stream, nallahs, railway track, level crossing etc. with all labour, material, tools, plants, machinery and equipment, taxes,	2,000	RMT	-	**12,366.49**	**2,47,32,980.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		cess etc. as a complete job in accordance with the Specification and the Drawings. Note – i.Cost of cement is included in the above item. ii.Cost of Reinforcement steel is not included in the above item and will be paid separately under relevant item of schedule-B1. iii.Cost of temporary casing pipe is included in the above item. However, the cost of permanent casing pipe is not included in this item and shall be paid separately under relevant item of schedule B1, if required and approved by the Engineer.					
157	**NS-5**	Earthwork in filling with contractor's own earth of approved quality from borrow areas including all lead all lead, lift, ascent, descent, royalty, taxes, cess, compensation, crossing of nallahs /stream and other obstructions including mechanical compaction in layers with watering to 95% of MDD (as per IS 2720 part 8), handling, re-handling, dressing to the final profile with all labour, material, tools, plant, machinery and equipment, taxes, cess etc. as a complete job in accordance with the specification and drawings Note:- This item will be used for earthwork in filling for other than railway embankment work.	20,000	Cum	-	**287.75**	**57,55,000.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
158	**NS-6**	Providing, fabricating & laying of colour coated galvalume(Proflex system roofing)material for self supported roofing system, material shall be of following specification, BMT 0.90mm to 1.00mm,APT 0.95mm tolerance +/- 0.02mm thick ,Width 605 mm or as decided by railway (Tolerance +/- 2mm),including supplying, loading ,transporting, uploading & stacking at site ,fabricating and laying with all contractors tools, plants, machineries materials and fixtures labours including all lead and lift and laps/wastage if any etc. complete. The colour of sheet will be decided by Engineer. The rate is also inclusive of designing of roofing system, proof checking and providing execution drawing. Fabrication and installation of self supported roofing.	3,000	Sqm	-	**2,513.24**	**75,39,720.00**
159	**NS-7**	Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners , stainless steel bolts etc., of required size, on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.).	500	Kg	-	**696.80**	**3,48,400.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
160	**NS-8**	supplying, fabricating, transportation and fixing galvanized H-Beam sleepers as per RDSO drawing RDSO/B/1636/4/R & RDSO/B/1636/5 with latest alteration and specifications thereto complete with all fittings and fixtures including the cost of all steel sections, all fittings and fixtures ,elastomeric pad, galvanized bolts, nuts, washer, split pin, fish plates 1m and 0.6m long along with fish bolts and nuts for60Kg running rail and 52Kg guard rail respectively, track fittings and fastenings (Zero Toe Load Fastening) for 60 kg running rail and 52 Kg guard rail as per RDSO drg - RDSO/T-8759 to RDSO/T8765. labour, lead, lift, plants and equipment including galvanized work of full steel components complete in all respects as per approved drawing and technical specifications & as per direction of Engineer on Open Web Girder (OWG) bridges. The rate is also inclusive of the cost of supply of approved quality of epoxy/adhesive and fixing of elastomeric pads with different components of steel sleepers & girder in accordance with approved drawings. The steel to be supplied by the contractor for fabrication of steel H-Beam sleepers shall conform to IS-2062-2006, Grade B0 only. The rate is alsoinclusive of inspection charges of components of sleepers including all fixtures & fastening, galvanization etc. from the reputed laboratory/organization. Elastomeric pad plate and other	508	Each	-	**29,601.96**	**1,50,37,795.68**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		track fittings shall be procured from RDSO approved source.Note: Payment under this item shall be made in following manner;i. 75% of the rate shall be paid after fabrication, galvanization and transportation of H beam sleepers tothe site and submission of material test certificate of manufacturer and inspection certificate of theagency nominated by Engineer.ii. 15% of the rate shall be paid after supply of fittings to the site and submission of inspection certificateof the agency nominated by Engineer. iii. 10% of the rate will be paid after fixing H Beam sleepers to the girder in satisfactory manner. iv. In case fixing is not required, then balance payment will be released on handing over of the sleepers after making recovery @ Rs.850/- per sleeper.					
161	**NS-9**	Supplying, fabrication and fixing pathway on Open Web Girder bridges with hollow steel, rolled and chequred plate including welding / bolting, priming painting with one coat ready mix Zinc Chromate conforming to IS:104 with DFT of 25-30Microns, followed by one coat of Zinc Chrome red oxide conforming to IS:2074 with DFT of 25 Microns with all material, labour, T&P as a complete job as RDSO drawing No. CBS 0045	82	MT	-	**1,17,633.50**	**96,45,947.00**
162	**NS-10**	Casting, supplying and installation of Pre-cast cement concrete blocks of size **25X25 X20cm**. or of required size as directed by the Engineer for protective works at bridges & banks like pitching, toe wall, flooring, drains	3,300	Cum	-	**6,792.44**	**2,24,15,052.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		etc. using M20 design concrete mix with 20mm aggregate size including Contractor's shuttering, leading to bridge site from casting depot, including dressing and levelling of surface, providing gravel backing, laying & jointing blocks with cement mortar 1:3 with Contractor's labour and as directed by Engineer-in-charge (All labour and materials including cement by Contractor). Note: i) Payment for gravel backing will be paid under item no. NS-11of this Schedule. ii) 60% Payment shall be made after casting of pre-cast concrete blocks and bringing at work site. The balance 40% will be made on completion of laying and finishing. iii) Measurement is based on quantity calculation of blocks used only (no of blocks x volume of one block).					
163	**NS-11**	Supplying and laying of 150mm thick well graded stones aggregate/gravel as base layer over the slopes of embankment with manual dressing with water compaction including the cost of supply of all material, labour, lead, lift, tools, plants, crossing of tracks etc. complete as per approved drawings and technical specifications.	2,100	Cum	-	**722.04**	**15,16,284.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
164	**NS-12**	Providing Boulder Backing behind wing wall, return wall, retaining wall with hand packed boulders & cobbles not less than 15cm in any direction & not less than 15kg (except smaller boulders required for filling voids) including all lead, lift, labour & other incidental charges as complete work in all respect. Cost of boulder/cobbles is included in this item.	28,774	Cum	-	**1,494.09**	**4,29,90,945.66**
165	**NS-13**	Providing and fixing of 75mm dia PVC pipe for weep holes in abutments, Wing Wall, Return Wall, Face wall, retaining wall etc. at suitable intervals as directed by the Engineer-in-charge.	8,100	Rmt	-	**244.86**	**19,83,366.00**
166	**NS-14**	Manufacturing, transportation (including loading & unloading) and installation in position (including joining and grouting) M-50 or higher grade precast reinforced cement concrete segmental retaining walls of specified height (height measured from founding level) as per the directions of the Engineer. Precast reinforced retaining walls shall be factory-made and steam cured in a controlled environment with weep holes and in-built inserts for handling/transportation. Dimensional tolerances shall be as per IS: 6408 (part 2) for PC Class 6. Note:- 1. This item includes cost of all the materials, labour, machinery, tools & plant etc. complete required for manufacture of precast segments except Steel	3,000	Cum	-	**30,126.94**	**9,03,80,820.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		Reinforcement which shall be paid separately under relevant item of schedule B1. 2. Boulder Backing and backfilling of filter media behind wall shall be paid separately under NS-12 of this schedule and relevant item of schedule B1. 3. Excavation of soil for foundation shall be paid separately under item (USSOR item No. 022010) of Schedule B1. 4. Before placing of wall segments, 20 mm thick stiff 1:3 cement mortar bedding layer shall be laid over a levelling course of 150 mm thick of M20 concrete. Payment for M20 concrete shall be made under relevant item (USSOR-2019 item 022040) of Schedule B1and for mortar under relevant item (DSR Item no. 3.8) of Schedule- B3. 5. 60% of the rate shall be paid on receipt of the precast retaining wall segments at site and balance 40% will be paid on fixing the same in position in satisfactory condition.					

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
167	**NS-15**	Manufacturing, transportation (including loading & unloading) and installation in position (including joining and grouting) M-50 or higher grade precast reinforced cement concrete U-shaped drain with cover as per the directions of the Engineer. Precast reinforced U-shaped drain shall be factory-made, and steam cured in a controlled environment with inserts for handling/transportation. Dimensional tolerances shall be as per IS: 6408 (part 2) for PC Class 6.Note: -1. This item includes cost of all the materials, labour, machinery, tools & plant etc. complete required for manufacture of precast segments except Steel Reinforcement which shall be paid separately under relevant item of schedule B1.2. Excavation of soil for foundation shall be paid separately under item (USSOR item No. 022010) of Schedule B1. 3. Before placing wall segments, 20 mm thick stiff 1:3 cement mortar bedding layer shall be laid over a levelling course of 150 mm thick of M20 concrete. Payment for M20 concrete shall be made under relevant item (USSOR-2019 item 022040) of Schedule B1and for mortar under relevant item (DSR Item no. 3.8) of Schedule- B3.4. 60% of the rate shall be paid on receipt of the precast drain segments at site and balance 40% will be paid on fixing the same in position in satisfactory condition.	20	Cum	-	**30,126.94**	**6,02,538.80**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
168	**NS-16**	Linking of track on H- beam sleepers on Open Web Girder (OWG) bridges with 60 Kg running rail and 52 kg guard rail with track fittings/fastenings including leading of Running and guard rails from bridge approach and fixing of running rails & guard rails, bending of guard rails, notching, drilling of holes, cutting of rails etc., as directed and making track structure fit for sectional speed. (Rails will be supplied by Employer)	1,200	RTM	-	**1,388.64**	**16,66,368.00**
169	**NS-17**	Supplying and fixing M.S. Angles 100mmx 100 mmx 10mm size conforming to IS:2062 in expansion joint of Composite girder bridges including provision of 10mm dia dowel bar & 12mm dia anchor bolts at 150 mm centre to centre, and 250mm wide GI plate over the top of angles as per relevant RDSO standard drawing with all material, labour, T&P as a complete job.	275	Each	-	**6,568.82**	**18,06,425.50**
170	**NS-18**	Supply and fixing of Metallic Guided Bearing in position true to line and level as per RDSO drawing No. RDSO/B-11754/3R2 and IRC:83 pt. III-2018 including supply & grouting of anchor bolts with approved non-shrinking epoxy grout with all material, labour, T&P as a complete job.	4	Each	-	**53,000.00**	**2,12,000.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
171	**NS-19**	Supply, fabrication and erection of bed plate of approved sizes as per relevant RDSO drawing No. RDSO/B-11751/4R2, B-11753/5R1, B-11754/3R2 with UpToDate corrections, in exact position over bed block on pier/abutments by giving full and even bearing, setting them on the layer of free flow non-shrinkable grouting compound, scrapping or chipping of bed block, if required, fabrication and fixing of HD bolts of suitable sizes along with nuts, washers etc., drilling holes of required size, grouting of holes by epoxy mortar after fixing HD bolts with all labour, material, T & P as a complete job.					
171a	**NS-19a**	More than 12.2m and upto 18.3m clear span	11,200	Kg	-	**241.43**	**27,04,016.00**
171b	**NS-19b**	More than 18.3m and upto 30.5m clear span	52,800	Kg	-	**252.93**	**1,33,54,704.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
172	**NS-20**	Designing, Providing and erection of specified grade precast RCC Facia Panel of thickness 180 mm made with M-35 Grade Concrete Batching plant, Transit Mixer, Concrete Pump and Vibrator for retaining earth with all element and accessories including reinforcing element complete as per approval drawing and Section 3100 of MORT&H specification including all material labour machinery etc. (Scope of work including designing, getting approval, casting in yad, curing, storing, Transporting, lifting, placing in position, erection with all necessaries fasteners etc complete).The cost of cement & steel are included in this item & no separate payment shall be paid whatsoever. The rate also include cost for excavation, foundation, reinforcing element, fasteners, drainage layer, drain pipe, coping beam and other accessories for which nothing extra shall be paid. Mode of Payment: 1- Casting of RE Panel : 60% 2- Erection & fixing : 35 % 3- Final Bill: 5%	6,000	Sqm	-	**6,229.67**	**3,73,78,020.00**
173	**NS-21**	Providing Placing & Compacting to desired density approved backfill material in layers as per approved methodology including testing of reinforced fill portion in approaches between reinforced soil (RS) wall panels as per approved drawing as per Section 3103 of MORT&H Specification. The soil should be	30,000	Cum	-	**381.91**	**1,14,57,300.00**

Schedule 'B'/R1 Retaining Wall, Bridges & other civil works							
S. No	Item No.	Description of Item	Quantity	Unit	USSOR/ DSR Rate in INR	Estimated Rate including GST@18% in INR	Estimated Amount in INR
		predominantly coarse grained, Not more than 10 % of particles should pass 75 micron sieve. The item shall be measured and paid for the finished volume of backfill and subgrade placed in position excluding the volume of filter media at base and behind the RS RE Wall					
174	**NS-22**	Providing & constructing of RCC Crash Barrier of M35 at the edge of road , approaches to bridge structures and medians, constructed with specified grade of concrete using batching plant , transit mixer, concrete pump and vibrator with 450 mm long at expansion joint filled with premolded asphalt filler board, keyed to the structure on which it is built and installed as per design and dimension in the approved drawing and at location directed by the engineer, all as specified as per Section 809 of MORT&H Specification including all material labour, scaffolding etc.	500	Cum	-	**7,342.91**	**36,71,455.00**
						Total Estimated Amount of Schedule 'B'	**2,74,48,66,582.33**

7 Schedule 'C'/R1: General Electrical Services

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
1	Concealed/Surface conduit wiring system- Supply of material and wiring of LP/TP/FP/Ex. Fan point with 1.5sqmm PVC single core multistranded copper wire insulated concealed in stone/brick masonry wall in19/20 mm conduit with 1.5sqmm PVC wire insulated copper for earth wire 1-way/2-way switch 5/6A as required and good quality ceiling rose including connection(with modular switch, socket & ceiling rose) as per specification.	880	Numbers	289.94	255147.20
2	Supply and fixing 5/6A plug, modular 5-pin 230V including modular switch and with modular board and wiring with 2.5sqmm PVC CU cable as per specification.	480	Numbers	173.84	83443.20
3	Supply and fixing 15/16A plug, modular 5-pin 230V including modular switch and with modular board and wiring with 4 sqmm PVC CU cable as per specifications.	200	Numbers	192.3	38460.00
4	Supply and fixing 2 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality and standard size, concealed fixing of GI /PVC as per specifications.	360	Numbers	74.73	26902.80
5	Supply and fixing 4 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality and standard size, concealed fixing of *GI /PVC* as per specifications.	440	Numbers	103.29	45447.60

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
6	Supply and fixing 8 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality and standard size, concealed fixing of *GI /PVC* as per specification.	250	Numbers	178.02	44505.00
7	Supply and fixing 12 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality and standard size, concealed fixing of *GI /PVC* as per specification.	180	Numbers	191.5	34462.80
8	Supply, laying, connection and commissioning of sub- main 2x2.5 Sqmm with PVC insulated single core copper conductor cable and same size PVC insulated copper conductor for earthing wire in 19/20 mm conduit as per site requirement etc. as per specifications.	11000	Metre	58.14	639540.00
9	Supply, laying, connection and commissioning of sub- main 2x4 Sqmm with PVC insulated single core copper conductor cable and same size (4 sqmm) PVC insulated copper conductor for earthing wire in 19/20 mm conduit as per site requirement and as per specification.	6000	Metre	97.16	582960.00
10	Supply, laying, connection and commissioning of sub- main 2x6 Sqmm with PVC insulated single core copper conductor cable and same size PVC insulated copper conductor for earthing wire in 19/20 mm conduit as per site requirement and as per specification	3000	Metre	98.40	295200.00
11	Supply, Installation, testing and commissioning of 1200/1400mm ceiling fans ISI marked, 5 star rated reputed make and as per specification.	250	Numbers	1042.98	260745.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
12	Supply and fixing of ceiling fan regulator electronic type 5-step (modular type) as per specifications.	250	Numbers	282.16	70540.00
13	Supply of 4 Core 16 Sqmm XLPE Armoured Cable with Aluminium Conductor 650/1100 V grade confirming to IS 7098 (Part-1) 1988, 1.1 KV grade LT XLPE insulated armoured, aluminium conductor cable as per specification	12000	Meters	171.59	2059080.00
14	Supply of 4 Core, 35 Sqmm XLPE, Armoured Cable with Aluminium Conductor 650/1100 V grade confirming to IS 7098 (Part-1) 1988, 1.1 KV grade LT XLPE insulated armoured, aluminium conductor cable as per specification.	5000	Meters	295.2	1476000.00
15	Supply of 4 Core 50 Sqmm XLPE Armoured Cable with Aluminium Conductor 650/1100 V grade confirming to IS 7098 (Part-1)1988, 1.1 KV grade LT XLPE insulated armoured, aluminium conductor cable as per specification.	9500	Meters	393.60	3739200.00
16	Supply of 4 Core 70 Sqmm XLPE Armoured Cable with Aluminium Conductor 650/1100 V grade confirming to IS 7098 (Part-1) 1988, 1.1 KV grade LT XLPE insulated armoured, aluminium conductor cable as per specification.	1500	Meters	527.3	790890.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
17	Supply of 4 Core 95 Sqmm XLPE Armoured Cable with Aluminium Conductor 650/1100 V grade confirming to IS 7098 (Part-1) 1988, 1.1 KV grade LT XLPE insulated armoured, aluminium conductor cable as per specification.	1500	Meters	664.2	996300.00
18	Supply of 4 Core 120 Sqmm XLPE Armoured Cable with Aluminium Conductor 650/1100 V grade confirming to IS 7098 (Part-1) 1988, 1.1 KV grade LT XLPE insulated armoured, aluminium conductor cable.	3000	Meters	818.0	2453850.00
19	Supply of 4 Core 185 Sqmm XLPE Armoured Cable with Aluminium Conductor 650/1100 V grade confirming to IS 7098 (Part-1) 1988, 1.1 KV grade LT XLPE insulated armoured, aluminium conductor cable as per specification.	1200	Meters	1243.53	1492236.00
20	Supply, fixing, installation and commissioning of 25 ltrs. fully automatic with auto cut off RO (Reverse osmosis) portable water purification system with inbuild storage tank similar to Aquaguard model no - AG 25 LPH RO S 8421 and as per specification.	5	Nos	22360.58	111802.90
21	Supply and laying of HDPE pipe conforming to IS 4984:1995, 75/80 mm dia wall thickness 3 mm PN-4 under the road/air, as per specification.	5500	Meters	71.26	391930.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
22	Supply and laying of HDPE pipe conforming to IS 4984:1995, 50 mm dia wall thickness 3 mm PN-4 under the road/air, as per specification.	24000	Meters	72.89	1749360.00
23	Supply and laying of HDPE pipe dia 160mm (OD) under road/ground/ floor/railway track or as per site requirement already excavated trench. the material grade PE-80 and class of pipe should be PN-4 IS-4984/1995 wall thickness between 6.2mm to 7.1 mm as per specification.	2000	Meters	369	738780.00
24	Supply and fixing of 50mm dia G.I. pipe medium B class for cable laying as per specification	200	Meters	178.57	35714.00
25	Laying of LT/HT cables in Air/pipe/cable tray/trench etc. as per specification.	33700	Meters	16.24	547288.00
26	Excavation & Refilling of trench of size 0.5 mtr wide x 1.2 mtr deep as per specification. Trench work may be on kuchha/pacca land and all type of soil as per site requirement and without protective layer of brick. Surface of trench shall be made good in all respect and satisfaction of site engineer includes suitable protection of loop cable and as per specification.	28000	Meters	96.51	2702280.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
27	Supply, fixing & commissioning of 300 mm sweep ISI marked exhaust fan with louvre shutter as per specification.	80	Numbers	956.87	76549.60
28	Supply and fixing of Double Door MCB, TPN DB 8 modules 4 row, neutral and earth link, with one no four pole MCB 40 amp, one no FP RCCB 40 amp 30 mA and twenty four no SP MCB 40/32/25/16/10/6amp. 'C' series. Breaking capacity not less than 10 kA. MCB, RCCB and DB should be as per technical specifications and of same make.	15	Numbers	13403.41	201051.15
29	Supply and fixing of Double Door MCB, DB SP 12 way (10+ 2 module),neutral and earth link, with one no DP MCB 40amp, one no DP RCCB 40 amp 30 mA and eight no SP MCB 32/25/16/10/6 amp. 'C'series. Breaking capacity not less than 10 kA. MCB, RCCB and DB should be as per technical specifications and of same make.	20	Numbers	6099.17	121983.40
30	Supply, fixing, testing and commissioning of 22 W Energy efficient LED tubular lamp four feet with its driver and Luminaire of CRCA steel sheet enclosure, IP-20 for indoor application, operating voltage (140-270)V, minimum 2000 Lumens, color temperature 6500ºK, CRI>65 as per specification.	580	Numbers	501.13	290655.40

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
31	Supply, Transportation, erection, testing, Installation & commissioning of self-contained drinking water cooler (150 litre) with all connected standard fitting, accessories etc and 5 kVA wall mounted IC controlled electronic auto voltage corrector with time delay relay. Supply and erection of earth electrode and connection to earthing system etc as required.	10	Numbers	66260.70	662607.00
32	Supply & erection of 5 m high with single/ double arm model, hot dip galvanized steel octagonal pole with galvanized base plate of 200x200x12 mm, junction box with 6 Amp. MCB and GI stud terminals (for mounting inside the base compartment of pole), GI foundation bolt size 4x16mm dia. 600 mm in length including excavation and making foundation as per specification and drawing. It shall be galvanized internally and externally by single dipping methods. The pole and foundation shall be made as per specification.	250	Numbers	8081.77	2020442.50
33	Supply, fixing and commissioning of street light fitting accessories i.e GI pipe of suitable size.	50	Numbers	117.14	5857.00
34	Supply, Erection, testing & commissioning of 40 Watt LED Energy efficient LED based street light fitting with pressure die cast aluminium housing with driver & suitable fixing arrangement, IP-65 for outdoor application, operating voltage (140-270) V, System efficacy more than 100 lm/W, color temperature 6500K, CRI>65, and as per technical specification.	300	Numbers	3313.66	994098.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
35	Supply, fixing testing and commissioning of (OFF delay) modular digital timers for operation of platforms and circulating area street light, as per specification.	12	Numbers	4148.88	49786.56
36	Supply, Fixing, testing and commissioning of *feeder pillar CRCA material powder coated with 7 tank process* of size 900x600x300 mm and bus bar capacity 200 Amp 3 phase and neutral with box as per specification.	15	Numbers	2940.55	44108.25
37	Supply, installation, Testing & Commissioning of rechargeable batten type Emergency light 60 LED 4 watt or higher with one hour minimum backup.	50	Numbers	2230.63	111531.50
38	Supply and preparation of all drawings in AutoCAD (Original + *5* copies) showing electrical installation being done through this contract for station as per specification.	5	Numbers	2802.78	14013.90
39	Supply, installation, testing and commissioning of Single sided LED signage board with pictogram/symbol (if any) as per specification.	*48*	*Square Mtr*	*16549.9*	794395.20
40	Supply, installation, testing and commissioning of double sided LED signage board with symbol as per specification.	*28*	*Square Mtr*	*20526.3*	574736.40
41	Supply and fixing of Rubber mat (ISI marked) nonstick type suitable for 11 kv AC size 2000x1000x25mm & as per specification.	30	Numbers	738.00	22140.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
42	Supply, installation, testing and commissioning of LT heat shrinkable straight through joint with required accessories complete in all respect suitable for LT ,XLPE, 4 core cable as per site requirement and as per specification.	30	Numbers	1597.35	47920.50
43	Supply and erection of GI cable route marker of size not less than 200x150x3mm thick GI Plate. for HT / LT Electric underground cable as per Drawing and specification.	250	Numbers	329.64	82410.00
44	Dismantling of Rail/cable tray Pole & Over head line, EFT's, cable tray complete, as per specification.	30	Numbers	410.43	12312.90
45	Supply, installation, testing and commissioning earth electrode complete in all respect with perforated GI pipe medium "B" class (Blue) confirming to IS 1239 part-I length of 3 mtr, bore 50mm with all accessories like nut, bolt, reducer nipple, wire meshed funnel and CC finished chamber covered by CI/RCC frame etc. Digging pit and refilling it with charcoal and salt in successive layers and connection with 8 SWG GI wire and as per IS:3043 and drawing and testing of earth resistance as required.	220	Numbers	924.29	203343.80

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
46	Design, manufacture, Supply, testing, erection and commissioning of indoor type LT PANEL, Medium voltage switch board front operated type will have digital ammeter, voltmeter, multifunction energy meter of reputed make on all the main and 3 phase. LED type indication lamps on all the mains, digital ammeter & 3 phase flush type mounted electronic energy meter counter display in every outgoing MCCB's copper bus bar and accessories as per specification with following features: (A) incoming 2x250 amp 4 pole MCCB's with change over provision with microprocessor release having integral overload, short circuit, earth fault and neutral protection and breaking capacity 60 KA (Ics=100%Icu). (B)outgoing 2x125 amps, 2x100 amps and 2x63 amp, 4 poles MCCB's with adjustable overload and adjustable short trip unit and breaking capacity 36KA (Ics=100%Icu). the panel is to be provided with over voltage protection with suitable relay. work includes formation for panel foundation and other civil work with suitable trench up to the satisfaction of the site engineer (as per technical specification). panel shall be manufactured from CPRI tested firm. All the material should be of reputed make and as per tech specification. General arrangement, single line diagram and technical detail (make & model no) of the equipment and electrical accessories.	5	Numbers	129429.62	647148.10

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
47	Supply, erection, testing and commissioning of phase change over distribution board (phase selector box) size 610x450x190 mm fabricated from 1.6mm thick CRCA sheet with 7 tank process power coated with 01 no, 100 Amp FP MCCB at the incomer and 01 no, 100 amp SPN MCCB as outgoing and 01 no 63 amp phase selector switch with multi LED indication lamps & by pass arrangement as per specification.	5	Numbers	7944.16	39720.80
48	Supply and fixing of GI cable duct 40 x 60 mm (Approx.) slot greenish as per specification.	1000	Meters	73.82	73820.00
49	Supply and fixing of 4 pole MCCB 200 amp. 36 kA with enclosure and adjustable thermal, fix magnetic release complete. MCCB should be of reputed make and as per specification.	10	Numbers	12778.00	127780.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
50	Laying of cable under the road/Railway track, recessing in platform /wall along with Railway Track. in laid HDPE /GI pipe as required 1.1 KV grade LT XLPE insulated armored, aluminium conductor cable including making chase & plastering after laying of cable/digging of cable trench, sand cushioning, protective covering with bricks of compressive strength 7.5/sqmm (minimum). Provision of cable route marker as per technical specification. including end terminations with Aluminium Crimping socket/lugs testing and commissioning of Various sizes. NOTE:- i) All cable connection shall be made with proper size of crimping socket /Glands by the contractor at his own cost and labour ii) Road/floor where cable is to be laid shall be made good as original by the firm at his own cost and to the satisfaction of Engineer.	800	Meters	39.80	31840.00
51	Supply and fixing of GI jali 1"x1" welded on GI angle as per specification.	1200	Kg	46.70	56040.00
52	Supply of submersible energy efficient pump set of 10 HP (3 star & above rated), 20 Stages, Head :120-160 Mtr, 415 V, AC complete with accessories at sight as per specification.	10	Numbers	50457.00	504570.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
53	Supply fixing, testing and commissioning of automatic control panel with star delta starter for 10 HP three- phase pump including connections and providing cable from main board to control panel and connection for water level controller (WLC) in bore well as per specification.	10	Numbers	14118.00	141180.00
54	Lowering, testing and commissioning of submersible pump set of 10 HP with G.I. pipe, nuts, bolts, washer & rubber packing and copper flat cable & as per specification. Interface shall be made with Civil agency who will be making the bore hole.	10	Numbers	3435.00	34350.00
55	Supply, Installation, Testing and commissioning of mono-block submersible pump 2.0 HP complete in all respect as per specification.	6	Numbers	10901.79	65410.74
56	Supply & fixing of G.I. pipe 50 MM dia B class with flanges, sockets and welding as per IS 1239 as per specification.	800	Meters	167.38	133904.00
57	Supply and fixing pipe fitting bends, sockets, flanges, delivery valve, Non Return valve and supporting clamps (2 set). As per specification.	10	set	2996.86	29968.60
58	Supply, fixing, testing, commissioning of 3 core 6 Sq.mm. size PVC insulated PVC sheathed multi strand flat copper cable conductor. As per specification.	2000	Metre	57.80	115600.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
59	SITC of Submersible mono block pump (150 mm dia) 5 HP, 3.75KW (dia 150 mm), 20-25 mtrs. Head, discharge 700 LPM complete with all accessories and as per specification.	4	Numbers	16290.69	65162.76
60	Supply, fixing, testing and commissioning of automatic control panel with DOL starter for 5 HP three-phase pump including connections and providing cable from main board to control & as per specification. Interface shall be made with Civil agency who will be making the bore hole.	4	Numbers	8287.09	33148.36
61	Lowering, testing and commissioning of horizontal monoblock submersible pump set. as per specification.	4	Numbers	1207.25	4829.00
62	Supply, installation, testing and commissioning of 32 Amp. DP MCB, 10 kA, 'C' curve with metal enclosure as per specification.	30	Numbers	1206.07	36182.10
63	Supply of material and wiring of shed with 1.5 sqmm single core multi-stranded copper wire PVC insulated in conduit 1.5mm thick 19mm size white colour shall be fixed with junction box TEE and 1.5mmsq PVC CU cable insulated multi stranded for earth wire and 5/6A, ceiling rose. The conduit shall be fixed with rawl plugs/ tied with 14 S.W.G. GI wire including connection. As per specification and satisfaction of Engineer.	450	Numbers	106.28	47826.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
64	*Supply, installation, testing and commissioning of 125 KVA Capacity radiator cooled Silent DG Set with AMF panel and Complete with all accessories like- exhaust fan system, diesel engine with alternator capable of delivering continuous power output at 3 phase 4 wire 415 Volts AC Supply with control panel, electronic energy meter, digital Ammeter, Voltmeter, Power factor meter, Digital frequency meter, clustered LED Type indication light, cable glands, earthing terminal maintenance free battery set mounted on wooden frame and plank, Anti-Vibration pad and all other accessories equipment, protective device, Exhaust fan shall be installed as per latest CPCB norms as per specification.*	*1*	*Numbers*	*885000.00*	*885000.00*
65	Supply, installation, testing and commissioning of Cu Earthing with 600mmx600mmx3mm thick copper earth plate, as per IS 3043(latest version) to achieve earth resistance less than one ohm and salt, providing concrete enclosure and cast Iron(CI) cover plate with lifting arrangement, watering pipe etc. as required and as per specification.	10	Numbers	7424.0	74240.00
66	Supply and fixing 40mm x 5mm copper strip on surface or in recess or in 50mm dia G.I. pipe as required and as per specification.	50	Meters	1102.0	55100.00

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
67	Supply, fixing, testing and commissioning of passenger Lift, gearless machine room less, single landing (GF & FF) Minimum load 13 persons, speed - 1 m/s to 1.5 m/s, Automatic doors with two sides opening, Microprocess based variable frequency, variable voltage drive controller with ARD etc. and all safety devices as required. (The cost excludes Civil and Electrical work) as per specification, with warranty period of 24 months from the date of commissioning of lift and 30 months from the date of supply, whichever is earlier.	3	Numbers	2580137.0	7740411.00
68	Supply, Fixing, testing & commissioning of 1.5 Ton heavy duty Split inverter type Air conditioner with including petty hardwares, gas charging along with the cost of refrigerant with LCD display cordless remote ,5 star rating suitable for 1 phase, 230 Volts & IC controlled electronic auto voltage corrector.	30	Numbers	46731.80	1401954.00
69	Supply and fixing of Metal Clad Plug Socket 20A single phase with 32A MCB including fixing and sheet metal enclosure box with one 20A plug top (Ray roll type) to be supplied with board as per spec as per specification,	30	Numbers	750.75	22522.50

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
70	Supply and fixing of junction box size 390x305x170mm comprising of SMP/FRP material with rubber gasket, padlock arrangement, zinc passivated earth bolt, etc. similar to Sintex model no. GSJB 3525 or similar with 4 no. aluminium busbar cap 200 Amp., suitable for 415 volt supply requirement.	100	Numbers	1972.92	197292.00
71	Supply, Installation, testing and commissioning of 2 kVA, 240 volt AC, pure sine wave, online UPS cum inverter consisting of intelligent battery charging mechanism with adaptive battery charging and 150 AH , 24 Volt tubular battery (2 batteries of 12 V each connected in series) suitable for heavy duty application. with UPS cum inverter warranty of 24 months and for Battery - 36 months, as per specification.	10	Numbers	32864.78	328647.80
72	Supply, installation and commissioning and of Perforated Cable Tray of size 150x50 mm made out of GI sheet hot dip galvanized (85 microns) 1.6 mm thick with suitable fixing arrangement.	500	Meters	535.46	267730.00
73	Supply, Installation, testing & commissioning of control and distribution panel for colour light signalling for 10/25 kVA AT supply in 25 kV AC traction system as per RSDO technical specifications No. TI/SPC/PSI/CLS/ 0020 (12/02) With A&C slips No. 1 to 4 or latest, connections as required.	10	Numbers	77563.80	775638.0

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
74	*New Connection/Load Augmentation complete in all respect for bringing Power supply HT/LT from DISCOM terminal to HORC HT/LT Panel and payment of all fees/charges to DISCOM as per specification.*	*300*	*KW*	*6000.0*	*1800000.0*
75	Supply, Installation, testing and commissioning of 16 M high mast shaft totally hot dip galvanized and suitable for wind velocity as per IS 875 part-3. The mast shall be in two finished sections, it shall also include all accessories for 16M high mast including head frame, steel wire rope 6mm dia (7/19 construction) double drum winch galvanized lantern carriage arrangement suitable for 8 luminaries and its control gear boxes and lightning finial. The mast shall have integral power tool installed at its base compartment. The high-powered single- phase non-reversible power tool for electrical operation of raising and lowering of lantern carriage with its supporting stand, torque limiter and fixing chain. The mast shall have only one longitudinal seam weld per section along with Earthing with *GI flat.* As per specification.	4	Numbers	174988.3	699953.0
76	Design and casting of suitable foundation with M-20 concrete for the 16 mtr High Mast having the safe soil bearing capacity at site as *10T/sqm at 2 meter depth* including supply of foundation bolts manufactured from special steel along with *GI nuts, washers and anchor plates and templates.* As per specification.	4	Numbers	18811.0	75244.0

Schedule 'C'/R1 General Electrical Services					
S. No.	**ITEM Description**	**Item Qty**	**Unit**	**Unit Rate including GST @18% (INR)**	**Estimated Amount in INR**
77	Supply, fixing, testing and commissioning of LED type flood light luminaries wattage 200 Watt made up of pressure die cast housing and heat sink in aluminium extrusion with IP- 66 protection as per CEE/NR/121-Elect/PS/2018 (Rev-03) dt 28/06/18 & CEE/NR/121- Elect/PS/2019(Rev-04) dt 04 /11/19 or latest specification and as per site requirement. Guarantee five years from date of commissioning and as per specification.	32	Numbers	9220.0	295040.0
78	Supply, installation, testing and commissioning of LED Aviation light luminaries Model no. BGAV 302 LED of Bajaj or similar as per specification.	4	Numbers	8215.0	32860.0
79	Supply, installation, testing and commissioning of control panel housing suitable timer contactor circuit for automatic ON & OFF of the mast lights at a pre-set time, (16M) as per specification.	4	Numbers	8431.0	33724.0
80	*Supply, installation, testing and commissioning of 11/0.433kV ,250 kVA outdoor type CSS consisting of 2 LBS (Load break Switch) and 1 VCB at HT side (630 Amps., 20 kA), 250 kVA Dry type transformer and 400 Amps ACB at LT side including RMU and other associated items as per requirement & as per specification.*	*2*	*Numbers*	*1857800.0*	*3715600.0*
81	Supply, installation, testing and commissioning of automatic power factor correction control panel (APFC panel) with 100 KVAR shunt capacitors complete in all respect and as per specification.	1	Numbers	73731.4	73731.4
Total Estimated Amount of Schedule 'C'					**4,86,55,175.76**

8 Schedule 'D'/R1: Item rate for miscellaneous woks

Schedule 'D'/R1 Item rate for miscellaneous woks					
S. No	**Item Reference DSR-21/USSOR-2019 (NWR)**	**Description of Item**	**Unit**	**DSR/USSOR Rate in INR**	**Estimated Rate including GST@18% in INR**
DSR-21 Items (From S. No. 1 to 2)					
1	19.35	Providing and laying Non Pressure NP-3 class (Medium duty) R.C.C. pipes including collars/spigot jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete.			
I	19.35.1	450mm dia. RCC pipes	Metre	2385.5	2,612.84
II	19.35.2	600 mm dia RCC pipes.	Metre	3051.55	3,342.36
2	19.6	Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete :			
I	19.6.1	100 mm dia. R.C.C. pipe	Metre	447.25	489.87
II	19.6.2	150 mm dia. R.C.C. pipe	Metre	493.1	540.09
III	19.6.3	250 mm dia. R.C.C. pipe	Metre	811	888.29

Schedule 'D'/R1 Item rate for miscellaneous woks					
S. No	**Item Reference DSR-21/USSOR-2019 (NWR)**	**Description of Item**	**Unit**	**DSR/USSOR Rate in INR**	**Estimated Rate including GST@18% in INR**
USSOR-2019 (NWR) Items - (From S. No. 3 to 6)					
3	031110	Load testing of one or more spans of bridge as selected by the Engineer as per approved load test procedure following relevant IS/IRC/Railway codes with contractor's labour, deflection measuring instruments, loading materials, recoding and analyzing the load testing results including all lead & lift, etc. complete as required. The rates are all inclusive and will be paid after load test is finished and girder is cleared of the kentledges/loading material etc. The load shall be 1.25 times the stipulated design load.			
I	031111	For Span design load upto 100 MT	Each	85662.09	96,815.29
II	031112	Extra for every increase 1 MT or part thereof in the span design load capacity upto 800 MT	MT	845.81	955.93
4	021010	Exploratory drilling of boreholes down to required depth, drilling of 150mm dia. boreholes in all type of soils except hard rock & large boulders (boulder core more than 30cm) including refilling, reinstating surface and disposing off surplus material including use of mechanical rigs with power operated winches as well as percussion/chiselling tool for advancing through occasional seams of hard strata to be employed, where necessary in Dry area.			
I	021011	0m to 10m	Metre	1,213.51	1,371.48
II	021012	10m to 20m	Metre	1,296.46	1,465.22
III	021013	20m to 30m	Metre	1,431.59	1,617.94

Schedule 'D'/R1 Item rate for miscellaneous woks					
S. No	**Item Reference DSR-21/USSOR-2019 (NWR)**	**Description of Item**	**Unit**	**DSR/USSOR Rate in INR**	**Estimated Rate including GST@18% in INR**
IV	021014	30m to 40m	Metre	1,554.68	1,757.06
5	021050	Drilling of NX size borehole (75mm dia.) in all types of hard rock and collection of rock core samples from boreholes and preserving in boxes			
I	021051	0m to 10m	Metre	3,189.64	3,604.84
II	021052	10m to 20m	Metre	3,418.43	3,863.41
III	021053	20m to 30m	Metre	3,775.66	4,267.15
6	021060	Conducting in-situ full size Plate Load Test (PLT) at selected location as per IS:1888 including making loading arrangements & casting of RCC/cast in-situ concrete footing as per codal provisions including excavation and refilling of trial pit			
I	021062	Plate size 45cm x 45cm	Each	27,754.18	31,367.00
II	021063	Plate size 60cm x 60cm	Each	31,000.02	35,035.35
7	021080	Conducting SCPT for soil as per IS:4968	Each	47,313.49	53,472.38
8	021090	Conducting DCPT for soil as per IS:4968	Each	37,394.02	42,261.67
9	021110	Taking out 100mm dia. & 450mm long undisturbed samples of soil from bore holes, including provision of air tight containers for packing and, labelling incl. transporting the samples to laboratory. Piston sampler shall be used for extracting undisturbed samples where necessary. Samples shall be collected as per IS:2720.	Each	152.52	172.37

Schedule 'D'/R1 Item rate for miscellaneous woks					
S. No	**Item Reference DSR-21/USSOR-2019 (NWR)**	**Description of Item**	**Unit**	**DSR/USSOR Rate in INR**	**Estimated Rate including GST@18% in INR**
10	021120	Taking out 100mm dia. & 450mm long disturbed samples of soil from bore holes, including provision of air tight containers for packing, labelling and transporting the samples to laboratory. Samples shall be collected as per IS:2720.	Each	164.57	185.99
11	021130	Conducting standard penetration test as per IS:2131 at approximate1.5m intervals in bore holes, as directed by the Engineer in charge	Each	852.27	963.21
12	021150	Conducting laboratory Tests on collected soil samples as per relevant IS code			
I	021151	Moisture Content/Dry Density	Each	287.66	325.11
II	021152	Atterberg Limits	Each	586.02	662.30
III	021153	Specific Gravity	Each	631.51	713.71
IV	021154	Grain size analysis including Hydrometer analysis	Each	731.85	827.12
V	021155	Direct Shear Test	Each	2,140.70	2,419.36
VI	021156	Natural Density	Each	709.11	801.42
VII	021157	Consolidation Test	Each	6,886.37	7,782.78
VIII	021158	Unconfined Compression Test	Each	2,006.91	2,268.15
IX	021159	Tri-axial Test	Each	2,408.29	2,721.78

Total Estimated cost of Schedule 'D'- INR 2.00 Crore (INR 20 million).

Tender No. HORC/HRIDC/C-23/2022
Attachment 3
to
Corrigendum No. 2

Part 2, Section VII-2: Employer's Requirements-Functional/R1

Functional /R1

Section VII: Employer's Requirements

Section VII-2: Functional /R1

EMPLOYER'S REQUIREMENTS – FUNCTIONAL /R1

Objective

The objective of the Contract is the design, construction, testing and commissioning of the permanent works by the Contractor (including without limitation, the design, construction and removal of the Temporary Works) and the rectification of defects appearing in Permanent Works in the manner and to the standards and within the time obligations, liabilities and risks which may be involved, the Contractor shall undertake the execution of the Works.

1. GENERAL

1.1 *The Works to be executed under Package C-23 is for design and construction of civil works and General electrical services work as per Employer's Requirements on 'Design Build' basis. All information available with the Employer has been furnished in Section VIII-Tender Drawings and Documents, Part 2, Employer's Requirements. The Works are to be designed by the Contractor. Any other site data and information required for design of the Works shall be collected (through tests or otherwise), arranged, produced by the Contractor at his own cost. No claim from the Contractor whatsoever shall be entertained on the ground of certain information not being furnished in the Contract.* The design and performance of the Permanent Works shall comply with the specific core requirements contained in these Employer's Requirements – Functional and Employer's Requirements- General Electrical Services.

1.2 The Permanent Works shall be designed and constructed to the highest standards available using proven up-to-date good Engineering practices. The Specification shall in any case not specify standards which, in the Engineer's opinion, are less than or inferior to those described in the Outline Design Specifications (ODS) and Outline Construction Specifications (OCS). Construction shall be carried out employing the procedures established by the Contractor as per approved quality assurance plan and Environmental, Social, Health and Safety (ESHS) Plan.

1.3 The Contractor shall be responsible for obtaining all necessary approvals from the relevant Public/Government/Local/Statutory or any agencies in the design and construction of the Works.

1.4 Employer's Requirements- Functional shall be read in conjunction with Employer's Requirements-Design, Construction, Outline Design specification (ODS), Outline Construction Specifications (OCS), General Electrical Services and other requirements of the Contract.

1.5 Jurisdictional Sketch of Civil works under C-23 package is given in Section VII-8, Tender Drawings and Documents, Part 2, Employer's Requirements.

2. SCOPE OF WORK

2.1 Scope under Lump Sum Price Schedule 'A'

The through Chainages mentioned in the Scope of the Works/Tender drawings can undergo some minor corrections, without any impact on the overall length/Scope of the Works. The Lumpsum Scope of Work in brief is given below but the scope also includes all other requirements stipulated in various parts/sections of the Contract Document including Appendices and Annexures.

2.1.1 Design of the Works

i. Schedule 'A'

a) Design and drawings of all items of the Works under Schedule 'A' shall be carried out by the Contractor and the payment for the same is included in Cost Centre 'CD' of Schedule 'A'.

b) Design and drawings of all the temporary works, temporary road diversion shall also be carried out by the Contractor and the payment for the same is included in Cost Centre 'CD' of Schedule 'A'.

ii. Schedule 'B'

a) Design and drawings of all items of the Works under Schedule 'B' shall be carried out by the Contractor and the payment for the same is included in Cost Centre 'CD' of Schedule 'A'.

b) Design and drawings of all the temporary works, temporary road diversion shall also be carried out by the Contractor and the cost for the same is deemed to be included in the rates quoted for the relevant item of Schedule 'B' unless otherwise specified in the Contract.

Payment matrix for design of bridges is given in **Annexure F-7.**

2.1.2 Design and construction of railway formation

The Contractor shall design and construct railway formation for 32.5 t axle load as per RDSO Specifications "Comprehensive Guidelines and specifications for Railway Formation-Specification No. RDSO/2020/GE: IRS-0004, Sept 2020" from Chainage 29680 m to Chainage 49700 m and from Chainage 55600 m to Chainage 61500 m for double track of Main line; from Chainage 614 m to Chainage 2700 m for connecting single line from New Patli to Patli; from Chainage 703 m to Chainage 4114 m for connecting single line from New Patli to Sultanpur; and at Sultanpur station from Chainage +689.546 m on Farukhnagar side and from Chainage +530.00 m on Badsa side to Chainage -861.218 m on Garhi Harsaru side as shown in Tender drawings and shall include earthwork in cutting/filling, subgrade, prepared subgrade and blanketing including mechanical compaction. The Contractor shall arrange borrow areas for earthwork in embankment at its own cost.

Excavated earth/rock from cutting shall be utilised for formation in embankment/structures in C-23 Package. Royalty for using the excavated earth/rock for construction of the Works shall be borne by the Contractor. Surplus/unsuitable excavated earth/rock shall be disposed off by the Contractor at his own cost.

2.1.3 Design and construction of slope protection works

The slope of embankment/cuttings shall be protected by vegetative cover comprising perenial turf forming grass in accordance with Section VII- 6 Outline Construction Specifications (OCS)-Civil . On embankments/cuttings higher/deeper than 4 m *vegetative cover* shall be provided using coir netting as per IS:15869, IS:15872 and IRC: 56.

After Taking Over the Works, the Contractor shall maintain slopes of embankment/cutting and vegetative cover for a period of one (01) year and shall make good any loss/damage to formation and vegetative cover due to rain cuts, pedestrian movement or any other reason.

2.1.4 Design and construction of drainage system on embankments/cuttings by providing precast RCC drains on berms, chute drains, sumps and RCC catch water drains & side drains in cuttings

The Contractor shall design and construct precast RCC longitudinal drains on berms of embankments/cuttings to collect surface runoff from the slope. Precast RCC chute drains shall be provided at approximately every 50 m for collecting water from drains on berms and discharging it safely away from toe in embankments or to side drain in cuttings as shown in the Tender drawings. RCC collecting chambers shall be provided at the junction of longitudinal berm drains and chutes.

In cuttings the Contractor shall design and construct following additional items:

a. Cast in-situ RCC catch water drains of adequate capacity to intercept and safely dispose of the surface runoff from adjoining areas from entering into the cutting.

b. Cast in-situ RCC side drain of adequate capacity on both sides near toe of cutting to safely carry the surface runoff from cutting slope and formation.

After Taking Over the Works, the Contractor shall maintain drainage system in embankment/cutting including sump, drain on berms, side drains, catch water drains, chutes etc. for a period of one (01) year and shall make good any damage to the drainage system due to rain cuts, pedestrian movement or any other reason.

2.1.5 Design and construction of minor bridges

The Contractor shall design and construct minor bridges (RUBs, canal and waterway bridges) including protection works on bridge approaches and height gauges at all RUBs as per Employer's Requirements. List of minor bridges is given in ***Annexure-F-1.*** *Approach road on both sides of RUBs shall be designed and constructed by the Contractor upto ROW of HORC for full clear width of RUB. Design and construction of permanent diversion at RUBs shall be carried out by the Contractor as shown in the Tender drawings. Payment matrix for various items incidental to bridges is given in* ***Annexure F-7.*** *Drainage and rain water harvesting system shall be designed and constructed at RUBs where road level in the RUB is located below natural ground level i.e. at Br No. 77 at Ch.31365, Br No.125 at Ch.49167.307 on main line and Br No.04 on New Patli to Patli connectivity at Ch.2518.489.*

2.1.6 Design and construction of major bridges

The Contractor shall design and construct major bridges (RUBs, canal and waterway bridges) including protection works on bridge approaches and height gauges at all RUBs as per Employer's Requirements. List of major bridges is given in ***Annexure- F-2****. Approach road on both sides of RUBs shall be designed and constructed by the Contractor upto ROW of HORC for full clear width of RUB. Design and construction of permanent diversion at RUBs shall be carried out by the Contractor as shown in the Tender drawings. Payment matrix for various items incidental to bridges is given in* ***Annexure F-7.***

For construction of Br No. 150 and 153, temporary diversions of existing roads will be required first. Then existing roads will be lowered by about 1.90 m at the site of the bridges and regraded to join the existing roads. Thereafter, Br Nos. 150 and 153 will be constructed.

2.1.7 Linking of track on Open Web Girders (OWG)

The Contractor shall supply H- beam sleepers & track fittings and link track on OWG bridges including providing and fixing guard rails and gang pathway as per list given in **Annexure F-2.** *The Contractor shall supply spare track fittings as per* ***Annexure F-8.***

Rails for linking of track shall be supplied free of cost by the Employer *at the stock yard of T-1 Contractor located at Manesar station yard. Rails for linking of track shall be provided in the length of 13/26 m. Rails shall be transported to the Site of OWG bridges by the Contractor.*

2.1.8 Design and construction of stations

The Contractor shall design and construct *four new stations namely Dhulawat, Chandla Dungerwas, Pachgaon & New Patli.In addition there is one existing halt station i.e. Sultanpur (on Garhi Harsaru- Farrukhnagar railway line) which is to be converted into a crossing station.*

i. *New Patli station*
   New Patli is a crossing station with five tracks, one island platform and one end platform..There is a S&T service building on the platform which shall be designed and constructed as shown in Tender drawings.
ii. *Dhulawat Station*
   This is a crossing station with five tracks, one island platform and one end platform. There is a station building at Dhulawat station which shall be designed for single storey as shown in Tender drawings.
iii. *Chandla Dungerwas*
   This is a halt station having only two tracks and two platforms.
iv. *Pachgaon*
   This is a halt station having only two tracks and two platforms.
v. *Sultanpur*
   This is a halt station and will be converted into a crossing station. The sequence of working at Sultanpur station shall be as follows:
   a) *The Contractor shall dismantle the existing platform*
   b) *The Contractor shall prepare formation for Line No.1 in Sultanpur yard and construct the New platform, station building, other structures and facilities as shown in the Tender drawing.*
   c) *T-1 contractor shall slew/dismantle existing main line track to the prepared formation of line No.1.*
   d) *The Contractor shall prepare formation for Line No.2*
   e) *T-1 Contractor shall link the track for Line No.2*
   The items of works to be carried out at various stations are shown in ***Annexure F-3.*** *Tender drawings. One subway shall be constructed at Dhulawat, Chandla Dungerwas, Pachgaon & New Patli stations as shown in Tender drawings. The list of subways is*

*shown in **Annexure F-5**. The works at stations shall be carried out in accordance with Tender drawings, Outline Design Specifications (ODS) and Outline Construction Specifications(OCS).*

2.1.9 Design and construction of RCC hume pipe (NP-4) of 450 mm dia/precast RCC box (500mm x 500mm, clear opening) in the embankment at approximately 500m interval for crossing utilities in future.

2.1.10 Design of precast RCC longitudinal drain of required capacity with suitable slope and outfall at places where HORC embankment overlaps with KMP expressway embankment to safely cater the surface runoff from the slopes of HORC embankment and KMP expressway embankment. *Construction of precast RCC drain shall be paid under Schedule 'B'.*

2.1.11 Design of precast and cast in-situ retaining walls for retaining soil of formation along the alignment at locations given in ***Annexure F-4***. Construction of these retaining walls shall be paid under Schedule 'B'.

2.1.12 *Design of bridges including protection works as mentioned in **Annexure F-6** including design of drainage and rain water harvesting system for Br No.76 at Ch.31114. Construction of these bridges shall be paid under Schedule 'B'.*

2.1.13 *Design of station building at New Patli station which shall be designed for G+5 storeys with stilt parking but construction will be carried out only for G+1 with stilt parking. Construction of station building shall be paid under Schedule 'B'.*

2.1.14 *Design of Retaining wall/RE wall in station area as shown in Tender drawings.*

2.1.15 *Design of minor structures at stations like portico, ticket counter structure, approach roads to stations etc. shall also be carried out by the Contractor. Construction of above mentioned items shall be paid under Schedule 'B'*

2.1.16 *Design of permanent road diversion and regrading (raising and lowering) of roads at RUBs for Br. Nos. 73 & 112 of **Annexure F-6** and Br. Nos. 150 and 153 of **Annexure F-2.** Construction of these items shall be paid under Schedule 'B'.*

2.1.17 Traffic management along the work site including construction works required in connection with traffic management like road works, footpaths, drains and other services etc. and repair and maintenance of these construction works during construction period. Any road widening / diversion along with associated drainage system required to facilitate the movement of traffic and their repair & maintenance *shall also be carried out by the Contractor*. It also includes reinstatement of land/structure/*roads/*services etc. to original condition wherever road diversion has been made outside original road including reconstruction of structure demolished for traffic management. Materials and other specification related to traffic control devices shall conform to IRC standards.

2.1.18 Design and construction of one deep *bore well* of *15,000 litre/hr* yield with pump house and overhead gantry for lowering/taking out pumps at Dhulawat, Chandla Dungerwas, Pachgaon, New Patli and Sultanpur stations, providing GI/Mild Steel pipeline from tube well to underground water storage tank and from underground water storage tank to overhead water storage tank with all accessories.

2.1.19 Design and application of water proofing system in subway at four stations–i.e, Dhulawat, Chandla Dungerwas, Pachgaon and New Patli as per the Employer's Requirements.

2.1.20 The Contractor shall provide and maintain during progress of works barricading around the work area where vehicular or pedestrian traffic passes with all safety measures as shown in Tender drawings. The excavations near habitations/public movement areas and all works along the roads shall be provided with proper caution signs and marked with red lights, reflectors at night to avoid accidents near public places to ensure safety of public

2.1.21 Reinstatement/Restoration of roads and services with new material of similar specification as per codal requirement after completion of work for the area disturbed by the Contractor during construction activities. However, reinstatement of roads and its drainage system will be as per current standards being used by the roads/service owning agency for similar roads. Proper survey to be done before dismantling of any of the above services along with extensive photographs, videos & sample of these services by the Contractor & get it verified by the representative of Engineer so as to ascertain the extent of these existing services and its specification.

2.1.22 There is possibility of some of the items not getting mentioned in the above list of works. Tenderers are requested to go through the Tender drawings also in details as the works listed in Clause 2.1 above as well as indicated in the Tender drawings would be considered inclusive in the scope of work under lump sum quoted price except the items mentioned in Sub-Clause 2.2, 2.3 and 2.4 below unless specified otherwise in the Contract. Engineer's decision shall be final in this regard in case of dispute.

2.1.23 The work content against the lump sum component of the work i.e. Schedule 'A' shall also include, but not be limited to, the following:

a) Site clearance and dismantling of obstructions etc., before commencement of work as specified or as directed by the Engineer;

b) True and proper setting out and layout of the Works, benchmarks and provision of all necessary labour, instruments and appliances in connection therewith as specified or as directed by the Engineer;

c) All aspects of quality assurance, including testing of materials as per the approved Inspection and Test Plan and other components of the work, as specified or as directed by the Engineer;

d) Day to day cleaning of worksite throughout the execution period;

e) Maintenance of the completed Works during the period as specified or as directed by the Engineer;

f) Submission of completion (i.e., 'As-Built') drawings 06 (Six) sets in A-1 size and all other related documents as specified including scanned and AutoCAD copy with soft copies in both formats of all As-built drawings & documents.

g) Preparing Definitive Design, Construction Reference drawings, Good For Construction(GFC) drawings and working drawings for various components of the works and obtaining approval in respect thereof from the Engineer, inclusive of incorporation of all modifications, alterations, changes, etc. that may be required to be carried out as directed by the Engineer;

h) Compliance of requirements of Environmental, Social, Health and Safety (ESHS) Manual as per Appendix 13 of Employer's Requirements, Section VII-9

i) Results of sub-surface investigations conducted at project site are enclosed with the Tender documents. This information about the soil and sub-soil water conditions is being made available to the Contractor in good faith and the Contractor shall have to obtain the details of sub soil parameters independently. No claim whatsoever on account of any discrepancy/variation about the soil parameters and sub soil water conditions that may be actually encountered at the time of execution of the work and those given in these Tender Documents shall be admissible to the Contractor under any circumstances.

2.1.24 Other Works under Lump Sum

The Interface Management Document as per Appendix- 5 of Employer's Requirements shall also be complied with**.**

2.1.25 Safety of adjoining structures of KMP Expressway and IR

Alignment is passing adjacent to KMP Expressway/IR Tracks. The Contractor should ensure that the design and construction of the Works should be carried out with adequate measures for the safety & protection of KMP/IR structures. Construction activities shall be planned without affecting the operations of the existing system. It shall be ensured that no damage is caused to any element/person/ property of these systems. The Engineer/ Employer shall be indemnified against any damage caused to such structures at no extra cost.

2.1.26 Associated Works

Works to be performed shall also include all general works, preparatory works for the construction and works of any kind necessary for the design and satisfactory construction, completion and maintenance of the works to the intent and meaning of the drawings adopted and Outline Construction Specifications , to best Engineering standards and orders that may be issued by the Engineer from time to time, compliance with all Conditions of Contract, supply of all materials, apparatus, plants, equipment, tools, fuel, water, strutting, timbering, transport, offices, stores, workshop, staff, labour and the provision of proper and sufficient protective works, diversion, temporary fencing, lighting and watching required for the safety of the public and protection of works on adjoining land; first-aid equipment, sanitary accommodation for the

staff and workmen, effecting and maintenance of all insurances, the payment of all wages, salaries, fees, royalties, duties or the other charges arising out of the execution of works and the regular clearance of rubbish, clearing up, leaving the site perfect and tidy on completion.

2.1.27 Land for Contractor's Facilities & Site Office

For batching plants, field quality control laboratories, site offices and other activities (excluding labour camps), *land total admeasuring approx. 20,000 Sq. m will be made available at multiple locations between km 29.68 to km 61.5* by the Employer on as is where is basis free of cost. This land shall be made good for such offsite activities as needed by the Contractor at no extra cost to the Employer. The land shall be cleared from debris, all structures made by the Contractor including RCC footings and rafts etc. and reinstated to the line, level and to the same conditions as existed before the work started before handing over back to the Employer within 91 days after Taking over Certificate. The final bill shall be released to the Contractor after all structures from the Contractor facility and site office are removed & clearance of site. The cost of setting up of all the above mentioned facilities & the office and reinstatement of site is included in lump sum price in Schedule 'A'.

2.2 Scope under BOQ Schedule 'B'

Under this Schedule, the Contractor is required to carry out works which are not covered in Schedule 'A'. Broadly following works shall be carried out under this Schedule 'B':

a) Procurement, supply and installation (including joining and grouting) of precast retaining walls along the embankment at locations as given in ***Annexure F-4*** for heights upto 2 m from ground level.

b) Construction of cast in-situ retaining wall generally for heights more than 2m from ground level at locations as given in ***Annexure F-4***.

c) *Construction of Retaining wall/RE wall in station area as shown in Tender drawings.*

d) Construction of bridges including slope protection on bridge approaches and drainage & rain water harvesting system at Br.No.76 as shown in Tender drawings. List of bridges is mentioned in ***Annexure F-6***. Foundation of open web girders of 76.2 m span and 61.0 m span of Br.Nos.112 & all the piers and abutments of Br No.136 of Annexure F-6 shall be pile foundation only.

e) Permanent road diversion and regrading of existing roads required for construction of Bridge Nos. 150 and 153 on main line.

f) Temporary diversion and permanent regrading of existing roads required for construction of Bridge No. 73 on main line.

g) Temporary diversion of roads required for construction of Bridge No. 112 on main line.

h) Construction of station building at New Patli, ticket counter structures at Chandla Dungerwas & Pachgaon, elevated approach to Pachgaon and portico at stations.

i) Construction of approach road including RE wall/Retaining wall at Dhulawat, Chandla Dungerwas, Pachgaon, New Patli and Sultanpur Stations.

j) *Construction of precast RCC longitudinal drain of required capacity where HORC embankment overlaps with KMP expressway embankment to safely cater the surface runoff from the slopes of HORC embankment and KMP expressway embankment*.

k) Any other item as directed by the Engineer related to the work.

2.3 Scope under Schedule 'C' (General Electrical Services works)

Under this Schedule, the Contractor is required to carry out General Electrical Services works. Detailed Scope of Works is given in Section VII-7:General Electrical Services, Part 2-Employer's Requirements

2.4 Scope under Schedule 'D' (Item Rate for miscellaneous works)

Under this Schedule, the Contractor is required to carry out works which are not covered in Schedule 'A', Schedule 'B' and Schedule 'C' on specific instructions of the Engineer for the followings:

a) Diversion of all uncharted utilities, if required, as per approved plan.

b) Any other activity as directed by the Engineer

2.5 REFERENCE TO THE STANDARD CODES OF PRACTICE

2.5.1 All Standards, Outline Construction Specifications, Technical Specifications and Codes of Practice referred to shall be latest editions including all applicable official amendments and revisions. The Contractor shall make available at site all relevant Indian Standard Codes of practice, IRS, IS, IRC, UIC, as applicable.

2.5.2 Wherever Indian Standards do not cover some particular aspects of design/ construction, relevant International Standards will be referred to. The Contractor shall make available at site such standard codes of practice.

2.5.3 In case of discrepancy among Standard codes of practice and Section VII-6: Outline Construction Specifications-Civil (OCS), the order of precedence shall be as given below:

a. Outline Design Specifications-Civil

b. Outline Construction Specifications-Civil.

c. Standard Codes of Practice. In case of discrepancy among Standard Codes of Practice, the order of precedence will be

   i. IRS,

   ii. IS,

   iii. IRC,

   iv. other International codes

d. Indian Railway Unified Standard Specifications,

e. CPWD specifications,

f. NBC 2016,

g. MORTH Specification for Road & Bridges,

2.6 DIMENSIONS

As regards errors, omissions and discrepancies in Specifications and Drawings, relevant clause of Particular Specification will apply. The levels, measurements and other information concerning the existing site as shown on the conceptual / layout drawings are believed to be correct, but the Contractor shall verify them for himself and also examine the nature of the ground as no claim or allowance whatsoever shall be entertained on account of any errors or omissions in the levels or strata turning out different from what is shown on the drawings.

2.7 INSPECTION

The Employer may appoint an independent agency to ensure the quality checking of design, supply, fabrication, erection and construction of all works under scope of work. *Payment to the independent agency shall be made by the Employer separately.* The Contractor shall ensure complete co-operation with the agency to perform their work satisfactorily. In addition, the Employer also reserves right to undertake quality check and inspection directly by itself.

2.8 ALIGNMENT OF TRACKS

2.8.1 The alignment shall be as shown in the Tender drawings. The alignment has been developed by the Employer to meet operational and technical criteria. The Contractor is not required to evaluate the alignment for compliance with these criteria but shall review it with respect to his own design and construction proposals and shall satisfy himself that it suites to the available land width and there is no conflict with the clearances at proposed structures.

2.8.2 The Contractor is permitted to propose minor deviations in alignment to suit his construction proposals, but he must demonstrate that any such deviations shall comply with good design practice and the alignment requirement of the Design Criteria. Such deviations shall require prior approval of the Employer subject to following conditions:

i. There is no extra cost to the employer.

ii. Changes proposed are essentially required to suit the contractor's specific design.

iii. There is no change at the contract boundaries or if there is any, the same is agreed by the Contractor of the adjoining section without any extra cost to the employer**.**

2.8.3 *The ground levels shown in Conceptual Alignment Plan & L-Section Tender drawings are based on preliminary survey. Detailed survey will have to be carried out by the Contractor for confirming and preparation of final Alignment Plan & L-Section. No cost implication shall be considered for any variation in the ground levels with respect to ground levels shown in conceptual Alignment Plan & L-Section tender drawings.*

2.9 DURABILITY AND MAINTENANCE

The Permanent Works shall be designed and constructed such that, if maintained reasonably, they shall endure in a serviceable condition throughout their minimum lives as described in Section VII-5, Outline Design Specifications-Civil. The Permanent Works shall be designed and constructed so as to minimise the cost of maintenance whilst not compromising the performance characteristics and ride quality of the railway.

2.10 OPERATIONAL REQUIREMENTS

a) The vertical and horizontal alignments for the main and connectivity line shall comply with the conditions laid in para 2.8 (a) & (b) above.

b) During construction the Contractor shall be responsible for providing and maintaining adequate flood protection to ensure protection of the works.

2.11 ENVIRONMENTAL CONSIDERATIONS

All provisions and conditions contained in the Environmental, Social, Health and Safety (ESHS) Manual as per Appendix 13 shall be strictly complied with.

2.12 TRAFFIC MANAGEMENT

The Contractor shall carry out the Works so as to minimise disruption to road and pedestrian traffic. The Contractor shall prepare his traffic management plan based on his proposed construction methodology in co-ordination with the Engineer and in conjunction with the concerned road authority as per Appendix 10. He shall comply strictly with the approved plan during construction of his works.

2.13 CRS INSPECTION

The Contractor shall note that the Commissioner for Railway Safety (CRS) will inspect the Works from time to time for the purpose of determining whether the HORC Project complies with the terms of operational and infrastructural safety in accordance with the Laws of India. The Contractor shall note that CRS approval is mandatory for commissioning the system. Notwithstanding other provisions of the Contract, the Contractor shall ensure that the Works comply with the requirements of CRS in terms of construction to the drawings and shall make all necessary arrangements and assist the representatives of the Employer and CRS in carrying out their inspection duties and also comply with their instructions regarding rectifying any defects and making good any deficiencies. Contractor shall prepare and make available all drawings, documents, sketches, photographs etc. as required for submission of application for inspection of CRS as instructed by the Engineer.

2.14 STANDARDS

Equipment, materials and systems shall be designed, manufactured and tested in accordance with the latest issue of National and/or International codes and standards. The Contractor shall submit hard copies in original to the Engineer of all codes and standards used for the work.

Reference to standards or to materials and equipment of a particular manufacturer shall be regarded as followed by the words "or equivalent". The Contractor may propose alternative standard materials, or equipment that shall be equal to or better than those specified. If the Contractor for any reason proposes alternatives to or deviations from the specified standards, or desires to use materials or equipment not covered by the specified standards, the Contractor shall apply for the consent of the Engineer. The Contractor shall state the exact nature of the change, the reason for making the change and relevant specifications of the materials and equipment in the English language. The decision of the Engineer in the matter of quality will be final.

ANNEXURE-F-1

LIST OF MINOR BRIDGES***

A. MAIN LINE							
S. No.	Br. No.		*Chainage (m)	Type of Crossing	Type of Bridge	SPAN	No. of Tracks
	Br No. as per RFP dated 11.11.2022	Br No. as per Final RFP				No. x L (in m) x H (in m)	
1	75	77	31365.0	RUB	RCC Box	1x6x4	2
2	76	78	32022.0	RUB	RCC Box	1x6x4	2
3	77	80	33155.0	RUB	RCC Box	1x6x4.5	2
4	78	81	33269.230	Canal	RCC Box	1x2x2	2
5	79	82	33450.0	Balancing Culvert	RCC Pipe	1x1.8	2
6	80	83	33673.045	RUB	RCC Box	2x7x5.65	2
7	83	87	35371.018	RUB	RCC BOX	1x5x3	2
8	84	88	35916.064	RUB	RCC BOX	1x5x3	2
9	86	90	37317.678	Balancing Culvert	RCC PIPE	1 x 1.8	2
10	87	91	37804.099	RUB	RCC BOX	1x5x3.15	2
11	89	94	39552.508	RUB	RCC BOX	1x5x3	2
12	91	96	40357.531	Balancing Culvert	RCC PIPE	1 x 1.8	2
13	92	97	40671.025	RUB	RCC BOX	1 x 4 x 2.5	2
14	93	98	41312.174	RUB	RCC BOX	1 x 4 x 3.0	2
15	94	99	41666.651	Balancing Culvert	RCC PIPE	1 x 1.8	2

A. MAIN LINE							
S. No.	Br. No.		*Chainage (m)	Type of Crossing	Type of Bridge	SPAN	No. of Tracks
	Br No. as per RFP dated 11.11.2022	Br No. as per Final RFP				No. x L (in m) x H (in m)	
16	95	100	41925.899	Balancing Culvert	RCC BOX	1 x 2 x 2.0	2
17	97	102	42238.9	Balancing Culvert	RCC BOX	1 x 2 x 2.0	2
18	98	103	42578.906	RUB	RCC BOX	1X5x3	2
19	100	106	43758.291	RUB	RCC BOX	1 x 4 x 3.1	2
20	102	108	44281.401	Balancing Culvert	RCC BOX	1 x 4 x 5	2
21	103	109	44401.641	Balancing Culvert	RCC BOX	1 x 4 x 5	2
22	104	110	44420.238	RUB	RCC BOX	1X6X5	2
23	108	114	46635.175	Balancing Culvert	RCC BOX	1 x 6 x 6	2
24	109	115	46768.341	RUB	RCC BOX	1 x 6 x 6	2
25	110	116	46915.023	Balancing Culvert	RCC BOX	1 x 5 x 5	2
26	111	117	47300.018	RUB	RCC BOX	2 x 5 x 5	2
27	112	118	47500.360	Balancing Culvert	RCC BOX	1 x 4 x 4	2
28	113	119	47824.336	Balancing Culvert	RCC BOX	1 x 4 x 3	2
29	114	120	48093.515	Balancing Culvert	RCC BOX	1 x 4 x 4	2
30	115	121	48231.618	RUB	RCC BOX	1 x 4 x 4	2
31	116	122	48594.592	Balancing Culvert	RCC PIPE	1 x 1.8	2

A. MAIN LINE							
S. No.	Br. No.		*Chainage (m)	Type of Crossing	Type of Bridge	SPAN	No. of Tracks
	Br No. as per RFP dated 11.11.2022	Br No. as per Final RFP				No. x L (in m) x H (in m)	
32	118	124	48794.629	RUB	RCC BOX	1 x 4 x 4	2
33	119	125	49167.307	RUB	RCC BOX	2X5X3.6	2
34	120	126	49583.348	Balancing Culvert	RCC PIPE	1 x 1.2	2
35	137	137	56117.426	Balancing Culvert	RCC Box	1x5x4	2
36	138	138	56290.652	RUB	RCC Box	1x5x4	2
37	139	139	56465.029	Balancing Culvert	RCC Box	1x5x4	2
38	140	140	56755.035	Balancing Culvert	RCC Box	1x5x4	2
39	**	141	57154.991	Culvert	RCC Box	1x2x2	2
40	141	141A	57167.991	RUB	RCC Box	1x5x4	2
41	142	142	57520.000	Balancing Culvert	RCC Box	1x5x4	4
42	143	143	57670.809	RUB	RCC Box	2x7x5.25	5
43	144	144	57987.046	Balancing Culvert	RCC Box	1x2x2	5
44	145	145	58203.149	RUB	RCC Box	1x5x3	5
45	146	146	58564.993	Balancing Culvert	RCC Box	1x2x2	5
46	148	148	59884.954	RUB	RCC Box	2x5x5.25	2
47	149	149	60161.343	RUB	RCC Box	1x5x3	2
48	**	149A	60171.264	Balancing Culvert	RCC Box	1x2x2	2

A. MAIN LINE							
S. No.	Br. No.		*Chainage (m)	Type of Crossing	Type of Bridge	SPAN	No. of Tracks
	Br No. as per RFP dated 11.11.2022	Br No. as per Final RFP				No. x L (in m) x H (in m)	
49	154	154	61163.504	Balancing Culvert	RCC Box	1x2x2	2

Notes:

1. *Main line Chainages start from Prithla station of HORC.
2. **No Bridge No. was given to these bridges in RFP dated 11.11.2022.
3. ***Payment of bridges in Annexure F-1 will be made in Cost Centre 'CB'-Bridges under lumpsum Schedule 'A'.

B.CONNECTING LINES							
S.No	**Br. No. as per RFP dated 11.11.2022**	**Br No. as per Final RFP**	**Chainage (m) (From Centre line of New Patli station)**	**Type of Crossing**	**Type of Bridge**	**SPAN No. x L (m) x H (m)**	**No. of Tracks**
NEW PATLI TO PATLI							
1	1	1	1046.562	RUB	RCC Box	1x5x3.25	1
2	2	2	1277.958	Balancing Culvert	RCC Box	1x2x2	1
3	3	3	1986.847	RUB	RCC Box	1x4x3.25	1
4	4	4	2518.489	RUB	RCC Box	1x5x5.25	1
5	5	5	2687.006	Balancing Culvert	RCC Box	1x2.5x3	1
NEW PATLI TO SULTANPUR							
1.	2	2	1548.996	Balancing Culvert	RCC Box	1x2x2	1
2.	4	4	2189.831	Balancing Culvert	RCC Box	1x2x2	1
3.	5	5	2823.679	RUB	RCC Box	1x5x4.25	1

Note: ***Payment of bridges in Annexure F-1 will be made in Cost Centre 'CB'-Bridges under lumpsum Schedule 'A'.

ANNEXURE-F-2

LIST OF MAJOR BRIDGES***

A. MAIN LINE

S. No.	Bridge No.		*Chainage (m)	Type of Crossing	Type of Bridge Super structure	Span Arrangement	No. of Tracks
	Br. No. as per RFP dated 11.11.2022	Br No. as per Final RFP					
1.	82	86	34899.045	RUB	PSC U SLAB	2x12.2	2
2.	101	107	44246.344	Waterway	**CG	1 x 18.3	2
3.	105	111	44570.310	RUB	PSC I GIRDER	1x18.3	2
4.	117	123	48663.628	Viaduct	PSC I GIRDER	1 x 18.3	2
5.	136	136	55724.752	ROR	**CG+#OWG	18.3(CG)+ 76.2(OWG)+ 18.3(CG)	2
6.	147	147	59106.085	RUB	#OWG	1x45.7 m	2
7.	150	150	60457.614	RUB (KMP Slip Road)	**CG	1x30.5 m	2
8.	151	151	60563.367	RUB	**CG	1x24.4 m	2
9.	152	152	60642.669	RUB	**CG	1x24.4 m	2
10.	153	153	60754.591	RUB (KMP Slip Road)	**CG	1x30.5 m	2

*Chainages start from Prithla station of HORC
**CG-Composite Steel Girders
#OWG- Open Web Girders

B. CONNECTING LINE-NEW-PATLI TO SULTANPUR

S. No.	Bridge No		*Chainage (m)	Type of Crossing	Type of Bridge Superstructure	Span Arrangement	No. of Tracks
	Br. No. as per RFP dated 11.11.2022	Br No. as per Final RFP					
11.	1	1	951.499	(RUB)	OWG	1x45.7 m	1
12.	3	3	1767.989	RUB	PSC U-Slab	1x12.2	1

Note:

1. *Chainages start from centre line of New Patli station of HORC.
2. ***Payment of bridges in Annexure F-2 will be made in Cost Centre 'CB'-Bridges under lumpsum Schedule 'A'.

ANNEXURE-F-3

List of items of works to be carried out at stations under Schedule 'A'

S. No	Item	New Patli	Sultanpur	Pachgaon	Chandla Dungerwas	Dhulawat
1	**Station Building and service building-**					
	a) Station Building.	-	1 No.	-	-	1 No.
	b) S & T service building.	1 No. on island PF	-	-	-	-
	c) S & T huts.	2 Nos	2 Nos	-	-	2 Nos.
2	**Platforms (HL) -**					
	a) Earthwork in filling above formation level, cast in-situ platform face Wall.	13m x 600m (island), 6m x 600m (end).	01 No. 6m x 600m	2 Nos. 6m x 425m each	2 Nos. 6m x425m each	13m x 600m (island), 6m x 600m (16m width adjacent to station building) end PF
	b) Surfacing of platform with VDC RCC precast coping, tactile tiles, precast fencing at end platforms.	For entire area of platform.	For entire area of platform.	For entire area of platform.	For entire area of platform.	For entire area of platform.
	c) PF Shelters	2 x 20m on each PF	2 x 20m	2 x 20m on each PF	2 x 20m on each PF	2 x 20m on each PF
	d) Mini PF Shelters	4 Nos. on each PF	4 Nos.	4 Nos. on each PF	4 Nos. on each PF	4 Nos. on each PF
	e) Passenger amenities-					
	i) Toilet blocks.	01 No. on each PF	01 No.	01 No. on each PF	01 No. on each PF	01 No. on each PF

S. No	Item	New Patli	Sultanpur	Pachgaon	Chandla Dungerwas	Dhulawat
	ii) Drinking water booths at platforms.	5 Nos. on each PF	5 Nos.	5 Nos. on each PF	5 Nos. on each PF	5 Nos. on each PF
	iii) Seating arrangement (Stainless steel).	48 Nos. on each PF	36 Nos.	48 Nos. on each PF	24 Nos. on each PF	36 Nos. on each PF
3	a) Subway for its platform transfer with covered stairs & ramps to platform, (lift well), flooring, dado, water proofing, drainages complete in all respects.	1 No.	Nil	1 No.	1 No.	1 No.
	b) Lift Well	3 Nos.	-	-	-	-
4	**Water supply system-**					
	a) Borewell & pump house.	Yes	Yes	Yes	Yes	Yes
	b) Underground RCC water storage tank. (litres)	50,000	50,000	50,000	50,000	50,000
	c) Overhead RCC water storage tank. (litres)	20,000	20,000	20,000	20,000	20,000
	d) Water supply distribution system complete from borewell to service building and platforms.	Yes	Yes	Yes	Yes	Yes
5	**Drainage, Sewerage & Rainwater Harvesting system-**					

S. No	Item	New Patli	Sultanpur	Pachgaon	Chandla Dungerwas	Dhulawat
	i) Platform drainage.	Yes	Yes	Yes	Yes	Yes
	ii) Station Yard drainage.	Yes	Yes	Yes	Yes	Yes
	iii) Sewerage system.	1 No. soak pit for island PF; 1 No. septic tank for 50 users at end PF; 1 No. septic tank for 100 users for S&T service building.	1 No. septic tank for 50 users at PF; 1 No. septic tank for 100 users at station building.	1 No. septic tank for 50 users at each PF.	1 No. septic tank for 50 users at each PF.	1 No. soak pit for island platform; 1 No. septic tank for 50 users for end PF and for 100 users for station building.
	iv) Rainwater harvesting for storm water of platform & station yard.	Yes	Yes	Yes	Yes	Yes
6	**Miscellaneous Work –**					
	a) Station name board at station building and at platform ends.	Yes	Yes	Yes	Yes	Yes
	b) Platform number board at each platform.	Yes	Yes	Yes	Yes	Yes

Annexure-F-4
Approximate Details of Retaining Wall under Schedule 'B'

Main Line (RHS)				
S. No.	Chainage (m)		Length (m)	Approx. Height(m) above ground level
	From	To		
1.	40240	40280	40	2.50-3.50
2.	40280	40300	20	1.75-2.0
3.	40300	40320	20	1.25-1.75
4.	40320	40360	40	2.50-3.50
5.	40360	40380	20	1.75-2.0
6.	40380	40400	20	1.25-1.75
7.	40400	40420	20	1.75-2.0
8.	40420	40460	40	1.25-1.75
9.	40460	40480	20	0.50-1.00
10.	40480	40500	20	1.25-1.75
11.	40500	40520	20	0.50-1.00
12.	40540	40560	20	0.50-1.00
13.	42480	42520	40	1.0-1.25
14.	42520	42540	20	2.50-3.50
15.	42560	42600	40	1.0-1.25
16.	42600	42660	60	0.50-1.00
17.	44120	44220	100	3.50-4.50
18.	44300	44340	40	3.50-4.50
19.	44340	44360	20	1.75-2.0
20.	44880	44900	20	0.50-1.00
21.	44900	44920	20	1.25-1.75
22.	44920	44940	20	4.50-5.50
23.	44940	44960	20	5.50-6.50
24.	44960	45000	40	1.0-1.25
25.	45000	45020	20	1.75-2.0
26.	45020	45040	20	0.50-1.00
27.	45160	45200	40	4.50-5.50
28.	45800	45820	20	3.50-4.50
29.	45820	45860	40	3.50-4.50
30.	45860	45940	80	1.75-2.0
31.	45960	46000	40	1.0-1.25
32.	46600	46620	20	3.50-4.50
33.	46620	46640	20	4.50-5.50
34.	46640	46660	20	5.50-6.50
35.	46660	46680	20	4.50-5.50
36.	46680	46700	20	6.50-7.50

Main Line (RHS)				
S. No.	Chainage (m)		Length (m)	Approx. Height(m) above ground level
	From	To		
37.	46700	46780	80	4.50-5.50
38.	46780	46840	60	3.50-4.50
39.	46840	46860	20	5.50-6.50
40.	46860	46900	40	6.50-7.50
41.	46900	46920	20	5.50-6.50
42.	46920	46980	60	4.50-5.50
43.	46980	47000	20	3.50-4.50
44.	47000	47100	100	4.50-5.50
45.	47100	47140	40	3.50-4.50
46.	47140	47160	20	4.50-5.50
47.	47160	47240	80	3.50-4.50
48.	47240	47260	20	4.50-5.50
49.	47260	47320	60	3.50-4.50
50.	47320	47380	60	2.50-3.50
51.	47380	47400	20	3.50-4.50
52.	47400	47440	40	2.50-3.50
53.	47440	47520	80	1.25-1.75
54.	47520	47540	20	1.75-2.0
55.	47540	47560	20	1.25-1.75
56.	47560	47580	20	1.0-1.25
57.	47580	47640	60	0.50-1.00
58.	47640	47680	40	2.50-3.50
59.	47680	47720	40	3.50-4.50
60.	47720	47740	20	1.25-1.75
61.	47740	47780	40	1.0-1.25
62.	47780	47800	20	3.50-4.50
63.	47800	47820	20	1.75-2.0
64.	47840	47860	20	1.0-1.25
65.	47860	47900	40	3.50-4.50
66.	47900	47920	20	1.0-1.25
67.	47920	47940	20	2.50-3.50
68.	47940	47960	20	1.75-2.0
69.	47960	47980	20	3.50-4.50
70.	47980	48140	160	0.50-1.00
71.	48000	48020	20	1.25-1.75
72.	55600	55640	40	7.50-8.50
73.	55800	55820	20	3.50-4.50
74.	55820	55860	40	2.50-3.50

Main Line (RHS)				
S. No.	Chainage (m)		Length (m)	Approx. Height(m) above ground level
	From	To		
75.	55860	55880	20	1.75-2.00
76.	55880	55920	40	1.25-1.75
77.	55920	55960	40	1.0-1.25
78.	55960	56000	40	0.50-1.00
79.	56000	56040	40	1.0-1.25
80.	56040	56100	60	3.50-4.50
81.	56120	56160	40	3.50-4.50
82.	56160	56200	40	1.25-1.75
83.	56200	56260	60	0.50-1.0
84.	56260	56270	10	3.50-4.50
85.	56270	56280	10	4.50-5.50
86.	56300	56440	140	3.50-4.50
87.	56440	56460	20	2.50-3.50
88.	56480	56520	40	2.50-3.50
89.	56520	56560	40	1.75-2.00
90.	56560	56580	20	1.25-1.75
91.	56580	56640	60	2.50-3.50
92.	56640	56680	40	1.75-2.00
93.	56680	56740	60	1.25-1.75
94.	56760	56780	20	1.00-1.25
95.	56780	56820	40	0.50-1.00
96.	56820	56900	80	2.50-3.50
97.	56900	56940	40	1.75-2.00
98.	56940	56980	40	0.50-1.0
99.	57080	57100	20	0.50-1.00
100.	57140	57160	20	0.50-1.00
101.	57320	57520	200	5.50-6.50
102.	59040	59060	20	2.50-3.50
103.	59160	59240	80	2.50-3.50
104.	59240	59260	20	1.25-1.75
105.	60500	60520	20	0.50-1.00
106.	60660	60700	40	3.50-4.50
107.	60740	60760	20	2.50-3.50
108.	60780	60800	20	1.0-1.25
109.	60800	60840	40	3.50-4.50
110.	60840	60920	80	2.50-3.50
111.	60920	61000	80	3.50-4.50
112.	61000	61040	40	2.50-3.50

Main Line (RHS)				
S. No.	Chainage (m)		Length (m)	Approx. Height(m) above ground level
	From	To		
113.	61040	61100	60	1.75-2.00
114.	61100	61140	40	1.25-1.75
115.	61140	61160	20	0.50-1.0
		Total	**4500**	
Main Line (LHS)				
S. No.	Chainage (m)		Length (m)	Approx. Height(m) above ground level
	From	To		
1.	55600	55620	20	3.5-4.5
2.	55620	55640	20	5.5-6.5
3.	55640	55660	20	6.5-7.5
4.	55800	55860	60	3.5-4.5
5.	55860	55960	100	4.5-5.5
6.	55960	56040	80	3.50-4.50
7.	56040	56080	40	3.50-4.50
8.	56080	56100	20	4.50-5.50
9.	56120	56160	40	3.50-4.50
10.	56160	56200	40	1.25-1.75
11.	56200	56220	20	1.00-1.25
12.	56220	56280	60	0.50-1.00
13.	56320	56460	140	3.50-4.50
		Total	**660**	

New Patli- Sultanpur Connectivity (LHS)				
S. No.	Chainage (m)		Length (m)	Approx. Height(m) above ground level
	From	To		
1.	1140	1180	40	4.50-5.50
2.	1180	1300	120	5.50-6.50
3.	1300	1360	60	4.50-5.50
4.	1360	1400	40	3.50-4.50
5.	1400	1520	120	2.50-3.50
6.	1520	1540	20	3.50-4.50
7.	1540	1580	40	4.50-5.50
8.	1580	1640	60	3.50-4.50
9.	1640	1660	20	1.25-1.75
10.	1720	1800	80	1.25-1.75
11.	1800	1860	60	2.50-3.50
12.	1860	1900	40	1.75-2.00
13.	1900	1920	20	1.25-1.75
14.	1940	1960	20	1.75-2.00
15.	2000	2020	20	0.50-1.00
16.	2020	2040	20	1.25-1.75
17.	2040	2060	20	1.75-2.00
18.	2060	2080	20	1.00-1.25
19.	2080	2100	20	1.25-1.75
20.	2100	2220	120	3.50-4.50
21.	2220	2340	120	2.50-3.50
22.	2340	2360	20	0.50-1.00
23.	2360	2380	20	1.00-1.25
24.	2380	2400	20	0.50-1.00
25.	2420	2520	100	0.50-1.00
26.	2520	2560	40	1.00-1.25
27.	2600	2620	20	1.25-1.75
28.	2620	2720	100	1.75-2.00
29.	2720	2760	40	1.25-1.75
30.	2760	2800	40	0.50-1.00
31.	2820	2920	100	0.50-1.00
32.	2920	2940	20	1.25-1.75
33.	2940	3000	60	0.50-1.00
34.	3880	3960	80	0.50-1.00
		Total	**1760**	

New Patli- Sultanpur Connectivity (RHS)				
S. No.	Chainage (m)	Length (m)		Approx. Height(m) above ground level
		From	To	
1	1140	1160	20	0.50-1.00
2	1360	1380	20	0.50-1.00
3	1380	1400	20	1.00-1.25
4	1400	1420	20	1.25-1.75
5	1420	1460	40	1.75-2.00
6	1460	1520	60	2.50-3.50
7	1520	1540	20	3.50-4.50
8	1540	1580	40	4.50-5.50
9	1580	1640	60	3.50-4.50
10	1640	1660	20	1.25-1.75
11	1720	1800	80	1.25-1.75
12	1800	1860	60	2.50-3.50
13	1860	1900	40	1.75-2.00
14	1900	1940	40	1.25-1.75
15	1940	1960	20	1.75-2.00
16	2120	2180	60	0.50-1.00
17	2180	2220	40	1.25-1.75
18	2220	2240	20	1.00-1.25
19	2240	2320	80	0.50-1.00
20	2620	2720	100	0.50-1.00
		Total	**860**	

New Patli-Patli connectivity (LHS)				
S. No.	Chainage (m)		Length (m)	Approx. Height(m) above ground level
	From	To		
1	840	860	20	4.50-5.50
2	860	1020	160	3.50-4.50
3	1020	1200	180	2.50-3.50
4	1140	1180	40	1.75-2.00
5	1200	1220	20	0.50-1.00
6	1300	1320	20	0.50-1.00
7	1360	1420	60	1.25-1.75
8	1440	1460	20	1.25-1.75
9	1460	1480	20	2.50-3.50
10	1480	1500	20	0.50-1.00
11	1500	1540	40	1.00-1.25
12	1540	1660	120	1.25-1.75
13	1660	1720	60	1.00-1.25
14	1720	1780	60	0.50-1.00
15	2520	2540	20	0.50-1.00
16	2540	2560	20	4.50-5.50
		Total	**880**	
New Patli- Patli Connectivity (RHS)				
S. No.	Chainage (m)		Length (m)	Approx. Height(m) above ground level
	From	To		
1	840	860	20	5.50-6.0
2	860	920	60	4.50-5.50
3	880	900	20	5.50-6.0
4	920	940	20	5.50-6.0
5	940	1060	120	4.50-5.50
6	1060	1080	20	5.50-6.0
7	1080	1200	120	4.50-5.50
8	1200	1240	40	3.50-4.50
9	1240	1280	40	0.50-1.00
10	1280	1300	20	3.50-4.50
11	1300	1320	20	4.50-5.50
12	1320	1360	40	3.50-4.50
13	1360	1420	60	4.50-5.50
14	1420	1440	20	1.25-1.75
15	1440	1480	40	4.50-5.50
16	1480	1500	20	2.50-3.50

17	1500	1520	20	3.50-4.50
18	1520	1540	20	2.50-3.50
19	1540	1580	40	1.75-2.00
20	1580	1620	40	1.25-1.75
21	1620	1640	20	1.00-1.25
22	1640	1680	40	0.50-1.00
23	2380	2460	80	0.50-1.00
24	2460	2480	20	1.00-1.25
25	2480	2500	20	1.25-1.75
26	2500	2540	40	1.75-2.00
27	2540	2560	20	2.50-3.50
		Total	**1040**	

ANNEXURE-F-5

LIST OF SUBWAYS*** AT STATIONS

S. No.	Bridge No.		*Chainage (m)	Type of Crossing	Type of Bridge	SPAN	No. of Tracks
	Br. No. as per RFP dated 11.11.2022	Br. No.as per Final RFP				No. x L (in m) x H (in m)	
1	**	79	32767	Subway	RCC Box	1x6x2.65	5
2	**	104	42700.983	Subway	RCC Box	1x6x2.65	2
3	107	113	46283.634	Subway	RCC Box	1x6x2.65	2
4	**	144A	58135.5	Subway	RCC Box	1x6x2.65	5

Note:-

1. *Chainages start from Prithla station of HORC
2. **No Bridge No. was given to these bridges in RFP dated 11.11.2022.
3. ** *Payment of above subways will be made in Cost Centre 'CS'-Stations under lumpsum Schedule 'A'

ANNEXURE F-6

LIST OF BRIDGES UNDER SCHEDULE 'B'							
S. No.	**Bridge No**		***Chainage (m)**	**Type of crossing**	**Type of Bridge**	**Tentative Span (m)**	**No. of Track**
	Br. No. as per RFP dated 11.11.2022	**Br. No. as per final RFP**					
A. MAIN LINE							
1.	71	73	30155	ROB (4 lane)	RCC Box	1x11.5x11	02
2.	**	74	30528	Syphon	RCC box	2x3x2	02
3.	**	75	30839	Syphon	RCC box	2x5x2.5	02
4.	**	76	31145	RUB	RCC box	2x6.2x5.65	02
5.	80A	84	33976.50	RUB	RCC box	1x6.0x5.0	02
6.	**	85	34280.218	RUB	RCC box	2x5.5x5.65	02
7.	85	89	36984.118	RUB	RCC box	2x7x5.65	02
8.	***	92	38456.750	RUB	RCC box	2x5.5x5.65	02
9.	***	93	39155	Balancing Culvert	RCC box	1x3x2	02
10.	***	95	40003.467	RUB	RCC box	2x5.5x5.65	02
11.	**	101	41962.645	RUB	RCC box	2x7x5.65	02
12.	99	105	43506.883	RUB	RCC box	2x7x5.65	02
13.	106	112	45495.969	RUB	OWG/CG	4x18.3(CG) +1x30.5(CG) +8x24.4(CG)	02

ANNEXURE F-6

LIST OF BRIDGES UNDER SCHEDULE 'B'							
S. No.	**Bridge No**		***Chainage (m)**	**Type of crossing**	**Type of Bridge**	**Tentative Span (m)**	**No. of Track**
	Br. No. as per RFP dated 11.11.2022	**Br. No. as per final RFP**					
						+1x76.2(OWG) +2x24.4(CG) +1x61(OWG)	
14.	**	146A	58720.513	GAIL pipe line	Inverted U slab	1x5x6.5(110 m long)	05
15.	***	147A	59587	Balancing Culvert	RCC box	1x2x2	2
*Main line Chainages start from Prithla station of HORC ** No Bridge Number was given to these bridges in RFP dated 11.11.2022. *** Additional bridges added in Final RFP.							
B. CONNECTING LINE-NEW PATLI- SULTANPUR							
S. No.	**Bridge No**		***Chainage (m)**	**Type of crossing**	**Type of Bridge**	**Tentative Span (m)**	**No. of Track**
	Br. No. as per RFP dated 11.11.2022	Br. No. as per final RFP					
16.	**	3A	1785	GAIL Pipe Line	Inverted U/Slab	1 x 5m x 6.5m (100m long)	01
17.	**	5A	3733	GAIL Pipe Line	Inverted U/Slab	1 x 5m x 3.5m (20m long)	01
*Chainages are from centre line of New Patli station ** No Bridge Number was given to these bridges in RFP dated 11.11.2022.							
Note:-Payment for construction of all the bridges included in Annexure F-6 shall be made under Schedule 'B'.							

Annexure F-7

Payment matrix for Design of Bridges, Temporary diversions, Permanent diversions, widening of existing roads and Restoration of existing roads for C23 package.

Sr No	Activity	Minor bridges in Annexure F-1 included in Schedule A	Major bridges in Annexure F-2 included in Schedule A	Subways at stations in Annexure F-5 included in Schedule A	Bridges in Annexure F-6 included in Schedule B
	Number of bridges covered	57	12	04	17
i.	a. Submission of design of permanent works, permanent diversion and regrading of roads and submission of As Built drawings and documents	Included in Cost Centre 'CD' of Price Schedule A	Included in Cost Centre 'CD' of Price Schedule A	Included in Cost Centre 'CD' of Price Schedule A	Included in Cost Centre 'CD' of Price Schedule A
	b. Design of Temporary works and temporary diversion/widening of roads	Included in Cost Centre 'CD' of Price Schedule A	Included in Cost Centre 'CD' of Price Schedule A	NA	Included in quoted lumpsum cost of works under Schedule-B
ii.	Construction of temporary diversions, if any including additional land (if any required beyond ROW) for constructing the same	Included in quoted lumpsum cost of works under Schedule A	Included in quoted lumpsum cost of works under Schedule A	NA	• Included in the rates quoted for Schedule B for all bridges except for Br No 73 & 112 • Temporary diversions (excluding cost of additional land required temporarily for diversion) of Br 73 & 112 will be paid separately under Schedule-B

Sr No	Activity	Minor bridges in Annexure F-1 included in Schedule A	Major bridges in Annexure F-2 included in Schedule A	Subways at stations in Annexure F-5 included in Schedule A	Bridges in Annexure F-6 included in Schedule B
	Number of bridges covered	57	12	04	17
iii.	Construction of permanent diversions and re-grading, if any required	Included in quoted lumpsum cost of works under Schedule A	• Included in quoted lumpsum cost of works under Schedule A, except for Br No.150 & 153 • Permanent diversion and regrading of Br No. 150 & 153 will be paid under Schedule B	NA	Will be paid separately under Schedule -B
iv.	Widening of existing roads (within HORC ROW)	Included in quoted lumpsum cost of works under Schedule A	Included in quoted lumpsum cost of works under Schedule A	NA	Included in quoted lumpsum cost of works under Schedule-B
v.	Restoration of existing roads damaged during construction activities	Included in quoted lumpsum cost of works under Schedule A	Included in quoted lumpsum cost of works under Schedule A	NA	Included in the rates quoted for Schedule-B

ANNEXURE F-8

LIST OF TRACK FITTINGS

TABLE OF BILL OF MATERIALS FOR 1 No. H- BEAM SLEEPERS 60Kg RUNNING RAIL WITH 52 Kg GUARD RAIL.

SL.NO.	DESCRIPTION OF PARTS	DRAWING NO.	SPECIFICATION	NO./SL.
1	H-BEAM (ISHB 200 X 200) 2655 mm LENGTH	BASED ON R.D.S.O./B-1636/4/R	BS : 45, IS : 4759, .	1
2	M.S. BASE PLATE	R.D.S.O./T-8760	IS.2062-2011	2
3	RAIL PAD WITH EMBEDDED STEEL PLATE	R.D.S.O./T-8761	IRS. SPECIFICATION FOR 10mm.THICK G. R. PAD(PROVISIONAL-1989) & STEEL AS PER PROVISIONAL-2019	2
4	SPL.CAST LINER (INNER)FOR 60KG RAIL	R.D.S.O./T-8762	IRS.SPECIFICATION PROVISIONAL-2019	2
5	SPL.CAST LINER (OUTER)FOR 60KG RAIL	R.D.S.O./T-8763	IRS.SPECIFICATION PROVISIONAL-2019	2
6	ELASTIC RAIL CLIP MK III	RDSO/T-3701	IRS T-31-2018	4
7	TAPPER WASHER (FOR GUARD RAIL)	R.D.S.O./T-5161	IS.226-1962	4
8	TAPPER WASHER (FOR GUARD RAIL)	R.D.S.O./T-5162	IS.226-1962	4
9	SINGLE COIL SPRING WASHER	R.D.S.O./T-10773	IRS T-42-1988	4
10	6mm GROOVED RUBBER PAD (FOR GUARD RAIL)	R.D.S.O./T-5163	IRS. SPECIFICATION FOR 6mm.THICK G. R. PAD(PROVISIONAL-1989)	4
11	305x300x25/30mm ELASTOMERIC PAD	R.D.S.O./B-1636/5	REV.-02 Dt-26/11/2012	2
12	TAPERED SPLIT PIN	CE's NO.22994/8	IS.226-1962	8
13	ø28 HOOK BOLT 347mm Length and 2 nos NUT & 3 Nos. washer	BASED ON R.D.S.O./B-1636/5	IS.226-1962	4
14	PACKING PLATE FOR GUARD RAIL 150X22X75		IS.226-1962	4
15	BOLT & NUT FOR GUARD RAIL	R.D.S.O./T-5164	IRS T-10-1968	2

Note: The above list excluding Sr No.1, 2 & 14 will be considered equal to 1 set of fittings. The Contractor shall supply spare set of fittings for 20% quantity of H Beam sleepers included in Schedule 'A'.

Tender No. HORC/HRIDC/C-23/2022

Attachment 4

to

Corrigendum No. 2

Part 2, Section VII-4: Employer's Requirements-Construction (Civil)

1. **Attachment C-1/R1: Minimum Organisation Structure Required & Penalty for Non-Deployment**

2. **Attachment C-2/R1: Minimum Qualification & Experience of Project Personnel**

3. **Attachment C-3/R1: Minimum Resources Proposed for the Project- Plants & Equipment**

ATTACHMENT - C-1/R1

MINIMUM ORGANISATION STRUCTURE REQUIRED & PENALTY FOR NON-DEPLOYMENT

The figures indicated in Table 1 below are the minimum number of Project-Personnel required which are to be deployed as per the minimum level of supervision. The qualification/experience of such Project personnel is given under Attachment-C-2

S. No.	Designation of Project Personnel	Minimum no. of Project-Personnel required	Penalty for Non-deployment per week or part thereof per person
1.	Contractor's Representative/ Project Manager (Team Leader)	1	Rs 1,00,000/-
2.	Deputy Project Manager (Formation)	1+1	Rs 40,000/- for first 3 months and Rs. 80,000/- thereafter
3.	Deputy Project Manager (Bridges & station)	1+1	Rs 40,000/- for first 3 months and Rs. 80,000/- thereafter
4.	Planning Engineer	1+1	Rs 40,000/- for first 3 months and Rs. 80,000/- thereafter
5.	Senior Quality Assurance /Quality Control Expert	1	Rs 40,000/- for first 3 months and Rs. 80,000/- thereafter
6.	Quality Assurance /Quality Control Expert	1+1	-
7.	Civil Engineer (Formation)	3+3	-
8.	Civil Engineer (Bridge)	2+2	-
9.	Civil Engineer (Station)	1+1	-
10.	Civil Engineer (Fabrication & launching of steel OWG)	1+1	-
11.	Procurement Manager	1+1	-
12.	Health & Safety Expert	1+1	Rs 40,000/- for first 3 months and Rs. 80,000/- thereafter
13.	Environmental Expert	1	Rs 40,000/- for first 3 months and Rs. 80,000/- thereafter
14.	Surveyor	1+2	-
15.	Civil Engineer (Concrete Expert)	1+1	-

NOTES:-

i. The Contractor shall deploy resources as per the above-mentioned table. The Contractor shall also confirm to deploy manpower over and above the minimum numbers indicated above, if the work so requires.

ii. *The work of C-23 is located in two different stretches. The list of project Personnel given above in the form of x+y means that a particular Personnel is required in x nos. in one stretch and in y nos. in another stretch.*

iii. The performance of project personnel deployed will be evaluated periodically by the Engineer during the contract period. In case the performance of any of the project personnel is not satisfactory, the Contractor shall replace them with good personnel immediately as per directions of the Engineer.

iv. The personnel at Sr.No.1, must be deployed by Commencement Date. Personnel at Sr. No.2, 3, 4,5, 12 & 13 in the above table must be deployed within 30 days of Commencement Date. Non adherence to these provisions shall attract penalty as indicated in the table above.

v. The resources indicated in table above are for peak requirement. All resources need not be mobilized simultaneously for entire duration of the contract. The Contractor shall mobilize the resources as per the deployment programme approved by the Engineer.

vi. In case of non-deployment of project personnel, the penalty shall be imposed as indicated above and deducted from Contractor's running / final bills. The decision of the Engineer in this regard shall be final and binding.

ATTACHMENT C-2 /R1

Minimum level of supervision & qualification/ experience of Project Personnel is as follows:

S. No.	DESIGNATION	QUALIFICATION	EXPERIENCE LEVEL
1.	Contractor's Representative/ Project Manager (Team Leader)	Graduate in Civil Engineering	Minimum total experience of 15 years out of which, minimum 5 years as In-charge in projects of Railway/ DFC/ Metro/ RRTS/ Highway /Expressways.
2.	Dy. Project Manager (Formation)	Graduate/Diploma in Civil Engineering	Minimum total experience of 10/12 years out of which minimum 05/08 years in projects of Railway/ DFC/ Metro/ RRTS/ Highway /Expressways
3.	Dy. Project Manager (Bridges & station)	Graduate/Diploma in Civil Engineering	Minimum total experience of 10/12 years out of which minimum 05/08 years in projects of Railway/ DFC/ Metro/ RRTS/ Highway /Expressways
4.	Planning Engineer	Graduate in Civil Engineering with certification in Primavera software	Minimum total experience of 10 years out of which minimum 05 years in relevant field in planning of Infrastructure projects.
5.	Senior Quality Assurance /Quality Control Expert	Graduate / Diploma in Civil Engineering	Minimum total experience of 10/12 years out of which minimum 05/07 years in QA (Field) and at least one year as In-charge in Infrastructure Project
6.	Quality Assurance (QA) /Quality control Expert	Graduate / Diploma in Civil Engineering	Minimum Total Experience of 08/10 years out of which minimum 03/05 years in QA (Field) in Infrastructure Project
7.	Civil Engineer (Formation)	Graduate / Diploma in Civil Engineering	Minimum total experience of 05/08 years out of which 2 years experience in relevant field in in projects of Railway/ DFC/ Metro/ RRTS/ Highway /Expressways
8.	Civil Engineer (Bridge)	Graduate / Diploma in Civil Engineering	Minimum total experience of 05/08 years out of which 2 year experience in relevant field in projects of Railway/ DFC/ Metro/ RRTS/ Highway /Expressways.
9.	Civil Engineer (Station)	Graduate or Diploma in Civil Engineering	Minimum total experience of 0*5/08* years out of which 2 year experience in relevant field in projects of

S. No.	DESIGNATION	QUALIFICATION	EXPERIENCE LEVEL
			Railway/ DFC/ Metro/ RRTS/ Highway /Expressways.
10.	Civil Engineer (Fabrication & launching of steel OWG)	Graduate or Diploma in Civil Engineering	Minimum total experience of 05/08 years out of which 2 year experience in relevant field in projects of Railway/ DFC/ Metro/ RRTS/ Highway /Expressways.
11.	Procurement Manager	Graduate in Engineering / Diploma in procurement	Minimum total Experience Of 05/08 in Procurement in Infrastructure Project.
12.	Health & Safety Expert	Graduate / Diploma in Engineering/Science with one year full time Diploma in Industrial safety or equivalent	Minimum total Experience of 06/08 with relevant experience of 3 years in infrastructure projects.
13.	Environmental Expert	Graduate in Environmental Engineering/ Master's degree in Environmental Engineering/Environmental Science or equivalent	Minimum total experience of 06 years out of which 3 years of experience of working on environmental aspects in Infrastructure projects.
14.	Surveyor	Diploma in Civil Engineering / ITI	Minimum Total Experience of 05/08 Years in survey work for linear Infrastructure project
15.	Civil Engineer (Concrete Expert)	Graduate in Civil Engineering	Minimum total experience of 05 years out of which minimum 03 years in relevant field in Infrastructure projects.

NOTES:

1. The CVs of concerned personnel shall be submitted to the Engineer for approval. No person mentioned in table above shall be deployed in the project without Engineer's approval.

2. Relaxation in qualification / experience can be given by the Engineer in exceptional cases where candidates have got high level of professional competency. Decision of the Engineer in such cases shall be final and binding.

ATTACHMENT C-3/R1

MINIMUM RESOURCES PROPOSED FOR THE PROJECT- PLANTS & EQUIPMENTS

The figures indicated below are the minimum number of equipment required.

S. No.	Types of Equipment Required for the Work	Minimum No. of Unit of Equipment Required for the Work
1.	Excavator (75 cum/hr)	03+03
2.	Grader	02+02
3.	Dozer (150 Cum/hr)	04+04
4.	Vibratory Roller (10 T)	04+04
5.	Tippers	30+30
6.	Pugmil/Crusher(200MT/hr)	01+01
7.	Concrete Batching Plant	01+01 Min. capacity of batching plant 30 cum/hr
8.	Concrete Boom Placer	02
9.	Stationary Concrete Pumps (36 cum/hr)	02+02
10.	Transit mixtures	06+06
11.	Survey Instruments (Total Station)	01+01
12.	Lab Testing equipment- fully equipped for site tests.	As per Appendix 12 of Section VII-9: Appendices, Part 2- Employer's Requirements
13.	Digital Level (Leica, Sokia)	2+2

Note:

i. The work of C-23 is located in two different stretches. The list of equipment given above in the form of x+y means that a particular equipment is required in x nos. in one stretch and in y nos. in another stretch.

ii. These resources are for peak period of each activity. All plants and equipment need not be mobilized simultaneously. Plants and equipment as required as per the progress of the work shall be brought at site in advance as directed by the Engineer.

iii. The Contractor must have a tie up for fabrication of steel bridge girders included in this contract with RDSO approved plant/workshop in Part-A.

Tender No. HORC/HRIDC/C-23/2022
Attachment 5
to
Corrigendum No. 2

Part 2, Section VII-4: Employer's Requirements-Outline Design Specifications (ODS)-Civil

1. **Sub-Clause 5.2-Details of Structures to be Designed**
2. **Sub-Clause 5.3-Design Requirements**

5. OUTLINE DESIGN SPECIFICATIONS: STATIONS

5.1 General

Concept Plan of the station buildings *has been furnished in Tender drawings*. The Contractor shall prepare the *layout and* detailed architectural design and drawings of the station. The structural design of buildings and other works as mentioned in the Design Requirement Criteria shall be done by the Contractor as per the requirements briefed hereunder.

This Outline Design Specification (ODS) is applicable for station buildings and other Civil works at stations which do not support IR/Road live loads.

5.2 Details of Structures to be designed

The details of the items to be designed in this group are described as follows:

a) Stations

The Contractor shall prepare and submit architectural drawings of various stations. Various architectural alternatives shall be prepared for the station building with better aesthetics, pleasing appearance, durability and environment friendliness.

The Contractor shall design *station buildings and structures at* five stations namely Dhulawat, Chandla Dungerwas, Pachgaon, New Patli and Sultanpur.

The design of station shall include, but not limited to, the following -

i. Station Buildings

ii. *Cast-in-Situ RCC* Platform wall *with pre-cast coping*, platforms, platform shelter, *mini platform shelter,* water booths, toilets and seating arrangements at platforms

iii. Water supply system

iv. Rain-water harvesting system for *storm water from station yard and platforms*

v. RCC retaining walls *within station yards*

vi. *Platform and* Yard drainage

vii. Subway for inter-platform transfer including stairs & ramp with self supporting covering lift *wells and waterproofing system*

viii. Bore well, pump house, pipe connections, underground & overhead water storage tanks

ix. Septic tank *and soak pits for toilets of station buildings and platforms*

x. RCC portico

xi. *Elevated approach* along with stairs and ramp at Pachgaon station

xii. Approach road to stations

xiii. *Ticket counter*

xiv. RCC pre cast fencing at end platforms

xv. *S&T huts*

xvi. Design of platform back wall (Reinforced Earth) at all the four new stations

The design of station building shall include, but not limited to, the following: -

i. Architectural and structural design

ii. Plumbing arrangement

iii. Arrangement for ventilation

iv. All other building services as necessary for functioning of the station as per NBC 2016

5.3 Design Requirements

a) Layout Criteria

i. The layouts of the stations, as prepared & provided by the Employer are indicative. The Contractor shall develop the layout so as to comply with the Employer's Requirements.

ii. Architecture and profile of all buildings shall conform to local aesthetics, cultural ethos, local architecture and environment and shall be subject to consent and approval of the Engineer.

iii. The functional and structural design of all the station buildings shall be carried out as per provisions of National Building Code 2016 and the by-laws of the local authorities to the extent of their applicability.

iv. Method of structural analysis shall be appropriate for the structure or component to be analysed and shall be carried out by the Contractor using well established software duly consented by the Engineer. However, critical designs shall be supported by manual checks.

v. Dynamic analysis shall be performed to obtain the design seismic force by Response Spectrum Method as per latest IS 1893. Analysis of framed structure shall be carried out considering fixed support at top of pile cap / Open foundation Structural design of building shall confirm to codal provision of IS 456, IS 4326 and IS 13920. Design of water retaining structure shall confirm to codal provision of IS 3370.

vi. Loading due to earthquake shall be assessed based on the provisions of IS: 1893 (Part I) and IRS seismic code, with latest revision.

vii. Loads and load combinations shall be for most unfavorable effects and shall comply with relevant Indian Standards including IS: 456 and IS:800.

viii. Overall stability and serviceability requirements shall be checked in accordance with the provisions of relevant Indian Standards.

ix. All the buildings shall have provision for concealed ducts/pipes for wiring of telecom facilities in addition to the wiring for power supply and distribution. Concealed ducts/pipes for wiring of telecom & power supply facilities shall be provided in consultation with the Engineer.

x. False ceiling shall be proposed at a clear height of about 3m in the rooms with air-conditioning facilities with a view to help in energy conservation.

xi. Station signages shall be designed as per IR standards.

xii. Benches at platform shall be four-seater bench with backrest, with seat partition as per RDSO drawing no. RDSO/WKS/2018/2.

b) VAC Requirements for Station Building

Ventilation of station building shall be provided as per provisions of ISHARE / National building Code except for Signalling/ Telecommunication / UPS/ IPS/ Battery Rooms.

c) Other requirements

The minimum requirement of the facilities for Operation and Maintenance shall be as specified below: -

i. Amenities for persons with disability (PwD) shall be provided as per as per extant Railway Board instructions/guidelines. All platforms shall be accessible for disabled passenger on wheelchair. Tactile tiles shall be provided on platforms, subway, entry & exit and other places to guide the visually impaired person as per the Railway Board guidelines.

ii. In stairs, riser shall be kept maximum as 125mm *(net height)* and tread minimum as 250 mm *(clear width)* in the station area and inter-platform connectivity.

iii. *Approach* roads shall be designed for 450 commercial vehicle /day & for a design period of 30 years or more as per IRC:58-2015. *Approach road* shall have VDC of minimum thickness 250 mm.

iv. Covered underground *RCC* water storage tanks *shall be provided at all the station* having minimum capacity of 50,000 litres. *Effective* depth of tanks shall be kept about 1.5 m to 2.0 m.

v. *RCC overhead water storage tanks shall be provided for a capacity of 20,000 litres at all the stations over RCC staging of suitable height as per requirements.*

vi. Platform-

- All platforms shall be high level.
- Platform surface shall be smooth and provided with fiber reinforced Vacuum Dewatered Concrete (VDC) flooring.
- End platforms shall be provided a slope of about 1:60 away from the track.

- Platform coping shall be of approximate size of 1125mmx530mmx100mm prefabricated from M-30 or higher grade concrete by vibro compaction in a factory under controlled environment.
- Effluent from drinking water taps etc. shall be collected and disposed of safely through underground drainage system.
- Two underground *HDPE pipes of 150mm dia* with manholes at about *25* m interval along the length of platform shall be provided for electrical and S&T wiring etc.

vii. *Elevated approach* at Pachgaon station - The contractor shall design the *elevated approach with* covered stairs *and* ramp.

viii. *Stairs and ramps shall be provided with self-supporting covering in accordance with Section VII-6: OCS.*

Tender No. HORC/HRIDC/C-23/2022
Attachment 6
to
Corrigendum No. 2

Part 2, Section VII-7: Employer's Requirements -Outline Construction Specifications (OCS)-Civil

New Sub-Clause 4.4.5, f)- Waterproofing of Subway

4.4.5 Subway & Inter Platform connectivity

f) Waterproofing of Subway

1) Waterproofing of subway shall be carried out by a manufacturer having minimum 10 years of experience in manufacturing waterproofing product of the type specified, able to provide test report showing compliance with the specifications, and able to provide on -site technical representation to advise on installation.
2) The installation shall be carried out either by the manufacturer or his approved applicator having experience of minimum 05 years in application of waterproofing products in underground structures. The waterproofing shall be carried out by manufacturer's applicators strictly in accordance with the recommendation of the manufacturer.
3) All components and elements, which are required to make the structures watertight, shall be demonstratable and proven to work together. There shall be a single source of responsibility and performance of the material and products. Specifically, material and water stops shall be manufactured out of virgin raw material and only form the same formulation of raw material. The manufacturer shall confirm full, demonstratable and proven compatibility of the entire waterproofing system in writing. The waterproofing system provided shall be installed without damage and protected against construction operations. The contractor shall carry out a trial application of the waterproofing and submit the report containing the details and method statement to obtain approval from the Engineer.
4) The waterproofing shall be provided on outside side of vertical walls and top slab.
5) Waterproofing scheme
    i. Outside of vertical walls and top slab shall be provided with spray applied liquid coating of minimum thickness 2.0 mm as per IS 16471 (Type A).
    ii. Construction joints in vertical walls shall be provided with PVC water stops as per IS 16471 (Type B).
    iii. Use of waterproofing admixture to the concrete of slabs and walls of subway
6) Spray applied liquid coating on external side of vertical walls and top slab
    i. System and properties of materials

    Fully bonded spray-applied liquid polymer two component, solvent free, hybrid polyurea polyurethane/ polyurea/ polyurethane applied elastomeric seamless membrane of minimum 2 mm Dry Film Thickness (DFT) shall be used. DFT shall be achieved in minimum 2 coats (of two different contrasting colors), over and above one coat of a solvent free two component epoxy primer which shall be compatible with the liquid polymer and from the same manufacturer. No sand broadcast layer is permitted in the system. The system must be such that it is thixotropic, can be applied by airless spray; as well as the same product shall be capable of being applied manually only for local detailing and patch repairs (maximum area 1 m^2). The product shall be applied in accordance with the manufacturer's instructions.

ii. The waterproofing membrane shall have following minimum properties:

a. Tensile strength> 15MPa as per ASTM D 412.

b. % Elongation>300% as per ASTM D 412.

c. Bond strength on concrete > 2 MPa as per ASTM D 7234.

d. Minimum crack bridging capability of over 2.0 mm.

e. Specific Gravity of 1.15 (+/-10%)

iii. Code and standards for reference:

Code and standard Number	**Code and Standard Title**
ASTM D 412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D 7234	Standard Test Methods for Pull-off Adhesion Strength of Coating on concrete Using portable Pull – off Adhesin Testers.

iv. Inspection

The thickness of spray applied liquid coating waterproofing membrane shall be checked for every 20 m^2 area of water proofing. The thickness at the point of checking shall not be less than 2 mm.

7) Construction joints in vertical walls

i. The contractor shall construct his concrete works so as to minimize the likelihood of water penetration.

ii. Before placing new concrete against concrete that has already hardened, the face of the old concrete shall be treated in accordance with manufacturer's recommendation.

iii. Inside rendering shall not be accepted as a method of making joints watertight.

iv. Water stops shall be of PVC strips. The water stops shall be installed so that they are securely held in their correct positions whilst the concrete is being placed. No holes shall be made through any water stop except were provided for by the manufacturer. Water stops shall be provided as per manufacturer recommendations. The contractor shall submit the method statement for providing water stops to the Engineer for approval.

8) Use of waterproofing admixtures in concrete of slabs and vertical walls of subway

Waterproofing admixtures shall be used in conjunction with other waterproofing components supplied by the same manufacturer, for example, water stops, achieve watertight structures.

9) Surface preparation

Waterproofing work shall commence only after obtaining approval from the Engineer. Application of waterproofing system shall only commence upon the completion of curing of concrete. All cracks on the exposed concrete surfaces of external structural members shall be

effectively sealed before applying any waterproofing system. The Contractor shall ensure that surfaces to which waterproofing is to be applied, shall be clean, dust-free and dry and shall be prepared fully in accordance with the manufacturer's recommendation. The waterproofing shall be carried out by the manufacturer's applicators strictly in accordance with the recommendations of the manufacturer and with accepted best practice in the trade.

Tender No. HORC/HRIDC/C-23/2022
Attachment 7
to
Corrigendum No. 2

Part 2, Section VII-7: Employer's Requirements -Outline Construction Specifications (OCS)- Civil

Sub-Clause 5.2.8: Rainwater Harvesting System

5.2.8 Rainwater Harvesting System

The Contractor shall provide rainwater harvesting system as per the Tender drawings. The Contractor shall generally follow provisions of "Manual for Rainwater Harvesting and Conservation" (CPWD), IS: 15792 (Guidelines for artificial recharge to ground water) and guidelines issued by CGWB and local authorities.

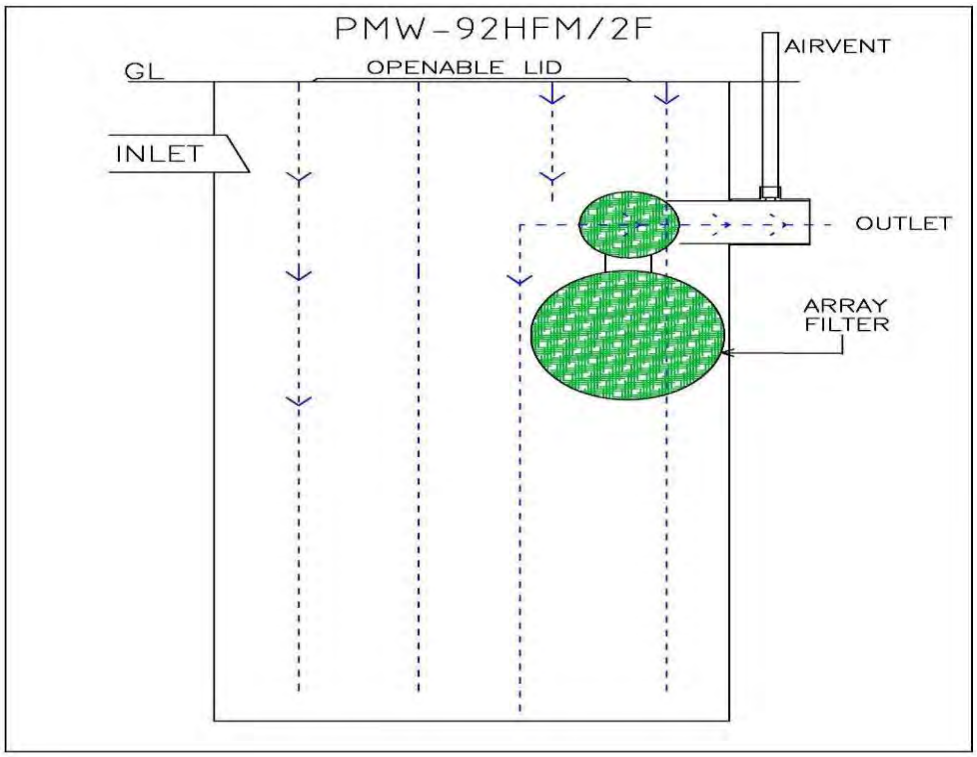
5.2.8.1 Construction of Rainwater Harvesting System for Railway Station Platform:

The Contractor shall carryout survey, hydrological investigations for construction of recharge well, submission and approval of working drawings including all layout sections, typical details, working drawings, As-built drawings & implementation schedule. Rainwater harvesting system to be constructed at stations will consist of:

i. Collection Chamber
ii. Horizontal filtration Module (**HFM**)
iii. Sand filtration Module (**SFM**),
iv. Holding tank Module **(HT**)
v. Recharge well.

(a) **Collection Chamber**: Collection chamber shall be square in shape (600 mm x 600 mm) having 600 mm depth and 150 mm diameter as shown in Tender drawings.

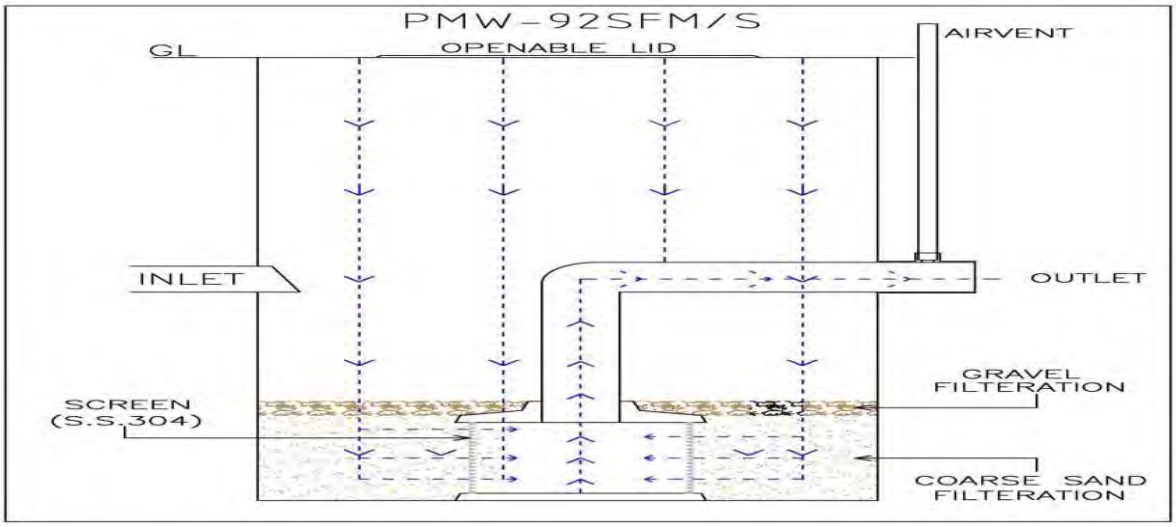
(b) **Horizontal Filtration Module (HFM)**: This module shall capture sediments primarily from surface runoff water. It shall be octagonal shaped` M-25 grade cement concrete module having circumscribing diameter and height of 918 mm and 1614 mm respectively. The module will consist of 2 Nos. removable Array filters shall be able to be cleaned within or outside the module using pressurised water. Total filtration area will be approximately 3000 cm^2 and filtration capacity will be $8m^3$ to $10m^3$ per hour. The inlet and outlet will be 110mm dia uPVC pipes connected with sand Filtration module.



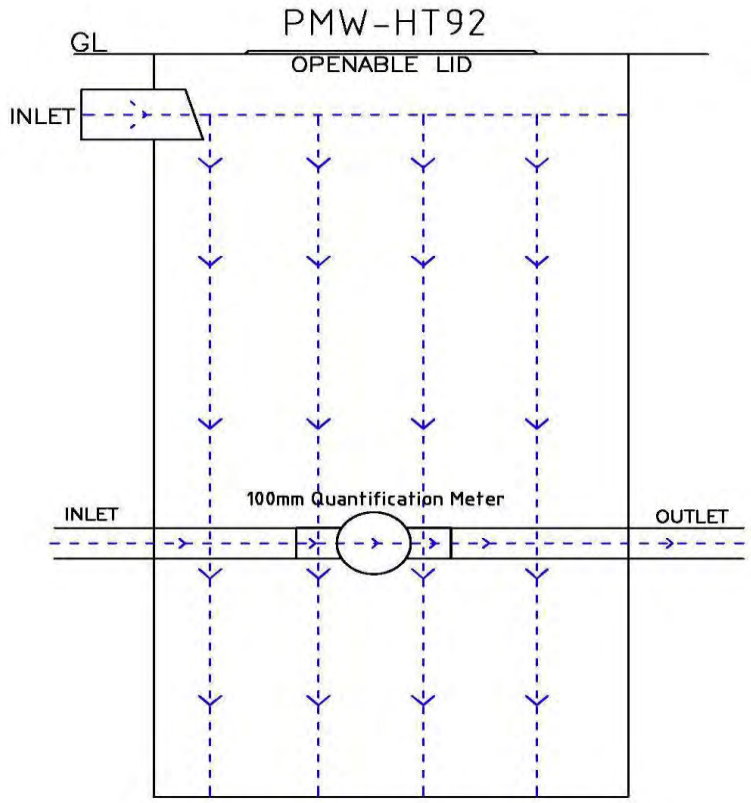
PMW-Precast modular step well

(c) **Sand Filtration Module (SFM)**: This will be octagonal shaped M-25 grade cement concrete module having circumscribing diameter and height of 1000 mm and 1614 mm respectively with

SS 304 screen and natural filters. This module will be fixed below ground level. Filtration capacity of the module will be $8m^3$ to $10m^3$ per hour. The inlet and outlet of the system will be 90 mm dia uPVC pipes. The module will hold a filter media in the form of sand bed around a continuous slot fine aperture stainless screen (420 mm diameter and 240 or 300 mm length). Screen will be fixed to the bottom slab and fully covered by 0.10 m^3 filtration sand with 40 mm graded gravels. Screen will create entry points for the filtered water. The filtered water will be finally connected to holding tank module.

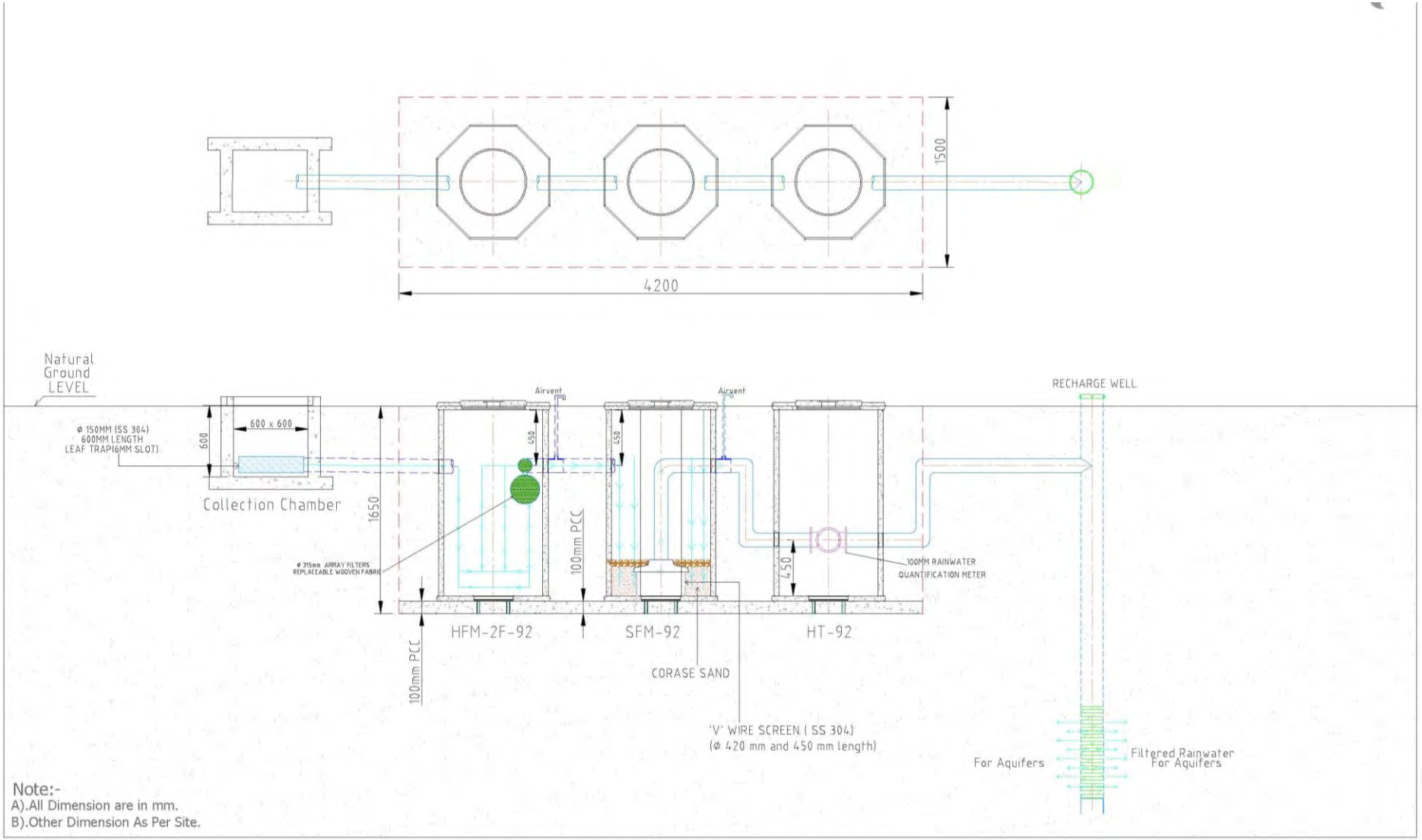


(d) **Holding Tank Module (HT)**: This shall be octagonal shaped M-25 module having circumscribing diameter and height of 918 mm and 1614 mm respectively. Each precast slab (1500 mm x 330 mm x 40 mm thick) will be held together between two horizontal pre cast octagonal slabs (with 1500 mm edge length, 50 mm thick and hole of 110 mm diameter in the centre). The top surface of well will be flushed with ground level. The module will be connected with 100 mm quantification meter fixed at bottom or middle of module.



(e) **Recharge Well**: For recharge well, the Contractor will follow the following specifications:

i. Drilling with suitable rig having 14"/16" dia bore size in all kind of strata except hard rock.
ii. Supply & fixing of 8" UPVC Plain Pipe & Slotted Pipe of Astral/Apollo/Duke Make. (IS 12818)
iii. Lowering of 8" UPVC Plain & Slotted Pipe of Astral/Apollo/Duke Make.(IS 12818)
iv. Supply of sorted gravel including loading /unloading (Filling of bore hole by gravel surrounding 200mm pipe)
v. Supply of sand (Filling of bore hole by river sand surrounding 200mm pipe) -if required .
vi. Development of tube well for each water bearing zone through air compressor.
vii. Providing & fixing of Recharge well pipes Fittings like bail plug, cap, etc.


1500
4200
Natural
Ground
LEVEL
ø 150MM (SS 304)
600MM LENGTH
LEAF TRAP(6MM SLOT)
600 x 600
600
Collection Chamber
1650
ø 315mm ARRAY FILTERS
REPLACEABLE WOOVEN FABRIC
Airvent
Airvent
450
450
100mm PCC
100mm PCC
450
100MM RAINWATER
QUANTIFICATION METER
HFM-2F-92
SFM-92
HT-92
CORASE SAND
'V' WIRE SCREEN (SS 304)
(ø 420 mm and 450 mm length)
RECHARGE WELL
For Aquifers
Filtered Rainwater
For Aquifers
Note:-
A).All Dimension are in mm.
B).Other Dimension As Per Site.

Tender No. HORC/HRIDC/C-23/2022
Attachment 8
to
Corrigendum No. 2

Part 2, Section VII-7: Employer's Requirements - General Electrical Services/R1

Section VII: Employer's Requirements

Section VII-7: General Electrical Services/R1

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CHAPTER – 1 SCOPE OF WORK

1.1 GENERAL

A general description of the broad scope of work, relating to works covered in this Contract under Schedule 'C', is given below. It shall, however, be clearly understood that the description is for the purpose of general guidance only and is not exhaustive. For complete appreciation of the Scope, the specifications, drawings and other relevant paragraphs of the Tender documents shall be referred to. *Contractor shall obtain all relevant RDSO Standards/drawing from RDSO at its own cost.*

1.2 ITEMS OF WORK

The following items of work are within the Scope of this Tender:

i. Electrification of Dhalawat, Chandla Dungerwas, Pachgaon, New Patli and Sultanpur Station Building and Yard area with allied facilities, *FOB/Subway etc*. and complete power supply arrangement as per Standard Railway Practice and guideline issued by Railway Board/ RDSO/ CPWD specification in Package C-23 for HORC Project.

ii. Supply, Installation, testing and commissioning of substation (11/0.44 kV, 2x250 kVA CSS with DRY type transformer (250 kVA) and silent type DG of 125 kVA capacity including AMF, APFC Panel of 100kVAR & LT Panel) including earthing system and all Safety equipment with complete power supply arrangement at New Patli station. The Location of Compact Sub Station (CSS) with all accessories shall be proposed by contractor in Station Area for approval of Engineer.

iii. *Deleted*

iv. Supply, Installation, testing and commissioning of High Mast Towers (16 mtrs) and octagonal poles (5 mtrs) with luminaries at yards, platform and circulating area with complete cabling arrangement to meet standard LUX level as per guideline issued be RDSO/ Railway Board.

v. Supply, Installation, testing and commissioning of CLS PANEL with cabling arrangement of suitable size and rating at each station as per RDSO specification.

vi. Supply, installation, testing and commissioning of Single sided and Double sided LED signage board with pictogram/symbol at each station as per specification.

vii. Supply, Installation, Testing and Commissioning of 3 Nos Lifts(G+1) (13 Passenger ,884 Kg) at New Patli Station. with all safety equipment and 02-year or warranty given by OEM whichever is higher including all schedule maintenance as per OEM, attending breakdown with in prescribed time.

viii. All equipment testing, system acceptance test, integrated testing, and Commissioning of all erected equipment.

ix. Provision of all the construction drawings, documents and as-built drawings required to supply, install, test and commission the above installations.

x. Deal and resolve in co-ordination with the Engineer the Interface with other Contractors to ensure timely completion of the Works.

xi. Space for Escalator (Future) at New Patli station to be kept.

xii. New 11kV HT connection at New Patli station and New connection/Load Augmentation at LT at Dhulawat, Chandla Dungerwas, Pachgaon and Sultanpur Station shall be arranged and availed by the contractor.

xiii. Provision of Submersible pumps at all stations.

xiv. Provision of water cooler, Inverter and cabling etc.

xv. Provision of LT panel for distribution of LT supply for lighting, fans, air conditioners, Yard Lighting, Fob/Sub Way Lighting, signalling and Telecom Load, SCADA RTU load, Lift load, submersible pump load, Tower Wagon shed, Power supply for operation of OHE motorised isolator/Interrupter etc. Twenty percent (20%) spare capacity shall be kept in LT panel for future loads.

xvi. All Nuts, bolts, Studs, washers, Pins etc. shall be of GI or stainless steel. All earthing strips shall be of GI.

1.3 SCOPE

1.3.1 General

In general, The Contractor is responsible for all electrical works relating to electrification of station building/Yard with allied facilities including provision of lifts and (11/0.44 kVA) substation of rated capacity in this Section.

Table -2.1 Scope of work

S.NO	NAME OF SECTION	SCOPE
1	Dhulawat Station	Various Electrical General Services Work
2	Chandla Dungerwas Station	Various Electrical General Services Work
3	Panchgaon Station	Various Electrical General Services Work
4	New Patli Station	Various Electrical General Services Work including SITC of Passenger Lifts
5	Sultanpur Station	Various Electrical General Services Work
6	Design	All General Services Work

NOTE: - The Contractor shall arrange *inspection test plan of all required items. Contractor shall obtain approval of* lay out plan of Complete HT/LT power supply arrangement from Engineer before commissioning of work.

XXXXXX

CHAPTER 2 — DESIGN AND PERFORMANCE REQUIREMENTS

2.1 General

2.1.1 The design, supply, installation, testing and commissioning of General Services work including Power supply system etc. shall meet the design and performance requirements within the design environments specified in this PS.

2.1.2 Design Environment

Adequate Margin shall be built in Design, particularly to take care of Climate Conditions/Operating Environment. Wherever the equipment is installed in open at the surface level or inside service buildings at surface level, the same shall be designed for working in the tropical conditions existing here and the ambient temperature and humidity levels pertaining to HORC Project area.

2.2 Basic Design Philosophy and Requirements

2.2.1 Proven Design

The Contractor shall develop the design based on specification and on proven and reliable Engineering Practices. The design details shall be submitted with technical data and calculations to the Engineer for review. *The Design shall include complete Single line Diagram indicating Local, DG set and AT supply*.

The contractor shall submit drawings in such a form as the Engineer will require them for approval, copies as required of all drawings, diagrams and details of all equipment in part or in whole. The contractor shall make any drawings available to the Engineer at all reasonable times. Wiring diagrams and other drawings as the Engineer deems shall not be finally settled until satisfactory installation and testing has been made, this shall be approved in principle.

The contractor shall submit a schematic block diagram of the equipment showing the manner, in which the functional requirements of this specification shall work together. The contractor shall submit a schedule including details of numbering, categories and drawing registers / indexes for the production, submission and approval during the period of the contract of drawings and also of any information, required for the Engineer in connection with the design of the contract works.

This schedule shall be suited to the requirements of manufacture, delivery and installation of the contract works to meet the requirements of the contract and shall allow reasonable time (approx. 8 weeks) for study and approval by the Engineer of all drawings, calculations and graphics submitted (and, as necessary, resubmitted) by the contractor.

No approval by the Engineer of any drawing shall relieve the contractor of any of his obligations of liabilities under the contract or of his responsibility for ensuring that the work is satisfactory done and that all operational requirements shall be met.

The contractor shall provide final drawings without undue delay, and in any case within twelve weeks of the award of the contract, these drawings shall include dimensions, capacity of equipment and complete power supply arrangement with all associated items of each station. *Incomplete submission of documents and Drawings shall not be considered as submission. by contactor.*

2.2.2 The design philosophy should meet the following criteria:

a) Application of state-of-the-art Technology
b) Service proven design
c) Design life *20* years *(However the individual equipment shall have different design life.*
d) Minimum life cycle cost
e) Low maintenance cost
f) Use of interchangeable, modular components
g) Extensive and prominent labelling of parts, cables and wires
h) High reliability
i) Low energy loss
j) System safety
k) Adequate redundancy in system
l) Fire and smoke protection
m) Use of fire retardant materials and fire survivals cables
n) Environment friendly
o) Adherence to operational performance requirements
p) Maximum utilization of indigenous materials and skills, subject to quality conformity.

Adequate margin shall be built into the design particularly to take care of the higher ambient temperatures, dusty conditions, and high seasonal humidity, etc. prevailing in HORC Project area.

2.3 AS-BUILT DRAWINGS

Preparation of the as-built drawings shall be part of these specifications. As-built drawings will be Final Design Drawings of the project showing the actual work done. The contractor shall provide the as-built drawings in one original and one reproducible negative produced from the original, with the names of the signature authorities of the Engineer and the contractor. After they are signed for approval, prints shall be taken from the signed original of each drawing. Also, *Hard Disc Drive (1 TB)* with all as-built drawings shall be handed to the Engineer. Together with the as-built drawings, the contractor shall provide reduced size (e.g. A3 size) booklets of the as-built drawings as per the Engineer requirement.

All details, dimensions, texts, etc., on the reduced size drawings shall be clearly recognizable and readable. The contractor shall complete and obtain the Engineer's approval on the as-built drawings and make the final submission of the as-built drawings together with the A3 size booklets latest within three months following the date of the Certificate of Completion. All costs associated with the provisions mentioned above shall be deemed to be included in the contract price.

As-built drawings shall cover in general (but not limited to):

a) For mechanical equipment:

i. Construction drawings,
ii. Instruction drawings,
iii. Functional block diagrams with set-point range of process parameters depicted

thereon.

b) For electrical installation:

i. Installation drawings with circuit numbers and exact type-assignation of all installed equipment,
ii. Distribution diagrams with circuit numbers,
iii. Fault analysis and protection co-ordination settings the of protection system,
iv. Power consumption,
v. Precise type numbering
vi. Earthing systems

c) For distribution panels:

i. Construction drawings,
ii. Circuit drawings as operating diagrams,
iii. Additional current flow-charts where required,
iv. Accurate lists of any installed equipment with precise description of this equipment,
v. Adjustment tolerances of circuit-breakers, switches, etc.

d) For equipment:

i. Construction drawings,
ii. Circuit diagrams,
iii. Functional block diagrams with set-point range of process
iv. parameters depicted thereon,
v. List of quantities with detailed break-down of the bill of materials comprising the equipment.

e) For cabling:

i. Diagrams with dimensions, type of cables and power requirements with regular cross- section area and measured cable values shall be used for these diagrams.

2.4 System Requirements :

2.4.1 Conformity with Governing Specifications and other Statutory Requirements: -

The work shall be carried out in accordance with the following governing specifications and other statutory rules:

i. Indian Electricity Act 2003 with latest amendments.
ii. CEA Regulations 2010
iii. Central Safety regulations, 2010
iv. Regulations laid down by Chief Electrical Inspector to the government.
v. Regulations laid down by EIG Indian Railways.
vi. National Building Code.
vii. Rules and Regulations prescribed by local authorities as applicable.
viii. Relevant, Indian Standards, IEC Standards, CENELEC, British Standards and

other National/ International standards as applicable.

ix. The Contractor shall furnish information asked for by a statutory body (e.g., Government of India, Ministry of Railways, Commissioner of Railway Safety, Government of Haryana etc.) in particular format as directed by Engineer. Any documents, studies, test reports, compliances required for getting safety clearances from any authority shall be submitted by the contractor

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CHAPTER –3 INSTALLATION AND CONSTRUCTION

3.1 REQUIREMENTS

3.1.1 General Requirements

i. The Contractor shall comply with all Enactments in executing the Works, including but not limited to all statutory provisions on occupational health and safety.

ii. The Contractor shall co-ordinate with Other Contractors in the execution of the Works.

iii. The Contractor shall also co-operate with all Relevant Authorities in the execution of the Works.

iv. The installation of all equipment shall be undertaken at all times by suitably trained and competent employees of the Contractor, to the satisfaction of the Engineer.

v. Only appropriate tools, plant, equipment and vehicles shall be used.

vi. Installation of all equipment shall be in accordance with the Construction and Installation Plan described in the drawing/plans as approved by Engineer before commissioning of work.

vii. Installation of all equipment shall conform to the best industry practices.

viii. Precautions shall be undertaken to ensure the safety of personnel and equipment for all installation works.

ix. The Contractor shall, prior to starting any installation and construction work, identify any possible hazards, and implement measures of eliminating and/or controlling such potential hazards, in line with safe working practices.

x. The Contractor shall ensure that all areas of work are sufficiently illuminated for the works to be undertaken and that a safe system of work is employed for all activities.

xi. The Contractor shall operate a robust system for the control of persons entering or working upon the site.

xii. The Contractor shall co-operate, always, with the Engineer and Other Contractors to ensure that the Site is protected from unauthorised admission, either wilfully or otherwise.

xiii. The Contractor shall make due provision for the safe access and egress to the Site of Works for its staff and subcontractors.

xiv. This access shall be maintained such that it is free of all hazards and is in a safe condition throughout the duration of the Works.

xv. Contractor shall submit method statement for (a). Erection of equipment, (b).Equipment testing and commissioning and (c). Performa and checklist for recording during equipment testing.

xvi. The contractor shall set up at least one main store/ depot for receiving and storing materials & other equipment at his own cost.

3.1.2 Specific Requirements

The installation and construction work pertaining to this Contract shall include, but not be limited to the following: -

i. Finalisation of the Construction and Installation Programme provided by contractor and duly approved by Engineer.
ii. Survey on Site and review the technical requirements shown in this Specification and the Engineer's Drawings (if any).
iii. Production of the calculation sheets and installation drawings for Site installation.
iv. Production of specific site designs and drawings based on typical designs and drawings supplied.
v. Installation in accordance with the finalised installation drawings.
vi. Co-ordination with Other Contractors;
vii. Submission of the installation reports and records.
viii. Testing and commissioning, as per finalised protocol and programme.

3.2 Construction and Installation Plan

The Contractor shall undertake installation work in stages as shown in the detailed installation programme. Installation, testing and commissioning of later stages shall not impact revenue operation of earlier stages.

As a minimum, the detailed Construction and Installation Plan shall include but not be limited to all the activities, installation details and methods of all activities, equipment and tools to be used for installation, safety issues, supervision, temporary land occupation needed and the vehicles to be used for installation.

3.2.1 *Material* Handling

To facilitate handling of equipment during installation and maintenance thereafter, the Contractor shall closely co-ordinate and interface with other contractors travelling hoists and unloading jib cranes for sub-stations. The entire material handling plan for movement of bulky item such as Transformers, Panels, DG sets, and cables etc. shall be carefully planned. Crane of adequate capacity with a jib of requisite length will be arranged by the Contractor at his own cost. Road crane for handling heavy materials at the contractor's depot for loading and unloading of material will be arranged by the contractor who will also arrange his own crew for its operation and maintenance. All charges including pay and allowances of the crew and all running expenditure will be borne by the contractor.

3.3 Site Supervision/ Deployment of Technical Staff: -

3.3.1 The Contractor shall set up a Site supervision system, which shall be part of the overall safety, system assurance and quality management system.

i. The Contractor shall provide sufficient number of experienced Engineer, Supervisors and skilled workers to ensure progress and quality of the work at Site and in the Contractor's workshops (if any), are maintained to the satisfaction of the Engineer. The minimum number of Engineers required to be deployed is shown in table below: -

No	Post	Minimum Eligibility	Minimum Requirements in nos.
1	Sr. Engineer (Overall in charge of all type of General Services work)	Graduate in Electrical Engineering with 10 or more- year experience in Electrical General Services work or HT & LT works.	1
2	Electrical Engineer (Site Engineer)	Graduate in Electrical Engineering with 7 or more-year experience in General Services work or HT & LT works. **Or** Diploma in Electrical Engineer with 10 or more years experience in General Services work or HT & LT works.	2

ii. The contractor shall submit to the Engineer, not later than 60 days from the date of award of contract, the organization chart showing following key positions, and CV's of the incumbents and the brief job descriptions. The Engineer shall issue Notice of "No-objection" or otherwise for the appointment of "key positions" within stipulated working days of such submission.

iii. The performance of personnel shall be under observation by Engineer. In case the performance of any personnel is not up to the mark, as decided by Engineer. In case replacement is required, contractor shall be responsible for replacement of such personnel.

iv. In case the contractor fails to employ the technical staff as aforesaid to the satisfaction of the Engineer-in-charge, the recovery shall be as mentioned below per each calendar month or part thereof of default.

Sl. No.	Post	Amount to be recovered per person per each calendar month or part thereof of default. (Rs)
1	Sr. Engineer	1.0 Lakhs
2	Electrical Engineer	50,000 /-
3	E&M Engineer	50,000/-

v. Contractor is to abide by the provisions of Payment of Wages act & Minimum wage act.

vi. The Contractor's supervision system shall be responsible not only for the supervision of the concerned system installation but also for the supervision of the installation of the primary fixing system, earth mats and systems, etc. The supervisors shall work on a full-time basis during the entire installation process.

vii. The Contractor shall maintain a set of drawings at each system which accurately reflect the current status of field changes. The Contractor shall obtain letter of no objection from the Engineer for any such changes. The Contractor shall prepare final drawings showing the as built configuration. These drawings shall be developed in a logical format to facilitate routine system maintenance and troubleshooting. All drawings and details shall be endorsed by the Contractor.

viii. The Engineer reserves the right to undertake, at any time, checks on the proficiency of the Contractors staff, licensing and all associated documentation. If any of the Contractors staff be found incompetent or unlicensed he shall be removed from the site until their Competency has been established.

3.4 Workmanship

All the installation shall be carried out according to the instructions shown in these specifications and Drawings (as approved).

All assemblies of equipment and their components and parts shall be completely interchangeable if they are of similar type

The style and procedure of the workmanship shall be consistent throughout the Works. Unless otherwise specified, the Engineer shall decide the final colours for all paint work and other finishes to be applied to any part of the Works.

All parts, which are subject to, wear or damage by dust, shall be completely enclosed in dust proof housings.

3.4.1 Installation of Cables

The Contractor shall co-ordinate with the Civil Contractors wherever necessary, for the installation of cables in cable galleries, trenches, ducts, trays, risers and other locations. The cable system shall, during installation, be fully protected from mechanical damage and be generally accessible at all points for inspection along its entire route. Suitable cable markers shall be provided for covered cables upon completion of installation Should it prove necessary to cut any cable during installation, all cut ends shall be properly sealed.

The maximum pulling force of any cable during installation shall not exceed the design force of cables.

All cables shall be installed in the formed cable trenches, shafts, hangers, trays and brackets. The minimum recommended bending radius of the cables shall be adhered to during installation.

All materials used for termination, jointing and installation of cables in confined spaces shall have flame retardant, low smoke, halogen free characteristics.

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CHAPTER – 4 TESTING AND COMISSIONING

4.1 TESTING

This Chapter describes the testing & commissioning related to the Various General Services works in conformity with the requirements of RDSO/Railway Board Standards and standard Railway practices.
Testing constitutes an essential obligation to satisfy the Railway System.

4.2 Testing Conditions and Equipment Acceptance

The Contractor will have to carry out all the tests and checks required guaranteeing the Engineer of the good construction and the satisfactory operation of all power supply installation. Also, the contractor shall co-ordinate & arranges testing equipment etc. required for testing facilities.

The various high, medium and low voltage equipment will be subjected to all the tests required under equipment test sheets, (lists are not exhaustive) as per the relevant IEC or other standards mentioned in the technical specification of each equipment or otherwise.

It is reminded that the contractor is totally entrusted with full responsibility of assembly and installation of all pieces of equipment mentioned in this specification, with supplying the maintenance equipment and the special tooling which shall be delivered as soon as equipment installation will be completed and with the various duties he is bound to regarding witnessing of tests at commissioning and supervision after energising.

4.2.1 **In-plant testing**: -

In plant testing concern type, routine tests and factory acceptance test.

i. Type tests are tests performed on one or two of an equipment series
ii. Routine test are tests performed on each equipment
iii. Factory acceptance tests are tests on a sample size as per standards.
iv. These tests will enable checking the quality of the equipment and its compliance with the specifications.
v. Following equipment, if desired by the Engineer shall be tested at third-party (duly approved by the Engineer)/ RITES during Factory Acceptance Test.:
    1. DG sets *and AMF Panel.*
    2. Transformer of any capacity
    3. Switch gears
    4. Different size of cables (LT/HT)
    5. LED light fittings
    6. Different types of HT/LT panels and APFC panel etc.
    7. Earthing material.
    8. *16 mtr and 5 mtr High Mast.*
    9. *Submersible Pumps*
    10. Any other material decided by Engineer

Employer/Engineer representative shall also witness the testing of materials as decided by Employer. Once the equipment will have passed the in-plant acceptance tests, it shall be delivered and installed under the contractor responsibility.

Concerning some type tests, test certificates issued by recognised agencies will be able to

be supplied if the contractor cannot carry out these tests himself and if the test certificates are related to a similar equipment of same capacity and design.

The final factory tests will be carried out on the fully assembled equipment as specified. Thereafter, if required and permitted by the technical features of the equipment, the equipment may be dis-assembled for transportation purposes. The dis-assembly should not, however, cause any deterioration of the technical performance of the equipment.

These tests will be carried out by the contractor, under his responsibility and in the presence of the Engineer and of the consulting Engineer. The cost of Factory Inspection/Site Inspection/Lab Test/Documentations will be borne by contractor.

Each of these tests will be subjected to a certificate. Provisional acceptance will be granted only after execution of the both sets of tests.

NOTE: For type tests, the contractor can provide test reports performed according to the corresponding IEC standard, on similar equipment of same capacity and design.

4.2.2 Third Party Tests

i. During execution stage Engineer may conduct the Test on any type of equipment from third party independent lab at its own cost, to ensure the quality of material supplies. If any of the samples fail in the test, the cost of the Test along with the complete replacement of whole lot shall be borne by the Contractor.
ii. If contractor represents, two random samples from the failed Lot shall be collected by the contractor in the presence of Engineer duly sealing the samples and send to two different NABL accredited labs (as approved by Engineer) for conducting all those tests, which were conducted on the failed sample. Cost of the testing including the collection of sample and transportation of sample will be borne by the contractor.
iii. If both the samples pass all the Tests, the Lot will be deemed as accepted by HRIDC, but in the case of failure of any of the samples collected by the contractor, complete Lot will be deemed as rejected and contractor will replace the whole Lot.
iv. The delay, if any for the procurement of the material due to failure, shall be considered as non-compliance and applicable penalty shall be imposed on the contractor.

4.2.3 System Acceptance Tests

At least six weeks in advance of any particular site testing, the contractor shall submit details of tests and details for the teste equipment the proposes to use for that testing to the Engineer for his approval.

All tests for statutory requirements and insurances including arrangements for such tests, inspections by Authorized bodies, persons or insurers, as necessary and the provision of certificates in the prescribed and approved forms necessary to enable plant and equipment to be put into service, shall be made by the contractor.

If each section of plant is installed, commissioning tests for each section shall be carried out on site. At least six weeks in advance of any particular site testing, the contractor shall submit details of tests and details for the test equipment he proposes to use for that testing

to the Engineer for his approval. As installation proceeds, the insulation resistance of cables shall be checked and recorded.

The identification of the cores shall be confirmed from end to end of each cable end, in the case of communication, alarm- and control-cabling, from end to end of each circuit. Tests on cables shall be completed and accepted by the Engineer before the testing of the associated equipment starts.

All tests for statutory requirements and insurances including arrangements for such tests, inspections by authorized bodies, persons or insurers, as necessary and the provision of certificates in the prescribed and approved forms necessary to enable plant and equipment to be put into service, shall be made by the contractor.

4.2.3.1 On-site commissioning tests being subject of acceptance by the Engineer shall include:

a) All equipment, cabling, distribution etc. is electrically and mechanically safe.
b) All interlocks, isolators and door and cover securing mechanisms shall be properly fitted and adjusted.
c) All exposed metal work is properly bonded and grounded and that all connections and points required to be grounded for a safe and satisfactory operation shall be properly grounded in accordance with the manufacturer's requirements.
d) All cables, cores and terminations shall be secure, properly fitted and correctly identified and coloured.
e) All phases, polarities, neutral and common connections shall be correctly switched / connected as required, so that the power is correctly available at all points and that the voltage and frequency at all equipment is correct and in accordance with the requirements for correct work.
f) All supplies shall be properly fused or otherwise protected, to give successfully discrimination and safe disconnection under fault conditions.
g) All contacts shall be properly aligned / adjusted and not subject to excessive wear or corrosion.
h) Batteries shall be correctly installed, connected and fitted and checked that the battery chargers are working correctly.
i) The insulation-resistance of all cabling and equipment shall not be less than specified.
j) During the commissioning of major item like HT panel, Transformer, DG sets etc. the contractor shall arrange expert Engineer of OEM of such item at respective sites. The expenditure for charges for the same including transport, lodging, shall be borne by the contractor at no extra cost.
k) All instruments and meters shall be energized with correct polarity and working properly.
l) All fault indications and alarms shall be working correctly.
m) In addition to all operational tests, required for a successful hand-over, the operation of all interlocks, sequences and protections which are not utilized in normal operations shall be subject of acceptance by the engineer.
n) The on-site commissioning tests shall be conducted under the supervision of the engineer.

4.2.3.2 (a) The final acceptance tests shall begin after all on-site commissioning tests have been successfully completed and all defects detected during those tests have been rectified / corrected, which is accepted by the Engineer. The tests shall include full operation tests on the works as a whole and selected technical tests on some or all of the equipment.

(b) On completion of the site acceptance tests, the contractor shall forward the test results certified by him to the Engineer. When the Engineer has received the results and deems that the plant has successfully passed the tests, he will write to the contractor to that effect. During the site acceptance tests the Engineer shall inform the contractor of minor faults detected and which of these minor faults shall be corrected before the beginning of the tests on completion.

4.2.4 TRIAL OPERATION

The trial operation shall occur with full responsibility of the contractor. The trial operation shall take place after finishing the tests on completion. For starting the trial operation, it is required, that all tests on completion are finished positive for the entire installation and shall occur within 21 days.

The trial operation shall show the evidence of a fully functional operation of the electrical system and that security is given during operation. Therefore, the trial operation shall occur without significant malfunctions. The contractor shall test different operation cases during the trial operation (e.g. loss of different equipment etc.).

The contractor shall make organizational measurements during the trial operation, so that malfunctions can be rectified as soon as possible (within max. 2 days).

The results of the different tests during trial operation shall be shown in a protocol. This protocol shall be signed by the contractor and the Engineer.

4.2.5 Energization: -

The Contractor shall prepare operation safety rules and procedures for the review of the Engineer before Energization.

The Contractor shall carry out all necessary checks to ensure safe Energization.

All power equipment shall be subject to inspection by inspectors from the Electrical Inspectorate of Engineer before Energization. The Contractor shall ensure all Engineer requirements are met. Contractor shall be responsible for reliable operation of all Electrical equipment.

4.3 COMMISSIONING

4.3.1 General

The Commissioning description, based on the following frame, will have to be defined by the contractor and submitted to the Engineer.

Once the contractor will have completed the above tests, and the various pieces of equipment installation, the assignment should include:

i. Putting into service tests

ii. After energising

The Engineer will be empowered to ask for any additional testing they may deem necessary. The contractor will have to supply the testing installations and measuring apparatuses required to this effect in accordance with the stipulations, provisional acceptance will then take place, followed by final acceptance at the end of the guarantee time.

4.3.1.1 Putting into Service Tests

It should be performed at this stage the tests verifying that the different equipment is acting correctly when energised.

4.3.1.2 Integrated Testing and Commissioning

The general testing having shown proper operation, an overall integrated test of the installations, should be performed, after the first 15 days of operation, during which the various actuation and operation situation (putting into service, normal actuation, failure tripping) will be simulated.

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CHAPTER – 5 MAINTENANCE AND TRAINING

5.1 INTRODUCTION

This Chapter describes the maintenance philosophy and training of maintenance staff for Electrical system considering RDSO/ Railway board standards and Railway practices.

The Contractor shall provide comprehensive training and documentation to the Engineer staff in accordance with the requirement of this chapter and the chapter of General Specifications.

This training shall enable all the installations, to be operated and maintained in the most efficient and safe manner, to achieve the maximum reliability and economy required by such System.

Note: - All type of Routine, Preventative and Schedule Maintenance work will be carried out at regular intervals, based on latest SMI's/ Instructions/Guidelines issued by RDSO/Railway Board and equipment manufacturers' recommendations.

5.1.1 Maintenance Management

The management of the maintenance process entails defining various levels of responsibility and enabling them to implement the strategic orientations defined by the directing authority:

i. By defining their respective missions,
ii. By setting objectives for each person,
iii. By translating these objectives into action plans,
iv. By implementing the means required to carry out action plans,
v. By diagnosing the causes of any deviation from the set objectives,
vi. By taking corrective measures concerning the action plans or the objectives.

This management process requires a global approach and helps to improve the performance of the maintenance work of different components with quality, on time and at low cost. It must be implemented at three levels:

i. At the level of human resources and management in the context of the scheduling of work, the allocation of human resources and the training of personnel.
ii. At the skills level to ensure quality, safety and suitable working conditions.
iii. At an economic and financial level to ensure responsible management of production, spare parts, purchasing and miscellaneous costs.

The quality of this management depends on the capability of those entrusted with operation and maintenance responsibilities:

i. To exploit the results of management within their field of responsibility.
ii. To react in the event of any deviation from the action plans defined with a view to achieving the set objectives.

Within the context of this approach, the management control function ensures timely advice to be given to those with operational and maintenance responsibility:

i. By placing at their disposal, the tools and information required for piloting and diagnosis.

ii. By participating in carrying out this diagnosis.

iii. By participating in the task of defining the objectives to be achieved.

In conclusion, the process of maintenance management must incorporate two major components:

i. the management of human resources and the study of the most suitable means of achieving the set objectives.
ii. This is one of the first guidelines of maintenance organisation in the various relevant centres.

5.1.2 Determining Requirements in Terms of Facilities and Tools

The achievement of the objectives assigned to the maintenance division about quality, safety and regularity for the lowest possible overall cost requires the implementation of a number of resources which must be perfectly tailored to the requirements.

The facilities and tools are part and parcel of the resources placed at the disposal of the maintenance division to achieve the set objectives.

Owing to the cost of these facilities, the number of maintenance centres to be equipped and the necessity of keeping the maintenance actions consistent and uniform, the main choices of facilities and tools are integral part of the System maintenance policy and program.

When determining these requirements, in-depth knowledge in the dedicated maintenance plan is needed while taking due account of the experience acquired in similar fixed installation which has been in service for several years.

5.2 SUPERVISION AND PLANNING OF MAINTENANCE

5.2.1 General

The following outlines the Engineer maintenance strategy, various levels of maintenance, the Maintenance Management System and the arrangement for maintenance.

The Contractor shall make use of all relevant information to provide supervision of maintenance.

5.2.2 Engineer's Maintenance Strategy

According to the maintenance strategy, all equipment and infrastructure supplied for the 'Project' must be such as to ensure for minimum or no maintenance. Maintenance activities required must be capable of being performed with little or no impact on the train service. In addition, the maintenance work systems shall ensure safety of personnel and equipment.

The Contractor shall ensure that to supervise maintenance during the DNP (Defects Notification Period) personnel are always available with the relevant skills and level of competence.

The Contractor, upon noticing any defects, deficiency in quality and quantity of spares and materials shall without delay, arranges for alternative source of supply and submit his proposal to the Engineer for review.

5.2.3 Planned Maintenance

Routine preventative maintenance will be carried out at regular intervals based on condition, reliability, usage, and service history, SMI 's issued by Railway Board/ RDSO and equipment manufacturers' recommendations. The Operating and Maintenance Manual shall describe the different levels of planned maintenance.

5.2.4 Supervisory Staff

The Contractor shall provide supervisory Maintenance staffs who are expert in all the different levels of fault finding, maintenance and repair of the various relevant systems supplied under the Contract:

i. Electrical system
ii. Switch gear/power supply arrangement
iii. Other works

5.2.5 Maintenance requirements

I. Testing and Re-commissioning of System and Equipment

In the event of a failure requiring modifications to the System, the Contractor shall undertake any testing and re-commissioning required.
Any such modification shall be submitted for Engineer review.

II. Temporary Alterations to Restore Service

The Contractor shall undertake any temporary modifications necessary to maintain service.
Any such modification shall be submitted for Engineer review.

III. Discrepancies between Installation and Design Records

Should the Contractor discover inconsistencies between the maintenance drawings and documentation and the installed equipment, the Contractor shall correct all such errors within two weeks.

IV. Communications

The Contractor shall ensure that adequate communication facilities are provided to its staff during the DNP and maintenance period as per approval of Engineer.

V. Location of Staff

The Contractor shall be responsible for locating staff such that the Contractor meets its contractual obligations and as per approval of Engineer.

VI. Maintenance Regimes

The Contractor shall provide documented maintenance regimes to be followed by the Engineer upon substantial completion of various components of the work until the end of the DNP.

The Contractor shall produce a maintenance regime for the equipment that shall comprise two constituent parts, corrective and routine/preventative maintenance.

Routine/preventative maintenance shall be non-intrusive to the day-to-day operation of the train service and be capable of being pre-planned in advance of the work.

Corrective maintenance shall be available 24 hours per day, able to respond to all foreseeable circumstances**.**

The maintenance regime shall cover all parts and equipment of the system designed, installed and commissioned by the Contractor.

The Contractor shall take into account the requirements of the operations and maintenance when determining and proposing its maintenance regime.

VII. Scope and Hours of Coverage

The regime and structure of corrective maintenance shall be robust in design.

The Contractor shall provide full 24 hour On-Call coverage and shall be such that initial response and rectification of failure are in accordance with the following:

i. Assistance to first level and corrective maintenance within 30 minutes, upon request of first line maintainer.

ii. All elements of preventative maintenance shall be carried out and completed during non-traffic hours without interrupting train services.

VIII. Routine and Corrective Maintenance Procedures

Routine and corrective maintenance procedures shall be supplied for all equipment. The format shall be as follows:

i. Uniform format and layout irrespective of equipment supplier.

ii. Colour coding for each activity.

iii. Cross referenced to the Operation and Maintenance Manuals.

iv. Document control information.

IX. Maintenance Manuals

The Contractor particulars of operating parameters, tools for dismantling and testing, methods of assembly and disassembly, tolerances, repair techniques and all other information necessary to set up a repair and servicing programme as per satisfaction of Engineer.

The Contractor shall provide documentation for all hardware and software for computer systems and other associated electronic equipment to meet the following requirements.

Such documents shall include but not be limited to:

i. manufacturers' documentation supplied as standard with the equipment;

ii. hardware configuration with details of expansion capabilities and options;

iii. programme loading instructions, including runtime environment configuration;

iv. programme listing including comprehensive 'comment statements' in hard copy and soft format for source code, compilers and development tools necessary to modify and recompile software;

v. flow charts, data flow diagrams and state diagrams as appropriate;

vi. description of software modules including purpose, linkage with other modules, error routines and any special considerations;

vii. memory maps for both internal and peripheral memory showing description of all programmes, data files, overlay areas, memory available for expansion and the like;

viii. loading and operating instructions for diagnostic programmes and specifically developed debugging tools; and

ix. Programming manuals relevant to operating systems, languages, development tools, etc.

The manual shall also include inspection/overhaul procedure and periodicity of various inspection/overhaul schedules in detail including the tools, special tools/plants, and facilities required.

5.3 TRAINING:

During the contract period, the contractor shall provide training manuals, as well as onsite training and training courses to ensure that the Engineer staff associated with this project may acquire full knowledge and appreciation / understanding of all aspects of the design, day to day operation, breakdown and routine maintenance and fault diagnosis of the power supply, the surveillance and control equipment as well as the belonging hard- and software. The contractor shall train the Engineer personnel about all equipment in theoretical and practical way. Also, the maintenance staff shall be trained. The Engineer will nominate members of his staff, who are attending the training courses.

The contractor shall nominate qualified instructors. It shall be essential that prior approval of the Engineer is obtained for the instructor and the instructor's qualifications in each case.

The contractor shall provide all relevant and necessary facilities which are needed for complete and effective staff training (such as video, TV, slide- and film-projectors and others) and venue. The contractor shall provide all facilities including accommodation, transport and catering of all trainees. Within three months after the signing of the contract, the contractor shall submit a detailed syllabus for the training courses for approval by the Engineer.

5.3.1 General Requirements

The Contractor keeping the above aspect in view shall provide comprehensive training to the Engineer's staff in accordance with the requirements contained in this Particular specification and general specification. The training courses and/or sessions shall include system performance requirements and all major equipment and works designed, by the Contractor.

The specific objectives of each course, training facilities to be used, the qualification and experience of the training instructors and the assessment criteria shall be developed by the

Contractor and submitted to the Engineer for review at least three months before any course is conducted.

The Contractor shall provide full-time on-Site management and co-ordination of the entire training programme to ensure the continuity of classes, and proper distribution of training materials, and be responsible for interfacing with the instructors.

The training courses shall be delivered to all relevant Engineer's staff, including instructors, operation and maintenance Engineering staff.

5.3.2 Mock-Up for Training

The Contractor shall install mock-up equipment for system and any such facility(s) considered necessary for the training of Engineer's staff in the training school.

The training mock-up shall include but not limited to the following: -

i. Clear Cut Section drawings / photographs of various power supply equipment's such as Circuit Breakers, HT/LT panel, Power supply arraignment, Current Transformers and Potential Transformers.

ii. Cut Section drawings / photographs of HT/LT cables.

iii. Cut Section drawings / photographs of Gas Insulated Switchgear and other types of panels.

iv. Clear photographs of transformers, their windings, bushings etc.

v. Samples of various item used in substations.

vi. Clear drawings and photographs of Control panel, protection schemes, earthing and complete power supply arrangement system.

The Contractor shall submit full details of the training span and other mock up equipment, photographs etc. including proposed training activities and objectives.

5.3.3 Training of Engineer's Training Instructors (ETI)

The objective of the training is to enable the Engineer's Training Instructors to be competent to deliver future training courses for other employees of the Engineer.

The Contractor shall provide training to the Engineer's Training Instructors on the various Systems. Aspects covered shall include, but not be limited to, the following:

i. Configuration of the entire System, including interface with the DHBVNL supply system at the feeding points;

ii. Feature and functional principles of the entire System;

iii. System design aspects including but not limited to design standards, design criteria and parameters, short-circuit and other calculations, insulation and protection co-ordination;

iv. Details of major equipment and material including but not limited to voltage and current transformers, Electrical fittings, assemblies and protection relays, and cables of different types and their joints used in the system;

v. System operation and maintenance management and procedures;

vi. Earthing arrangement, covering safety aspects of touch and step potential, safety to personnel, passengers and outsiders;

5.3.4 Operations Staff Training

The objective of the training is to enable the Engineer's operations staff to be familiar with the Systems, with focus on the operational aspects under normal and emergency conditions.

The training shall also enable the trainee to acquire full capability for identification, trouble shooting and rectification of faults in the specified duration. After classroom training which includes mock ups of equipment, the staff shall be trained in actual operation.

5.3.4.1 Maintenance Staff Training

The objective of the training is to enable the Engineer's maintenance staff and Engineering staff to be familiar with the Systems focus on the maintenance aspects of the System including but not limited to the following: -

i. Full understanding of all the equipment, sub-systems and system, their function, maintenance and overall requirements.
ii. Procedures to be followed for unscheduled maintenance and repair.
iii. Identification of failed components and sub-systems in electronic equipment by use of special test kit as necessary.
iv. Modification in the software to extend or modify the control, monitoring and protection functions.

5.3.4.2 Training Requirements

Man weeks of contractor's Training Instructors for training Engineer's maintenance personnel in India.

S. No	Training	Man-Weeks
1	HT/LT panels, Transformer, Circuit Breakers, DG set , Switchgear and cables	2
2	Other General services Equipment/Electrical wiring	2
3	Electrical safety & Earthing system	1

5.4 Defects Notification Period (DNP)

The Contractor shall be responsible for all the Defects and deficiencies, till the expiry of a **period of 01 (One) year**. The Contractor shall repair or rectify all Defects and deficiencies observed by the Authority Engineer during the Defects Notification Period within time period as may be determined by the Engineer in accordance with Good Industry Practice.

5.4.1 Warranty Certificates from OEM:

i. All Original Warranty Certificates of OEMs of all Electrical system or equipment including contract spare, Commissioning spare, DNP spares and Special tools & Test and Measuring equipment shall be valid for three years or as specified in RDSO Specification of the equipment whichever is later and registered in the name of Engineer. These warranty certificates received from the OEMs should be passed on to Engineer before final Taking over.

ii. Validity of period of Warranty Certificates shall start from date of Commissioning.

iii. Original invoice shall also be submitted with the OEM warranty certificates in a booklet form before Commissioning.

iv. Warranty period and defect liability support shall start from the date of Commissioning.

XXXX

CHAPTER – 6 TECHNICAL SPECIFICATION

6.1 TECHNICAL SPECIFICATION OF GENERAL SERVICES WORKS: -

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
1.	Wiring for light/ceiling fan/exhaust fan/call bell etc. points including circuit wiring, sub-main wiring with Fire Retardant (FR), PVC insulated, multistranded, copper conductor, single core cable on surface/in recessed conduits, distribution boards, sub distribution boards, earthing and suitable number of modular switch and socket. *Surface Conduits shall be of GI and concealed conduit may be of GI/PVC. All PVC conduit shall be fire resistant Low smoke (FRLS).*	1. The point/ circuit wiring is to be done by 03 x 1.5 sqmm insulated multi-strand copper wire for phase, neutral and earth inside pvc duct/ conduit 19/20 mm. 2. Wiring of sub-main with single core insulated, multi-stranded 3x2.5/3x4.0/3x6.0 sqmm PVC CU cable in conduit 19/20mm concealed in stone/ bricks masonry wall separate conduit & 2.5/4.0/6.0 sqmm PVC CU cable insulated multi-stranded for earth wire respectively. 3. Wire for phase, neutral and earth shall be laid/done in concealed conduit pipe, minimum 19/20 mm dia and thickness 1.5 mm along with bend / junction. 4. SITC of 5/6 and 15 Amp plug 5-pin 230V or above modular type switch socket of standard size on existing board and connection with 2.5sqmm and 4.0 sqmm PVC CU cable respectively. 5. Supply and fixing of *GI* cable duct 40 x 60 *mm* (w x h) 1 M STD slot greenish grey. 6. SITC of Double Pole MCB of 32 Amp, 10 kA C series is to be provided in the metal enclosure. 7. SITC of 02/04/08/12 Module modular Plate MS Box (GI) for fixing of switches and sheet metal box of thickness 2/3 mm, of good quality and standard size. 8. SITC of Double Door MCB DB SP 12 way (10+ 2 module), neutral and earth link and suitable IP protection, with one no DP MCB 40amp, one no DP RCCB 40 amp 30 mA and eight no SP MCB 32/25/16/10/6 amp. 'C' series.	i. IS: 694-2010 for PVC conductor. ii. IS: 3854/1997 for switches iii. IS: 1293/2005 For Plugs & socket iv. IS: 371/1999 for celling rose. v. IS: 8828/1996 for MCB vi. IS 13947 (Part -1) 1993 for MCCB vii. IS:9537/2000 for PVC conduit The Electricity Act- 2003 or Latest. All CPWD Norms for electrical wiring	PVC CU conductor- Finolex / Polycab / KEI / Havells or similar as approved by Engineer. i. Modular switch/ socket – Anchor /Roma / Schneider / Legrand / Havells or similar as approved by Engineer. ii. MCCB/RCCB/ MCB/DB – Legrand, ABB, Schneider and similar. iii. PVC conduit – BEC / AKG / Poly pack or similar as approved by Engineer.

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
		9. SITC of Double Door MCB TPN DB 8 modules 4 row, neutral and earth link, and suitable IP protection with one no 4 pole MCB 40 amp, one no FP RCCB 40 amp 30 mA and twenty-four no SP MCB 40/32/25/16/10/6 amp. Min 02 Nos of DB should be installed at each floor of station building or as per requirement.		
2	Supply, installation, testing and commissioning of pre-wired 22 watt energy efficient Tube light fitting (4 feet) on wall bracket connections from junction box/light point etc. to luminary with 1.5 sq.mm FRLS PVC insulated multistranded copper conductor single core/three cable & earthing etc.	1.SITC of LED tube light (22 Watt) suitable for IP-20 for indoor application operating voltage (140-270) V minimum 2000 Lumens, Colour temperature 6500ºK, CRI>65, CRCA steel sheet type enclosure. **2.** SITC of rechargeable batten type Emergency light 60 LEDs, 4 watt or higher with one-hour minimum backup.	CEE Spec No:CEE/NR/121-Elect/PS/2019(REV-04) Dated-04.11.2019 or latest for LED light.	Bajaj, Philips, Crompton or similar as approved by Engineer.
3	Supply, installation, testing and commissioning of 230V A.C. ceiling fan (1200/1400MM)/ Exhaust fan and fan Regulator.	1. SITC OF ceiling fan 230V A.C. 1200/1400 mm ISI mark 5-star energy rating issued by BEE. 2. SITC of heavy duty exhaust fan 300mm sweep with louver shutter. 3. SITC of modular type electronic fan regulator, 5 step type on existing board.	i. IS: 374/1979 for ceiling fan ii. 2312/1967 for Exhaust fan. iii. IS:11037/1984	i. Crompton Greaves / Usha / Bajaj /Havells / Schneider or similar as approved by Engineer. ii. Anchor /Roma / North-West / Schneider / Legrand / Havells Crabtree or similar as approved by Engineer for fan regulator.
4	Provision of High Mast Tower (16 Mtrs) with LED Flood	**1.** SITC of hot dipped galvanised (inside & outside), 16m high mast system (in two sections), complete	i. IS:875(Part-3)/1987 for High Mast Structure,	Bajaj, Philips, Crompton or similar

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
	Light fitting (200 Watt) complete in all respect and as per requirement. Minimum 6 Nos of LED light fitting at each HMT.	with accessories, foundation bolts with nuts, washers, anchor plates & templates etc. manufactured from special steel, head frame, 2-point suspension system with steel wire rope 6mm dia (7/19 construction), double drum winch, galvanised lantern carriage arrangement suitable for required luminaries symmetrically arranged & control gear boxes and lighting finial etc. The mast shall have integral type power tool at the base compartment for its raising and lowering operation, twin dome LED aviation obstruction lights. construction of foundation as per recommendation of manufacturer and approved drawing and its fixing arrangements etc. 2. SITC of Control Panel consist of - (a) 1X63 A TPN MCB for incoming supply (b) 3X32 A SPN MCB for outgoing (50% lighting, 100% lighting, motor) (c) Automatic timer with Power contactor for controlling above lights of suitable capacity. (d) 1 no multi plug socket 16A 1. High mast shall be provided with fencing panel of size 2Mx2Mx1.5M in square shape for protection of erected high mast tower wherever required as directed by Engineer. **2.** SITC of LED flood light fitting (200 Watt) pre die cast aluminium, IP-66 protection, with high power LED lamp complete with all accessories. 3. Provision of Pipe Earthing system of each HMT. (Minimum 02 earth is required for each high mast tower).	ii. BSTN-10025/1993 for High Mast Shaft, iii. IS:2026 for other component IS: 2629 / 1985, BSEN ISO-1461 for Galvanization. *iv. IS 1367 for Fastener* v. RDSO specification No. ETI/OHE/13(4/84or latest) vi. CEE Spec No:CEE/NR/121-Elect/PS/2019(REV-04) Dated-04.11.2019 or latest for LED light.	

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
5	Provision of Octagonal poles (5 metres) with street light fitting (40 Watt) and 70-30% arrangement with complete accessories.	1. SITC of 5 mtrs. long octagonal pole made with 3 mm thick GI sheet, Top Dia 70 mm, Bottom dia 130 mm with single /double arm hot dip galvanized steel octagonal Poles with galvanized base plate of 220 x 220x 12 mm (as per IS 2062) and GI bolt size M20 X 600mm X4 no in position including excavation of pit and filling the same with concrete M-20 including supply of material as required or recommended by pole manufacturer. 2. SITC of 40-Watt LED Energy efficient LED based street light fitting with pressure die cast aluminium housing with driver &suitable fixing arrangement, IP-65 for outdoor application, operating voltage (140-270) V, System efficacy more than 100 lm/W, colour temperature 6500K, CRI>65. Complete with all accessories. 3. SITC of modular digital timer for automatic operation of platform, circulating area, street light etc. complete with required power Contact, digital timer and MCB etc. in enclosure of suitable size and power Contact.	i. IS:2629/1985, BESN ISO-1461 for Galvanization. ii. CEE Spec No:CEE/NR/121-Elect/PS/2019(REV-04) Dated-04.11.2019 or latest for LED light. iii. IS 1367 for *Fastener.* iv. RDSO specification No. ETI/OHE/13(4/84or latest)	Bajaj, Philips, Crompton or similar as approved by Engineer.
6	Provision of Passenger Lifts (13 Passengers, 884 Kg) (G+1) with complete accessories at New Patli Staion.	1. Supply, installation, testing and commissioning of passenger Lifts (13 Passanger,884 Kg) gearless machine room less, single landing (GF&FF), Minimum load 13 persons speed 1m/s to 1.5 m/s, Automatic door with two side opening, microprocessor base variable frequency, variable voltage derive controller with ARD, Stainless Steel Hairline Finish Car and Car Door, 1.00 MPS. Simplex Collective, Selective Control, Emergency Light, Fireman's switch, Alarm Button, Phase Failure & Phase Reversal Protection, Automatic Rescue Device, Vacuum fluorescent display in Car	i. IS-14665/2000 for Lift ii. RDSO/2013/EM/SPEC/0016 Rev (0) for Lift iii. All CPWD Norms for installation of Lifts.	OTIS, KONE, Mitsubishi, Jonson or similar as approved by Engineer.

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
		and other safety device with minimum guarantee/ warranty of 02 years. 2. Contractor should provide all the safety parameters/ License/ Insurance certificate and other required clearness issued by state authorities. 3. During Warranty period contractor will ensure all Preventive and Schedule maintenance/checks will be done by OEM only with in time interval as decided by Engineer. 4. During warranty period all the Breakdowns like defective/ broken of lifts Light, Fan, Batteries ARD and various electronic cards with in 3 hrs otherwise penalty may be imposed as per decision of Engineer. (Detail Technical specification of LIFT is also given at Para 6.2)		
7	Supply, Installation, Testing and Commissioning of *Compact* Sub-Station (11/0.440 KV) including CSS-1 and CSS-2. Each CSS Shall be consisting of 11KV Compact VCB/SF6 CB panel (1 incoming isolator + 2 outgoing ACB with air insulated BUS PT metering module) + DRY type Transformer (250 kVA) Capacity + L.T. Switchgear with all HT & LT inter-connections, accessories,	*1.* Each CSS comprising of 11 kV compact substation suitable for outdoor installation with natural cooling, having type tested equipment comprising of dry-type (CRT) distribution transformer and SF-6 insulated compact switchgear enclosed in robotically sealed stainless steel tank, low – voltage switchboard, interconnection between HT switchgear and transformer using cables and transformer to LT-switchgear using aluminium bus bars, factory built ready for connection type, internal GI earthing provided complete with other associated equipment etc. complete as required as regards to design, manufacturing, type-testing, route-testing, pedestrian and operator safety (IAC AB 21ka/1-sec). The enclosure shall have modular	IEC 62271-202, *IS: 7098 Part-2: 2011*	ABB/Raychem/Voltamp/Schneider/Siemens/CG or similar as approved by Engineer.

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
	fittings & auxiliary equipment inside GI Enclosure as per technical specification. CSS also include 1 RMU 11kVA 630 Amp 21 KA, LT panel as per spec., APFC panel 100 kVAR MPP type heavy duty, all HT *copper Cable* and LT cable with proper termination arrangement of suitable size and length, Suitable H-pole arrangement with GO/DO switch (if required) supply, fixing and commissioning of silent type 125 kVA DG set with AMF panel, Provision of Copper Plate earthing as per requirement and CT/PT for Metering system as per technical specification and supply & fixing of all safety items required as per rules.	construction using G.I. Sheet and shall be power-coated from exterior. The transformer compartment will have IP-54 protection. *Connection from 11kV HT meter of DISCOM in HORC premises to incomer of CSS.* 2. HT SWITCHGEAR shall comprise of 03-Way Ring Main Unit having 01nos. Fixed-Type VCBs feeding to transformer in CSS, all enclosed in common tank, made of robotically welded non-magnetic/non-ferritin Stainless Steel Sheets, and filled with SF6 gas acting as insulating medium to suitable pressure, the tank design meeting IP-67 criteria with SF6 gas leakage rate less than 0.1% per annum, whereas it shall be Arc-Proof design with internal Arc classification IAC 20ka/1-sec individually. The complete Ring Main Unit should be a front-accessible design with associated Capacitive Voltage LED Indicators for each arc-proof cable box, along with associated Terminal Protector boots and front-facia semaphore mechanical indication for isolator/breaker ON/OFF/EARTH. The breaker will have provided with integrated Self-Powered 30C +1EF relay with low and high set for over current and earth fault. Relay should have facility to display the maximum loaded phase current also. Relay shall record minimum 5 fault records with time stamping, and shall be actuated via Resin cast Ring Core Protection CTs of suitable ratio and burden installed in the cable box.		

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
		3. 01no. 250 KVA 11KV/433V Dyn11 Dry Type Distribution transformer having cast resin design Bushings for HT and LT with Off load tap switch of rating +5% to -5% @2.5% and WTI scanner. Temp Rise – 115 deg C, Class 'H' insulation, Losses = 2.2 kW (NLL/7.25KW(FLL) (Subject to IS Tol.), Impedance 5% (Subject to IS Tol.) and 01no. WTI Alarm/Trip Scheme and Surge arrestor in the HV side. 4. LV-PANEL shall be a totally enclosed, floor/Wall mounted, dead-front access, min IP2X protected panel which has a type tested design, aluminium busbars, suitable switchgear configuration and indication scheme as describe below 01no. 433V, 400 Amp, Aluminium Busbar Arrangement with suitable colour coding scheme for identification for each phase.01no. 800A, 433V, 50Ka, 4P Fixed, Manual ACB with microprocessor based over current, short circuit and earth fault release acting as IC-OG arrangement 01set. LED based ON/OFF/TRIP Indication for mains ACB. 01no. Multifunction Meter for measurement of various parameters like Voltage, Amp, kVA, kw, PF etc. of reputed make for mains ACB. (along with associated CT where applicable) 5.OUTDOOR ENCLOSURE shall comprise of having construction of Galvanised Sheet Steel of thickness at least 1.5mm. The Enclosure shall have IP54 degree of protection for HT & LT switchgear compartment . The enclosure shall be *Powder* coated. Each compartment will be provided with the door and pad locking arrangement. The compartment illumination lamp with the door		

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
		operated switch shall be provided for HV and LV compartment. The successful tenderer shall submit the arrangement GTP and other relevant drawings for approval as per standard make prior to supply and execution of work.		
8	Provision of Inverter type Split AC (1.5 Ton, Heavy duty, 5 Star Rating with Stabilizer) and other accessories as per site requirement	1. SITC of 1.5 Ton heavy duty, 5-star inverter type split air conditioner with required suitable size nuts, bolts, fasteners, cu pipe & petty hard ware in all respect. Top up the required refrigerant & maintain the pressure (If required) as per company recommendation or latest Eco-friendly refrigerant. 2. SITC of Metal Clad Plug Socket 20A single phase with 32A MCB 10kA ,c series including fixing and sheet metal enclosure box with one 20A plug top (Ray roll type) to be supplied with board for each AC.	IS:1391/1992 for Air conditioning	Voltas, Blue Star, Carrier, Hitachi, O -General, Mitsubishi or similar as approved by Engineer.
9	Provision of LED Signage Board & LED Station Name Board (Single Sided/Double Sided) with all accessories	1. Design, SITC of LED back lit single & double-sided signage boards with IP-65 CRCA housing, vinyl print on acrylic sheet which is back lit with high grade, high brightness LED modules inbuilt SMPS driver, without battery backup. Operating voltage 80-270VAC. LED with L70 life of minimum 50,000 hours, LPM technology, including fabrication and supply of clamping arrangements as desired. 2. The pictogram and letter of desired colour and size made by translucent vinyl sheet cut through computerized machine shall be pasted on acrylic sheet. Acrylic sheet with pictogram shall be fixed on CRCA/GI sheet powder coated box with suitable arrangement. Subject matter and pictogram	IS:16101-2012 and 16102-2012 part 1 and 2.	PHILIPS, NICHIA, OSRAM and SEOUL or similar as approved by Engineer.

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
		can be seen in the standard book of signage available in office. 3. Depth of box shall be approximately 3.5 inches (for single sided) 5.5 inches (for double sided) and made by 0.8 mm thick CRCA/GI sheet with powder coated having louvers for ventilation on two sides having suitable gaskets for protection against water and vermin ingress.		
10	Supply and laying of different sizes 1.1 kV grade LT XLPE insulated armoured, aluminium conductor cable, in trench/ air/ HDPE pipe. making good the damages, end terminations with aluminium crimping sockets/lugs, provision of cable route markers, etc.	1. Supply of 1.1 KV grade 4x16,4x35,4x50,4x70,4x95,4x120 and 4x185 sqmm LT XLPE insulated armoured aluminium conductor cable, making good the damages, end terminations with aluminium crimping sockets/lugs, gland, testing and meggering etc. as per required Technical specifications. Note: -The contractor shall arrange inspection of cable at manufacture's works before dispatch at his own cost if required by the Engineer. 2. Supply & laying of HDPE pipe in already excavated trench under road/ground/floor/railway track etc. as per site requirement size 75/80 and 50 mm Dia wall thickness 3mm PN-4 conforming to IS 4984:1995 or latest as per site requirement. Pipe should be laid in trench such that It shall be possible to withdraw the cables for repair or replacement without disturbing the work. 3. Supply & laying of HDPE pipe in already excavated trench under road/ground/floor/railway track etc. with technical specification 160 mm dia (OD), wall thickness between 6.2 mm to 7.1 mm, material grade PE-80 and class of pipe should be PN-4. 4. Laying of underground cable under the road/Railway track, recessing in platform /wall	i. *IS: 7098 Part- 1: -1988 for cable* ii. IS: 8130-1984 for cable iii. IEC-502 standards with latest amendment. iv. IS 4984:1995 or latest for HDPE pipe	i. KEI, Finolex, Havells and Universal or similar as approved by Engineer for cable. ii. Duraline/Godavari/Rex Polyextrusion/ Eflex or similar as approved by Engineer for HDPE pipe. iii. Comet / Dowells / Lapp Kabel/Hummel or similar as approved by Engineer for Lugs and glands.

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
		along with Railway Track. in laid HDPE /GI pipe as required 1.1 KV grade LT XLPE insulated armoured, aluminium conductor cable including making chase & plastering after laying of cable/digging of cable trench, sand cushioning, protective covering with second class bricks, provision of cable route marker (200x150x3mm thick M.S. Plate and welded to MS rod of min 5 mm dia including bending and fixing) as per tech. spec. 5. Excavation & Refilling of 0.5 Mtr Width 1.20 Mtr Deep trench in all kinds of soil for laying of HDPE/GI pipe for underground cable crossing. Contractor will clear all metallic parts & stones etc. in trench. 6. Drilling of horizontal bore below Rly track by pushing method for laying of HDPE/SPUN/DWC/CI/GI pipe up to 450 mm by pushing method. Horizontal boring will be done at minimum 1.5 Mtr. Below or as per site requirement from ground level. 7. SITC of LT heat shrinkable straight through joint with required accessories complete in all respect suitable for LT XLPE 4 core cable as per site requirement. *8. Cable Route Marker: Cable Route Marker size 200X150X3 mm thick GI plate for HT/LT electrical underground cables. The plate shall be provided with 250X50X6 mm flat whose one portion shall be welded to the route marker plate and another antiskid end shall be embedded suitably in 150X150X 150 mm M-20 grade concrete and concrete block shall be minimum 100 mm below the ground.*		

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
11	SITC of Water Cooler (150 Ltrs) capacity with MS Cage & suitable protection arrangement as per site requirement.	1. SITC of self-contained drinking water cooler 150 litres capacity (cooling capacity 150 Lts. per hour), ISI marked, min 3 star rated, suitable for operation on 230 volts+/-10%, 50Hz, AC supply system complete with all connected standard fittings, accessories etc. and 5KVA, wall mounted, I.C. controlled electronic auto-voltage corrector.	i. IS:1475/2005 ii. IS: 1475 Part-1/2001	Blue Star, Kelvinator, Shriram, Voltas or similar as approved by Engineer.
12	*Provision of Water Pumping Arrangement system with 10 HP Submersible Pump set, 10000 LPH or Above; Head range: 160M or above; Phase: 3 Phase;* *Submersible pump set ,2 HP Head Range 20-25 mtr,5000 LPH capacity* *Submersible pump 5 HP Monoblock Head Range 20-25 mtr, 15000 LPH capacity*	1.SITC The pump set 10 HP shall be Energy Efficient Pumps (3 star or above) confirm to latest relevant IS and shall be guaranteed for the pump discharge range of head between +25% and - 10% of the specified head. The pump set shall be suitable for 8" dia bore well. Rotor dynamically balanced suitable for operation on 3-phase 50 Cycles 415Volts -10% +5% AC Supply. Motor squirrel cage induction type and shall be adequate capacity to provide the pump discharge within the range as specified. The Electric motor shall be water-cooled and water lubricated sealed against pollution from outside water. The thrust bearing shall be hydrodynamic Mitch well type preferably and provided with tilting thrust pads de-signed to make up all outward loads at the most unfavourable conditions. The motor shall be of ISI 410grade material; starter of motor should be impregnated with superior quality epoxy paint having type it thermal insulation as per IS5831-1970 or latest the rotor shall be dynamically balanced. All nut-bolts in contact with water of bore well should be of stainless steel. 2.Supply, *Installation*, testing and commissioning *(SITC)* of single stage Mono-block open well submersible pump set with control panel rating 2 HP/1.5KW, Head range (M) :26 meters and above,	i. IS:8034/2002 for submersible pump set. ii. IS: 9283/1995 for Motor of submersible pump set. iii. IS: 14220/1994 for open well submersible pump set. iv. IS 694 Part-I 1964 or latest for CU cable.	i. ABB / BBL / Crompton Greaves / Kirloskar or similar as approved by Engineer. ii. Finolex / Polycab / KEI / Havells / Lapp or similar as approved by Engineer for CU cable.

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
		size (MM) suction X delivery 50X40, Discharge (LPH):5000 or above at 26-meter head suitable for single phase 50Hz AC supply. 3. Supply, *Installation ,Testing & Commissioning of* Three phase, mono block Horizontal/Sump pump *submersible* 5 HP, 3.75 KW (dia 150 mm), 20-25 mtrs. Head, discharge *1500 LPH with control panel and* complete with all accessories. *4. Supply and laying of flat submersible cable copper 3Cx6/3Cx10 sq.mm for pump set ISI mark as per requirement.*		
13	Supply, Installation Testing and Commissioning of Earthing System	1. The earthing shall be done with 3 meters long 50 mm dia. 'B' class G.I. Pipe earth electrode with l2 mm dia. holes around the pipe at distance of 30 cm, down side tapered. Earth electrode to be put vertically 3-meter-deep with alternate layer of salt & charcoal approx. 50 kg charcoal and l0 kg salt. 8 SWG hot dip G.I. or 7/4 mm dia. galvanized steel stranded earth wire shall be connected from earth electrode top with l2 mm dia. G.l. nut bolt to main board / equipment with masonry / RCC earth enclosure of size 300x300x300 mm (ln side to inside) with I25 mm wall thickness & suitable size *CI* /RCC pull out cover. The G.l. wire shall run in l2 mm 'B'class G. I. Pipe along with wall / pole up to height of 1.5 meter. The depth of 8 SWG hot dip G. I. or 7/4 mm dia galvanized steel stranded earth wire including connections from earth pipe to main board / equipment /H pole/Tower in ground shall be 30 cms.	i. IS:1239 or latest IS: 3043 ii. RDSO specification No. iii. RDSO/PE/SPEC/PS/0109 (REV-0)-2008	1) TATA, Jindal, Prakash, Surya Sail or similar as approved by Engineer for MS pipe for earthing. 2) Erico / Indlec / Duvalmession or similar as approved by Engineer for maintenance free earth.

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
		2 Supply and providing of Maintenance Free Earthing with primary *GI* conductor 40 mm dia 3000 mm long and secondary *GI* Electrode 80 mm dia 3000 mm long includes digging pit of size 5ft.x5ft.x10ft. And using earth enhancement chemical compound minimum 75 kg. Per pit suitable for 40 KA current capacities. 3. supply of Copper earthing of size (600x600x3 mm) thick copper earth plate & suitable size of 40 X 5 mm copper strip. The price shall also cover erection including digging of earth pit in any kind of soil at the specified location. The work shall also cover the earth treated to obtain earth resistance of less than 1 ohm. Connection of earth electrode should be made by providing Copper clamps nuts, bolts.		
14	Supply and fixing of suitable size feeder pillars and Junction Box	1. Supply, erection, testing and commissioning of feeder pillar size 900x600x300 mm fabricated from 16 SWG *CRCA* sheet suitable for outdoor installation, powder coated *7 tank process* complete enclosed type dust and vermin proof, with gland plate in bottom as required including connecting incoming & outgoing cables with aluminium lugs and brass glands, with 63 amp MCCB and 4 nos. aluminium bus bars suitable for 200A, complete with locking arrangement with *GI* angle stand 2 feet height angle size 40 x40 x6 mm Grouted in cement concrete mixture 1:3:6. 2. Supply and fixing of junction box size 390x305x170mm comprising of SMP/FRP material with rubber gasket, padlock arrangement, zinc pas- sivated earth bolt, etc. similar to Sintex model no. GSJB 3525 or similar with 4 no. aluminiums bus bar cap 200 Amp. Suitable for 415-	Relevant IS code	Popular make of ISI mark

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
		volt supply requirement. The box shall be fixed robustly with clamps at pole/ wall as per requirement.		
15	Supply and fixing of CLS panel suitable for 25 kVA/10 KVA capacity AT supply with complete accessories and protection system as per RDSO specification	1.SITC of CLS panel including automatic changeover complete as per connections as required.	RDSO specification No.TI/SPC/PSI/CLS/0020 (12/02) with A&C slips No. 1 to 4 or latest,	RDSO approved make.
16	Supply and fixing of Phase selector of size (610x450x190mm) with I/P MCCB- 100/ 63 amp and O/P MCCB- 63 Amp	1. SITC of 1.6 mm thick CRCA powder coated box of size 610 x 450 x 190 mm approximate with Din rail. The distribution board shall be indoor type dust vermin proof Knock out/glands plates as applicable shall be provided in the box for incoming and outgoing cables. Earth terminals shall be provided. Danger notice shall be provided at appropriate place. The complete internal wiring for each phase selector is to be done with copper wire of size 10 sqmm. 2. It consists of 01 no. 100 amp TPN MCCB as incomer,01 no. 100/63 amp (as per requirement) SPN MCCB as outgoing, 04 nos. integrated LED pilot lamp (3 incoming+1 outgoing),01 no. 63-amp selector switch (phase selector switch) without OFF Three pole three ways (Three phase incoming & only one phase outgoing.	Relevant IS code	
17	Design, supply, testing Erection and commission of	1. SITC of 1.5 mm CRCA sheet steel fabricated, cubicle, having outdoor type LT panel distribution	IS: 2147-1952 IS:2675-1966	Rittal / ABB / Schneider or similar as approved by Engineer.

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
	Indoor type LT panel with one incoming MCCB of suitable rating and Min 6 Nos of Output MCCB of suitable rating.	board, having suitable IP protection, floor mounted front operated, mounted on *GI* base channel of suitable size, with top / bottom removable cable gland plate as required, earth bus, hinged and lockable doors, dust and vermin proof, complete with all inter connections, small wiring by min 2.5 sq mm copper wires. The panel should consist of(A) incoming 2x250 amp 4 pole MCCB's with changeover provision (if required) with microprocessor release having integral overload, short circuit, earth fault and neutral protection and breaking capacity 60 KA (Ics=100%Icu). (B)outgoing 2x125 amps, 2x100 amps and 2x63 amp 4 poles MCCB's with adjustable overload and adjustable short trip unit and breaking capacity 36KA (Ics=100%Icu). the panel is to be provided with over voltage protection with suitable relay. The bus bar shall be insulated by heat shrinkable sleeves. The instrument shall be of flush type ammeter, voltmeter, and selector switches with CTs, feeder name & danger board.		
18	*Supply, Installation, Testing and Commissioning of 2 kVA, 240 volt AC, pure sine wave online inverter cum UPS consist of intelligent battery charging mechanisms with adaptive battery charging and 150 AH, 24 Volt tubular battery (2 nos 12 volt batteries to be connected in series) suitable for heavy duty application. Warranty of invertors is 24 months and for Battery -36 months*	1.SITC of 2 kVA, 24-volt pure sine wave Online UPS cum inverter. 2. SITC of 150 AH 24 volt heavy duty tubular Battery with 3 year warranty.	IS:13314/1992 for Inverter	Luminous, Microtek, Exide, Amaron or similar as approved by Engineer.

S.No	Description of work	Work to be Done	Relevant IS Code/Standards	Reference Make
19	Supply, *Installation, Testing and Commissioning* of Perforated Cable Tray of size 150x50 mm made out of MS sheet and hot dip galvanized (85 microns) 1.6 mm thick with suitable fixing Arrangements.	SITC of 150x50 mm and 1.6 mm tick galvanised cable tray for laying of cable with all accessories.	Relevant IS code	Adarsh / Indiana / Mahesh Wari or similar as approved by Engineer.
20	Fresh connection / Load Augmentation complete in all respect and as per specification.	*Application for New 11kV HT connection at new Patli station and New connection/Load Augmentation at LT at Dhulawat, Chandla Dungerwas, Pachgaon and Sultanpur Station and availing connection in HORC premises shall be arranged by the contractor. Necessary coordination and liaisoning with DISCOM shall be made by contractor including payment of all charges for bringing the power supply HT/LT from DISCOM terminal to HORC HT/LT Panel.*	-	-

6.2 DETAILED SPECIFICATION FOR PASSANGER LIFTS (FOR 13 PERSONS)

1	Type of Lift	Passenger lift
2	Number of lift required	As per requirement
3	Load: no. of person	13 Person
4	Related speed	1.0 metre per second
6	Number of floor served	2
7	a) Inside size of lift well	Approx. size 2500 mm x 1900 mm deep or as Per site feasibility
	b) Pit depth	1600 mm or as per site feasibility
	c) Head room	4800 mm or as per site feasibility
8	Clear inside size of lift car	Approximate size : 2000x1100x2200(H) mm or as per site feasibility
9	Dimension of machine room	Not Applicable(No machine room is being provided)
10	Position of counter weight	At the back / side of the car
11	Position of machine room	Not applicable
12	a) Type of control	Microprocessor based AC variable voltage variable frequency
	b) Type of operation	Simplex selective – collective without attendant
	c) Potential free contacts	Yes potential free contacts for each floor position and up and down movement of the lift shall be provided in the controller which can be used for the building automation system at later
13	Car entrance door	
	a) Number	1 No. center/side opening stainless steel
	b) Size	Approx. size900x2000 mm high or as per site feasibility
	c) Type of doors	Horizontal sliding-center / side opening
	d) Car open in front only or open through	Open in front at ground floor and opposite / reverse opening at first floor
14	Construction design and finish of car body work	Stainless steel Hairline finish with stainless steel drop ceiling and led lights fittings for lightning inside the car and axial flow fan, 5 mm thick antiskid PVC flooring. All other item as per CPWD general specification for lifts 2003 with up to date amendments.
15	Type of signal system	(a) Digital floor position indicator in the car and all landings (to be provided above the car/ landing doors).
		(b) Travel direction indicator in the car and at all landings. (to be provided above the car/ landing doors).
		(c) Gongs & visual indication through directional arrows on all landings pre arrival of the car at all floors.
		(d) Over load warning audio & visual indica-tor , inside the car (lift should not start on overload)
		(e) Battery operated alarm bell and emergency light.
		(f) Car operating panel with fade proof luminous buttons in in the car and with intercom. Braille switches to be provided in the lift.
		(g) Luminous hall buttons at all landings with Braille switches.
		(h) Fireman's switch at ground floor.

		(i) Voice annunciation system. This will announce the position of the car landing in Hindi & English facilities for any other announcement to be made from the central control room / reception of the building.
		(j) Protection against over – voltage, under voltage and single phasing should be provided.
16	Landing entrance	
	a) Location of landing entrance in different floors	Front at ground floor and opposite / reverse at first floor
	b) Number	2 pairs
	c) Size	Approx. size 900 mm wide x 2000 mm high or as per site feasibility
	d) Type of doors	Horizontal sliding – canter / side opening
	e) Lift in use / lift out of order sign	Suitable box above the landings with LED illuminated bilingual (in English & Hindi) sign of "LIFT OUT OF ORDER" coming up simultaneously on all floors.
17	Electric supply	a) Power 415 V, AC, 50 Hz, 3 Phase, 4 Wire system.
		b) Lighting : 230 V, AC, 50 Hz, 1 Phase
18	Is neutral wire available for control circuits	Yes
19	Proposed date for commencement of site	-
20	Proposed date for completion	-
21	Environmental condition at site of installation	Summer condition Winter condition Monsoon condition Height above sea level
22	Storage space provided	_
23	Additional item, if any	
	a) Firemen's switch	Required for all lifts
	b) Emergency power supply	Available
	c) The firm's offer should include beam and all structural steel required for work	
	d) Automatic Rescue Device (ARD)	Provisions of automatic rescue device for the purpose of bringing the lift car to the nearest floor should be provided, one each for individual lift. ARD's are to be provided. The each shall consist of 1. Control panel with necessary interface /integration of device with main controller 2.Invertor of required capacity 3. Maintenance free batteries of Ampere –hours 4. Battery charging unit 5. "Rescue Operation On "indicator in the lift car.

S.NO.	**Particulars of detail**	
A	General	
1	Name of manufacture	As per CPWD approved 'A' category manufacture
2	Capacities (Persons/Weight)	13 Person/884 kg
3	Service	Passenger
4	Speed of travel	1.0 MPS
6	No. of floor served	02
7	No. of openings	02
8	Position of counterweight	At the back / side of the car or as per site feasibility
9	Type of levelling method	Automatic +/- 5 mm
B	**Machine**	
1	Position of machine	Top of lift shaft in hoist way / Machine room less
2	Motor	Permanent magnet synchronous Motor, Gear less machine
3	Electric supply particulars for which it is suitable for operation	3 PH 415 V 50 HZ 4 wire system
C	**Brake**	
1	Type	Electromagnetic brake
D	**Car & Doors**	**Horizontal sliding, centre / side opening**
1	Outside dimension of car	AS PER SITE CRITERIA
2	Inside clear dimension	Approximate size : 2000x1100x2200 (H) mm or as per site feasibility
3	Construction of car	Stainless steel Hairline finish with stainless steel drop ceiling and LED lights fittings for lighting inside the car and axial flow fan. 5 mm thick antiskid PVC flooring. All other item as per CPWD general specification for lifts 2003 with up to date amendments.
4	Design/ type of enclosure of car	Rectangular / as per site condition, stainless steel scratch proof (HAIR LINE FINISH)

S.NO.	**Particulars of detail**	
5	Details of flooring	6 mm thick aluminium/5 mm SS Chequered plate
6	Attachment and fitting inside the car	Axial flow fan & LED light fittings with anti – theft arrangement (As per requirement)
7	Car doors	HORIZONTAL SLIDING, CENTRE/SIDE - OPENING
	a) Size	Approx. size 900mm x 2000 mm or as per site feasibility
	b) Operation	Power operated automatic door
	c) Construction, design & finish	Stainless steel scratch proof (HAIR LINE FINISH)
8	**Landing Doors**	
	a) size	Approx. size 900 mm x 2000 mm high or as per site feasibility
	b) operation	Power operated automatic door
	c) Construction, design & finish	Stainless steel scratch proof (HAIR LINE FINISH)
E	**SAFETY DEVICE**	
1	Car safety type	Progressive / instantaneous type
2	Counter weight safety- type	-
3	Door inter locks in car- type	Electrical type
4	Door locks in landing- type	Electromechanical type
F	**For physically challenged**	Note below
	Voice Response System.	Required in Hindi, English / local language if needed
	Luminous Push Button with Brail script.	Required
	Hand Rails	Stainless steel hair line finish, SS - 304

Note: -

a) All materials used in the work shall be procured from RDSO approved sources or ISI marked only and of the best quality and of the class suited for the purpose

specified.

b) Design codal life of all type of material/equipments should be as per RDSO codal life standard.

c) The contractor shall be solely responsible for the correctness of the position, levels and dimensions of the works according to approved drawings, notwithstanding that he may have been assisted by the Engineer or his men in setting out the same.

d) Notwithstanding anything given anywhere else all work execution shall be as per latest design and drawing of RDSO and latest guideline issue by Railway Board.

e) The contractor should follow all the clearances as per latest CEA regulation.

f) Meet the all protective provisions relating to electrical safety.

XXXXX

Tender No. HORC/HRIDC/C-23/2022
Attachment 9
to
Corrigendum No. 2

Part 2, Section VII-8: Tender Drawings and Documents

Section VII-8B:

List of Documents

3. List of Charted Utilities/R1

3. List of Charted Utilities/R1

(Ref. Sub-Clause 10.45 & 10.46, Appendix 10, Section VII-9: Appendices, Part 2 Employer's Requirements)

S. No.	Description	Page
3.1	**Charted Utilities**	**1**
3.1.1	Type A-Overground Electrical Crossings	
	a) Overhead Electrical Crossings, LT and HT (up to 33 KV)	**2-4**
	b) EHT (above 33 KV)	**5**

3.1.1 Type A-Overground Electrical Crossings

a) Overhead Electrical Crossings: LT and HT (up to 33 KV)

C23 Section: Type A-Overhead Electrical Crossings: LT and HT (up to 33 KV)					
S. No.	**HORC CH.**	**FEEDER**	**Description**	**Utility Owner**	**Remarks**
From Ch: km 29.68 to km 49.70					
1.	28900	Dhulawat AP	HT Crossing 11 KV (UG)	DHBVN	Near Tall Road
2.	28900	Dhulawat AP	LT Line	DHBVN	
3.	28900	Dhulawat AP	LT Line	DHBVN	
4.	29500	Indu VSM Food	HT Crossing 11 KV (UG)	DHBVN	Sohana Road
5.	29500	Salaka RDS	HT Crossing 11 KV (UG)	DHBVN	Sohana Road
6.	29700	Salaka RDS	HT Crossing 11 KV (UG)	DHBVN	Janun Farm
7.	30200	Padheni AP	HT Line shifting with Pole	DHBVN	5 No Pole shifting
8.	30300	Padheni AP	HT Crossing 11 KV (UG)	DHBVN	Jungle
9.	30500	Salaka RDS	HT Crossing 11 KV (UG)	DHBVN	Padheri Gaon
10.	30500		LT Line	DHBVN	
11.	30900	Padheni AP	HT Crossing 11 KV (UG)	DHBVN	Jungle
12.	31000		HT Line shifting with Transformer	DHBVN	1 Transformer, 5 Pole shifting
13.	31000		LT Line	DHBVN	
14.	31150	Padheni AP	LT Line	DHBVN	Tubewell
15.	31550	Padheni AP	LT Line	DHBVN	Tubewell
16.	31800	Padheni AP	LT Line	DHBVN	Tubewell
17.	32500	Sarai AP	HT Crossing 11 KV (UG)	DHBVN	
18.	32520	Gogjaka AP	HT Crossing 11 KV (UG)	DHBVN	
19.	33450	Gogjaka AP	HT Crossing 11 KV (UG)	DHBVN	
20.	33300		2 Nos. LT Line	DHBVN	Tokas farm
21.	33600	Golagaon	HT Line shifting with 2 Nos Transformer	DHBVN	Kothi
22.	33800	Bissar RDS Feeder	HT Crossing 11 KV (UG)	DHBVN	2 cable Gaon k liye
23.	33880	Gogjaka AP	LT Line	DHBVN	
24.	34100	Bissar RDS Feeder	HT Crossing 11 KV (UG)	DHBVN	
25.	34690	DRDO Feeder	HT Crossing 11 KV (UG)	DHBVN	Near Mohammadpur KMP Bridge
26.	34700	Tarudhan Feeder	HT Crossing 11 KV (UG)	DHBVN	Near Mohammadpur KMP Bridge
27.	34710	MES Feeder	HT Crossing 11 KV (UG)	DHBVN	Near Mohammadpur KMP Bridge
28.	34720	Mohammadpur AP	HT Crossing 11 KV (UG)	DHBVN	Near Mohammadpur KMP Bridge
29.	3550	Mohammadpur AP	HT Crossing 11 KV (UG)	DHBVN	Mohammadpur Ahil Village

C23 Section: Type A-Overhead Electrical Crossings: LT and HT (up to 33 KV)					
S. No.	**HORC CH.**	**FEEDER**	**Description**	**Utility Owner**	**Remarks**
30.		Mohammadpur	LT Line	DHBVN	Tubewell
31.	35800	Mohammadpur	LT Line	DHBVN	House
32.	36000	Mohammadpur	LT Line	DHBVN	Tubewell
33.	36500	Mohammadpur	LT Line	DHBVN	Tubewell
34.	36700	Hasanpur RDS	HT Crossing 11 KV (UG)	DHBVN	Sabras Village
35.	36750		LT Line	DHBVN	Tubewell
36.	36750	Sabras AP	HT Crossing 11 KV (UG), Pole shifting with Transformer	DHBVN	Sabras Village
37.	37120	Sabras	HT Crossing 11 KV (UG), Pole Shifting	DHBVN	Sabras Village
38.	37450	Sabras	LT Line	DHBVN	Tubewell
39.	38100	Sabras	LT Line	DHBVN	Tubewell
40.	38760	Sabras AP	LT Line	DHBVN	Sabras Village
41.	38900	Kalwadi Feeder	2 Nos. LT Line	DHBVN	Tubewell
42.	39220	Kalwadi AP	HT Line Shifting with Transformer	DHBVN	Kalwari Village
43.	39800	Rathiwas Feeder	HT Crossing 11 KV (UG)	DHBVN	Udaipuri (Pandu ka Mandir)
44.	39900	Kalwadi Feeder	HT Crossing 11 KV (UG)	DHBVN	Udaipuri (Pandu ka Mandir)
45.	40000	Kalwadi Feeder	LT Line	DHBVN	Tubewell
46.	40750	Kalwadi Feeder	HT Line with Transformer	DHBVN	Langra Village
47.	41250	Kalwadi Feeder	LT Line	DHBVN	Langra Village
48.	41830	Kalwadi Feeder	LT Line	DHBVN	Langra Village
49.	42820	Taudu-Rathiwas	HT Crossing 33 KV (UG)	DHBVN	Near Chandladungerwas village
50.	43000	Sohna - Manesar	HT Crossing 33 KV (UG)	DHBVN	Near Chandladungerwas village
51.	42850	Sohna - Manesar	HT crossing 11 KV (UG)	DHBVN	Near Chandladungerwas village
52.	43140	Sohna - Manesar	HT Crossing 11 KV (UG)	DHBVN	Near Chandladungerwas village
53.	43240	Sohna - Manesar	HT Crossing 11 KV (UG)	DHBVN	Near Chandladungerwas village
54.	43388	Sohna - Manesar	HT Crossing 11 KV (UG)	DHBVN	Near Chandladungerwas village

C23 Section: Type A-Overhead Electrical Crossings: LT and HT (up to 33 KV)					
S. No.	**HORC CH.**	**FEEDER**	**Description**	**Utility Owner**	**Remarks**
55.	43625	Sohna - Manesar	HT Crossing 11 KV (UG)	DHBVN	Near Chandladungerwas village
56.	46600	Manesar	HT Crossing 11 KV (UG)	DHBVN	near mandir
57.	47170	Manesar	HT Crossing 11 KV (UG)	DHBVN	village road
58.	47300	Manesar	HT Crossing 11 KV (UG)	DHBVN	village road
59.	48450	Manesar	HT Crossing 11 KV (UG)	DHBVN	Near KMP Toll
From Ch: km 55.60 to km 61.50					
60.	56000	Dhani site	HT Crossing 11 KV (UG)	DHBVN	Near telecom Tower
61.	56170	Dhani site	LT Crossing	DHBVN	Near telecom Tower
62.	56525	Transformer Site	Transformer Shifting	DHBVN	Near Bargad tree
63.	57769	Pig Farm	HT Crossing 11 KV (UG)	DHBVN	College road
64.	58960	Store front Side	HT Crossing 11 KV (UG)	DHBVN	Farukhnagar Road
65.	59060	Store front Side	HT Crossing 11 KV (UG)	DHBVN	Farukhnagar Road
66.	59110	Store Back Side	HT Crossing 11 KV (UG)	DHBVN	Farukhnagar Road
67.	61545	Sultanpur Main Line 1	HT Crossing 11 KV (UG)	DHBVN	Near Farukhnagar line
68.	61555	Sultanpur Main Line 2	HT Crossing 11 KV (UG)	DHBVN	Near Farukhnagar line
69.	61565	Sultanpur Main Line 3	HT Crossing 11 KV (UG)	DHBVN	Near Farukhnagar line
70.	1320	Sultanpur loop Line 1	HT Crossing 11 KV (UG)	DHBVN	Near Store
71.	1760	Sultanpur loop Line 2	HT Crossing 11 KV (UG)	DHBVN	GAIL
72.	2650	Sultanpur loop Line 3	HT Crossing 11 KV (UG)	DHBVN	
73.	3270	Sultanpur loop Line 4	HT Crossing 11 KV (UG)	DHBVN	GAIL
74.	3345	Sultanpur loop Line 5	HT Crossing 11 KV (UG)	DHBVN	GAIL
75.	3630	Sultanpur loop Line 6	HT Crossing 11 KV (UG)	DHBVN	GAIL
76.	2050	Patli To New Patli	HT Crossing 11 KV (UG)	DHBVN	Near Aam Tree

3.1.1 Type A-Overground Electrical Crossings

b) **Overground Electrical Crossings**: EHT (above 33 KV)

C-23 Section: Type A-Overground Electrical Crossings: EHT (above 33 KV)					
S. No.	**Feeder**	**kV**	**Utility Owner**	**HORC CH**	**Remarks**
From Ch: km 56.60 to km 61.50					
1.	Harsaru-Farukhnagar line	66 kV	HVPNL	59+195	EHT Modification work is in progress
2.	Dadri-Samaypur-bahadurgarh line	220 kV	BBMB	59+280	
3.	Dhanonda-Daulatabad line	400 kV	HVPNL	60+210	
4.	Sec 95-Mau line	220 kV	HVPNL	01+860 (Patli - New Patli Connecting Line)	
5.	Agra - Jhatikra Line	765 KV	PGCIL	60+020	Not Required to be modified
6.	Sec-95 - Mau Line	220 KV	HVPNL	2+590	
7.	Agra - Jhatikra Line	765 KV	PGCIL	2+000 (New Patli to Sultanpur connecting Line)	
8.	Dhanonda - Daulatabad Line	400 KV	HVPNL	3+800 (New Patli to Sultanpur connecting Line)	
From Ch: km 29.68 to km 49.70					
9.	Tauru - Mohammadpur Ahil Line	66 KV	HVPNL	33+340	EHT Modification work is in progress
10.	Badshahpur - Rewadi Line	220 KV	HVPNL	41+200	
11.	Manesar - Neemranan Line	400 KV	PGCIL	44+030	
12.	66 KV Panchgaon - Farukhnagar Line on 220 KV Multicircuit Tower	66 KV	HVPNL	44+270	
13.	Agra - Jhatikra Line	765 KV	PGCIL	36+070	Not Required to be modified

Tender No. HORC/HRIDC/C-23/2022
Attachment 10
to
Corrigendum No. 2

Part 2,
Section VII-9: Appendices

Appendix 12/R1

APPENDIX 12/R1
CONTRACTOR'S SITE LABORATORY

12. SITE LABORATORY

12.1 The Site Laboratory shall be approximately 250m^2 in area. It shall consist of the following accommodation:

1 concrete laboratory	60 m^2 floor area
1 Soil laboratory	30 m^2 floor area
2 office	each 15 m^2 floor area
1 storeroom	10 m^2 floor area
1 kitchen	10 m^2 floor area
Male & female toilets, changing room & shower	sufficient for 6 persons

12.2 The remainder of the 250m^2 shall consist of storage area for concrete cube curing tanks. The laboratory, office etc. shall be in one building; the curing tank storage building may be in a separate building, but if so, it shall be adjacent to the laboratory building & connected to it by a level, weatherproof passageway. In addition, an area of covered hard standing of 50m^2 for motor vehicles shall be provided adjacent to the laboratory.

12.3 STANDARD OF CONSTRUCTION

12.3.1 The laboratory shall be constructed to the best Engineering practice and as approved by the Engineer. Two independent telephone lines with two extensions each shall be provided for the laboratory. Telephones shall be in areas as agreed with the Engineer.

12.3.2 A water tank with minimum capacity of 2000 litres shall be installed, as a source of constant water pressure (15 kPa minimum) for each laboratory.

12.3.3 In the case of sinks used for washing samples, adequate trapping and/or separating devices shall be provided to ensure the proper functioning of the facility.

12.4 FURNISHINGS AND FIXTURES

The contractor’s site laboratory shall be provided with required furnishings and fixtures.

12.5 LABORATORY EQUIPMENT

12.5.1 The laboratory equipment, as listed below, shall be approved by the Engineer. The Contractor shall submit for the Engineer's approval within 2 weeks of the order to commence work the name of the supplier it intends to use for each piece of apparatus together with the relevant catalogue number. All the equipment shall be ISI marked. The list of equipment for earthwork shall be as per Annexure-VIII and Appendix -N of RDSO Specification No. RDSO/2020/GE:IRS-0004, September 2020. Equipment for concreting shall conform to specification given in relevant IS codes.

12.5.2 The layout of the equipment in the testing laboratory shall be instructed by the Engineer. The equipment shall be maintained to an accuracy appropriate to the required testing methods with routine calibration by an accredited organization as recommended by the appropriate Authority. Equipment shall also be calibrated after maintenance or relocation.

12.5.3 The Contractor's site laboratory shall be equipped with the following material testing equipment as a minimum. The nature and quantity of equipment required for testing may be varied by the

Engineer depending on the detail of the Contractor's Design and Construction methods or for any other reason which he deems to be valid and necessary for the proper control of quality:

S. No	Description	Unit
1.	Determining Liquid Limit	1 complete set.
2.	Liquid limit device (Casagrande type)	2 Set.
3.	Cone penetrometer	2 Nos.
4.	Grooving tools	3 Nos.
5.	Evaporating dish	2 Nos.
6.	Spatula 100mm blade	2 Nos.
7.	Laboratory balance, capacity 500 gm, (Sensitivity 0.01 gms.)	1Nos.
8.	Wash bottle, capacity 500 ml.	3 Nos.
9.	Wash bottle, capacity 1 lit.	2 Nos.
10.	Moisture cans, capacity 50 ml.	36 Nos.
11.	Determining Plastic Limit	(1 complete set)
12.	Glass plate 50cm x50cm x10 mm	3 Nos.
13.	Stainless steel rods, 3 mm dia.	2 Nos.
14.	Determining Moisture Content	1 complete set.
15.	Micro Oven- thermostatically controlled to maintain a temperature 105 to 110 °c.	1 No.
16.	Electronic weighing machine capacity 200 gm., sensitivity 0.01 gm.	2 Set.
17.	Lab. Tongs	1 No.
18.	Moisture cans 75ml. with lid	36 Nos.
19.	Compaction Characteristics	1 complete set.
20.	Standard compaction mould 100mm dia.	6 Nos.
21.	Modified compaction mould 150mm dia.	6 Nos.
22.	Standard compaction Rammer, 2.6 kg.	2 Nos.
23.	Modified compaction Rammer, 4.89 kg.	2 Nos.
24.	Straight edge 300mm long	2 Nos.
25.	Sample ejector for 100mm and 150mm mould	2 Nos.
26.	Sample tray 60 x 60 x 8 cm	10 Nos.
27.	Wash bottle, 500 ml.	2 Nos.
28.	Moisture cans 250 ml.	80 Nos.
29.	Density of soil in-place by sand cone method	2 complete set.
30.	Sand density cone apparatus, 150mm	2 Nos.
31.	Plate, 300mmx300mm with center hold 150mm	2 Nos.
32.	Glass jug for sand cone	2 Nos.
33.	Chisel 25mmx 150mm	6 Nos.
34.	Hammer	6 Nos.
35.	One-gallon field cans	24 Nos.
36.	Sampling spoon	3 Nos.
37.	Soft hairbrush	3 Nos.
Sieve Analysis		

S. No	Description	Unit
38.	Electric Sieve shaker (portable)	1 unit
39.	Coarse sieves in Sizes from 100mm to 10mm (As per IS 383 table no. 2) Fine Sieves 10mm, 4.75mm, 2.63mm, 1.18mm, .600mm, .300mm, .150mm) Pans & Covers Specific Gravity and Absorption of Coarse Aggregate Wire basket, 200mm dia.	1 Set each
40.	Heavy duty suspension balance, 20 kg x 1 gm. with accessory for weight in water.	2 Set.
41.	Suitable water container	1 Nos.
42.	Unit Weight of Aggregate Balance, 100 kg. capacity with 10 gm precision	1 No.
43.	Tamping rod 16mm diameter x 600mm long	3 Nos.
44.	Measuring containers (3,10,15,30 liters)	1 each
45.	Flakiness and Elongation Flakiness gauge, elongation index	2 Set.
46.	Soundness Test	
47.	Sodium sulphate	25 Kg.
48.	Soaking tank	1 Nos.
49.	Balance, Capacity 3 kg., Sensitivity 0.1 gm.	1 Set.
Concrete		
50.	Buckets for concrete sampling	12 Nos.
51.	Slump cone	12 Nos.
52.	Tamping rod	12 Nos.
53.	Base plate	12 Nos.
54.	Mixing pan for concrete	2 Nos.
55.	Scoop for general purpose	6 Nos.
56.	Concrete thermometer	6 Nos.
57.	Concrete cylinder mould, 150 mm * 300 mm;	30 each
58.	150 mm * 200 mm	30 each
59.	Concrete cube mould, 100 mm cube & 150 mm cube	10+100 each
60.	Adjustable spanners for dismantling cube moulds	6 Nos.
61.	Capping set	2 Nos.
62.	Capping Compound	As per requirement
63.	Riffle	1 No.
64.	Concrete curing tank with capacity for 270 cubes, temperature controlled, with circulation system drain and lockable cover	2 Nos.
65.	Schmidt test hammer	1 No.
66.	Compression testing machine (Fully automated)	1 No.
67.	Mould oil	As per requirement
68.	Temperature chart recorder	1 No.
Miscellaneous		
69.	Vernier calipers to measure up to 200mm, with elongated jaws	5 Nos.
70.	Steel rule, 300 mm long graduated	2 Nos.
71.	Rubber gloves	10 pr.
72.	Cotton working gloves	20 pr.
73.	First aid kit	1 Set.

S. No	Description	Unit
74.	Wire brush	6 Nos.
75.	Steel tape, 3m, 5m, 30m	3 each.
76.	Ball peen hammer, 1 kg	2 Nos.
77.	Paint scraper. Approx. 100mm wide	8 Nos.
78.	Float, steel Approx.280 x 120 mm	8 Nos.
79.	Sack barrow	1 No.
80.	Shovel: Square Mouthed	2 Nos.
81.	Round Mouthed	2 Nos.
82.	24- wheel trolley, heavy duty, approx. 0.7m x 1.0m long pneumatic tyred type	2 Nos.
83.	Wheelbarrow, rubber tyred	1 Nos.
84.	Comprehensive tool kit. To include screwdrivers, pliers, claw hammer, multi-grips, spanners (adjustable)	1 No.
85.	Type NR Schmidt Hammer and tester with recording device	1 No.
86.	Testing Anvil for Schmidt Hammer test (SHT)	1 No.
87.	Chart recording paper for SHT	10 pkts.
88.	Cover meter for detecting metal objects to depth of 100mm below the surface of non-magnetic objects	3 Nos.
89.	Noise meter	1 No.
90.	RCPT Testing Machine with mould	1 No.
91.	Permeability Testing Machine	1 No.
92.	Rain Gauge	1 Set.
93.	Loss angeles abrasion machine	1 Set.
94.	Mortar cube casting machine	1 Set.
95.	Cement testing kit as per Is-4031	1 Set.
96.	Nuclear Moisture Density Gauge (NMDG) Apparatus	2 Set.
97.	Core cutter with dolly and hammer (as per appendix D od RDSO-004)	4 Set.

S. No.	Consumable Item
1	Sieve brush Wire brush
2	Sodium carbonate
3	Sodium hexa meta phosphate.
4	Kerosene Mercury

S. No.	Additional Equipment
1	Hand auger 150mm dia with extension rod
2	Sampling tube 100mm dia. And 450mm length

Note: All machines and equipment should have Calibration Certificate.

Tender No. HORC/HRIDC/C-23/2022
Attachment 11
to
Corrigendum No. 2

Part 2, Section VII-8: Tender Drawings and Documents Section VII-8A: Tender Drawings/R1

Section VII-8: Tender Drawings and Documents

A- Tender Drawings/R1
B- Tender Documents

Section VII-8
A: Tender Drawings/R1

List of Drawings

-Black colour shows Tender drawings which have not been revised

-Blue colour shows Tender drawings which have been revised

-Red colour shows New additional Tender drawings

Note: Tender Drawings are available for downloading on HRIDC website under Active Tender Section (https://hridc.co.in/active-tender.php).

S. No	TITLE	REVISED/NEW DRAWING NO.
1. ALIGNMENT PLAN & L-SECTION		
1.	Conceptual Plan & longitudinal section (29KM to 33.0KM)	GC-HRIDC-ALL-DRW-ALN-P&P-29-33KM_A1
2.	Conceptual Plan & longitudinal section (33.0KM to 35.0KM)	GC-HRIDC-ALL-DRW-ALN-P&P-33-35KM_A1
3.	Conceptual Plan & longitudinal section (35.0KM to 40.0KM)	GC-HRIDC-ALL-DRW-ALN-P&P-35-40KM_A1
4.	Conceptual Plan & longitudinal section (40.0KM to 45.0KM)	GC-HRIDC-ALL-DRW-ALN-P&P-40-45KM_A1
5.	Conceptual Plan & longitudinal section (45.0KM to 50.0KM)	GC-HRIDC-ALL-DRW-ALN-P&P-45-50KM_A1
6.	Conceptual Plan & longitudinal section (55.0KM to 61.5KM)	GC-HRIDC-ALL-DRW-ALN-P&P-55-61.5KM_A1
7.	Conceptual Plan & longitudinal section connectivity towards Patli	GC-HRIDC-C2-DRW-ALN-P&P-03001_A2
8.	Conceptual Plan and longitudinal section connectivity towards Sultanpur	GC-HRIDC-C2-DRW-ALN-P&P-04001_A2
9.	Re-grading of Garhi Harsaru-Farukhnagar main line of Sultanpur station yard (conceptual)	GC-HRIDC-C23-DRW-ALN-P&P-06001_A0
2. ESP/YARD PLAN		
1.	Conceptual Engineering scale plan of New Patli Junction CH:58135.513 f/Prithala	GC-HRIDC-C23-DRW-STN-ESP-NPA01_A2
2.	Conceptual Engineering scale plan Sultanpur Kaliawas junction CH: 3674.74m f/Badsa KM:6/375	GC-HRIDC-C23-DRW-STN-ESP-SUL01_A2
3.	Conceptual Engineering scale plan Dhulawat Station CH: 32767m F/Prithala	GC-HRIDC-C23-DRW-STN-ESP-DHU01_A0
4.	Conceptual Engineering scale plan Chandla Dungerwas station yard CH:42606.159m F/Prithala	GC-HRIDC-C23-DRW-STN-ESP-CDU01_A1

S. No	TITLE	REVISED/NEW DRAWING NO.
5.	Conceptual Engineering scale plan Pachgaon Station yard Ch:46279.352m F/Prithala	GC-HRIDC-C23-DRW-STN-ESP-PCG01_A1
3. STATION BUILDING AND SUBWAY		
1.	Conceptual Architectural drawing New Patli Station & Subway Br.No 144A	GC-HRIDC-C23-DRW-STN-SAD-NPA01_A1 (Sheet 1 of 3)
		GC-HRIDC-C23-DRW-STN-SAD-NPA01_A1 (Sheet 2 of 3)
		GC-HRIDC-C23-DRW-STN-SAD-NPA01_A1 (Sheet 3 of 3)
2.	Conceptual Architectural drawing Sultanpur station building	GC-HRIDC-C23-DRW-STN-SAD-SUL01_A1
3.	Conceptual Architectural drawing Dhulawat station & subway Br.No 79	GC-HRIDC-C23-DRW-STN-SAD-DHU01_A1 (Sheet 1 of 2)
		GC-HRIDC-C23-DRW-STN-SAD-DHU01_A1 (Sheet 2 of 2)
4.	Conceptual Architectural drawing Chandla Dungerwas station & subway Br.No 104	GC-HRIDC-C23-DRW-STN-SAD-CDU01_A1
5.	Conceptual Architectural drawing Pachgaon station & subway Br.No 113	GC-HRIDC-C23-DRW-STN-SAD-PCG01_A1
4. BRIDGES		
4.1 MINOR BRIDGES		
4.1.1 MAIN LINE		
1.	Conceptual general arrangement drawing proposed ROB Br. No. 073 Span 1×11.5×11 RCC box (at Ch: 30155.000)	GC-HRIDC-C23-DRW-BRD-GAD-01073_A1
2.	Conceptual general arrangement drawing proposed Br. No. 074 span 2×3.0×2.0 RCC box (syphon) at Ch: 30528.000	GC-HRIDC-C23-DRW-BRD-GAD-01074_A1
3.	Conceptual general arrangement drawing proposed Br. No. 075 span 2×5.0×2.5 RCC box (syphon) at Ch: 30839.000	GC-HRIDC-C23-DRW-BRD-GAD-01075_A1
4.	Conceptual general arrangement drawing proposed RUB no. 076 span 2×6.2×5.650 RCC box at Ch: 31145.000	GC-HRIDC-C23-DRW-BRD-GAD-01076_A1
5.	Conceptual general arrangement drawing proposed RUB no. 077 span 1×6.0×4.0 RCC box at Ch: 31365.000	GC-HRIDC-C23-DRW-BRD-GAD-01077_A1
6.	Conceptual general arrangement drawing proposed RUB no. 078 span 1×6.0×4.0 RCC box at Ch: 32022.000	GC-HRIDC-C23-DRW-BRD-GAD-01078_A1
7.	Conceptual general arrangement drawing proposed RUB no. 080	GC-HRIDC-C23-DRW-BRD-GAD-01080_A1

S. No	TITLE	REVISED/NEW DRAWING NO.
	Span 1×6.0×4.50 RCC box at Ch: 33155.000	
8.	Conceptual general arrangement drawing balancing culvert bridge no. 81, 1x2x2 RCC box at CH:33269.230	GC-HRIDC-C23-DRW-BRD-GAD-01081_A1
9.	Conceptual general arrangement drawing bridge no. 82, 90, 96, 99 &122 pipe Culvert 1x1.8 span	GC-HRIDC-C23-DRW-BRD-GAD-PIPE_A1
10.	Conceptual general arrangement drawing for proposed RUB no. 083 span 2×7.0×5.650 RCC box at Ch: 33673.045	GC-HRIDC-C23-DRW-BRD-GAD-01083_A1
11.	Conceptual general arrangement drawing for proposed RUB no. 084 span 1×6.0×5.0 RCC box at Ch: 33976.50	GC-HRIDC-C23-DRW-BRD-GAD-01084_A1
12.	Conceptual general arrangement drawing for proposed RUB no. 085 span 2×5.5×5.650 RCC box at Ch: 34280.218	GC-HRIDC-C23-DRW-BRD-GAD-01085_A1
13.	Conceptual general arrangement drawing for road under bridge no 87 Span 1.0x5.0x3.0 RCC box at Ch: 35371.018m	GC-HRIDC-C23-DRW-BRD-GAD-01087_A1
14.	Conceptual general arrangement drawing for road under bridge no 88 Span 1.0x5.0x3.0 RCC box at Ch: 35916.064m	GC-HRIDC-C23-DRW-BRD-GAD-01088_A1
15.	Conceptual general arrangement drawing for proposed RUB no. 089 span 2×7.0×5.65 RCC box at Ch: 36984.118	GC-HRIDC-C23-DRW-BRD-GAD-01089_A1
16.	Conceptual general arrangement drawing for proposed RUB no. 091 span1×5.0×3.15 RCC box at Ch: 37804.099	GC-HRIDC-C23-DRW-BRD-GAD-01091_A1
17.	Conceptual general arrangement drawing proposed RUB no. 092 span 2×5.5×5.650 RCC box at Ch: 38456.750	GC-HRIDC-C23-DRW-BRD-GAD-01092_A1
18.	Conceptual general arrangement drawing for balancing culvert bridge no. 093 Span 1×3.0×2.0 RCC box at Ch: 39155.000	GC-HRIDC-C23-DRW-BRD-GAD-01093_A1
19.	Conceptual general arrangement drawing for road under bridge no. 094 span 1.0x5.0x3.0 RCC box at Ch: 39552.508	GC-HRIDC-C23-DRW-BRD-GAD-01094_A1

S. No	TITLE	REVISED/NEW DRAWING NO.
20.	Conceptual general arrangement drawing proposed RUB no. 095 span 2×5.5×5.650 RCC box at Ch: 40003.467	GC-HRIDC-C23-DRW-BRD-GAD-01095_A1
21.	Conceptual general arrangement drawing for proposed RUB no. 097 span 1×4.0×2.5 RCC box at Ch: 40671.025	GC-HRIDC-C23-DRW-BRD-GAD-01097_A1
22.	Conceptual general arrangement drawing for road under bridge no. 098 span 1.0x4.0x3.0 RCC box at Ch: 41312.174	GC-HRIDC-C23-DRW-BRD-GAD-01098_A1
23.	Conceptual general arrangement drawing for balancing culvert bridge no. 100 Span 1.0x2.0x2.0 RCC box at Ch: 41925.899	GC-HRIDC-C23-DRW-BRD-GAD-01100_A1
24.	Conceptual general arrangement drawing proposed RUB no. 101 span 2×7.0×5.650 RCC box at Ch: 41962.645	GC-HRIDC-C23-DRW-BRD-GAD-01101_A1
25.	Conceptual general arrangement drawing for balancing culvert bridge no 102 Span 1.0x2.0x2.0 RCC box at Ch: 42238.900	GC-HRIDC-C23-DRW-BRD-GAD-01102_A1
26.	Conceptual general arrangement drawing for proposed RUB no. 103 span 1×5.0×3.0 RCC box at Ch: 42578.906	GC-HRIDC-C23-DRW-BRD-GAD-01103_A1
27.	Conceptual general arrangement drawing proposed RUB no. 105 span 2×7.0×5.650 RCC box at Ch: 43506.883	GC-HRIDC-C23-DRW-BRD-GAD-01105_A1
28.	Conceptual general arrangement drawing for road under bridge no 106 Span 1.0x4.0x3.1 RCC box at Ch: 43758.291	GC-HRIDC-C23-DRW-BRD-GAD-01106_A1
29.	Conceptual general arrangement drawing for balancing culvert bridge no 108 Span 1.0x4.0x5.0 RCC box at Ch: 44281.401	GC-HRIDC-C23-DRW-BRD-GAD-01108_A1
30.	Conceptual general arrangement drawing for balancing culvert bridge no 109 Span 1.0x4.0x5.0 RCC box at Ch: 44401.641m	GC-HRIDC-C23-DRW-BRD-GAD-01109_A1
31.	Conceptual general arrangement drawing proposed RUB no. 110 span 1×6.0×5.0 RCC box at Ch: 44420.238	GC-HRIDC-C3-DRW-BRD-GAD-01110_A1
32.	Conceptual general arrangement drawing for balancing culvert bridge	GC-HRIDC-C23-DRW-BRD-GAD-01114_A1

S. No	TITLE	REVISED/NEW DRAWING NO.
	no 114 span 1.0x6.0x6.0 RCC box at Ch: 46635.175	
33.	Conceptual general arrangement drawing for road under bridge no 115 Span 1.0x6.0x6.0 RCC box at Ch: 46768.341	GC-HRIDC-C23-DRW-BRD-GAD-01115_A1
34.	Conceptual general arrangement drawing for balancing culvert bridge no 116 span 1.0x5.0x5.0 RCC box at Ch: 46915.023	GC-HRIDC-C23-DRW-BRD-GAD-01116_A1
35.	Conceptual general arrangement drawing for road under bridge no 117 Span 2.0x5.0x5.0 RCC box at Ch: 47300.018	GC-HRIDC-C23-DRW-BRD-GAD-01117_A1
36.	Conceptual general arrangement drawing for balancing culvert no 118 Span 1.0x4.0x4.0 RCC box at Ch: 47500.360	GC-HRIDC-C23-DRW-BRD-GAD-01118_A1
37.	Conceptual general arrangement drawing for balancing culvert bridge no 119 Span 1.0x4.0x3.0 RCC box at Ch: 47824.336	GC-HRIDC-C23-DRW-BRD-GAD-01119_A1
38.	Conceptual general arrangement drawing for balancing culvert bridge no 120 Span 1.0x4.0x4.0 RCC box at Ch: 48093.515	GC-HRIDC-C23-DRW-BRD-GAD-01120_A1
39.	Conceptual general arrangement drawing for road under bridge no 121 Span 1.0x4.0x4.0 RCC box at Ch: 48231.618	GC-HRIDC-C23-DRW-BRD-GAD-01121_A1
40.	Conceptual general arrangement drawing for road under bridge no 124 Span 1.0x4.0x4.0 RCC box at Ch: 48794.629	GC-HRIDC-C23-DRW-BRD-GAD-01124_A1
41.	Conceptual general arrangement drawing for road under bridge no 125 Span 2.0x5.0x3.6 RCC box at Ch: 49167.307	GC-HRIDC-C23-DRW-BRD-GAD-01125_A1
42.	Conceptual general arrangement drawing for bridge no. 126 Pipe culvert 1x1.2 span, at Ch: 49583.348	GC-HRIDC-C23-DRW-BRD-GAD-01126_A1
43.	Conceptual general arrangement drawing for balancing culvert bridge no 137 Span 1.0x5.0x4.0 RCC box at Ch: 56117.426	GC-HRIDC-C23-DRW-BRD-GAD-01137_A1
44.	Conceptual general arrangement drawing for road under bridge no 138 Span 1.0x5.0x4.0 RCC box at Ch: 56290.652	GC-HRIDC-C23-DRW-BRD-GAD-01138_A1

S. No	TITLE	REVISED/NEW DRAWING NO.
45.	Conceptual general arrangement drawing for balancing culvert bridge no 139 Span 1.0x5.0x4.0 RCC box at Ch: 56465.029	GC-HRIDC-C23-DRW-BRD-GAD-01139_A1
46.	Conceptual general arrangement drawing for balancing culvert bridge no 140 Span 1.0x5.0x4.0 RCC box at Ch: 56755.035	GC-HRIDC-C23-DRW-BRD-GAD-01140_A1
47.	Conceptual general arrangement drawing For Road + Balancing culvert bridge no 141/ 141A 1x2x2+1x5x4 RCC box at Ch: 57154.991/57167.991	GC-HRIDC-C23-DRW-BRD-GAD-01141_A1
48.	Conceptual general arrangement drawing for balancing culvert bridge no 142 1x5.0x4.0m RCC box at Ch:57520	GC-HRIDC-C23-DRW-BRD-GAD-01142_A1
49.	Conceptual general arrangement drawing for road under bridge no. 143, 2x7x5.25 RCC box at CH: 57670.809	GC-HRIDC-C23-DRW-BRD-GAD-01143_A1
50.	Conceptual general arrangement drawing for balancing culvert bridge no. 144, 1x2x2 RCC box at CH: 57987.046	GC-HRIDC-C23-DRW-BRD-GAD-01144_A1
51.	Conceptual general arrangement drawing for road under bridge no. 145, 1x5x3 RCC box at CH: 58203.149	GC-HRIDC-C23-DRW-BRD-GAD-01145_A1
52.	Conceptual general arrangement drawing for balancing culvert bridge no. 146, 1x2x2 RCC box at CH: 58564.993	GC-HRIDC-C23-DRW-BRD-GAD-01146_A1
53.	Conceptual general arrangement drawing for bridge no.146A - 5 m clear span inverted U over GAIL pipe line crossing at Ch. 58720.513	GC-HRIDC-C23-DRW-BRD-GAD-01146A_A0
54.	Conceptual general arrangement drawing for balancing culvert bridge no 147A 1x2.0x2.0m RCC box at Ch. 59587.000	GC-HRIDC-C23-DRW-BRD-GAD-01147A_A0
55.	Conceptual general arrangement drawing for road under bridge no. 148, 2x5x5.25 RCC box at CH: 59884.954	GC-HRIDC-C23-DRW-BRD-GAD-01148_A1
56.	Conceptual general arrangement drawing for Road+Balancing culvert bridge no 149/149A 1x5x3 + 1x2x2 RCC box at Ch. 60161.343m/ 60171.264m	GC-HRIDC-C23-DRW-BRD-GAD-01149_A1
57.	Conceptual general arrangement drawing for balancing culvert bridge	GC-HRIDC-C23-DRW-BRD-GAD-01154_A1

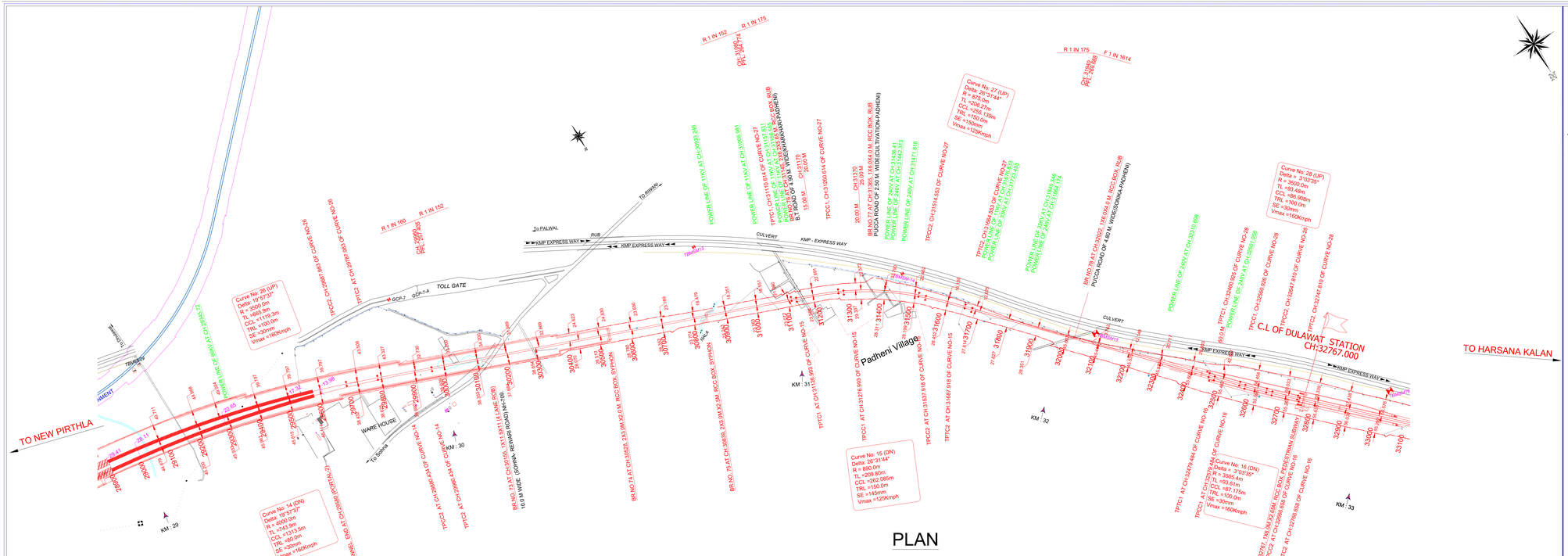
S. No	TITLE	REVISED/NEW DRAWING NO.
	no. 154, 1x2x2 RCC box at CH: 61163.504	
4.1.2 CONNECTING LINE		
A. NEW PATLI TO PATLI		
1.	Conceptual general arrangement drawing for road under bridge no. 1, 1x5x3.25 RCC box at CH: 1046.562 (connecting line New Patli to Patli)	GC-HRIDC-C23-DRW-BRD-GAD-03001_A1
2.	Conceptual general arrangement drawing for balancing culvert bridge no. 2, 1x2x2 RCC box at CH: 1277.958 (connecting line New Patli to Patli)	GC-HRIDC-C23-DRW-BRD-GAD-03002_A1
3.	Conceptual general arrangement drawing for road under bridge no. 3, 1x4x3.25 RCC box at CH: 1986.847 (connecting line New Patli to Patli)	GC-HRIDC-C23-DRW-BRD-GAD-03003_A1
4.	Conceptual general arrangement drawing for road under bridge no. 4, 1x5x5.25 RCC box at CH: 2518.489 (connecting line New Patli to Patli)	GC-HRIDC-C23-DRW-BRD-GAD-03004_A1 (Sheet 1 of 2) GC-HRIDC-C23-DRW-BRD-GAD-03004_A1 (Sheet 2 of 2)
5.	Conceptual general arrangement drawing for balancing culvert bridge no. 5, 1x2.5x3 RCC box at CH: 2687.006 (connecting line New Patli to Patli)	GC-HRIDC-C23-DRW-BRD-GAD-03005_A1
B. NEW PATLI TO SULTANPUR		
1.	Conceptual general arrangement drawing for balancing culvert bridge no. 2, 1x2x2 RCC box at CH: 1548.996 (connecting line New Patli to Sultanpur)	GC-HRIDC-C23-DRW-BRD-GAD-04002_A1
2.	Conceptual general arrangement drawing for bridge no.3A - 5 m clear span inverted U over GAIL pipe line crossing at Ch. 1785m (connecting line New Patli to Sultanpur)	GC-HRIDC-C23-DRW-BRD-GAD-04003A_A0
3.	Conceptual general arrangement drawing for balancing culvert bridge no.4, 1x2x2 RCC box at CH: 2189.831 (connecting line New Patli to Sultanpur)	GC-HRIDC-C23-DRW-BRD-GAD-04004_A1
4.	Conceptual general arrangement drawing for road under bridge no. 5, 1x5x4.25 RCC box at CH: 2823.679 (connecting line New Patli to Sultanpur)	GC-HRIDC-C23-DRW-BRD-GAD-04005_A1
5.	Conceptual general arrangement drawing for bridge no.5A - 5 m clear	GC-HRIDC-C23-DRW-BRD-GAD-04005A_A0

S. No	TITLE	REVISED/NEW DRAWING NO.
	span inverted U over GAIL pipe line crossing at Ch. 3733m (connecting line new Patli to Sultanpur)	
4.2	**MAJOR BRIDGES**	
4.2.1	**MAIN LINE**	
1.	Conceptual general arrangement drawing for PSC U Slab bridge no. 86, 2x12.2 RCC box at CH:34899.045	GC-HRIDC-C23-DRW-BRD-GAD-01086_A1
2.	Conceptual general arrangement drawing for proposed major bridge no.107 at Ch: 44246.344m 1 x 18.3 m Composite girder	GC-HRIDC-C23-DRW-BRD-GAD-01107_A1
3.	Conceptual general arrangement drawing for proposed major RUB no.111 at Ch:44570.310m as 1 x 18.3 m PSC I Girder	GC-HRIDC-C23-DRW-BRD-GAD-01111_A1
4.	Conceptual general arrangement drawing for prop. major RUB no.112, at Ch: 45495.969m 4x18.3(CG) + 1x30.5(CG) + 8x24.4 (CG) + 1x76.2(OWG) + 2x24.4(CG) + 1x61(OWG)	GC-HRIDC-C23-DRW-BRD-GAD-01112_A1 (Sheet 1 of 2) GC-HRIDC-C23-DRW-BRD-GAD-01112_A1 (Sheet 2 of 2)
5.	Conceptual general arrangement drawing for proposed viaduct br no.123 at Ch: 48663.628m as 1 x 18.3 m PSC I girder	GC-HRIDC-C23-DRW-BRD-GAD-01123_A1
6.	Conceptual general arrangement drawing for proposed major ROR bridge no.136, 18.3(CG) + 76.2(OWG) + 18.3 (CG) at Ch: 55724.752m	GC-HRIDC-C23-DRW-BRD-GAD-01136_A1
7.	Conceptual general arrangement drawing for proposed major RUB no.147 at Ch:59106.085m 1 x 45.7m, Open Web Girder	GC-HRIDC-C23-DRW-BRD-GAD-01147_A1 (Sheet 1 of 2) GC-HRIDC-C23-DRW-BRD-GAD-01147_A1 (Sheet 2 of 2)
8.	Conceptual general arrangement drawing for proposed major RUB no. 150, 1x30.5 Composite Girder at CH: 60457.614	GC-HRIDC-C23-DRW-BRD-GAD-01150_A1 (Sheet 1 of 2) GC-HRIDC-C23-DRW-BRD-GAD-01150_A1 (Sheet 2 of 2)
9.	Conceptual general arrangement drawing for proposed major RUB no. 151, 1x24.4 Composite Girder at CH: 60563.367	GC-HRIDC-C23-DRW-BRD-GAD-01151_A1 (Sheet 1 of 2) GC-HRIDC-C23-DRW-BRD-GAD-01151_A1 (Sheet 2 of 2)
10.	Conceptual general arrangement drawing for proposed major RUB no. 152, 1x24.4 Composite Girder at CH: 60642.669	GC-HRIDC-C23-DRW-BRD-GAD-01152_A1 (Sheet 1 of 2) GC-HRIDC-C23-DRW-BRD-GAD-01152_A1 (Sheet 2 of 2)

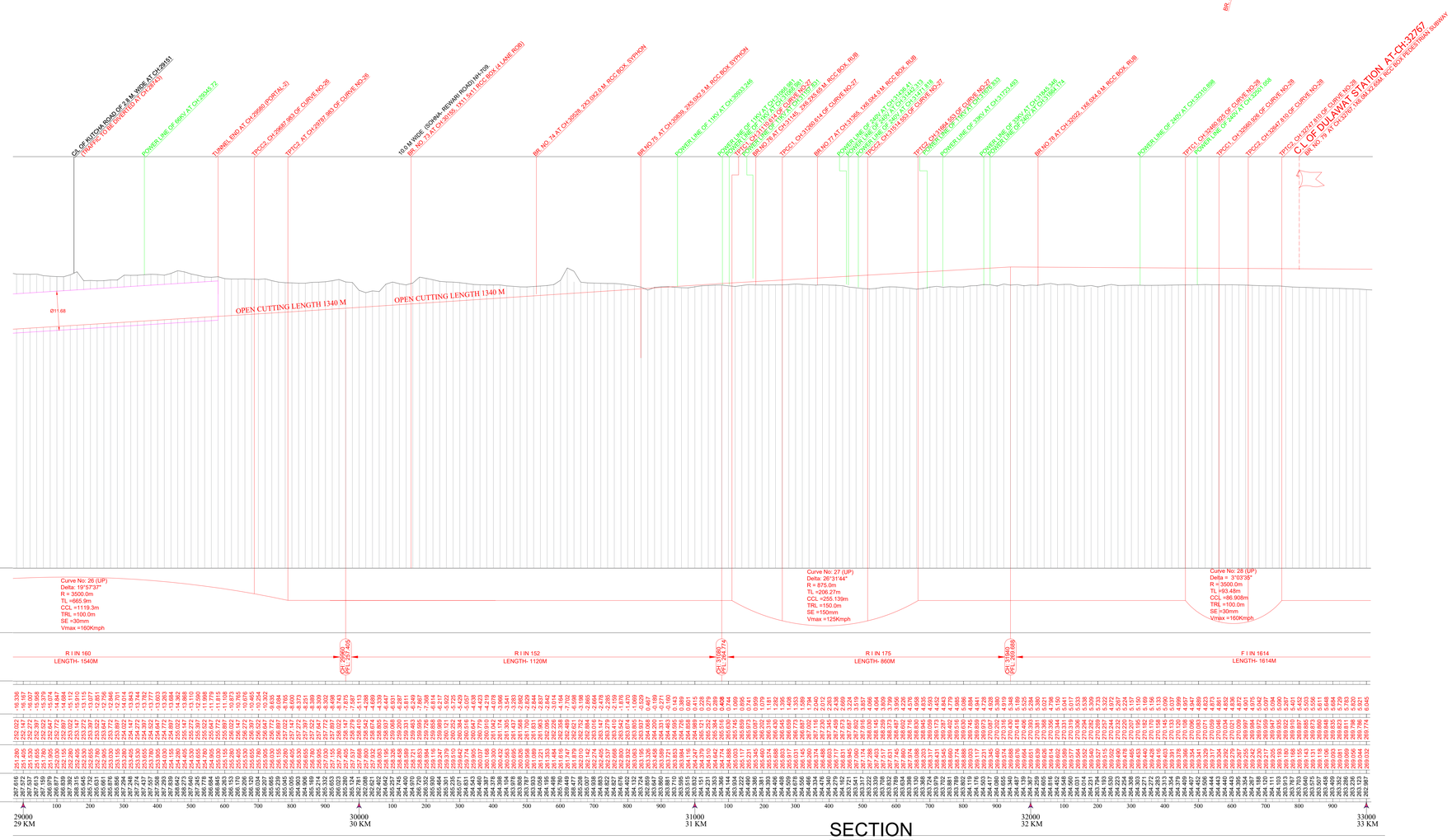
S. No	TITLE	REVISED/NEW DRAWING NO.
11.	Conceptual general arrangement drawing for proposed major RUB no. 153, 1x30.5 Composite Girder at CH: 60754.591	GC-HRIDC-C23-DRW-BRD-GAD-01153_A1 (Sheet 1 of 2)
		GC-HRIDC-C23-DRW-BRD-GAD-01153_A1 (Sheet 2 of 2)
4.2.2 CONNECTING LINE		
A. NEW PATLI TO SULTANPUR		
1.	Conceptual general arrangement drawing for proposed major RUB no. 1 at Ch:951.499 m 1 x 45.7m, Open Web Girder (connecting line new patli to sultanpur)	GC-HRIDC-C23-DRW-BRD-GAD-04001_A1
2.	Conceptual general arrangement drawing for proposed major RUB no. 3, 1x12.2 PSC U Slab at CH: 1767.989 (connecting line New Patli to Sultanpur)	GC-HRIDC-C23-DRW-BRD-GAD_04003_A1
5. MISCELLANEOUS DRAWINGS (CONCEPTUAL PLANS)		
1.	Conceptual Plan Typical embankment/cutting profile	GC-HRIDC-SK-GEN-001_A1
2.	Conceptual Plan S&T hut	GC-HRIDC-SK-GEN-002_A1
3.	Conceptual Plan Mini platform shelter	GC-HRIDC-SK-GEN-003_A1
4.	Conceptual Plan R.C. pre-cast fencing for end platform	GC-HRIDC-SK-GEN-004
5.	Conceptual Plan Station name board	GC-HRIDC-SK-GEN-005_A1
6.	Conceptual Plan Proposed toilet block on island platforms	GC-HRIDC-SK-GEN-006_A1
7.	Conceptual Plan Proposed toilet block on end platforms	GC-HRIDC-SK-GEN-007_A1
8.	Conceptual Plan Drains for Embankment	GC-HRIDC-SK-GEN-008_A1
9.	Conceptual Plan Steel barricade	GC-HRIDC-SK-GEN-009
10.	Conceptual Plan Water booth with one side taps arrangement (end platform)	GC-HRIDC-SK-GEN-010_A1
11.	Conceptual Plan Water booth with both side taps arrangement (island platform)	GC-HRIDC-SK-GEN-011_A1
12.	Conceptual Plan Ticket counter for New Patli station	GC-HRIDC-SK-GEN-013
13.	Conceptual Plan CC Toe wall	GC-HRIDC-SK-GEN-014_A1
14.	Conceptual Plan Typical details of protection work	GC-HRIDC-SK-GEN-015_A1
15.	Conceptual Plan Barbed wire fencing	GC-HRIDC-SK-GEN-016_A1

S. No	TITLE	REVISED/NEW DRAWING NO.
16.	Conceptual Plan Rain –Water Harvesting	GC-HRIDC-SK-GEN-018
17.	Conceptual Plan for Transition system of bridge approaches	GC-HRIDC-SK-GEN-019
18.	Conceptual Plan for Self-Supporting roof covering Shed	GC-HRIDC-SK-GEN-020
19.	Conceptual Plan for formation details below subway, lift well and building	GC-HRIDC-SK-GEN-021
20.	Conceptual plan for Trolley Refuge in embankment	GC-HRIDC-SK-GEN-022
21.	Conceptual plan for Trolley Refuge in cutting	GC-HRIDC-SK-GEN-023
22.	Conceptual sketch for RCC platform wall	GC-HRIDC-SK-GEN-024
23.	Conceptual Plan for single lane and double lane road	GC-HRIDC-SK-GEN-025
24.	Conceptual Plan for reinforced earth wall geogrid reinforcement	GC-HRIDC-SK-GEN-026
25.	Conceptual Plan for sump	GC-HRIDC-SK-GEN-027
26.	Conceptual sketch for NP4 pipe of 450mm Dia	GC-HRIDC-SK-GEN-028
27.	Conceptual sketch for precast RCC box 500 x 500 mm size	GC-HRIDC-SK-GEN-029
28.	Jurisdictional Sketch for civil works C-23 package	GC-HRIDC-C23-SK-CIVIL-001_A1
29.	Conceptual Plan Drainage arrangement (New Patli)	GC-HRIDC-C23-SK-CIVIL-002_A1
30.	Conceptual Plan Drainage arrangement (Sultanpur)	GC-HRIDC-C23-SK-CIVIL-003_A1
31.	Conceptual Plan Drainage arrangement (Dhulawat)	GC-HRIDC-C23-SK-CIVIL-004_A1
32.	Conceptual Plan Drainage arrangement (Chandla Dungerwas)	GC-HRIDC-C23-SK-CIVIL-005_A1
33.	Conceptual Plan Drainage arrangement (Pachgaon)	GC-HRIDC-C23-SK-CIVIL-006_A1
34.	Conceptual Plan Bank/cutting benching at interface locations	GC-HRIDC-C23-SK-CIVIL-009_A1
35.	Type plan powder toilet for divyangs	N.R.H.Q.E PLAN NO. HQ/20/11-2021

1.Alignment Plan & L-Section



PLAN



SECTION

NOTES :-

1. EXISTING WORK SHOWN IN BLACK.
2. PROPOSED WORK SHOWN IN RED.
3. ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE SPECIFIED.
4. CHAINAGE IS RECKONED 0.00 FROM C.L OF NEW PRITHLA STATION BUILDING .
5. RAIL LEVEL SHOULD BE 0.742m ABOVE FORMATION LEVEL FOR TRACK STRUCTURE 60KG NEW RAIL ON PSC SLEEPER (1660/KM) WITH 350mm BALLAST CUSHION.
6. RULLING GRADIENT IS 1 IN 150 OF THIS SECTION.(COMPENSATED)
7. VERTICAL CURVE WILL BE PROVIDED AS PER IRPWM PARA 419.
8. CROSS / LONGITUDINAL DRAINAGE ARRANGEMENT BET.TRACK SHOULD BE PROVIDED WHEREVER REQUIRED .
9. TROLLY REFUDGE IN BANKING / CUTTING SHALL BE PROVIDED AS PER PROVISION OF IRPWM.
10. STANRDARD OF LOADING (FOR PROP. LINE):- 32.5 T LOADING-2008 & HIGH RISE OHE.
11. TELEPHONE CABLE TO BE LAID FOR TELECOMUNICATION.
12. ALL ELECTRICAL X-ING WILL BE AS PER PARA II (I) OF CHAPTER I.GENERAL OF SCHEDULE 1 OF SOD 2004.

LEGEND	
EXISTING CENTRE LINE	
PROPOSED CENTRE LINE	
DFC CENTRE LINE	
EXISTING TPTC	
PROPOSED TPTC	
TBM	
KM-STONE	
PROPOSED BOUNDARY	
EXISTING BRIDGE	
PROPOSED BRIDGE	
NALA,CANAL,DRAIN	
PERMANENT STRUCTURE	
TEMPORARY STRUCTURE	
PROPOSED GATE LODGE	
TOE LINE	
ROAD	
POWER LINE WITH POLE	
PYLON	
EMBANKMENT / BUND	
ROCKY AREA	
COMPOUND WALL	
DITCH / QUARRY	
BARBED WIRE FENCING	
GROUND LEVEL	

GC/HORC	
NAME / DESIGNATION	SIGN
CHAHATEY RAM *PD*	
SUDHIR AGRAWAL *DPD/CIVIL*	
KRISHAN CHAND SAINSI *CRE/CIVIL*	

HRIDC	
NAME / DESIGNATION	SIGN
R. R. KUMAR *GM/ IP&P*	
RAJU SOLANKI *DGM/CIVIL*	

NORTHERN RAILWAY

DELHI DIVISION

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

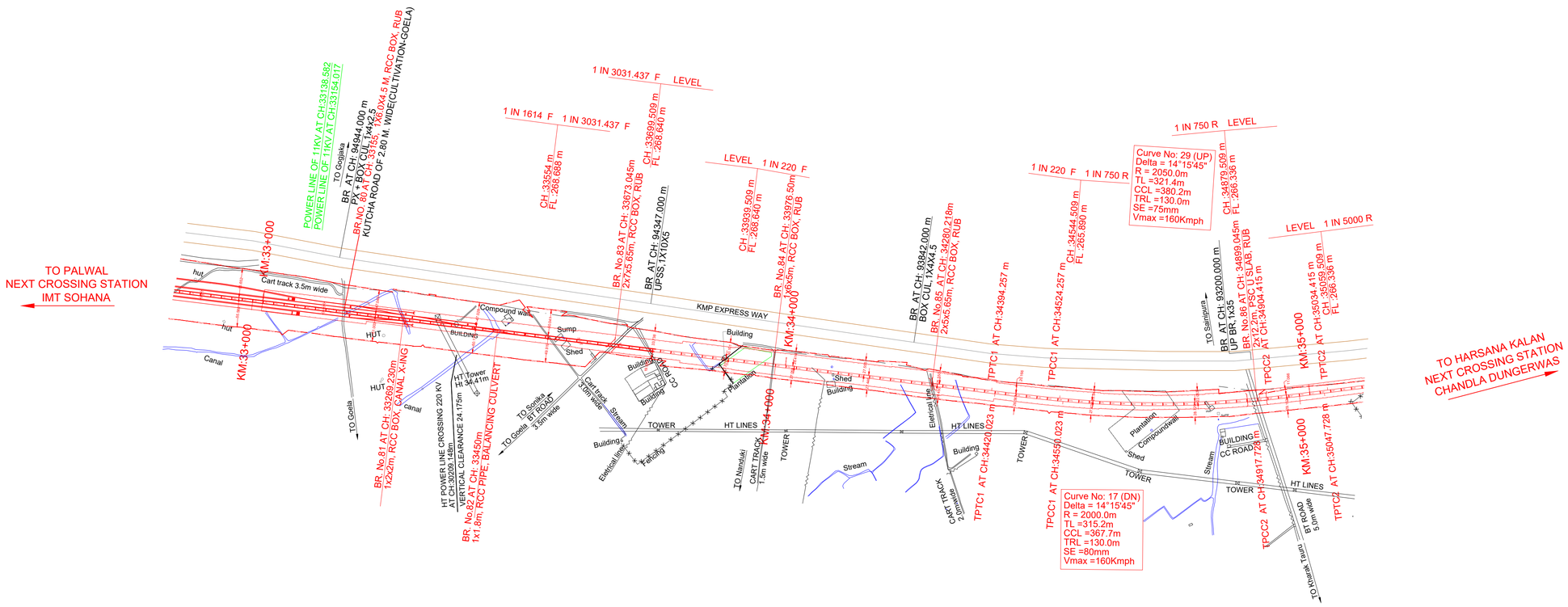
SIGN

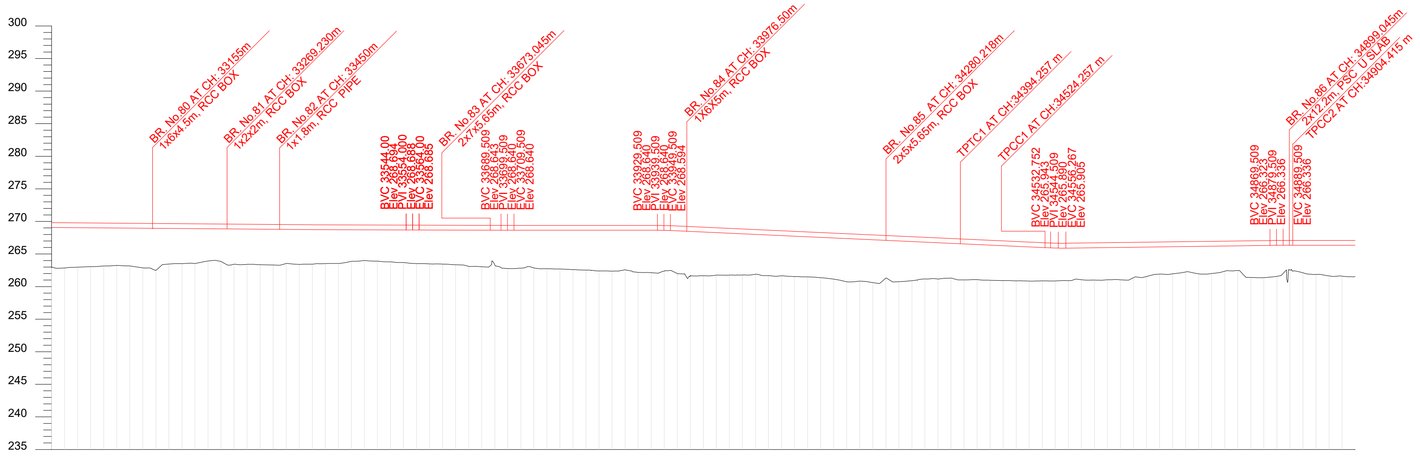
RITES THE INFRASTRUCTURE PEOPLE — SMEC YOUR DELIVERY PARTNER

TITLE:	CONCEPTUAL PLAN & LONGITUDINAL SECTION (29 KM TO 33.0 KM)
GC/HORC DRG. NO:-	GC-HRIDC-ALL-DRW-ALN-P&P-29-33KM_A1
ISSUE Dt:	11.11.2022 — REVISED Dt: 24.12.2022
SCALE	HORIZONTAL 1: 5000 — VERTICAL 1:500
SMC DRG. NO:-	SMC/HRIDC/TUNNEL/LS- (R-4)
CONSULTANT:	S.M. CONSULTANTS — An ISO 9001 Company — Khulsenwar / Balasore / Secunderabad / South Andaman / New Delhi — Web: www.smcindia.com, E-Mail: support@smcindia.com
DRAWN BY:-	L.MOHANTY — CHECKED BY:- SIVRAM J

A SERVENT PROJECT ENDURGE

RELEASED FOR	PRELIMINARY FOR APPROVAL	TENDER	CONSTRUCTION
		☑	





HORIZONTAL ALIGNMENT	L=1646.447m; TRL=130m; R =-2050m; TRL=130m
VERTICAL ALIGNMENT	L=1594m, 1 IN 1614 F; L=20.000m R=21220.654m; L=125.509m, 1 IN 3031.437 F; L=20.000m R=-60000.00m; L=220.000m LEVEL; L=20.000m R=4400.04m; L=583.243m, 1 IN 220 F; L=23.515m R=-4000.02m; L=313.242m, 1 IN 750 R; L=20.000m R=15000.01m; L=160.000m LEVEL

CHAINAGES	GROUND LEVELS	PROPOSED FORMATION LEVEL	PROPOSED RAIL LEVEL	HIGHT OF BANKING (+) / DEPTH OF CUTTING (-)
33000.0	262.987	269.032	269.774	+6.045
33020.0	262.854	269.019	269.761	+6.165
33040.0	262.977	269.007	269.749	+6.030
33060.0	263.065	268.994	269.736	+5.929
33080.0	263.157	268.982	269.724	+5.825
33100.0	263.242	268.970	269.712	+5.728
33120.0	263.168	268.957	269.699	+5.789
33140.0	262.861	268.945	269.687	+6.084
33160.0	262.470	268.932	269.674	+6.462
33180.0	263.458	268.920	269.662	+5.462
33200.0	263.527	268.908	269.650	+5.344
33220.0	263.551	268.895	269.637	+5.344
33240.0	263.915	268.883	269.625	+4.968
33260.0	263.860	268.870	269.612	+5.010
33280.0	263.445	268.858	269.600	+5.413
33300.0	263.415	268.845	269.587	+5.431
33320.0	263.357	268.833	269.575	+5.476
33340.0	263.305	268.821	269.563	+5.516
33360.0	263.550	268.808	269.550	+5.258
33380.0	263.402	268.796	269.538	+5.394
33400.0	263.446	268.784	269.526	+5.338
33420.0	263.524	268.771	269.513	+5.247
33440.0	263.536	268.759	269.501	+5.223
33460.0	263.872	268.747	269.489	+4.875
33480.0	263.998	268.734	269.476	+4.736
33500.0	263.897	268.722	269.464	+4.825
33520.0	263.799	268.709	269.451	+4.910
33540.0	263.703	268.697	269.439	+4.994
33560.0	263.328	268.684	269.426	+5.158
33580.0	263.470	268.672	269.414	+5.203
33600.0	263.450	268.659	269.401	+5.223
33620.0	263.354	268.647	269.389	+5.312
33640.0	263.101	268.634	269.376	+5.558
33660.0	263.048	268.622	269.364	+5.605
33680.0	263.350	268.609	269.351	+5.296
33700.0	262.769	268.597	269.339	+5.871
33720.0	262.825	268.584	269.326	+5.815
33740.0	262.859	268.572	269.314	+5.781
33760.0	262.743	268.559	269.301	+5.897
33780.0	262.700	268.547	269.289	+5.940
33800.0	262.598	268.534	269.276	+6.042
33820.0	262.532	268.522	269.264	+6.108
33840.0	262.406	268.509	269.251	+6.232
33860.0	262.337	268.497	269.239	+6.289
33880.0	262.360	268.484	269.226	+6.460
33900.0	262.180	268.472	269.214	+6.504
33920.0	262.136	268.459	269.201	+6.542
33940.0	262.372	268.447	269.189	+6.255
33960.0	261.999	268.434	269.176	+6.547
33980.0	261.639	268.422	269.164	+6.817
34000.0	261.657	268.409	269.151	+6.708
34020.0	261.756	268.397	269.139	+6.518
34040.0	261.764	268.384	269.126	+6.419
34060.0	261.762	268.372	269.114	+6.330
34080.0	261.886	268.359	269.101	+6.115
34100.0	261.886	268.347	269.089	+6.224
34120.0	261.650	268.334	269.076	+6.169
34140.0	261.543	268.322	269.064	+6.184
34160.0	261.447	268.309	269.051	+6.145
34180.0	261.357	268.297	269.039	+6.185
34200.0	261.144	268.284	269.026	+6.312
34220.0	260.735	268.272	269.014	+6.630
34240.0	260.841	268.259	269.001	+6.433
34260.0	260.609	268.247	268.989	+6.574
34280.0	261.289	268.234	268.976	+5.803
34300.0	260.758	268.222	268.964	+6.243
34320.0	260.901	268.209	268.951	+6.009
34340.0	261.171	268.197	268.939	+5.648
34360.0	261.169	268.184	268.926	+5.559
34380.0	261.300	268.172	268.914	+5.337
34400.0	261.020	268.159	268.901	+5.526
34420.0	261.061	268.147	268.889	+5.395
34440.0	260.913	268.134	268.876	+5.381
34460.0	261.044	268.122	268.864	+5.296
34480.0	260.887	268.109	268.851	+5.254
34500.0	260.838	268.097	268.839	+5.052
34520.0	260.881	268.084	268.826	+5.120
34540.0	260.865	268.072	268.814	+4.999
34560.0	260.911	268.059	268.801	+5.052
34580.0	261.049	268.047	268.789	+4.888
34600.0	260.998	268.034	268.776	+4.966
34620.0	261.043	268.022	268.764	+4.947
34640.0	261.037	268.009	268.751	+4.980
34660.0	261.373	267.997	268.739	+4.671
34680.0	261.549	267.984	268.726	+4.521
34700.0	261.906	267.972	268.714	+4.191
34720.0	261.952	267.959	268.701	+4.172
34740.0	262.124	267.947	268.689	+4.208
34760.0	262.565	267.934	268.676	+4.224
34780.0	262.177	267.922	268.664	+4.195
34800.0	262.009	267.909	268.651	+3.872
34820.0	262.358	267.897	268.639	+3.796
34840.0	262.461	267.884	268.626	+4.887
34860.0	261.397	267.872	268.614	+4.938
34880.0	261.372	267.859	268.601	+4.754
34900.0	261.579	267.847	268.589	+3.789
34920.0	262.547	267.834	268.576	+4.227
34940.0	262.109	267.822	268.564	+4.471
34960.0	261.865	267.809	268.551	+4.698
34980.0	261.638	267.797	268.539	+4.739
35000.0	261.597	267.784	268.526	+4.808
	261.528	267.772	268.514	+4.808

LONGITUDINAL PROFILE
HORIZONTAL-1:5000, VERTICAL-1:500

LEGEND:
- EXISTING RAILWAY TRACK
- PROPOSED UP & DN LINE
- DISMANTLING WORKS
- PROPOSED DIVERSIONS
- EXISTING ROAD
- PRO.HORC BOUNDARY
- EXPRESSWAY BOUNDARY
- HT LINE
- ELECTRICAL LINE(LT)
- STREAM / CANAL / DRAIN
- WELL
- POND
- PRO.TOE LINE

NOTE:-
1. ALL DIMENSIONS ARE IN METRE UNLESS OTHERWISE STATED
2. ALL THE LEVELS ARE WITH RESPECT TO MEAN SEA LEVEL.
3. TRACK CETRE BETWEEN MAIN LINES OF HORC HAS BEEN KEPT AS MIN 5.30m
4. PUBLIC UTILITIES HT/LT LINES OFC CABLES WATER /SEWER LINES ETC INTERFERING WITH DFC TRACKS SHALL BE RELOCATED.
5. ARRANGEMENT & SIZE OF THE BRIDGE SHOWN IN THE DRAWING IS TENTATIVE AND MAY CHANGE AS PER THE APPROVED GAD.
6. VERTICAL CLEARANCE FROM LOWEST CONDUCTOR OF HT POWER LINE TO PROPOSED RAIL LEVEL ARE SHOWN

PROPOSED TRACK STRUCTURE (TO SUIT FOR 25T AXLE LOAD)

I. FOR RAIL CORRIDOR: 160KMPH Speed
- * TRACK = 60KG RAILS
- * SLEEPER DENSITY : PSC SLEEPERS = 1660 No.S PER KM
- * BALLAST CUSHION : 350mm
- * ALL TURNOUTS ARE 1 in 12 UNLESS OTHERWISE SPECIFIED.

ABBREVIATIONS:-
1. BVC - BEGIN OF VERTICAL CURVE
2. PVI - POINT OF VERTICAL INTERSECTION
2. EVC - END OF VERTICAL CURVE

LEGEND FOR PROFILE :
- PROPOSED RAIL PROFILE
- PROPOSED FORMATION PROFILE
- GROUND PROFILE

GC/HORC	
NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	
SUDHIR AGRAWAL DPD/CIVIL	
KRISHAN CHAND SAINSI CRE/CIVIL	

HRIDC	
NAME / DESIGNATION	SIGN
R. R. KUMAR GM/ IP&P	
RAJU SOLANKI DGM/CIVIL	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

TITLE : CONCEPTUAL PLAN & LONGITUDINAL SECTION (33.0 KM TO 35.0 KM)

GC DRG.NO.	GC-HRIDC-ALL-DRW-ALN-P&P-33-35KM_A1		
ISSUE Dt:	11.11.2022	REVISED Dt:	24.12.2022
CONSULTANTS :		AARVEE ASSOCIATES	

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TANMAY (AM CAD) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED

DRG.NO.AA/2245/AL/DR/P&P/R3	SHEET No. 6 OF 24	
SCALE : H = 1:5000 V = 1:500	ISSUED Dt: 26.11.2019	REV Dt: 06-08-2022

LONGITUDINAL PROFILE

LEGEND:

EXISTING RAILWAY TRACK	
PROPOSED UP & DN LINE	
DISMANTLING WORKS	
PROPOSED DIVERSIONS	
EXISTING ROAD	
PRO.HORC BOUNDARY	
EXPRESSWAY BOUNDARY	
HT LINE	
ELECTRICAL LINE(LT)	
STREAM / CANAL / DRAIN	
WELL	
POND	
PRO.TOE LINE	

NOTE:-

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3. TRACK CETRE BETWEEN MAIN LINES OF HORC HAS BEEN KEPT AS MIN 5.30m
4. PUBLIC UTILITIES HT/LT LINES OFC CABLES WATER /SEWER LINES ETC INTERFERING WITH DFC TRACKS SHALL BE RELOCATED.
5. ARRANGEMENT & SIZE OF THE BRIDGE SHOWN IN THE DRAWING IS TENTATIVE AND MAY CHANGE AS PER THE APPROVED GAD.
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PROPOSED TRACK STRUCTURE (TO SUIT FOR 25T AXLE LOAD)

I. FOR RAIL CORRIDOR: 160KMPH Speed
- * TRACK = 60KG RAILS
- * SLEEPER DENSITY : PSC SLEEPERS = 1660 No.S PER KM
- * BALLAST CUSHION : 350mm
- * ALL TURNOUTS ARE 1 in 12 UNLESS OTHERWISE SPECIFIED.

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- PROPOSED RAIL PROFILE
- PROPOSED FORMATION PROFILE
- GROUND PROFILE

GC/HORC

NAME / DESIGNATION	SIGN
CHAHATEY RAM *PD*	[signature]
SUDHIR AGRAWAL *DPD/CIVIL*	[signature]
KRISHAN CHAND SAINSI *CRE/CIVIL*	[signature]

HRIDC

NAME / DESIGNATION	SIGN
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PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

TITLE : CONCEPTUAL PLAN & LONGITUDINAL SECTION (35.0 KM TO 40.0 KM)

GC DRG.NO. GC-HRIDC-ALL-DRW-ALN-P&P-35-40KM_A1

ISSUE Dt: 11.11.2022 | REVISED Dt: 24.12.2022

CONSULTANTS : aarvee associates
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Tel: 91-40-23737633; Fax: 91-40-23736277
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TANMAY (AM CAD) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED

DRG.NO.AA/2245/AL/DR/P&P/R3 | SHEET No. 7 OF 24
SCALE : H = 1:5000 V = 1:500 | ISSUED Dt: 26.11.2019 | REV Dt: 06-08-2022

LEGEND:

EXISTING RAILWAY TRACK	
PROPOSED UP & DN LINE	
DISMANTLING WORKS	
PROPOSED DIVERSIONS	
EXISTING ROAD	
PRO.HORC BOUNDARY	
EXPRESSWAY BOUNDARY	
HT LINE	
ELECTRICAL LINE(LT)	
STREAM / CANAL / DRAIN	
WELL	
POND	
PRO.TOE LINE	

NOTE:-

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LEGEND FOR PROFILE :

- PROPOSED RAIL PROFILE
- PROPOSED FORMATION PROFILE
- GROUND PROFILE

GC/HORC

NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	Chahatey Ram
SUDHIR AGRAWAL DPD/CIVIL	
KRISHAN CHAND SAINSI CRE/CIVIL	

HRIDC

NAME / DESIGNATION	SIGN
R. R. KUMAR GM/ IP&P	
UMA. M. RAO DGM/CIVIL	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
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GENERAL CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

TITLE : CONCEPTUAL PLAN & LONGITUDINAL SECTION (40.0 KM TO 45.0 KM)

GC DRG.NO. GC-HRIDC-ALL-DRW-ALN-P&P-40-45KM_A1

ISSUE Dt: 11.11.2022 | REVISED Dt: 24.12.2022

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e-mail: railways@aarvee.net; web:www.aarvee.net

AARVEE ASSOCIATES

TANMAY (AM CAD) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED

DRG.NO.AA/2245/AL/DR/P&P/R3 | SHEET No. 8 OF 24

SCALE : H = 1:5000 V = 1:500 | ISSUED Dt: 26.11.2019 | REV Dt: 06-08-2022

LEGEND:

EXISTING RAILWAY TRACK	
PROPOSED UP & DN LINE	
DISMANTLING WORKS	
PROPOSED DIVERSIONS	
EXISTING ROAD	
PRO.HORC BOUNDARY	
EXPRESSWAY BOUNDARY	
HT LINE	
ELECTRICAL LINE(LT)	
STREAM / CANAL / DRAIN	
WELL	
POND	
PRO.TOE LINE	

NOTE:-

1. ALL DIMENSIONS ARE IN METRE UNLESS OTHERWISE STATED
2. ALL THE LEVELS ARE WITH RESPECT TO MEAN SEA LEVEL.
3. TRACK CETRE BETWEEN MAIN LINES OF HORC HAS BEEN KEPT AS MIN 5.30m
4. PUBLIC UTILITIES HT/LT LINES OFC CABLES WATER /SEWER LINES ETC INTERFERING WITH DFC TRACKS SHALL BE RELOCATED.
5. ARRANGEMENT & SIZE OF THE BRIDGE SHOWN IN THE DRAWING IS TENTATIVE AND MAY CHANGE AS PER THE APPROVED GAD.
6. VERTICAL CLEARANCE FROM LOWEST CONDUCTOR OF HT POWER LINE TO PROPOSED RAIL LEVEL ARE SHOWN

PROPOSED TRACK STRUCTURE (TO SUIT FOR 25T AXLE LOAD)

I. FOR RAIL CORRIDOR: 160KMPH Speed
* TRACK = 60KG RAILS
* SLEEPER DENSITY : PSC SLEEPERS = 1660 No.S PER KM
* BALLAST CUSHION : 350mm
* ALL TURNOUTS ARE 1 in 12 UNLESS OTHERWISE SPECIFIED.

ABBREVIATIONS:-

1. BVC - BEGIN OF VERTICAL CURVE
2. PVI - POINT OF VERTICAL INTERSECTION
2. EVC - END OF VERTICAL CURVE

LEGEND FOR PROFILE :

PROPOSED RAIL PROFILE	
PROPOSED FORMATION PROFILE	
GROUND PROFILE	

GC/HORC

NAME / DESIGNATION	SIGN
CHAHATEY RAM *PD*	Chahatey Ram
SUDHIR AGRAWAL *DPD/CIVIL*	
KRISHAN CHAND SAINSI *CRE/CIVIL*	

HRIDC

NAME / DESIGNATION	SIGN
R. R. KUMAR *GM/ IP&P*	
UMA. M. RAO *DGM/CIVIL*	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

TITLE : CONCEPTUAL PLAN & LONGITUDINAL SECTION (45.0 KM TO 50.0 KM)

GC DRG.NO. GC-HRIDC-ALL-DRW-ALN-P&P-45-50KM_A1

ISSUE Dt: 11.11.2022 | REVISED Dt: 24.12.2022

CONSULTANTS : aarvee associates
architects engineers & consultants pvt.ltd.
Ravula Residency, Srinagar Colony Main Rd., Hyderabad-82, India
Tel: 91-40-23737633; Fax: 91-40-23736277
e-mail: railways@aarvee.net; web:www.aarvee.net

AARVEE ASSOCIATES
TANMAY (AM CAD) DRAWN | G.PRASAD (M) CHECKED | N.J. RAO (VP) APPROVED

DRG.NO.AA/2245/AL/DR/P&P/R3 | SHEET No. 9 OF 24
SCALE : H = 1:5000 V = 1:500 | ISSUED Dt: 26.11.2019 | REV Dt: 06-08-2022

LEGEND:

EXISTING RAILWAY TRACK	
PROPOSED UP & DN LINE	
DISMANTLING WORKS	
PROPOSED DIVERSIONS	
EXISTING ROAD	
PRO.HORC BOUNDARY	
EXPRESSWAY BOUNDARY	
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ELECTRICAL LINE(LT)	
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POND	
PRO.TOE LINE	

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PROPOSED FORMATION PROFILE	
GROUND PROFILE	

GC/HORC

NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	[signature]
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GENERAL CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

TITLE : CONCEPTUAL PLAN & LONGITUDINAL SECTION (55.0 KM TO 61.5 KM)

GC DRG.NO. GC-HRIDC-ALL-DRW-ALN-P&P-55-61.5KM_A1

ISSUE Dt: 11.11.2022 | REVISED Dt: 24.12.2022

CONSULTANTS : AARVEE ASSOCIATES
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architects engineers & consultants pvt.ltd.
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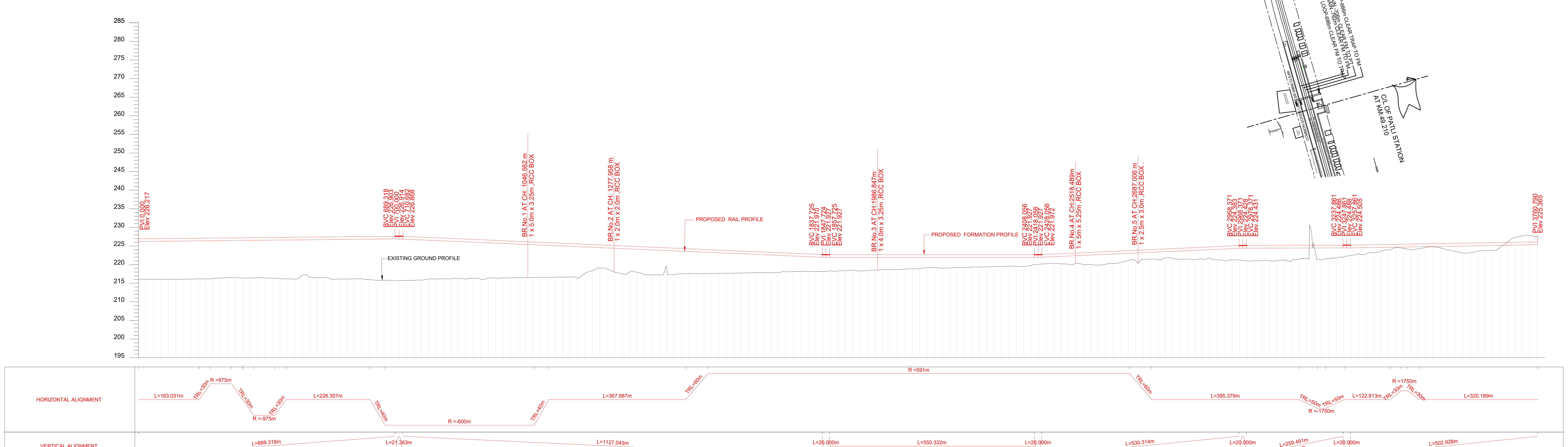
TANMAY (AM CAD) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED

DRG.NO.AA/2245/AL/DR/P&P/55-60/R3 | SHEET No. 1

SCALE : H = 1:5000 V = 1:500 | ISSUED Dt: 26.11.2019 | REV Dt: 06-08-2022

PLAN
1:5000



CHAINAGES	DEPTH OF CUTTING (-) / HIGHT OF BANKING (+)	PROPOSED RAIL LEVEL	PROPOSED FORMATION LEVEL	GROUND LEVELS
0.0	+10.172	226.959	226.217	216.045
20.0	+10.196	226.979	226.237	216.041
40.0	+10.234	226.999	226.257	216.023
60.0	+10.199	227.019	226.277	216.078
80.0	+10.209	227.039	226.297	216.088
100.0	+10.236	227.059	226.317	216.081
120.0	+10.269	227.078	226.336	216.067
140.0	+10.215	227.098	226.356	216.141
160.0	+10.191	227.118	226.376	216.185
180.0	+10.235	227.138	226.396	216.161
200.0	+10.200	227.158	226.416	216.216
220.0	+10.023	227.178	226.436	216.413
240.0	+9.985	227.198	226.456	216.471
260.0	+9.999	227.218	226.476	216.477
280.0	+10.106	227.238	226.496	216.390
300.0	+10.114	227.258	226.516	216.402
320.0	+10.033	227.278	226.536	216.503
340.0	+10.149	227.298	226.556	216.407
360.0	+10.226	227.317	226.575	216.349
380.0	+10.351	227.337	226.595	216.244
400.0	+10.459	227.357	226.615	216.156
420.0	+10.518	227.377	226.635	216.117
440.0	+9.574	227.397	226.655	217.081
460.0	+10.029	227.417	226.675	216.646
480.0	+10.217	227.437	226.695	216.478
500.0	+10.185	227.457	226.715	216.530
520.0	+10.651	227.477	226.735	216.084
540.0	+10.616	227.497	226.755	216.139
560.0	+10.651	227.517	226.775	216.124
580.0	+10.617	227.537	226.795	216.178
600.0	+10.599	227.556	226.814	216.215
620.0	+10.853	227.576	226.834	215.981
640.0	+11.053	227.596	226.854	215.801
660.0	+11.064	227.616	226.874	215.810
680.0	+11.165	227.636	226.894	215.729
700.0	+11.233	227.642	226.914	215.684
720.0	+11.060	227.569	226.827	215.767
740.0	+10.964	227.482	226.740	215.776
760.0	+10.801	227.395	226.653	215.852
780.0	+10.437	227.308	226.566	216.129
800.0	+10.319	227.221	226.479	216.160
820.0	+10.213	227.135	226.393	216.180
840.0	+10.095	227.048	226.306	216.211
860.0	+9.955	226.961	226.219	216.264
880.0	+9.993	226.874	226.132	216.139
900.0	+9.756	226.787	226.045	216.289
920.0	+9.857	226.700	225.958	216.101
940.0	+9.478	226.613	225.871	216.393
960.0	+9.416	226.526	225.784	216.368
980.0	+9.288	226.439	225.697	216.409
1000.0	+9.160	226.352	225.610	216.450
1020.0	+9.049	226.266	225.524	216.475
1040.0	+8.911	226.179	225.437	216.526
1060.0	+8.790	226.092	225.350	216.560
1080.0	+8.706	226.005	225.263	216.557
1100.0	+8.585	225.918	225.176	216.591
1120.0	+8.468	225.831	225.089	216.621
1140.0	+8.317	225.744	225.002	216.685
1160.0	+8.237	225.657	224.915	216.678
1180.0	+8.476	225.570	224.828	216.352
1200.0	+7.061	225.483	224.741	217.680
1220.0	+6.245	225.397	224.655	218.410
1240.0	+5.480	225.310	224.568	219.088
1260.0	+5.669	225.223	224.481	218.812
1280.0	+6.460	225.136	224.394	217.934
1300.0	+6.753	225.049	224.307	217.554
1320.0	+6.221	224.962	224.220	217.999
1340.0	+6.187	224.875	224.133	217.946
1360.0	+6.771	224.788	224.046	217.275
1380.0	+6.743	224.701	223.959	217.216
1400.0	+6.623	224.614	223.872	217.249
1420.0	+5.161	224.528	223.786	218.625
1440.0	+6.366	224.441	223.699	217.333
1460.0	+6.102	224.354	223.612	217.510
1480.0	+5.922	224.267	223.525	217.603
1500.0	+5.856	224.180	223.438	217.582
1520.0	+5.761	224.093	223.351	217.590
1540.0	+5.615	224.006	223.264	217.649
1560.0	+5.540	223.919	223.177	217.637
1580.0	+5.415	223.832	223.090	217.675
1600.0	+5.304	223.745	223.003	217.699
1620.0	+5.177	223.658	222.916	217.739
1640.0	+5.030	223.572	222.830	217.800
1660.0	+4.873	223.485	222.743	217.870
1680.0	+4.764	223.398	222.656	217.892
1700.0	+4.724	223.311	222.569	217.845
1720.0	+4.587	223.224	222.482	217.895
1740.0	+4.316	223.137	222.395	218.079
1760.0	+4.175	223.050	222.308	218.133
1780.0	+4.075	222.963	222.221	218.146
1800.0	+3.956	222.876	222.134	218.178
1820.0	+3.920	222.789	222.047	218.127
1840.0	+3.798	222.703	221.961	218.163
1860.0	+3.604	222.669	221.927	218.323
1880.0	+3.609	222.669	221.927	218.318
1900.0	+3.523	222.669	221.927	218.404
1920.0	+3.434	222.669	221.927	218.493
1940.0	+3.638	222.669	221.927	218.289
1960.0	+3.522	222.669	221.927	218.405
1980.0	+3.442	222.669	221.927	218.485
2000.0	+3.248	222.669	221.927	218.679
2020.0	+3.203	222.669	221.927	218.724
2040.0	+3.243	222.669	221.927	218.684
2060.0	+3.114	222.669	221.927	218.813
2080.0	+3.036	222.669	221.927	218.891
2100.0	+3.033	222.669	221.927	218.894
2120.0	+2.746	222.669	221.927	219.181
2140.0	+2.751	222.669	221.927	219.176
2160.0	+2.881	222.669	221.927	219.046
2180.0	+2.819	222.669	221.927	219.108
2200.0	+2.741	222.669	221.927	219.186
2220.0	+2.720	222.669	221.927	219.207
2240.0	+2.554	222.669	221.927	219.373
2260.0	+2.562	222.669	221.927	219.365
2280.0	+2.513	222.669	221.927	219.414
2300.0	+2.452	222.669	221.927	219.475
2320.0	+2.427	222.669	221.927	219.500
2340.0	+2.356	222.669	221.927	219.571
2360.0	+2.342	222.669	221.927	219.585
2380.0	+2.425	222.669	221.927	219.502
2400.0	+2.100	222.669	221.927	219.827
2420.0	+1.828	222.685	221.943	220.115
2440.0	+1.800	222.769	222.027	220.227
2460.0	+1.829	222.860	222.118	220.289
2480.0	+2.010	222.951	222.209	220.199
2500.0	+2.212	223.041	222.299	220.087
2520.0	+2.049	223.132	222.390	220.341
2540.0	+2.428	223.223	222.481	220.053
2560.0	+2.562	223.314	222.572	220.010
2580.0	+2.781	223.405	222.663	219.882
2600.0	+2.642	223.496	222.754	220.112
2620.0	+2.520	223.587	222.845	220.325
2640.0	+2.331	223.678	222.936	220.605
2660.0	+1.925	223.769	223.027	221.102
2680.0	+2.072	223.860	223.118	221.046
2700.0	+1.767	223.951	223.209	221.442
2720.0	+1.842	224.041	223.299	221.457
2740.0	+1.993	224.132	223.390	221.397
2760.0	+1.672	224.223	223.481	221.809
2780.0	+1.920	224.314	223.572	221.652
2800.0	+2.231	224.405	223.663	221.432
2820.0	+2.290	224.496	223.754	221.464
2840.0	+2.487	224.587	223.845	221.358
2860.0	+2.430	224.678	223.936	221.506
2880.0	+2.319	224.769	224.027	221.708
2900.0	+2.806	224.860	224.118	221.312
2920.0	+3.142	224.951	224.209	221.067
2940.0	+3.016	225.041	224.299	221.283
2960.0	+3.124	225.132	224.390	221.266
2980.0	+3.417	225.173	224.431	221.014
3000.0	+3.370	225.177	224.435	221.065
3020.0	+3.347	225.181	224.439	221.092
3040.0	+3.399	225.186	224.444	221.045
3060.0	+3.303	225.190	224.448	221.145
3080.0	+3.156	225.194	224.452	221.296
3100.0	+3.417	225.198	224.456	221.039
3120.0	+2.954	225.203	224.461	221.507
3140.0	+2.807	225.207	224.465	221.658
3160.0	-0.516	225.211	224.469	224.985
3180.0	+3.120	225.216	224.474	221.354
3200.0	+2.848	225.220	224.478	221.630
3220.0	+2.661	225.224	224.482	221.821
3240.0	+2.475	225.228	224.486	222.011
3260.0	+2.028	225.251	224.509	222.481
3280.0	+1.609	225.285	224.543	222.934
3300.0	+1.731	225.319	224.577	222.846
3320.0	+1.373	225.353	224.611	223.238
3340.0	+1.001	225.388	224.646	223.645
3360.0	+0.718	225.422	224.680	223.962
3380.0	+0.154	225.456	224.714	224.560
3400.0	+0.391	225.490	224.748	224.357
3420.0	+0.754	225.524	224.782	224.028
3440.0	+0.587	225.559	224.817	224.230
3460.0	+0.263	225.593	224.851	224.588
3480.0	-0.127	225.627	224.885	224.758
3500.0	+0.420	225.661	224.919	224.499
3520.0	+0.997	225.695	224.953	223.956
3540.0	+1.423	225.729	224.987	223.564
3560.0	+1.954	225.764	225.022	223.068
3580.0	+1.817	225.798	225.056	223.239
3600.0	+1.496	225.832	225.090	223.594
3620.0	+1.367	225.866	225.124	223.757
3640.0	+1.327	225.900	225.158	223.831
3660.0	+0.570	225.935	225.193	224.623
3680.0	-0.866	225.969	225.227	226.093
3700.0	-2.042	226.003	225.261	227.303
3720.0	-2.457	226.037	225.295	227.752
3740.0	-2.557	226.071	225.329	227.886
3760.0	-2.113	226.106	225.364	227.477
3780.0				

LONGITUDINAL PROFILE
HORIZONTAL-1 IN 5000, VERTICAL-1 IN 500

LEGEND:

- EXISTING RAILWAY TRACK
- PROPOSED UP & DN LINE
- DISMANTLING WORKS
- PROPOSED DIVERSIONS
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CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

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RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE : CONCEPTUAL PLAN & LONGITUDINAL SECTION CONNECTIVITY TOWARDS PATLI

GC DRG.NO. GC-HRIDC-C2-DRW-ALN-P&P-03001_A2

ISSUE Dt: 11.11.2022 | REVISED Dt: 24.12.2022

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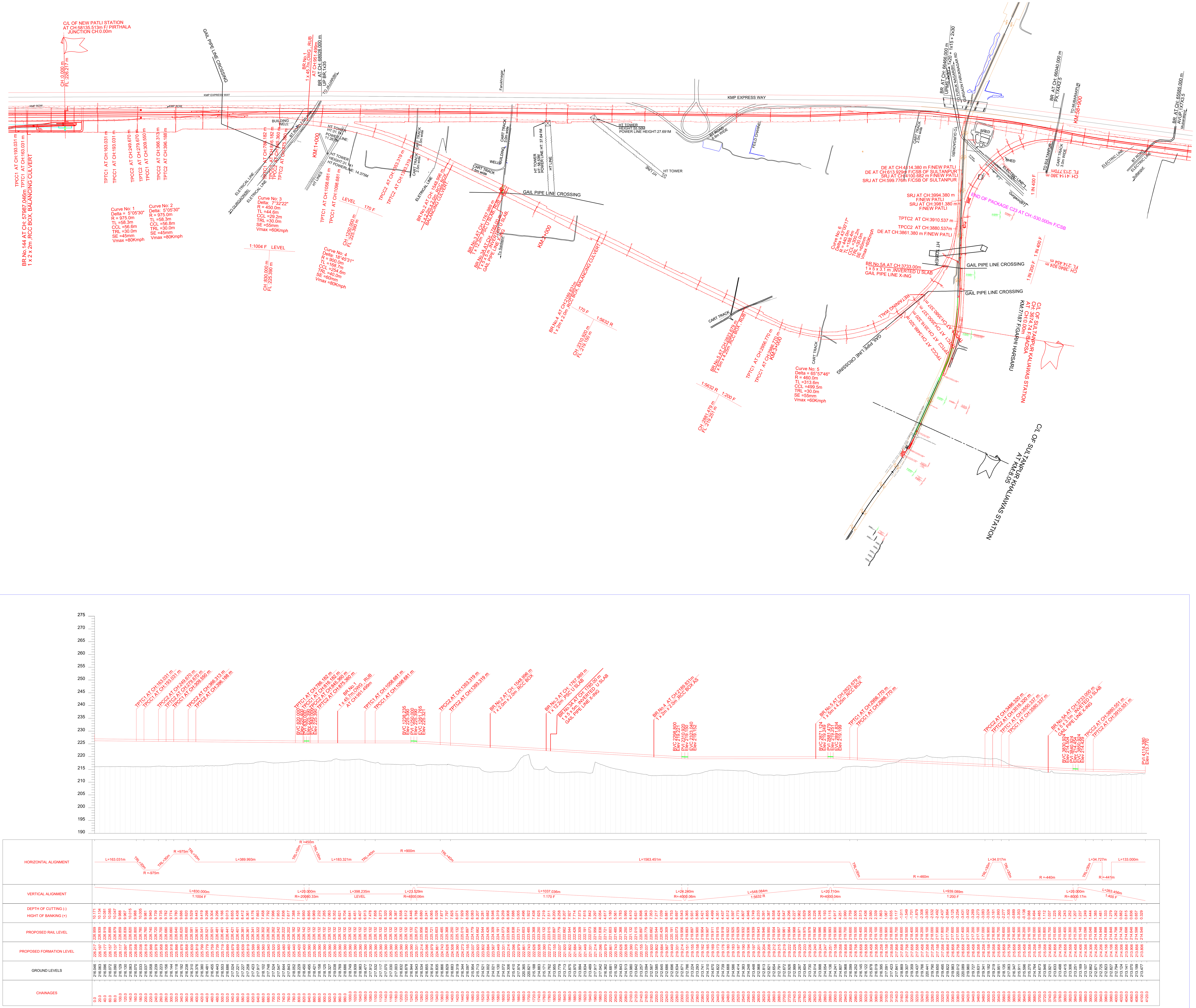
AARVEE ASSOCIATES

TANMAY (AM CAD) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED

DRG.NO. AA/2245/AL/DR/P&P/REV-2 | SHEET No. 1
SCALE : 1:1000 | ISSUED Dt: 26.11.2019 | REV Dt: 06-08-2022



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5. ARRANGEMENT & SIZE OF THE BRIDGE SHOWN IN THE DRAWING IS TENTATIVE AND MAY CHANGE AS PER THE APPROVED GAD.

LEGEND:
- EXISTING RAILWAY TRACK
- PROPOSED UP & DN LINE
- DISMANTLING WORKS
- PROPOSED DIVERSIONS
- EXISTING ROAD
- PRO.HORC BOUNDARY
- KMP EXPRESSWAY
- KMP EXPRESSWAY BOUNDARY
- EXISTING RAILWAY BOUNDARY
- HT LINE
- ELECTRICAL LINE(LT)
- STREAM / CANAL / DRAIN
- WELL
- POND

PROPOSED TRACK STRUCTURE (TO SUIT FOR 25T AXLE LOAD

I. FOR RAIL CORRIDOR: 160KMPH Speed
* TRACK = 60KG RAILS
* SLEEPER DENSITY : PSC SLEEPERS = 1660 No.S PER KM
* BALLAST CUSHION : 350mm
* ALL TURNOUTS ARE 1 in 12 UNLESS OTHERWISE SPECIFIED.

ABBREVIATIONS:-
1. BVC - BEGIN OF VERTICAL CURVE
2. PVI - POINT OF VERTICAL INTERSECTION
2. EVC - END OF VERTICAL CURVE

LEGEND FOR PROFILE :
- EXISTING RAIL PROFILE
- PROPOSED FORMATION PROFILE
- GROUND PROFILE

GC/HORC	
NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	
SUDHIR AGRAWAL DPD/CIVIL	
KRISHAN CHAND SAINSI CRE/CIVIL	

HRIDC	
NAME / DESIGNATION	SIGN
R. R. KUMAR GM/ IP&P	
UMA. M. RAO DGM/CIVIL	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

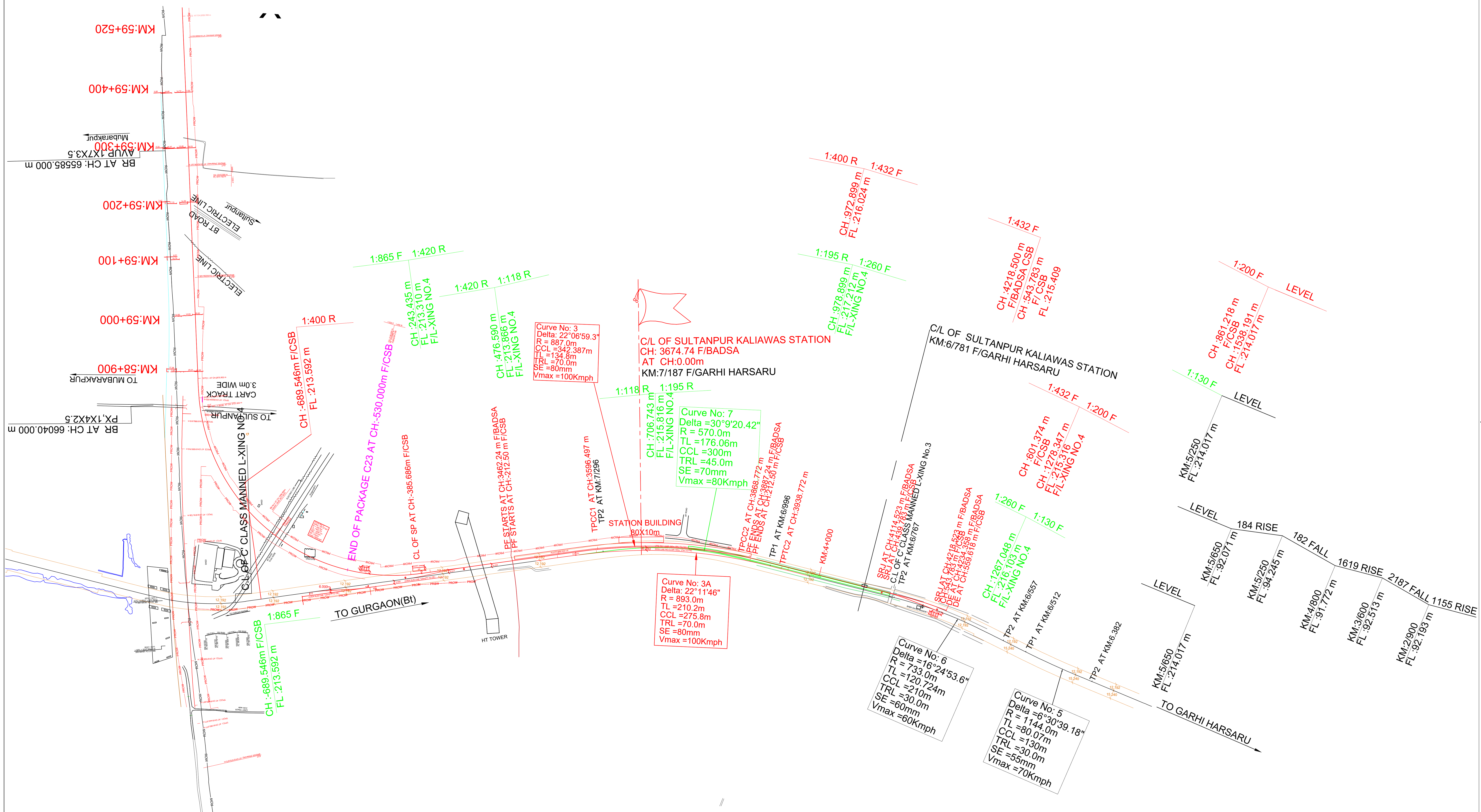
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE : CONCEPTUAL PLAN & LONGITUDINAL SECTION CONNECTIVITY TOWARDS SULTANPUR

GC DRG.NO.	GC-HRIDC-C2-DRW-ALN-P&P-04001_A2		
ISSUE Dt:	11.11.2022	REVISED Dt: 24.12.2022	
CONSULTANTS : aarvee associates, architects engineers & consultants pvt.ltd., Ravula Residency, Srinagar Colony Main Rd., Hyderabad-82, India, Tel: 91-40-23737633; Fax: 91-40-23736277, e-mail: railways@aarvee.net; web:www.aarvee.net	AARVEE ASSOCIATES		
	TANMAY (AM DWG) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED
DRG.NO. AA/2245/AL/DR/P&P/REV-2	SHEET No. 1		
SCALE : H= 1:5000,V = 1:500	ISSUED Dt: 26.11.2019	REV Dt: 06-08-2022	



LEGEND:

EXISTING RAILWAY TRACK	
PROPOSED UP & DN LINE	
DISMANTLING WORKS	
PROPOSED DIVERSIONS	
EXISTING ROAD	
PRO.HORC BOUNDARY	PROW
EXPRESSWAY BOUNDARY	ROW
EXISTING RAILWAY BOUNDARY	
HT LINE	
ELECTRICAL LINE(LT)	
STREAM / CANAL / DRAIN	
WELL	
POND	

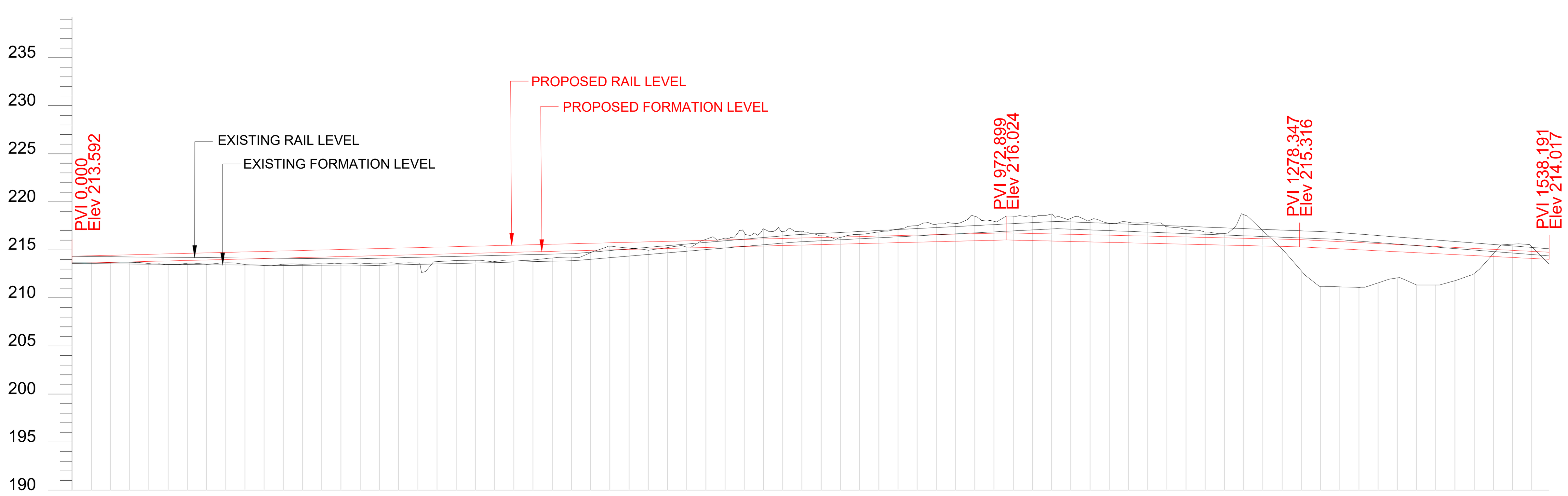
F/CSB-FROM CENTER LINE OF STN BLDG	RH - RIGHT HANDED
TP1 & TP2 - TANGENT POINT	LH - LEFT HANDED
R - RADIUS	FM - FOULING MARK
CCL - CIRCULAR CURVE LENGTH	SRJ - STOCK RAIL JOINT
TL - TANGENT LENGTH	TS - TRAP SWITCH
TR - TRANSITION LENGTH	DE - DEAD END
SE - SUPERELEVATION	Rr - RESULTANT RADIUS
Δ - DEFLECTION ANGLE	D - DEGREE OF CURVE
CSR - CLEAR STANDING ROOM	RH - RELAY HUT
SSP - SUB SECTIONING & PARALLING POST	

NOTE:

1. ALL DIMENSIONS ARE SHOWN IN METRES.
2. CH:0.00 IS RECKONED FOR C.L OF STATION BUILDING.
3. EXISTING WORK SHOWN IN BLACK.
4. PROPOSED WORK SHOWN IN RED.
6. ISOLATION WILL BE PROVIDED AS PER STD .IIR.
7. STD IIR ELECTRONIC INTERLOCKING WITH MACL SIGNALLING WILL BE PROVIDED.
8. ALL POINTS AND CROSSINGS ARE TO BE PROVIDED WITH FAN SHAPED CURVED SWITCHES ON CONCRETE SLEEPER .
9. CHAINAGES ARE RECKONED FROM C.L OF PIRTHALA STATION
10. RULING GRADIENT FOR THIS SECTION IS 1 IN 150 COMPENSATED

PROPOSED TRACK STRUCTURE (TO SUIT FOR 25T AXLE LOAD

I. FOR RAIL CORRIDOR: 160KMPH Speed
- TRACK = 60KG RAILS
- SLEEPER DENSITY : PSC SLEEPERS = 1660 No.S PER KM
- BALLAST CUSHION : 350mm
- ALL TURNOUTS ARE 1 in 12 UNLESS OTHERWISE SPECIFIED.



HORIZONTAL ALIGNMENT: TRL=70m R =893m TRL=70m

VERTICAL ALIGNMENT: L=972.899m 1:400 R | L=305.448m 1:-432 R | L=259.844m 1:-200 R

CHAINAGES	DIFF. B/W EXIST. RAIL LEVEL & PROP. RAIL LEVEL	PROPOSED RAIL LEVEL	PROPOSED FORMATION LEVEL	EXISITNG RAIL LEVEL	GROUND LEVELS
689.546	0.000	214.334	213.592	214.334	213.661
680.0	+0.073	214.384	213.642	214.311	213.648
660.0	+0.146	214.434	213.692	214.288	213.657
640.0	+0.220	214.484	213.742	214.264	213.667
620.0	+0.293	214.534	213.792	214.241	213.572
600.0	+0.366	214.584	213.842	214.218	213.452
580.0	+0.439	214.634	213.892	214.195	213.611
560.0	+0.512	214.684	213.942	214.172	213.505
540.0	+0.585	214.734	213.992	214.149	213.655
520.0	+0.658	214.784	214.042	214.126	213.478
500.0	+0.731	214.834	214.092	214.103	213.372
480.0	+0.805	214.884	214.142	214.079	213.496
460.0	+0.878	214.934	214.192	214.056	213.497
440.0	+0.892	214.984	214.242	214.092	213.548
420.0	+0.895	215.034	214.292	214.139	213.559
400.0	+0.897	215.084	214.342	214.187	213.624
380.0	+0.899	215.134	214.392	214.235	213.610
360.0	+0.902	215.184	214.442	214.282	213.611
340.0	+0.904	215.234	214.492	214.330	213.626
320.0	+0.906	215.284	214.542	214.378	213.776
300.0	+0.909	215.334	214.592	214.425	213.883
280.0	+0.911	215.384	214.642	214.473	213.921
260.0	+0.914	215.434	214.692	214.520	213.786
240.0	+0.916	215.484	214.742	214.568	213.827
220.0	+0.898	215.534	214.792	214.636	213.959
200.0	+0.778	215.584	214.842	214.806	214.152
180.0	+0.659	215.634	214.892	214.975	214.236
160.0	+0.539	215.684	214.942	215.145	214.718
140.0	+0.420	215.734	214.992	215.314	215.382
120.0	+0.300	215.784	215.042	215.484	215.178
100.0	+0.181	215.834	215.092	215.653	214.951
80.0	+0.061	215.884	215.142	215.823	215.237
60.0	-0.085	215.934	215.192	215.992	215.302
40.0	-0.178	215.984	215.242	216.162	216.095
20.0	-0.297	216.034	215.292	216.331	216.216
0.0 20.0	-0.417	216.084	215.342	216.501	216.794
40.0	-0.492	216.134	215.392	216.626	217.174
60.0	-0.544	216.184	215.442	216.728	216.909
80.0	-0.597	216.234	215.492	216.831	216.918
100.0	-0.650	216.284	215.542	216.934	216.458
120.0	-0.702	216.334	215.592	217.036	216.300
140.0	-0.755	216.384	215.642	217.139	216.612
160.0	-0.807	216.434	215.692	217.241	216.855
180.0	-0.860	216.484	215.742	217.344	217.167
200.0	-0.912	216.534	215.792	217.446	217.521
220.0	-0.965	216.584	215.842	217.549	217.669
240.0	-1.018	216.634	215.892	217.652	217.755
260.0	-1.070	216.684	215.942	217.754	218.497
280.0	-1.123	216.734	215.992	217.857	217.966
300.0	-1.199	216.750	216.007	217.949	218.497
320.0	-1.169	216.703	215.961	217.872	218.493
340.0	-1.139	216.657	215.914	217.796	218.726
360.0	-1.109	216.610	215.868	217.719	218.274
380.0	-1.078	216.564	215.822	217.642	218.094
400.0	-1.047	216.518	215.775	217.565	217.750
420.0	-1.017	216.471	215.729	217.488	217.871
440.0	-0.986	216.425	215.683	217.411	217.829
460.0	-0.955	216.379	215.636	217.334	217.407
480.0	-0.925	216.332	215.590	217.257	217.114
500.0	-0.894	216.286	215.544	217.180	216.861
520.0	-0.863	216.240	215.497	217.103	216.709
540.0	-0.833	216.193	215.451	217.026	216.659
560.0	-0.802	216.147	215.405	216.949	216.979
580.0	-0.771	216.101	215.358	216.872	215.086
600.0	-0.696	216.050	215.307	216.746	212.818
620.0	-0.642	215.950	215.207	216.592	211.204
640.0	-0.588	215.850	215.107	216.438	211.150
660.0	-0.534	215.750	215.007	216.284	211.076
680.0	-0.480	215.650	214.907	216.130	211.569
700.0	-0.426	215.550	214.807	215.976	212.076
720.0	-0.373	215.450	214.707	215.823	211.348
740.0	-0.319	215.350	214.607	215.669	211.344
760.0	-0.265	215.250	214.507	215.515	211.793
780.0	-0.211	215.150	214.407	215.361	212.541
800.0	-0.157	215.050	214.307	215.207	214.616
820.0	-0.102	214.950	214.207	215.053	215.584
840.0	-0.050	214.850	214.107	214.900	215.320
860.0	-0.010	214.750	214.017	214.760	213.514

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	(signed)	R.R.KUMAR GM IP&P/HRIDC	(signed)
SUDHIR AGRAWAL DPD/CIVIL	(signed)	UMA.M.RAO DGM/C/WEST	(signed)
KRISHAN CHAND SAINSI CRE/CIVIL	(signed)		

NORTHERN RAILWAY

DRM-DLI	
ADRM-INFRA-DLI	
SRDEN-CO-DLI	
SRDOM- DLI	
SRDSTE-DLI	
SRDEE-TRD-DLI	
SRDEN-5-DLI	
ADEN-DEE	
SSE-PWAY-GGN	
SSE-W-GGN	
NR.DIVL FILE NO.	
NR.DIVL PLAN NO.	
NRHQ CASE NO.	
NRHQ PLAN NO.	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE :
RE-GRADING OF GARHI HARSARU-FARUKHNAGAR MAIN LINE OF SULTANPUR STATION YARD (CONCEPTUAL)

GC DRG.NO. GC-HRID-C23-DRW-ALN-P&P-06001-A0
ISSUE Dt: 11.11.2022 REVISED Dt: 24.12.2022

CONSULTANTS : AARVEE ASSOCIATES
aarvee associates
architects engineers & consultants pvt.ltd.
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Tel: 91-40-23737633; Fax: 91-40-23736277
e-mail: railways@aarvee.net; web:www.aarvee.net

MANISHA (AM CAD) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED

DRG.NO.AA/RLY/2245/HRIDC/ESP-07/REV-3	SHEET No. 1
SCALE : 1:1000	ISSUED Dt: 26.11.2019 REV Dt: 18-07-2022

2. ESP/Yard Plan

CSR DETAILS FOR NEW PATLI YARD						
LINE NO	LINE NOTATION	START (F/CSB)		END (F/CSB)		TOTAL LENGTH OF CSR (m)
LINE NO-1	LOOP LINE	FM	428.800	SRJ	419.703	826.2610
LINE NO-2	LOOP LINE	SRJ	389.524	FM	448.907	826.2610
LINE NO-3	DN MAIN LINE	FM	580.842	FM	550.873	1119.522
LINE NO-4	UP MAIN LINE	FM	478.889	FM	512.716	991.605
LINE NO-5	LOOP LINE	SRJ	461.864	SRJ	495.669	957.533

LEGEND:

- EXISTING RAILWAY TRACK
- PROPOSED UP & DN LINE
- DISMANTLING WORKS
- PROPOSED DIVERSIONS
- EXISTING ROAD
- PRO.HORC BOUNDARY
- EXPRESSWAY BOUNDARY
- HT LINE
- ELECTRICAL LINE(LT)
- STREAM / CANAL / DRAIN
- WELL
- POND

F/CSB-FROM CENTER LINE OF STN BLDG	RH - RIGHT HANDED
TP1 & TP2 - TANGENT POINT	LH - LEFT HANDED
R - RADIUS	FM - FOULING MARK
CCL - CIRCULAR CURVE LENGTH	SRJ - STOCK RAIL JOINT
TL - TANGENT LENGTH	TS - TRAP SWITCH
TR - TRANSITION LENGTH	DE - DEAD END
SE - SUPERELEVATION	Rr - RESULTANT RADIUS
Δ - DEFLECTION ANGLE	D - DEGREE OF CURVE
CSR - CLEAR STANDING ROOM	RH - RELAY HUT
SSP - SUB SECTIONING & PARALLING POST	

NOTE:

1. ALL CHAINAGES ARE TAKEN FROM C.L OF STATION BUILDING AS 0.00 M .
2. ALL CHAINAGES AND LEVELS ARE IN METRES.
3. ALL MAIN LINE PTS & CROSSINGS ARE TO BE LAID WITH 60 Kg WITH 1 IN 12 THICK WEB SWITCH WITH WELDABLE CMS CROSSING.
4. TRACK STRUCTURE OF ALL NEW / REPLACEMENT OF LINES SHALL BE OF 60 KG RAILS ON 60 KG PSC SLEEPERS AND WITH SLEEPER DENSITY FOR MAIN LINE 1660 Nos/Km.BALLAST CUSHION 350 MM & FOR LOOP LINE 1540 Nos/Km.BALLAST CUSHION 250 MM.
5. PROVISION HAS BEEN MADE FOR EI/SSI WITH STD. - IIIR DISTRIBUTED INTERLOCKING AND MACL SIGNALING SYSTEM.
6. MINIMUM PASSENGER AMENITIES ARE TO BE PROVIDED WHEREVER REQUIRED AS PER RLY.BOARD. NORMS.(AS PER RLY. BOARD'S LT. NO: RB/L&A/005/2012. DTD:11/09/2012).

PROPOSED TRACK STRUCTURE (TO SUIT FOR 25T AXLE LOAD

I. FOR RAIL CORRIDOR: 160KMPH Speed

* TRACK = 60KG RAILS
* SLEEPER DENSITY : PSC SLEEPERS = 1660 No.S PER KM
* BALLAST CUSHION : 350mm
* ALL TURNOUTS ARE 1 in 12 UNLESS OTHERWISE SPECIFIED.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE — SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	[signature]	R.R KUMAR GM IP&P/HRIDC	[signature]
SUDHIR AGRAWAL DPD/CIVIL	[signature]	UMA.M.RAO DGM/C-W	[signature]
KRISHAN CHAND SAINSI CRE/CIVIL	[signature]	AM/S&T	
AMARNATH SINGH CRE/S&T	[signature]	DGM/Elect.	

TITLE : CONCEPTUAL ENGINEERING SCALE PLAN OF NEW PATLI JUNCTION CH:58135.513m F/PRITHALA

GC DRG.NO. GC-HRIDC-C23-DRW-STN-ESP-NPA01_A2

ISSUED Dt: 11.11.2022 REV Dt: 26.12.2022

CONSULTANTS : aarvee associates
architects engineers & consultants pvt.ltd.
Ravula Residency, Srinagar Colony Main Rd., Hyderabad-82, India
Tel: 91-40-23737633; Fax: 91-40-23736277
e-mail: railways@aarvee.net; web:www.aarvee.net

AARVEE ASSOCIATES

MANISHA (AM CAD) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED

DRG.NO.AA/RLY/2245/HRIDC/ESP-06/REV-3 SHEET No. 1

SCALE : 1:1000 ISSUED Dt: 26.11.2019 REV Dt: 28-07-2022

CSR DETAILS FOR SULTANPUR KALIAWAS YARD						
LINE NO	LINE NOTATION	START (F/PIRTHALA, CH: m F/CSB)		END (F/PIRTHALA, CH: m F/CSB)		TOTAL LENGTH OF CSR (m)
LINE NO-1	LOOP LINE	SRJ	320.217	SRJ	419.703	826.261
LINE NO-2	MAIN LINE	FM	320.217	FM	419.783	826.261

LEGEND:

- EXISTING RAILWAY TRACK
- PROPOSED UP & DN LINE
- DISMANTLING WORKS
- PROPOSED DIVERSIONS
- EXISTING ROAD
- PRO.HORC BOUNDARY (PROW)
- EXPRESSWAY BOUNDARY (ROW)
- EXISTING RAILWAY BOUNDARY
- HT LINE
- ELECTRICAL LINE(LT)
- STREAM / CANAL / DRAIN
- WELL
- POND

TP1 & TP2 - TANGENT POINT	RH - RIGHT HANDED
R - RADIUS	LH - LEFT HANDED
CCL - CIRCULAR CURVE LENGTH	FM - FOULING MARK
TL - TANGENT LENGTH	SRJ - STOCK RAIL JOINT
TR - TRANSITION LENGTH	TS - TRAP SWITCH
SE - SUPERELEVATION	DE - DEAD END
Δ - DEFLECTION ANGLE	Rr - RESULTANT RADIUS
CSR - CLEAR STANDING ROOM	D - DEGREE OF CURVE
SSP - SUB SECTIONING & PARALLING POST	RH - RELAY HUT

NOTE:

1. ALL DIMENSIONS ARE SHOWN IN METRES.
2. CH:0.00 IS RECKONED FOR C.L OF STATION BUILDING.
3. EXISTING WORK SHOWN IN BLACK.
4. PROPOSED WORK SHOWN IN RED.
5. ISOLATION WILL BE PROVIDED AS PER STD .IIR.
6. STD IIR ELECTRONIC INTERLOCKING WITH MACL SIGNALLING WILL BE PROVIDED.
7. ALL POINTS AND CROSSINGS ARE TO BE PROVIDED WITH FAN SHAPED CURVED SWITCHES ON CONCRETE SLEEPER .
8. RULING GRADIENT FOR THIS SECTION IS 1 IN 150 COMPENSATED
9. ADMINISTRATIVE APPROVAL FOR SHIFTING OF LC No.3 FROM STATE AUTHORITIES SHALL BE OBTAINED BY NORTHERN RAILWAY.
10. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.

PROPOSED TRACK STRUCTURE (TO SUIT FOR 25T AXLE LOAD

I. FOR RAIL CORRIDOR: 160KMPH Speed
- * TRACK = 60KG RAILS
- * SLEEPER DENSITY : PSC SLEEPERS = 1660 No.S PER KM
- * BALLAST CUSHION : 350mm
- * ALL TURNOUTS ARE 1 in 12 UNLESS OTHERWISE SPECIFIED.

NORTHERN RAILWAY	
DRM-DLI	
ADRM-INFRA-DLI	
SRDEN-CO-DLI	
SRDOM- DLI	
SRDSTE-DLI	
SRDEE-TRD-DLI	
SRDEN-5-DLI	
ADEN-DEE	
SSE-PWAY-GGN	
SSE-W-GGN	
NR.DIVL FILE NO.	
NR.DIVL PLAN NO.	
NRHQ CASE NO.	
NRHQ PLAN NO.	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	[signature]	R.R KUMAR GM IP&P/HRIDC	[signature]
SUDHIR AGRAWAL DPD/CIVIL	[signature]	UMA.M.RAO DGM/C/WEST	[signature]
KRISHAN CHAND SAINSI CRE/CIVIL	[signature]	AM/S&T	
AMARNATH SINGH CRE/S&T	[signature]	DGM/Elect.	

GC DRG.NO. GC-HRIDC-C23-DRW-STN-ESP-SUL01_A2

TITLE : CONCEPTUAL ENGINEERING SCALE PLAN
SULTANPUR KALIAWAS JUNCTION
CH:3674.74m F/BADSA KM:6/375

CONSULTANTS : aarvee associates
architects engineers & consultants pvt.ltd.
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AARVEE ASSOCIATES

MANISHA (AM CAD) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED

DRG.NO. AA/RLY/2245/HRIDC/ESP-07/REV-3	SHEET No. 1	
SCALE : 1:1000	ISSUED Dt: 26.11.2019	REV Dt: 25-06-2022

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R. KUMAR GM/IP&P / HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-S	
KRISHAN CHAND SAINSI CRE/CIVIL		AM/S&T	
AMARNATH SINGH CRE/S&T		DGM/Elect.	

NORTHERN RAILWAY

DELHI DIVISION

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

SIGN

THE INFRASTRUCTURE PEOPLE

TITLE: CONCEPTUAL ENGINEERING SCALE PLAN DHULAWAT STATION CH: 32767m F/PRITHALA

GC/HORC DRG. NO:- GC-HRIDC-C23-DRW-STN-ESP-DHU01-A0

ISSUE DATE: 11.11.2022 REVISED DATE: 26.12.2022

SCALE 1:1000 1MM:1METRE

SMC DRG. NO:- HRIDC/PS/LP-1

CONSULTANT: S.M. CONSULTANTS
An ISO 9001 Company
Bhubaneswar / Balasore / Secunderabad / South Andaman / New Delhi
Web : www.smcindia.com , E-Mail : support@smcindia.com

A. A. SAMANT
PROJECT INCHARGE

DRAWN BY:- R.DAS CHECKED BY:- A. A SAMANT

RELEASED FOR: PRELIMINARY FOR APPROVAL ☐ TENDER ☑ CONSTRUCTION ☐

LEGEND:

EXISTING RAILWAY TRACK	
PROPOSED UP & DN LINE	
DISMANTLING WORKS	
PROPOSED DIVERSIONS	
EXISTING ROAD	
PRO.HORC BOUNDARY	
EXPRESSWAY BOUNDARY	
HT LINE	
ELECTRICAL LINE(LT)	
STREAM / CANAL / DRAIN	
WELL	
POND	

TP1 & TP2 - TANGENT POINT	RH - RIGHT HANDED
R - RADIUS	LH - LEFT HANDED
CCL - CIRCULAR CURVE LENGTH	FM - FOULING MARK
TL - TANGENT LENGTH	SRJ - STOCK RAIL JOINT
TR - TRANSITION LENGTH	TS - TRAP SWITCH
SE - SUPERELEVATION	DE - DEAD END
Δ - DEFLECTION ANGLE	Rr - RESULTANT RADIUS
CSR - CLEAR STANDING ROOM	D - DEGREE OF CURVE
SSP - SUB SECTIONING & PARALLING POST	RH - RELAY HUT

NOTE:

1. ALL CHAINAGES ARE TAKEN FROM C.L OF STATION BUILDING AS 0.00 M .
2. ALL CHAINAGES AND LEVELS ARE IN METRES.
3. ALL MAIN LINE PTS & CROSSINGS ARE TO BE LAID WITH 60 Kg WITH 1 IN 12 THICK WEB SWITCH WITH WELDABLE CMS CROSSING.
4. TRACK STRUCTURE OF ALL NEW / REPLACEMENT OF LINES SHALL BE OF 60 KG RAILS ON 60 KG PSC SLEEPERS AND WITH SLEEPER DENSITY FOR MAIN LINE 1660 Nos/Km.BALLAST CUSHION 350 MM & FOR LOOP LINE 1540 Nos/Km.BALLAST CUSHION 250 MM.
5. MINIMUM PASSENGER AMENITIES ARE TO BE PROVIDED WHEREVER REQUIRED AS PER RLY.BOARD. NORMS.(AS PER RLY. BOARD'S LT. NO: RB/L&A/005/2012. DTD:11/09/2012).

PROPOSED TRACK STRUCTURE (TO SUIT FOR 25T AXLE LOAD

I. FOR RAIL CORRIDOR: 160KMPH Speed
* TRACK = 60KG RAILS
* SLEEPER DENSITY : PSC SLEEPERS = 1660 No.S PER KM
* BALLAST CUSHION : 350mm
* ALL TURNOUTS ARE 1 in 12 UNLESS OTHERWISE SPECIFIED.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	[signature]	R.R KUMAR GM IP&P/HRIDC	[signature]
SUDHIR AGRAWAL DPD/CIVIL	[signature]	UMA.M.RAO DGM/C/WEST	[signature]
KRISHAN CHAND SAINSI CRE/CIVIL	[signature]	AM/S&T	
AMARNATH SINGH CRE/S&T	[signature]	DGM/Elect.	

TITLE : CONCEPTUAL ENGINEERING SCALE PLAN
CHANDLA DUNGERWAS STATION YARD
CH: 42606.159m F/ PRITHALA

ISSUED Dt: 11.11.2022
REVISED Dt: 26.12.2022

GC DRG.NO. GC-HRID-C23-DRW-STN-ESP-CDU01_A1

CONSULTANTS : AARVEE ASSOCIATES
aarvee associates
architects engineers & consultants pvt.ltd.
Ravula Residency, Srinagar Colony Main Rd., Hyderabad-82, India
Tel: 91-40-23737633; Fax: 91-40-23736277
e-mail: railways@aarvee.net; web:www.aarvee.net

MANISHA (AM CAD) DRAWN | G.PRASAD (M) CHECKED | N.J. RAO (VP) APPROVED

DRG.NO.AA/RLY/2245/HRIDC/ESP-04/REV-4 | SHEET No. 1
SCALE : 1:1000 | ISSUED Dt: 26.11.2019 | REV Dt: 29-11-2022

LEGEND:

EXISTING RAILWAY TRACK	
PROPOSED UP & DN LINE	
DISMANTLING WORKS	
PROPOSED DIVERSIONS	
EXISTING ROAD	
PRO.HORC BOUNDARY	
EXPRESSWAY BOUNDARY	
HT LINE	
ELECTRICAL LINE(LT)	
STREAM / CANAL / DRAIN	
WELL	
POND	

TP1 & TP2 - TANGENT POINT	RH - RIGHT HANDED
R - RADIUS	LH - LEFT HANDED
CCL - CIRCULAR CURVE LENGTH	FM - FOULING MARK
TL - TANGENT LENGTH	SRJ - STOCK RAIL JOINT
TR - TRANSITION LENGTH	TS - TRAP SWITCH
SE - SUPERELEVATION	DE - DEAD END
Δ - DEFLECTION ANGLE	Rr - RESULTANT RADIUS
CSR - CLEAR STANDING ROOM	D - DEGREE OF CURVE
SSP - SUB SECTIONING & PARALLING POST	RH - RELAY HUT

NOTE:

1. ALL CHAINAGES ARE TAKEN FROM C.L OF STATION BUILDING AS 0.00 M .
2. ALL CHAINAGES AND LEVELS ARE IN METRES.
3. ALL MAIN LINE PTS & CROSSINGS ARE TO BE LAID WITH 60 Kg WITH 1 IN 12 THICK WEB SWITCH WITH WELDABLE CMS CROSSING.
4. TRACK STRUCTURE OF ALL NEW / REPLACEMENT OF LINES SHALL BE OF 60 KG RAILS ON 60 KG PSC SLEEPERS AND WITH SLEEPER DENSITY FOR MAIN LINE 1660 Nos/Km.BALLAST CUSHION 350 MM & FOR LOOP LINE 1540 Nos/Km.BALLAST CUSHION 250 MM.
5. MINIMUM PASSENGER AMENITIES ARE TO BE PROVIDED WHEREVER REQUIRED AS PER RLY.BOARD. NORMS.(AS PER RLY. BOARD'S LT. NO: RB/L&A/005/2012. DTD:11/09/2012).

PROPOSED TRACK STRUCTURE (TO SUIT FOR 25T AXLE LOAD

I. FOR RAIL CORRIDOR: 160KMPH Speed
* TRACK = 60KG RAILS
* SLEEPER DENSITY : PSC SLEEPERS = 1660 No.S PER KM
* BALLAST CUSHION : 350mm
* ALL TURNOUTS ARE 1 in 12 UNLESS OTHERWISE SPECIFIED.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R. KUMAR GM IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C/WEST	
KRISHAN CHAND SAINSI CRE/CIVIL		AM/S&T	
AMARNATH SINGH CRE/S&T		DGM/Elect.	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

GENERAL CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

SMEC

TITLE : CONCEPTUAL ENGINEERING SCALE PLAN
PACHGAON STATION YARD
CH:46279.352 m F/ PRITHALA

ISSUED Dt: 11.11.2022
REVISED Dt: 26.12.2022

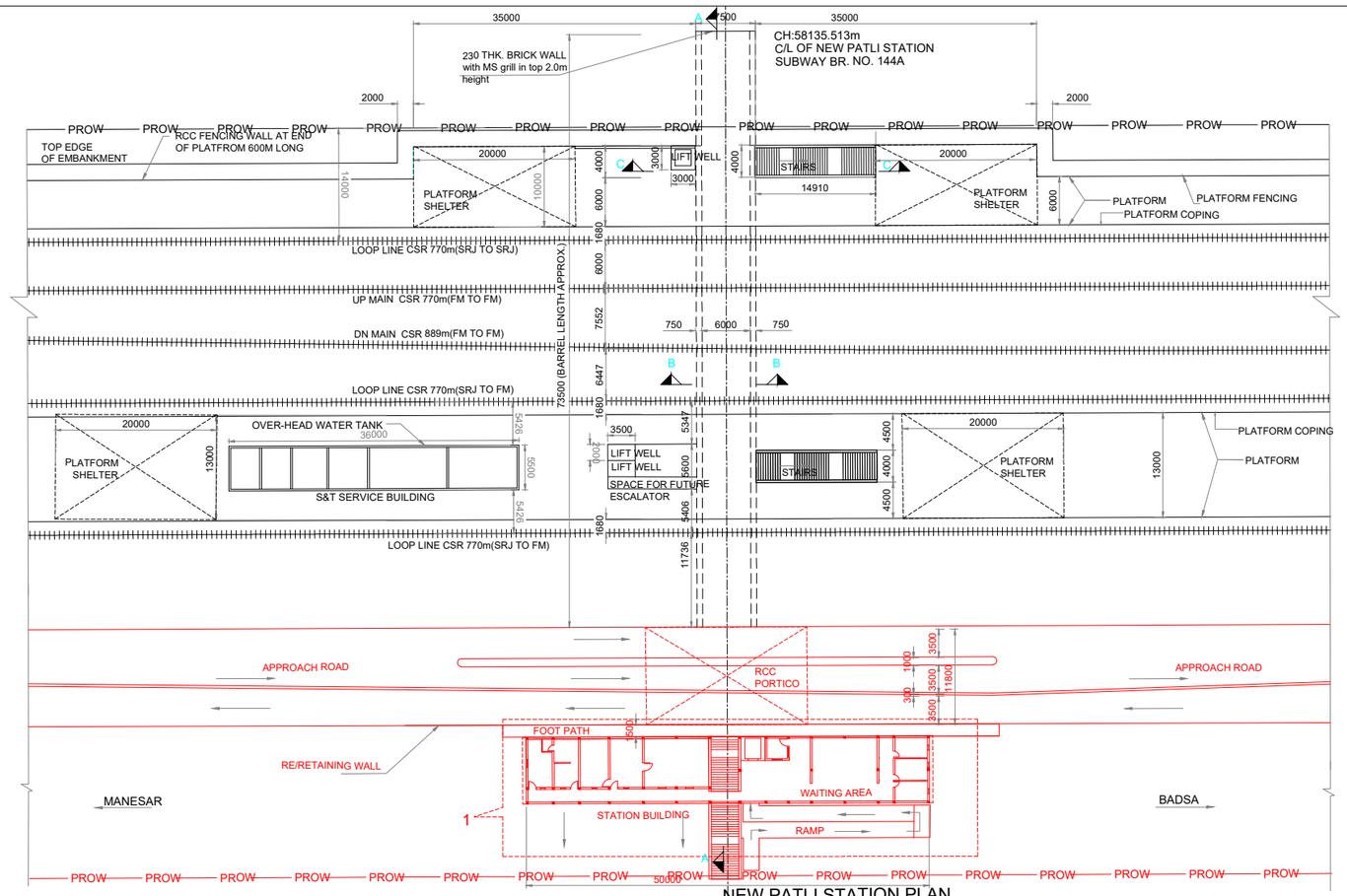
GC DRG.NO. GC-HRIDC-C23-DRW-STN-ESP-PCG01_A1

CONSULTANTS : AARVEE ASSOCIATES
aarvee associates
architects engineers & consultants pvt.ltd.
Ravula Residency, Srinagar Colony Main Rd., Hyderabad-82, India
Tel: 91-40-23737633; Fax: 91-40-23736277
e-mail: railways@aarvee.net; web:www.aarvee.net

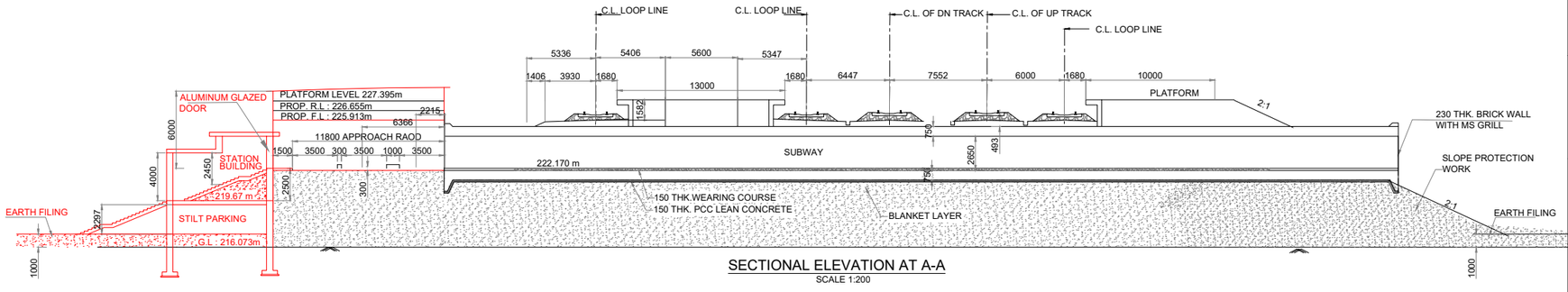
MANISHA (AM CAD) DRAWN	G.PRASAD (M) CHECKED	N.J. RAO (VP) APPROVED

DRG.NO.AA/RLY/2245/HRIDC/ESP-05/REV-4 SHEET No. 1
SCALE : 1:1000 ISSUED Dt: 26.11.2019 REV Dt: 29-11-2022

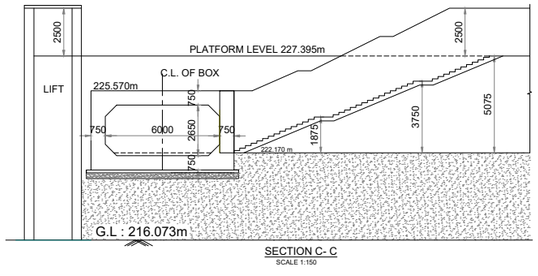
3. Station Building and Subway



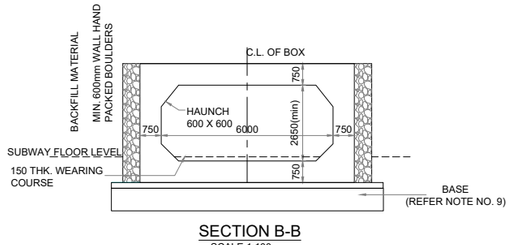
NEW PATLI STATION PLAN
(SCALE 1:350)



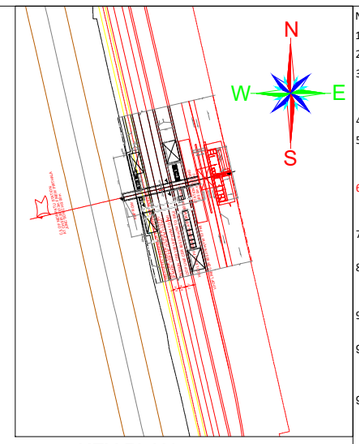
SECTIONAL ELEVATION AT A-A
SCALE 1:200



SECTION C- C
SCALE 1:150



SECTION B-B
SCALE 1:100



KEY PLAN
SCALE 1:NTS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL LEVEL ARE IN METERS.
3. PROTECTION WORK ON SLOPES OF BANK UP TO 30M, BOTH SIDES ON APPROACHES OF SUBWAY SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
4. STAINLESS STEEL HAND RAIL SHALL BE FIXED WITH WALL IN STAIRCASE & RAMP.
5. SUBWAY SHALL BE DESIGNED FOR 32.5 T LOADING. FOR STRUCTURAL DESIGN DETAILS NEAREST HIGHER SIZE OF STANDARD RDSO DRAWING NO. B-10157/3 SHALL BE FOLLOWED.
6. STATION BUILDING SHALL BE DESIGNED FOR G+5 WITH STILT PARKING FOR FUTURE DEVELOPMENT. IN THE PRESENT CONTRACT, STATION BUILDING AS SHOWN IN DRAWING SHALL BE CONSTRUCTED.
7. SELF-SUPPORTING SHED SHALL BE PROVIDED OVER STAIRS AS PER SKETCH NO.: GC-HRIDC-SK-GEN-020
8. LOCATION AND LAYOUT OF STATION BUILDING SHOWN IN THE DRAWING IS TENTATIVE. STATION BUILDING CAN BE RELOCATED/ LAYOUT REORGANIZED WITHIN THE GIVEN PLINTH AREA.
9. BASE OF SUBWAY & LIFT WELL SHALL BE SUPPORTED AS PER SKETCH NO.: GC-HRIDC-SK-GEN-021
9. BARREL LENGTH OF THE SUBWAY ON KMP SIDE SHALL BE EXTENDED UPTO THE LOCATION WHERE BOTTOM SLAB OF SUBWAY CUTS THE 2:1 SLOPE OF THE BANK.
9. PLATFORM FENCING ON END PLATFORMS TO BE PROVIDED AT 1.5m INSIDE OF THE TOP EDGE OF THE EMBANKMENT.

LEGEND

ALL WORKS SHOWN IN BLACK ARE PAYABLE IN SCHEDULE 'A'

ALL WORKS SHOWN IN RED ARE PAYABLE IN SCHEDULE 'B'

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		DGM/CIVIL	
DPD/EST		DGM/S&T	
REETU PATIAL CDE/CIVIL		DGM/Elect.	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

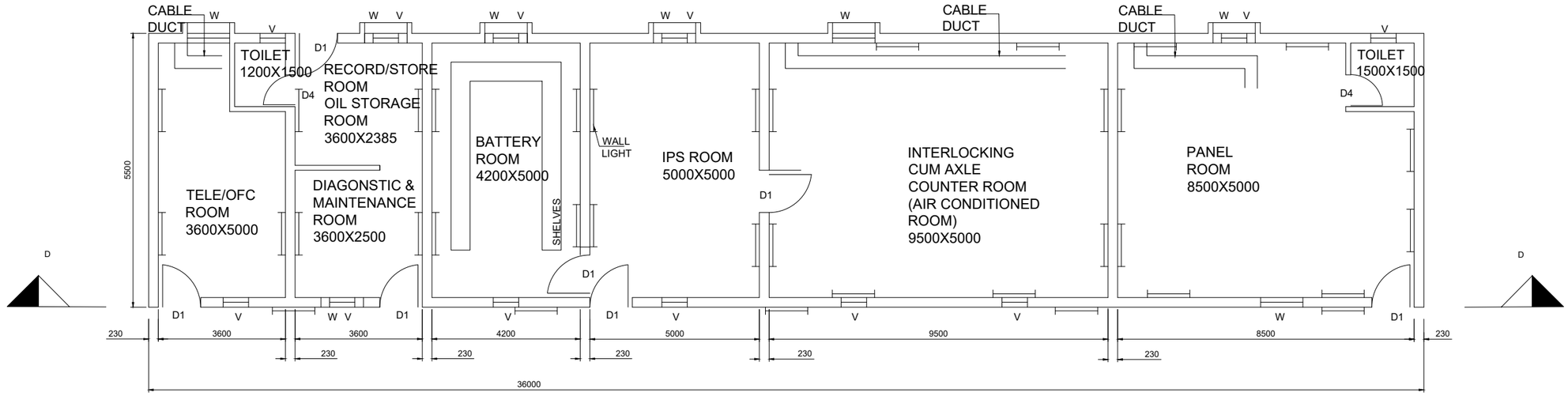
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

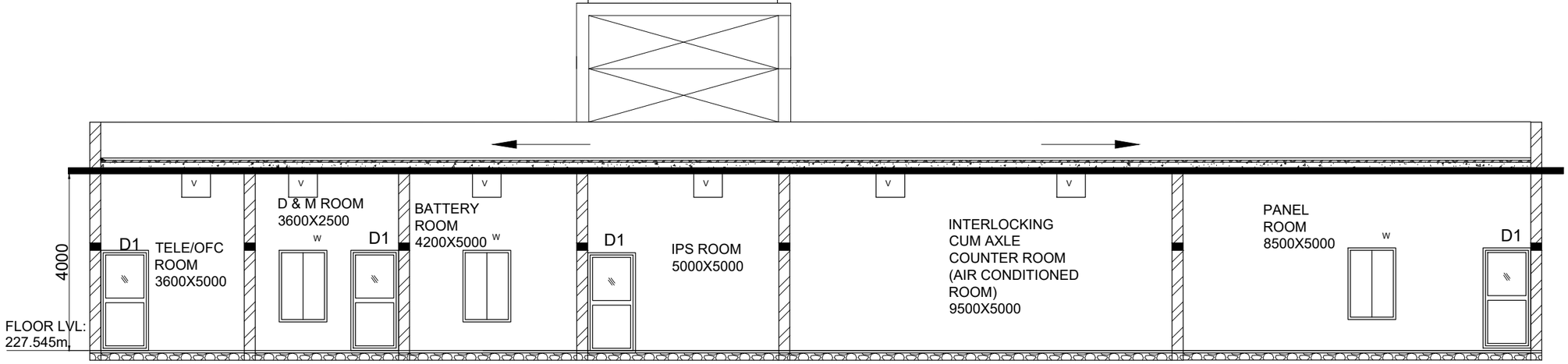
TITLE:-
CONCEPTUAL ARCHITECTURAL DRAWING
NEW PATLI STATION & SUBWAY BR. NO. 144A

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-STN-SAD-NPA01_A1	1 OF 3

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	24-12-2022



S&T SERVICE BUILDING PLAN



S&T SERVICE BUILDING ELEVATION

SECTION D-D

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		DGM/CIVIL	
DPD/EST		DGM/S&T	
REETU PATIAL CDE/CIVIL		DGM/Elect.	

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. THE FLOOR LEVEL OF PANEL ROOM SHALL BE AT LEAST 300 MM ABOVE PLATFORM LEVEL.
3. FOR ANY FURTHER DETAIL OF S&T SERVICE BUILDING REFER NR TYPE PLAN NO. O-99/2021 SHEET NO. 1 TO 5.

SCHEDULE DOOR

D1	1000x2100	FLUSH DOOR WITH MOSQUITO NET
D2	1000x2100	FLUSH DOOR
D3	1000x2100	HALF GLASS SINGLE DOOR WITH DOUBLE LOCKING ARRANGE MENT
D4	750x2100	FLUSH DOOR

SCHEDULE WINDOW

W	1500x1200	GLAZED WITH MOSQUITO NET
V	600X500	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

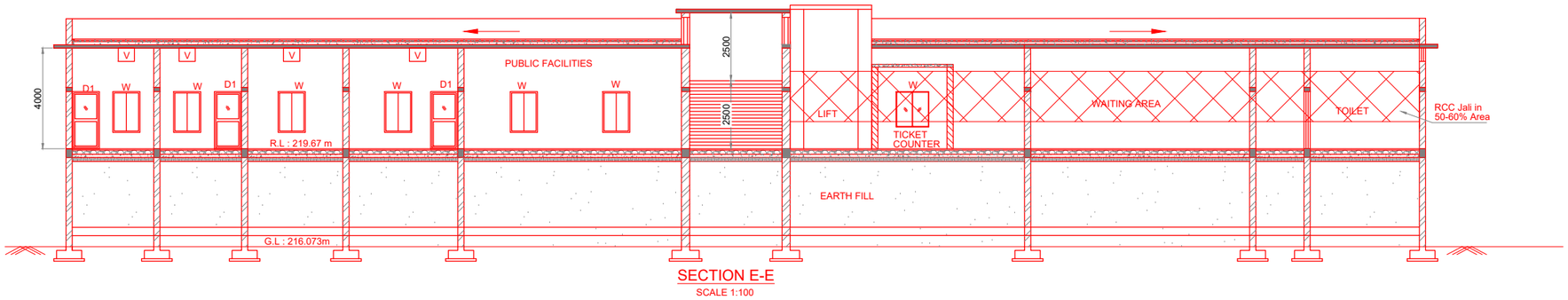
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:-
CONCEPTUAL ARCHITECTURAL DRAWING
NEW PATLI STATION & SUBWAY BR. NO. 144A

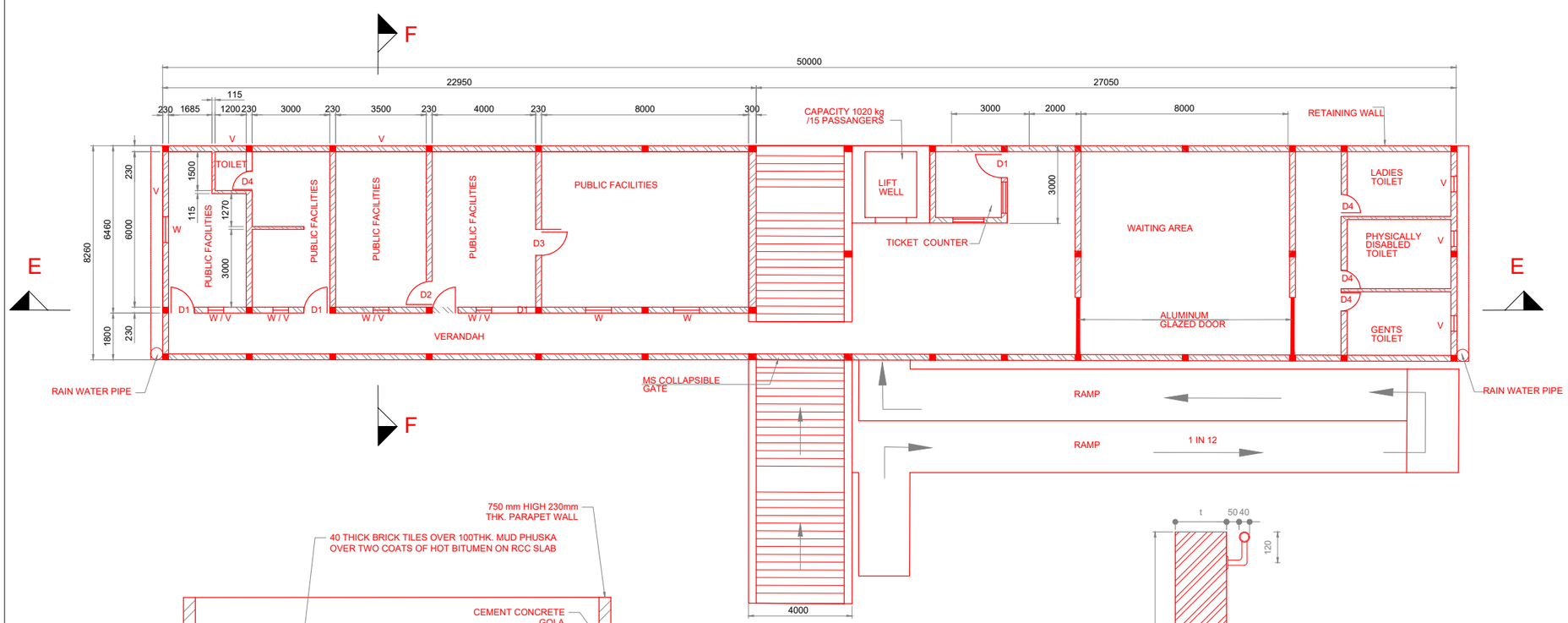
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-STN-SAD-NPA01_A1	2 OF 3

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	24-12-2022



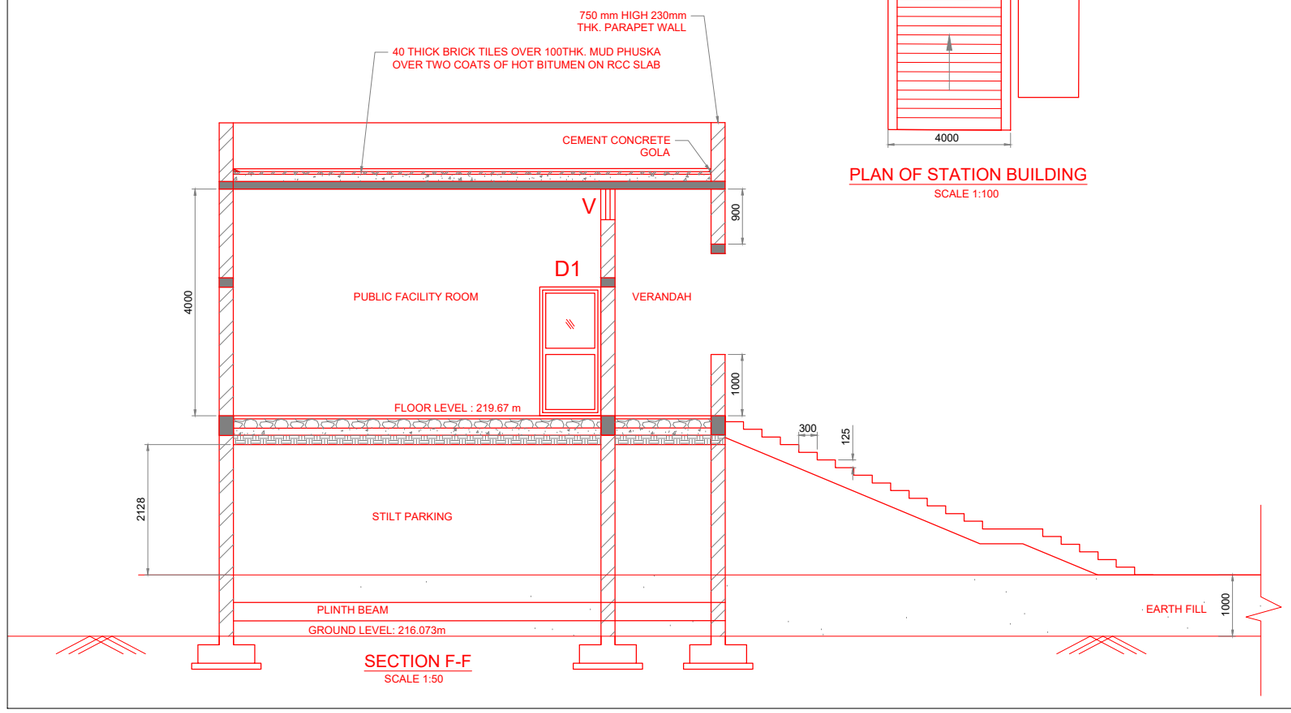
SECTION E-E

SCALE 1:100



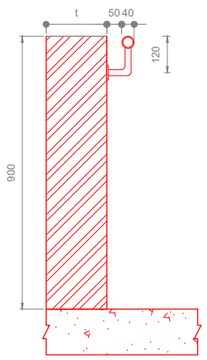
PLAN OF STATION BUILDING

SCALE 1:100



SECTION F-F

SCALE 1:50



FIXING DETAIL OF HANDRAIL TO THE WALL

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. FOR PHYSICALLY HANDICAPPED TOILET REFER DRAWING NO. O-104/2021 SHEET 1 OF 1.
3. SUITABLE ARRANGEMENT FOR SEPTIC TANK & SOAK PIT TO BE PROVIDED.
4. DETAILING OF TICKET COUNTER SHALL BE AS PER SKETCH NO. GC-HRIDC-SK-GEN0-013.
5. STAINLESS STEEL HANDRAIL SHALL BE FIXED WITH WALLS IN STAIRCASE AND RAMP PORTION.
6. SELF-SUPPORTING SHED SHALL BE PROVIDED OVER STAIRS AS PER SKETCH NO.: GC-HRIDC-SK-GEN-020
7. LOCATION AND LAYOUT OF STATION BUILDING SHOWN IN THE DRAWING IS TENTATIVE. STATION BUILDING CAN BE RELOCATED/ LAYOUT REORGANIZED WITHIN THE GIVEN PLINTH AREA.
8. BASE OF SUBWAY & LIFT WELL SHALL BE PLACED AS PER SKETCH NO.: GC-HRIDC-SK-GEN-021
9. FOR DETAILING OF LADIES AND GENTS TOILETS REFER DRAWING NO. GC-HRIDC-SK-GEN-007.

SCHEDULE DOOR

D1	1000x2100	FLUSH DOOR WITH MOSQUITO NET
D2	1000x2100	FLUSH DOOR
D3	1000x2100	HALF GLASS SINGLE DOOR WITH DOUBLE LOCKING ARRANGE MENT
D4	750x2100	FLUSH DOOR

SCHEDULE WINDOW

W	1500x1200	GLAZED WITH MOSQUITO NET
V	600X500	

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		DGM/CIVIL	
DPD/EST		DGM/S&T	
REETU PATIAL CDE/CIVIL		DGM/Elect.	

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

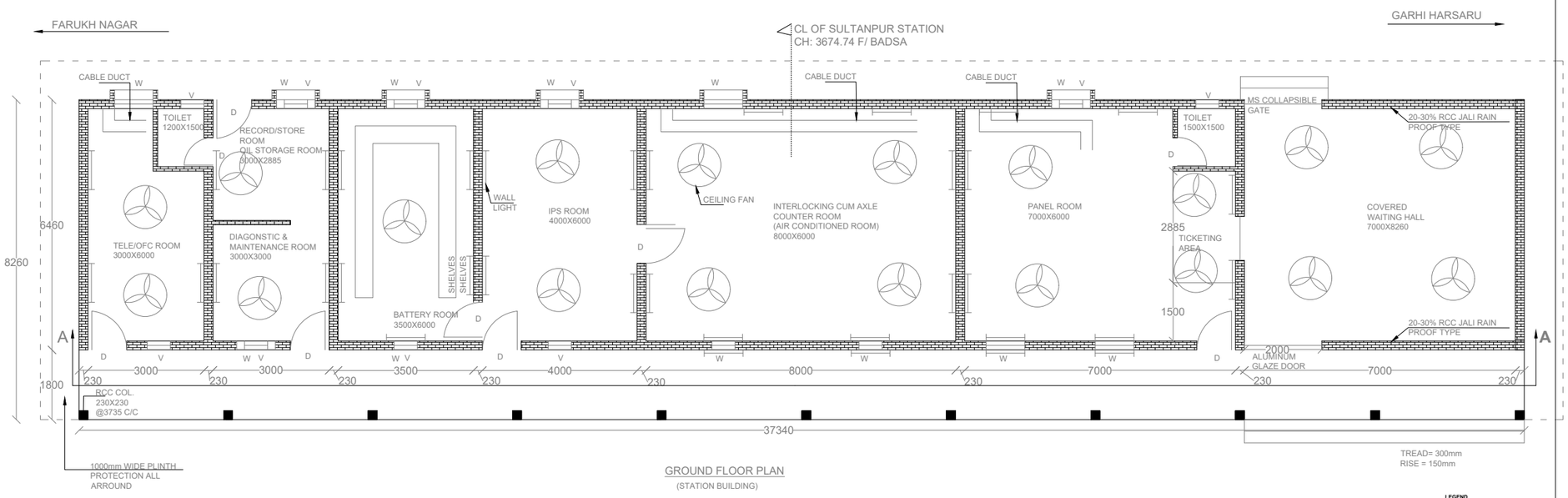
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

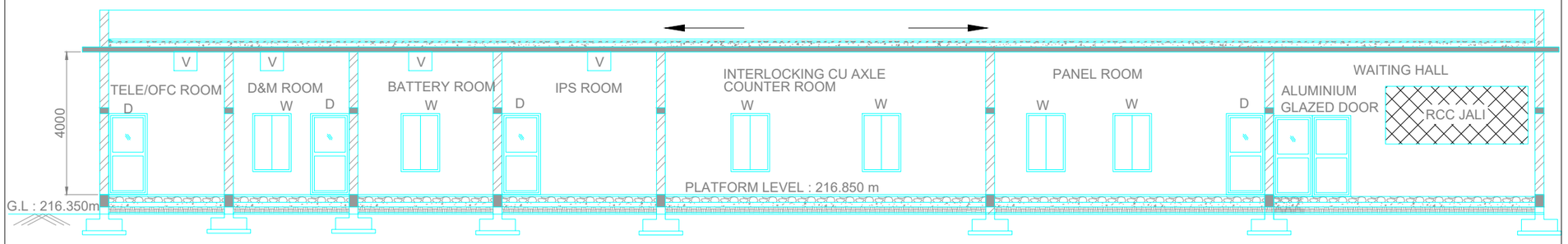
TITLE:-

CONCEPTUAL ARCHITECTURAL DRAWING NEW PATLI STATION & SUBWAY BR. NO. 144A

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-STN-SAD-NPA01_A1	3 OF 3

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	24-12-2022





SECTION A-A

TYPE	OPENING SIZE		DESCRIPTION
D	1000	2100	Panelled Door
D1	750	2100	PVC Framed Door
W	1500	1200	Glazed with MS Grill
V	750	600	Glazed Louvered Ventilator
V1	600	500	Glazed Louvered Ventilator

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. FOR OTHER DETAIL REFER NORTHERN RAILWAY DRAWING S & T SERVICE BUILDING DWG.NO N.R.H.Q.E.PLAN NO.HQ/02/02-2021. SH. 1 OF 5 TO 5 OF 5.
3. FLOOR LEVEL OF BUILDING SHALL BE 500mm ABOVE GROUND LEVEL.
4. HEIGHT OF STATION BUILDING SHALL BE MINIMUM 4000mm ABOVE FLOOR LEVEL
5. PLATFORM FENCING ON END PLATFORMS TO BE PROVIDED AT 1.5m INSIDE OF THE TOP EDGE OF THE EMBANKMENT.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		DGM/CIVIL	
DPD/EST		DGM/S&T	
REETU PATIAL CDE/CIVIL		DGM/Elect.	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

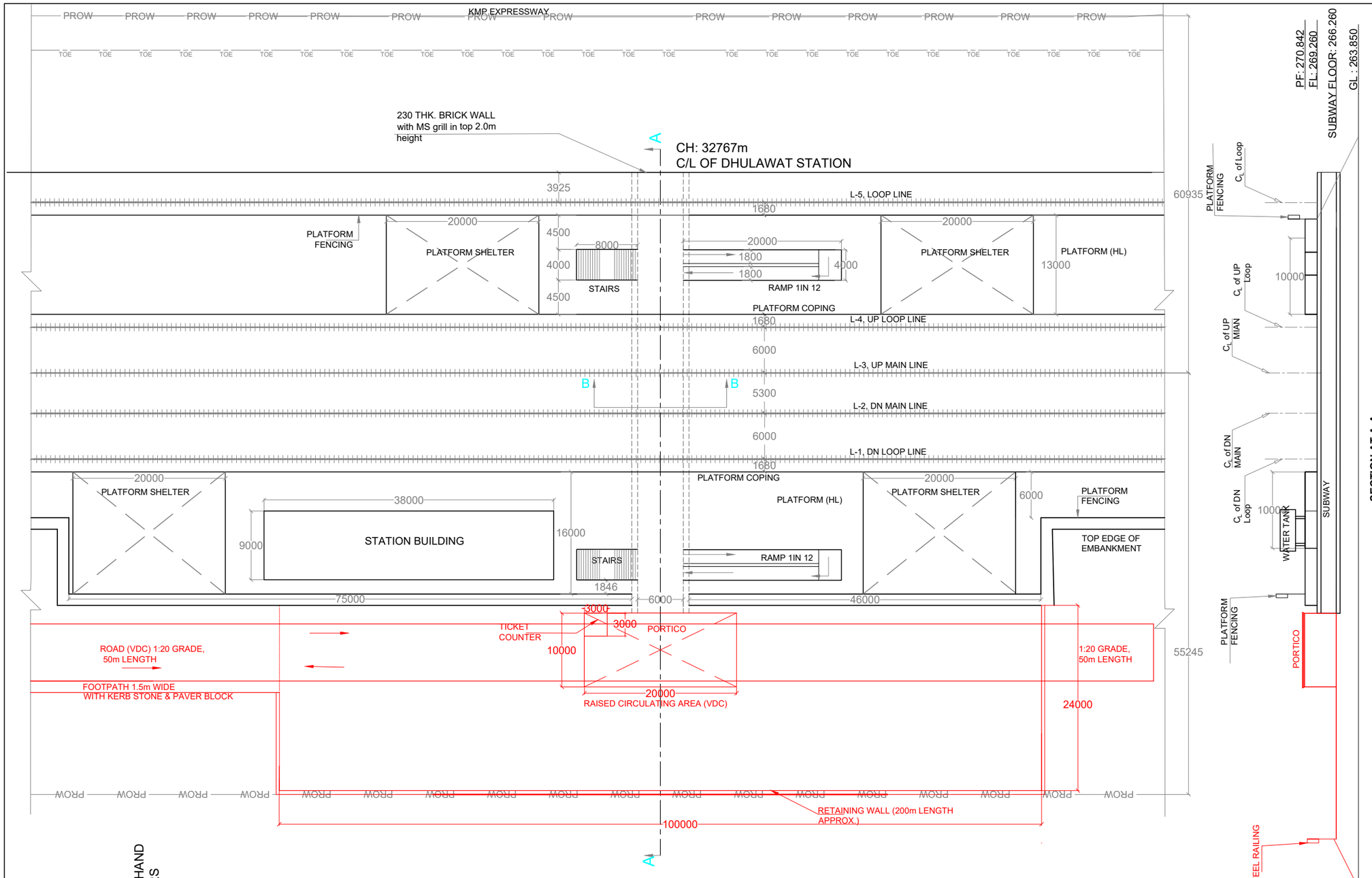
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

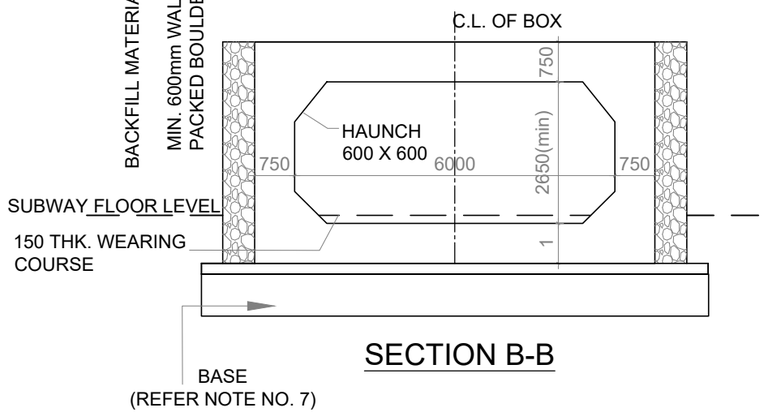
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:-
CONCEPTUAL ARCHITECTURAL DRAWING
SULTANPUR STATION BUILDING

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-STN-SAD-SUL01_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	24-12-2022





SECTION B-B

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL LEVEL ARE IN METERS.
3. PROTECTION WORK ON SLOPES OF BANK UP TO 30M, BOTH SIDES ON APPROACHES OF SUBWAY SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
4. STAINLESS STEEL HAND RAIL SHALL BE FIXED WITH WALL IN STAIRCASE & RAMP.
5. SUBWAY SHALL BE DESIGNED FOR 32.5 T LOADING. FOR STRUCTURAL DESIGN DETAILS NEAREST HIGHER SIZE OF STANDARD RDSO DRAWING NO. B-10157/3 SHALL BE FOLLOWED.
6. SELF-SUPPORTING SHED SHALL BE PROVIDED OVER STAIRS AND RAMP AS PER SKETCH NO. GC-HRIDC-SK-GEN-020.
7. BASE OF SUBWAYS SHALL BE SUPPORTED AS PER SKETCH NO. GC-HRID-SK-GEN-021.
8. BARREL LENGTH OF THE SUBWAY ON KMP SIDE SHALL BE EXTENDED UPTO THE LOCATION WHERE BOTTOM SLAB OF SUBWAY CUTS THE 2:1 SLOPE OF THE BANK.
9. PLATFORM FENCING ON END PLATFORMS TO BE PROVIDED AT 1.5m INSIDE OF THE TOP EDGE OF THE EMBANKMENT.

LEGEND

- ALL WORKS SHOWN IN BLACK ARE PAYABLE IN SCHEDULE 'A'
- ALL WORKS SHOWN IN RED ARE PAYABLE IN SCHEDULE 'B'

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		DGM/CIVIL	
DPD/EST		DGM/S&T	
REETU PATIAL CDE/CIVIL		DGM/Elect.	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

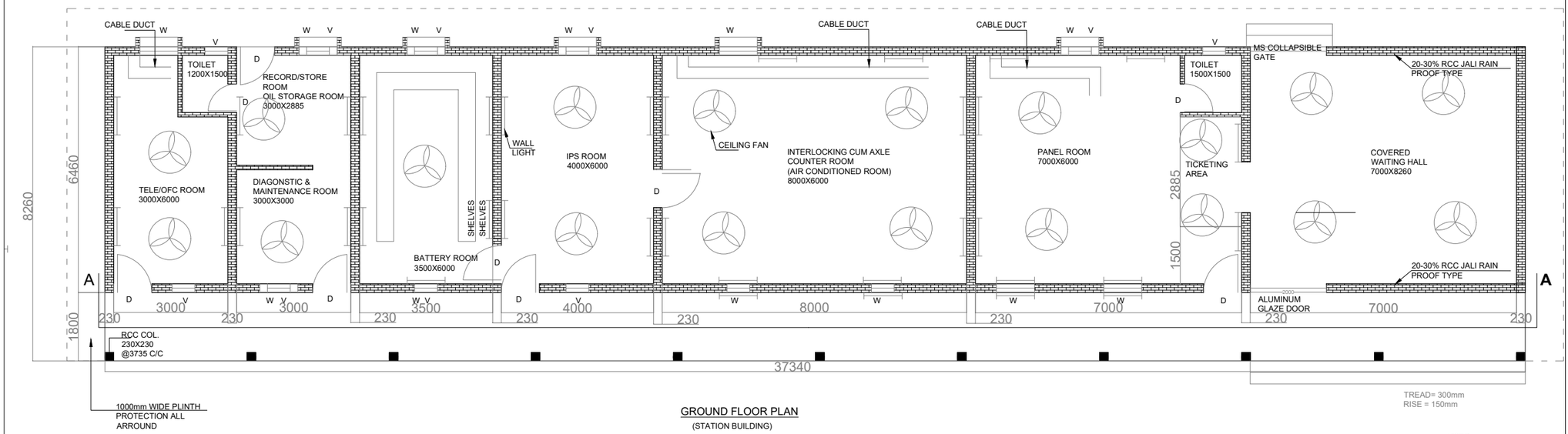
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:-
CONCEPTUAL ARCHITECTURAL DRAWING
DHULAWAT STATION & SUBWAY BR. NO. 79

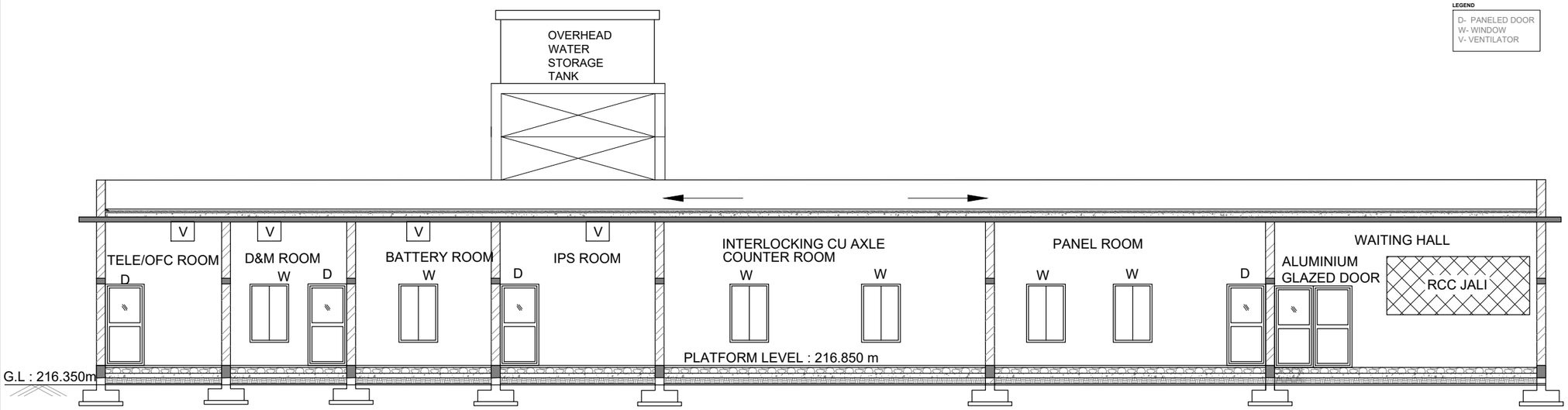
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-STN-SAD-DHU01_A1	1 OF 2

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	24-12-2022

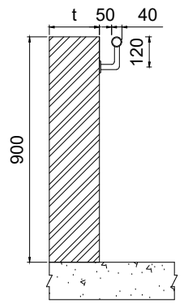


GROUND FLOOR PLAN
(STATION BUILDING)

LEGEND
D- PANELED DOOR
W- WINDOW
V- VENTILATOR



SECTION A-A



FIXING DETAIL OF
HANDRAIL TO THE WALL

TYPE	OPENING SIZE		DESCRIPTION
D	1000	2100	Panelled Door
D1	750	2100	PVC Framed Door
W	1500	1200	Glazed with MS Grill
V	750	600	Glazed Louvered Ventilator
V1	600	500	Glazed Louvered Ventilator

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. FOR OTHER DETAIL REFER NORTHERN RAILWAY DRAWING S & T SERVICE BUILDING DWG.NO N.R.H.Q.E.PLAN NO.HQ/02/02-2021. SH. 1 OF 5 TO 5 OF 5.
3. FLOOR LEVEL OF BUILDING SHALL BE 500mm ABOVE GROUND LEVEL.
4. HEIGHT OF STATION BUILDING SHALL BE MINIMUM 4000mm ABOVE FLOOR LEVEL.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		DGM/CIVIL	
DPD/EST		DGM/S&T	
REETU PATIAL CDE/CIVIL		DGM/Elect.	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE
SMEC Member of the Surbana Jurong Group

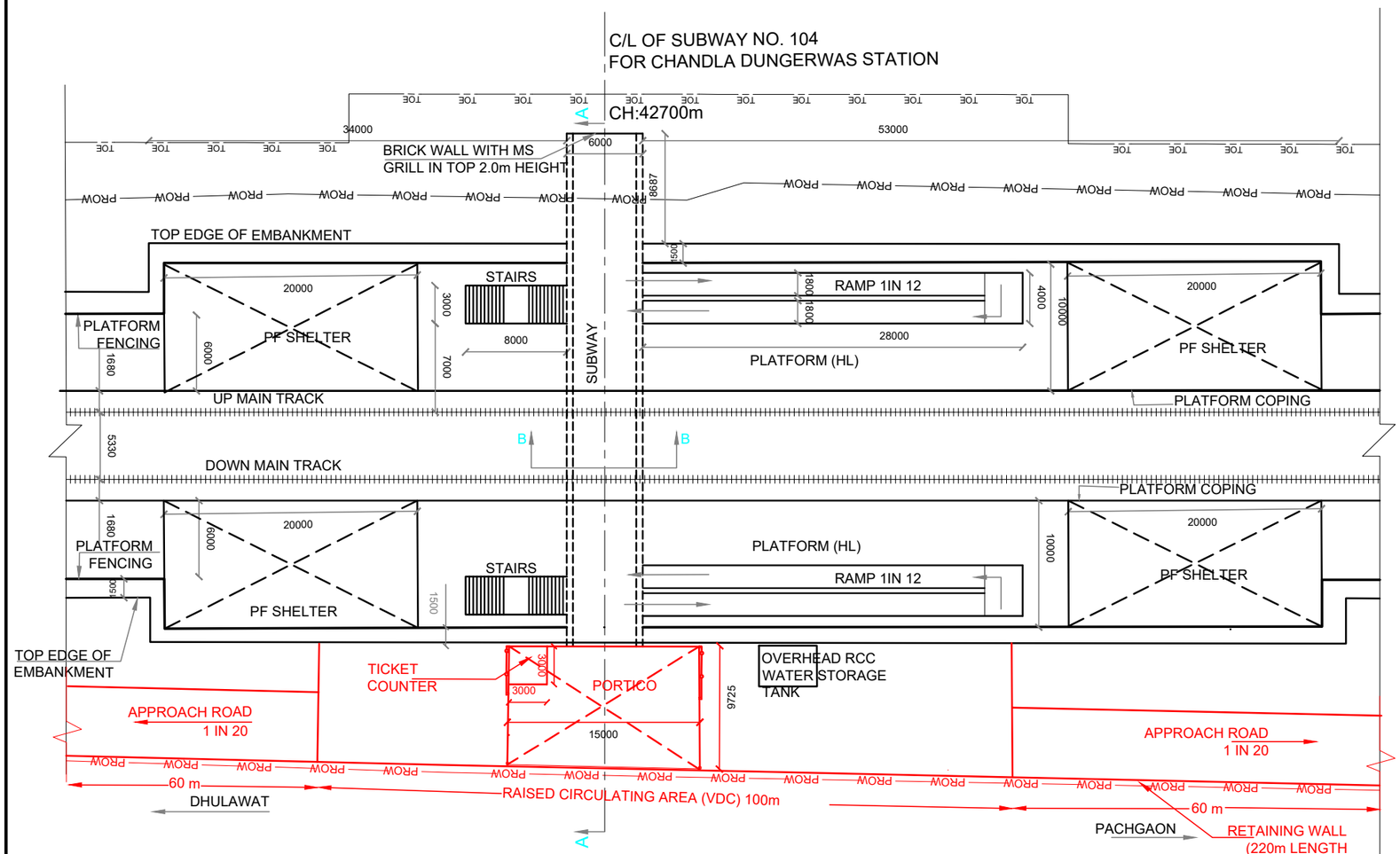
TITLE:-
CONCEPTUAL ARCHITECTURAL DRAWING
DHULAWAT STATION & SUBWAY BR. NO. 79

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-STN-SAD-DHU01_A1	2 OF 2

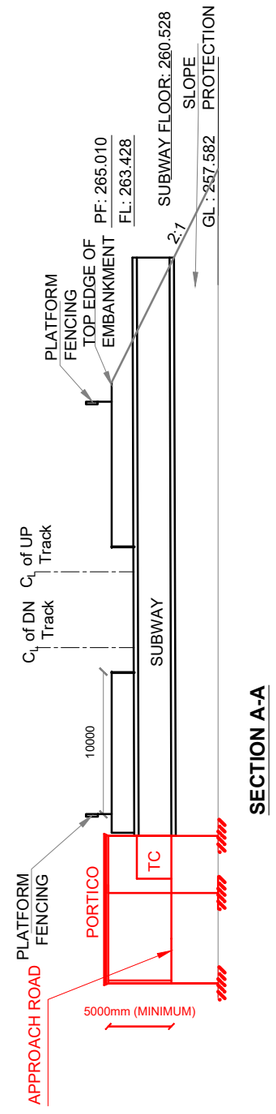
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	24-12-2022

KMP EXPRESSWAY

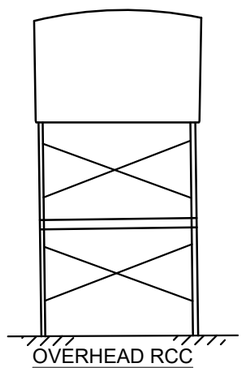
C/L OF SUBWAY NO. 104
FOR CHANDLA DUNGERWAS STATION



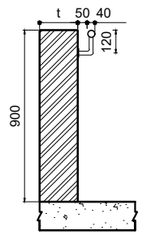
CHANDLA DUNGERWAS STATION PLAN



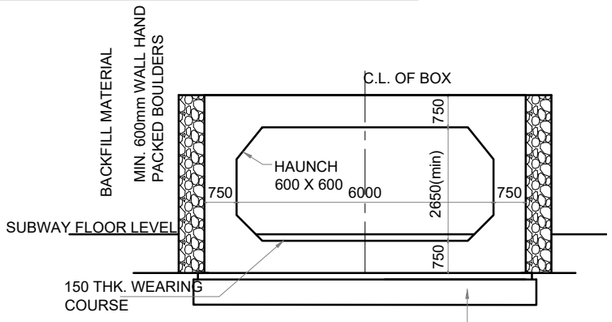
SECTION A-A



OVERHEAD RCC
WATER STORAGE TANK



FIXING DETAIL OF
HANDRAIL TO THE WALL



SECTION B-B

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL LEVEL ARE IN METERS.
3. PROTECTION WORK ON SLOPES OF BANK UP TO 30M, BOTH SIDES ON APPROACHES OF SUBWAY SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
4. DETAILING OF TICKET COUNTER SHALL BE AS PER SKETCH NO. GC-HRIDC-SK-GEN-013.
5. STEEL HANDRAIL SHALL BE FIXED WITH WALLS IN STAIRCASE AND RAMP PORTION.
6. SUBWAY SHALL BE DESIGNED FOR 32.5 T LOADING. FOR STRUCTURAL DESIGN DETAILS NEAREST HIGHER SIZE OF STANDARD RDSO DRAWING NO. B-10157/3 SHALL BE FOLLOWED.
7. SELF-SUPPORTING SHED SHALL BE PROVIDED OVER STAIRS & RAMP PROVIDED AS PER SKETCH NO. GC-HRIDC-SK-GEN-020.
8. BASE OF SUBWAY SHALL BE SUPPORTED AS PER SKETCH NO. GC-HRIDC-SK-GEN-021.
9. BARREL LENGTH OF THE SUBWAY ON KMP SIDE SHALL BE EXTENDED UPTO THE LOCATION WHERE BOTTOM SLAB OF SUBWAY CUTS THE 2:1 SLOPE OF THE BANK.
9. PLATFORM FENCING ON END PLATFORMS TO BE PROVIDED AT 1.5m INSIDE OF THE TOP EDGE OF THE EMBANKMENT.

LEGEND

ALL WORKS SHOWN IN BLACK ARE PAYABLE IN SCHEDULE 'A'

ALL WORKS SHOWN IN RED ARE PAYABLE IN SCHEDULE 'B'

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		DGM/CIVIL	
DPD/EST		DGM/S&T	
REETU PATIAL CDE/CIVIL		DGM/Elect.	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

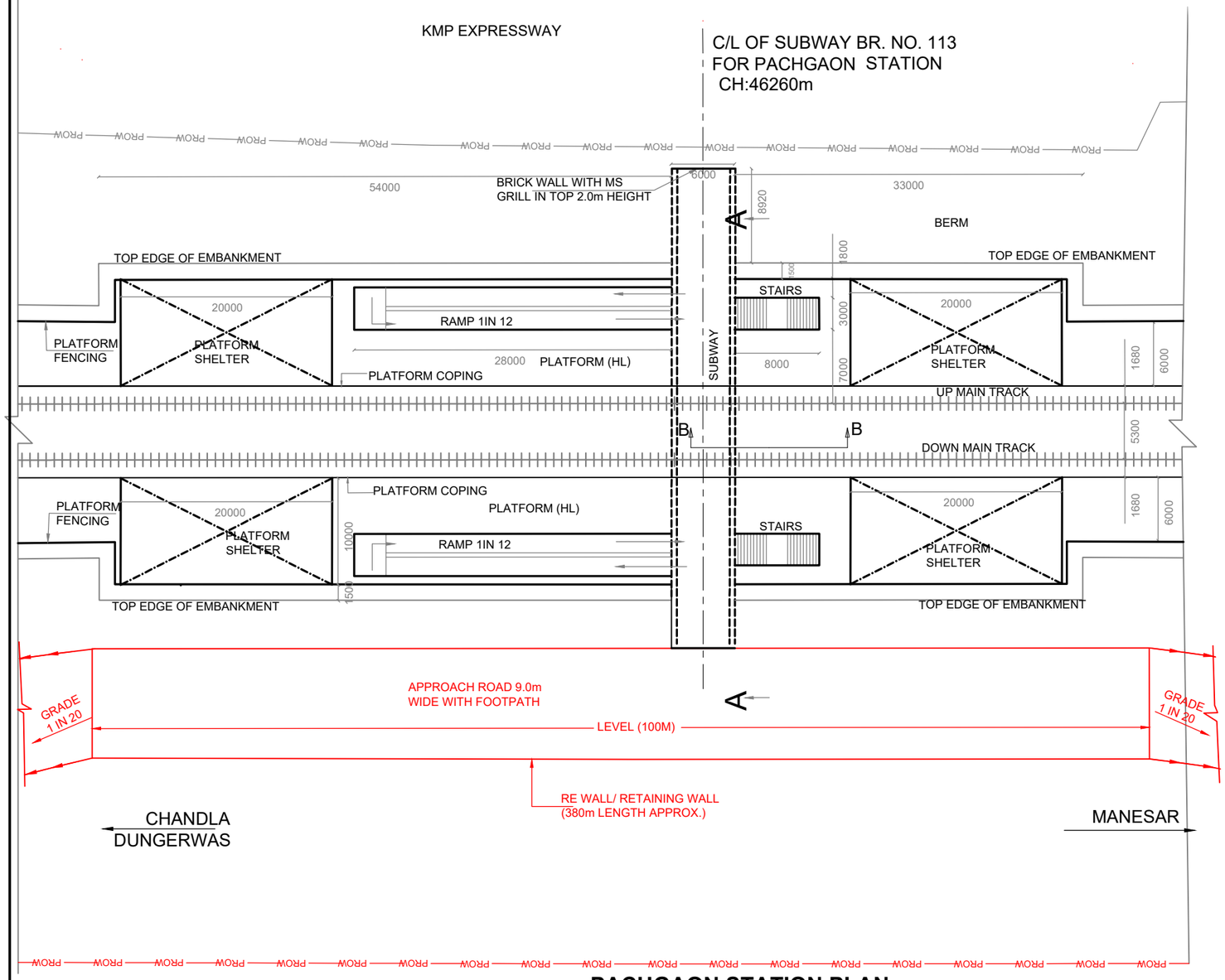
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

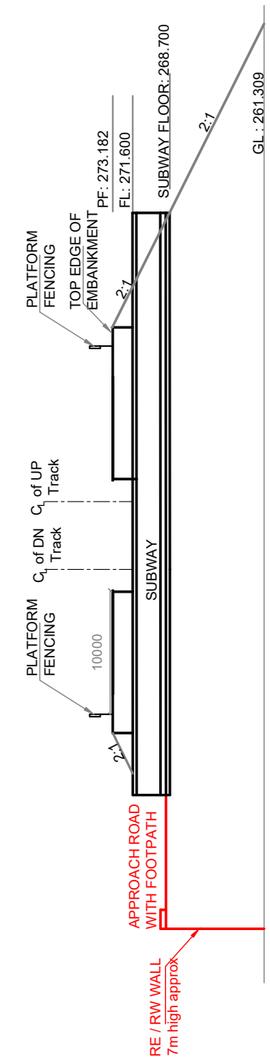
TITLE:-
CONCEPTUAL ARCHITECTURAL DRAWING CHANDLA DUNGERWAS STATION & SUBWAY BR. NO. 104

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-STN-SAD-CDU01_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	24-12-2022



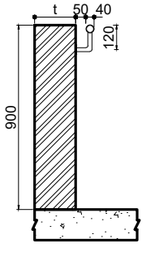
PACHGAON STATION PLAN



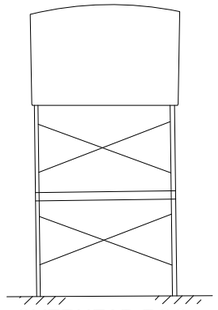
SECTION AT A-A

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL LEVEL ARE IN METERS.
3. PROTECTION WORK ON SLOPES OF BANK UP TO 30M, BOTH SIDES ON APPROACHES OF SUBWAY SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
4. DETAILING OF TICKET COUNTER SHALL BE AS PER SKETCH NO. GC-HRIDC-SK-GEN-013.
5. STEEL HANDRAIL SHALL BE FIXED WITH WALLS IN STAIRCASE AND RAMP PORTION.
6. SUBWAY SHALL BE DESIGNED FOR 32.5 T LOADING. FOR STRUCTURAL DESIGN DETAILS NEAREST HIGHER SIZE OF STANDARD RDSO DRAWING NO. B-10157/3 SHALL BE FOLLOWED.
7. SELF-SUPPORTING SHED SHALL BE PROVIDED OVER STAIRS & RAMP PROVIDED ON PLATFORM AS PER SKETCH NO. GC-HRIDC-SK-GEN-020.
8. BASE OF SUBWAY SHALL BE AS PER SKETCH NO. GC-HRIDC-SK-GEN-021
9. BARREL LENGTH OF THE SUBWAY ON KMP SIDE SHALL BE EXTENDED UPTO THE LOCATION WHERE BOTTOM SLAB OF SUBWAY CUTS THE 2:1 SLOPE OF THE BANK.
9. PLATFORM FENCING ON END PLATFORMS TO BE PROVIDED AT 1.5m INSIDE OF THE TOP EDGE OF THE EMBANKMENT.

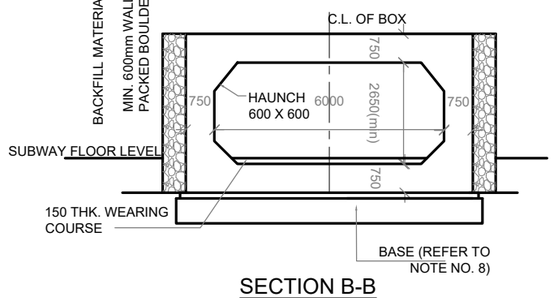
LEGEND
- ALL WORKS SHOWN IN BLACK ARE PAYABLE IN SCHEDULE 'A'
- ALL WORKS SHOWN IN RED ARE PAYABLE IN SCHEDULE 'B'



FIXING DETAIL OF
HANDRAIL TO THE WALL



OVERHEAD RCC
WATER STORAGE TANK



SECTION B-B

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		DGM/CIVIL	
DPD/EST		DGM/S&T	
REETU PATIAL CDE/CIVIL		DGM/Elect.	

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

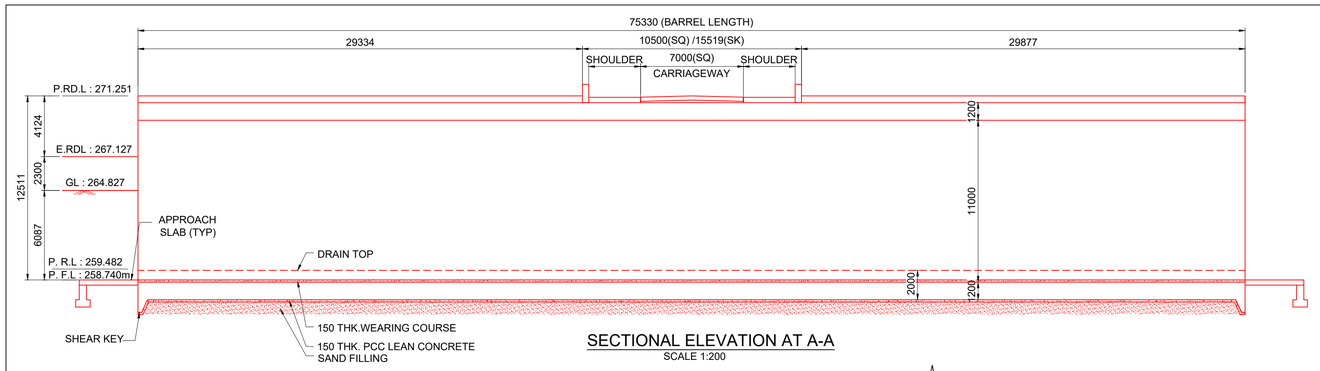
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:-
CONCEPTUAL ARCHITECTURAL DRAWING
PACHGAON STATION & SUBWAY BR. NO. 113

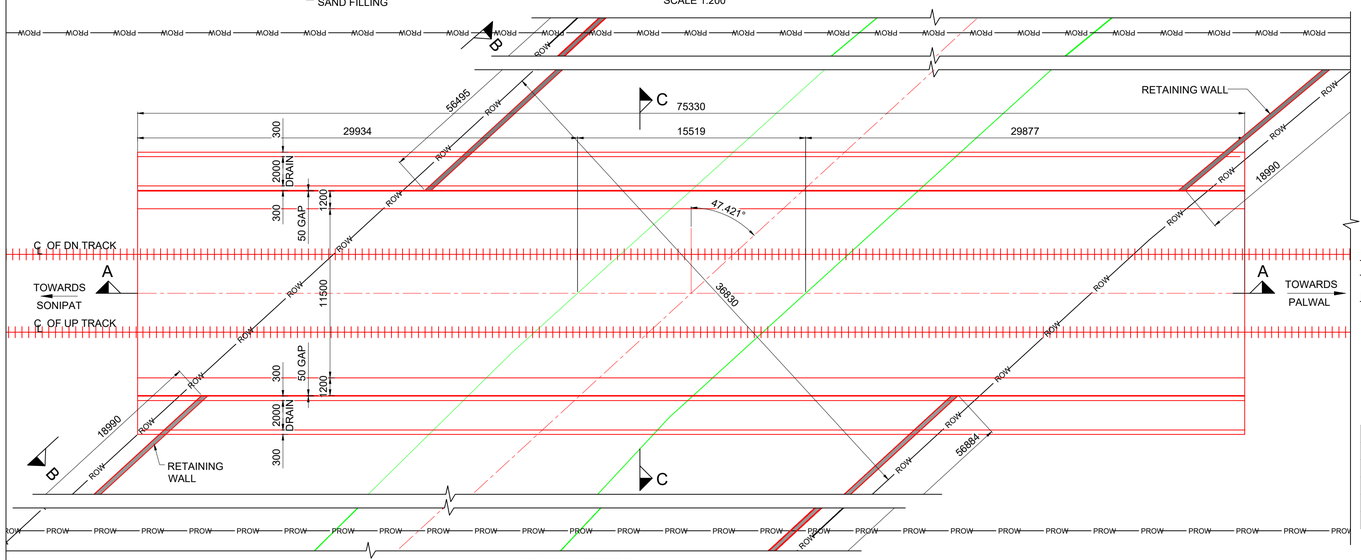
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-STN-SAD-PCG01_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	24-12-2022

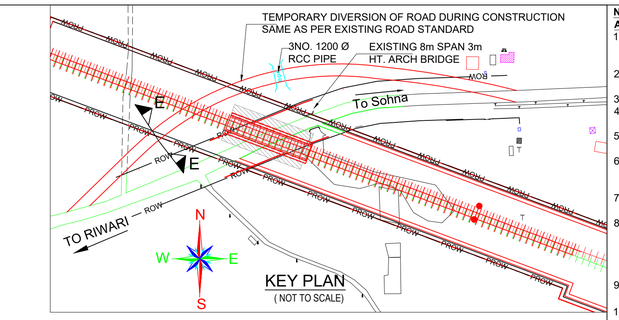
4 Bridges
4.1 Minor Bridges
4.1.1 Main Line

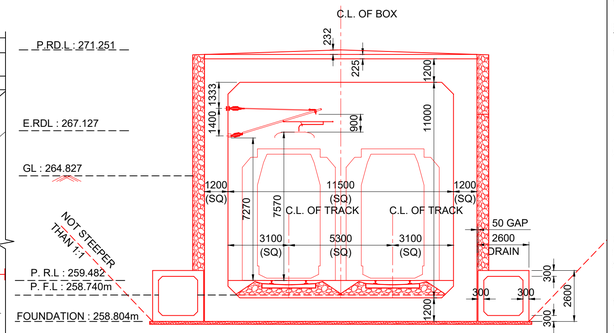


SECTIONAL ELEVATION AT A-A
SCALE 1:200

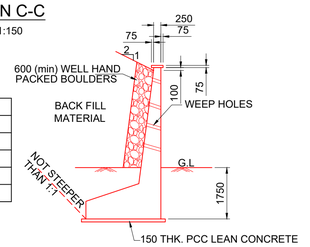


PLAN AT TOP
SCALE 1:200





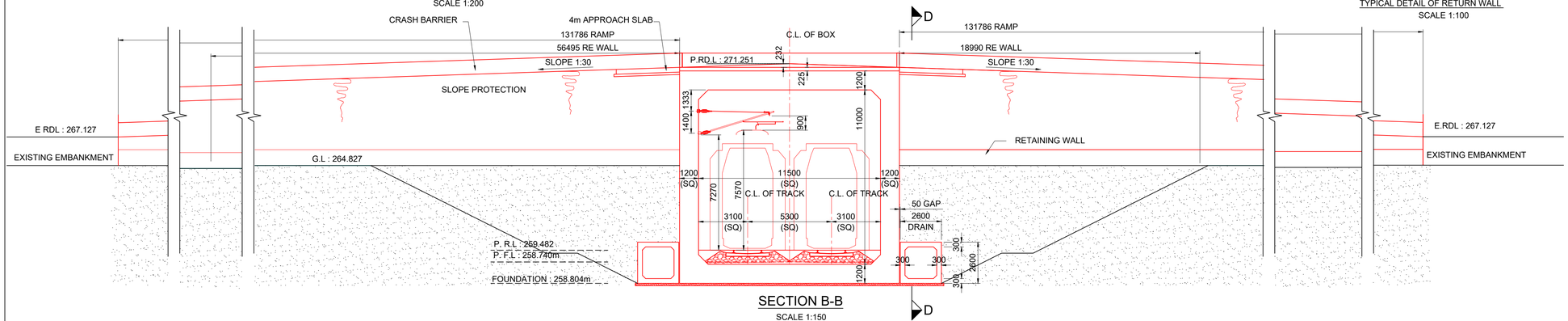
SECTION C-C
SCALE 1:150



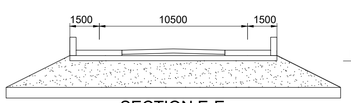
TYPICAL DETAIL OF RETURN WALL
SCALE 1:100

LEGEND

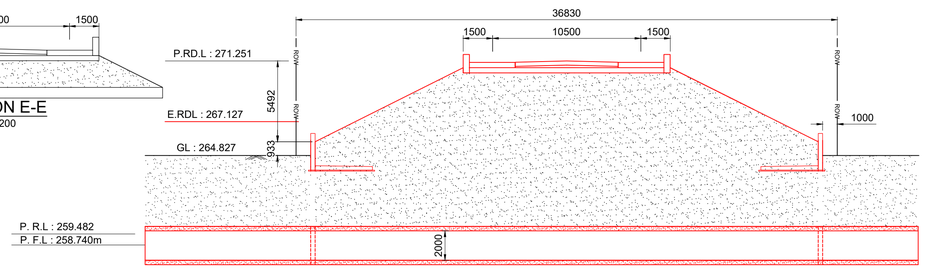
PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL
P.RD.L	PROPOSED ROAD LEVEL
E.RD.L	EXISTING ROAD LEVEL



SECTION B-B
SCALE 1:150



SECTION E-E
SCALE 1:200



SECTION D-D
SCALE 1:200

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE SHALL BE BE DESIGNED FOR CLASS-A& 70R AS PER IRC-6 AND 32.5 T LOADING AS PER IRS,AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL GAD,
11. SIZE OF STRUCTURAL MEMBERS ARE TENTATIVE AND SHALL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER,SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE. GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. ROAD TO BE TEMPORARY DIVERTED FOR CONSTRUCTION WITH SAME STANDARD AS OF EXISTING ROAD.
15. PERMANENT ROAD INCLUDING RE WALL SHALL BE CONSTRUCTED WITH SAME STANDARDS AS OF EXISTING ROAD. COST OF CONSTRUCTION OF ALL THE ELEMENTS SHOWN IN GAD SHALL BE BEARED BY HRIDC.
16. THE TRACK SHALL BE WITH GUARD RAIL.
17. DRAINAGE ARRANGEMENT SHOWN ARE INDICATIVE, DETAILED ARRANGEMENT SHALL BE SHOWN IN MISCELLANEOUS DRAWING.
18. SOFT AND LOOSE POCKET IN BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR MATERIAL.
19. PROPER DETAILING SHALL BE DONE FOR LIGHTENING AND VENTILATION.

PROJECT:
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CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR
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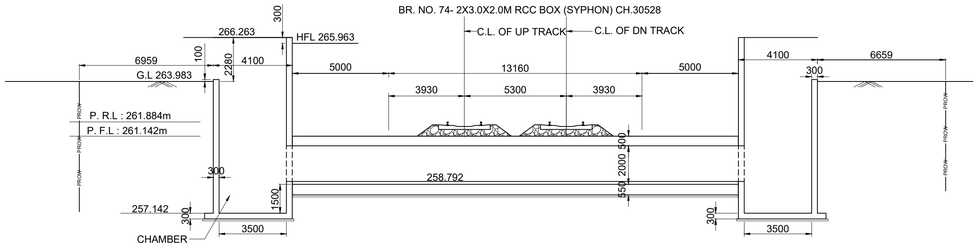
RITES THE INFRASTRUCTURE PEOPLE
SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			
STIPHEN SAHOO SRE/ ELECT.			

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED ROB BR. NO. 073
SPAN 1×11.5×11 RCC BOX (AT CH: 30155)

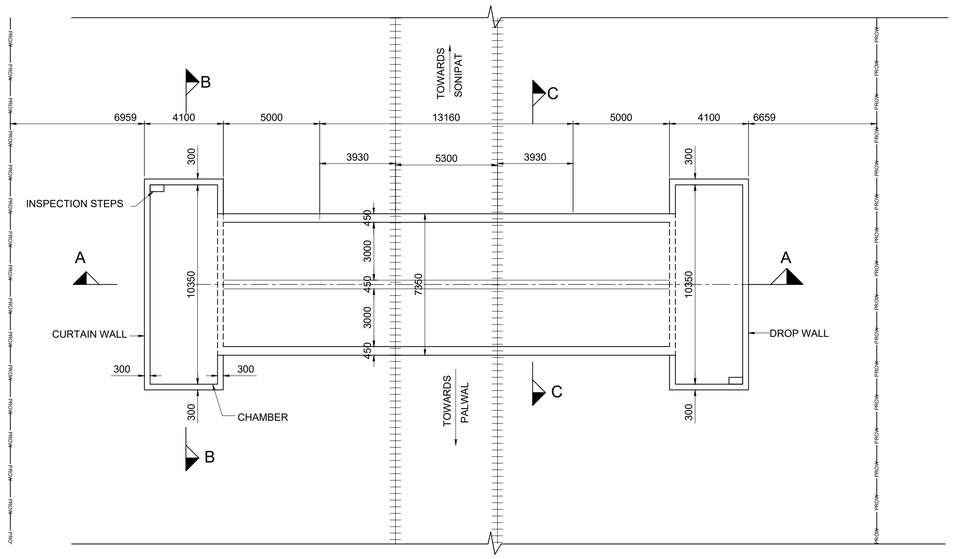
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01073_A1
SHEET NO. 1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



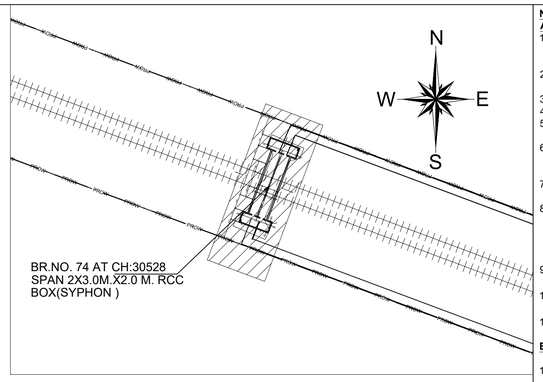
SECTIONAL ELEVATION AT A-A

SCALE 1:150



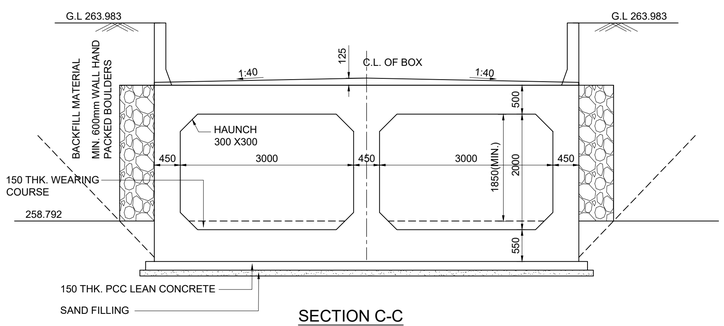
PLAN AT TOP

SCALE 1:150



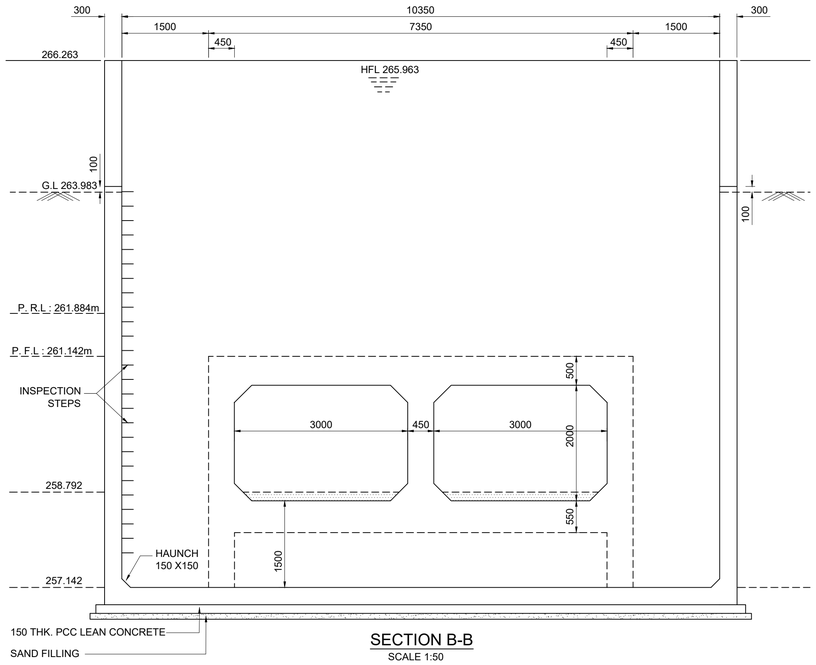
KEY PLAN

(NOT TO SCALE)



SECTION C-C

SCALE 1:50



SECTION B-B

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER,SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. ALL GAPS SHALL BE FILLED WITH POLY-SULPHIDE BASED SEALANT OR EQUIVALENT MATERIAL.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR
HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

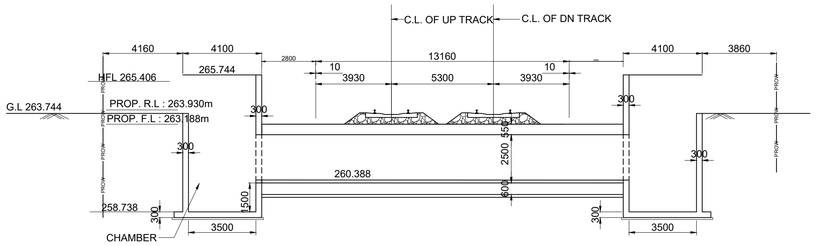
RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING

PROPOSED BR. NO. 074 SPAN 2×3.0×2.0
RCC BOX (SYPHON) AT CH: 30528

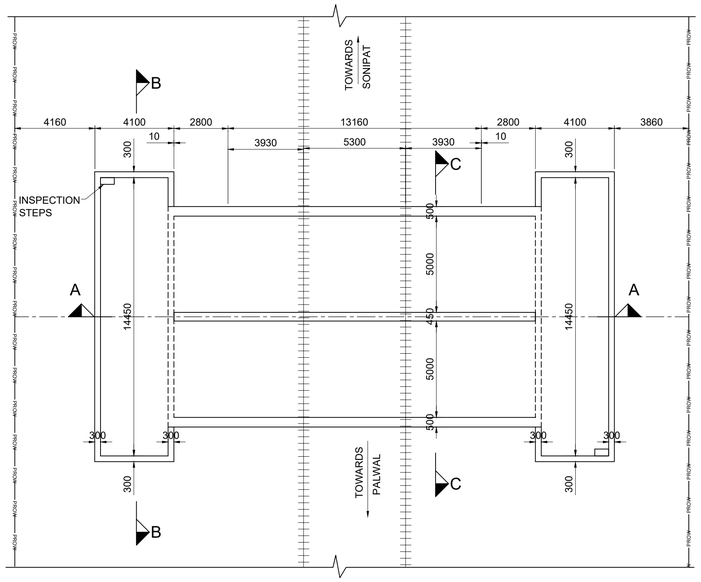
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01074_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



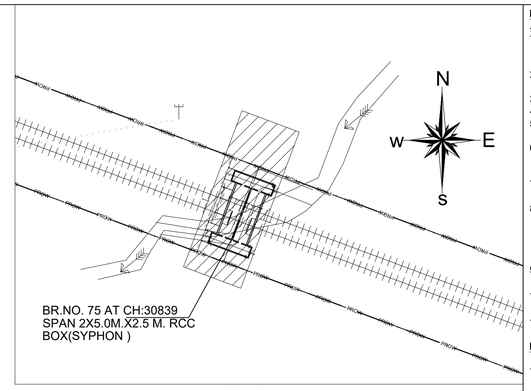
SECTIONAL ELEVATION AT A-A

SCALE 1:150



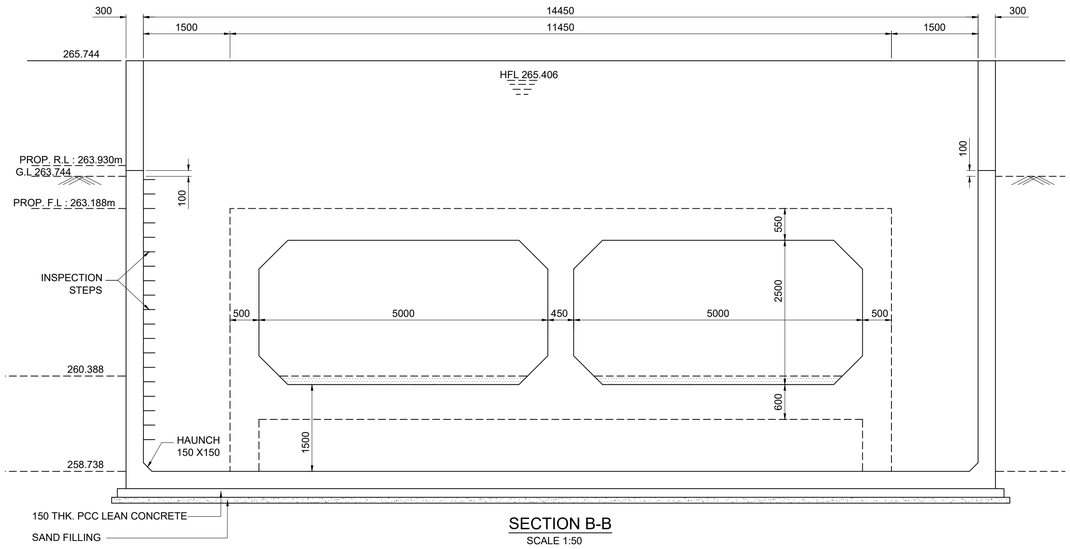
PLAN AT TOP

SCALE 1:150



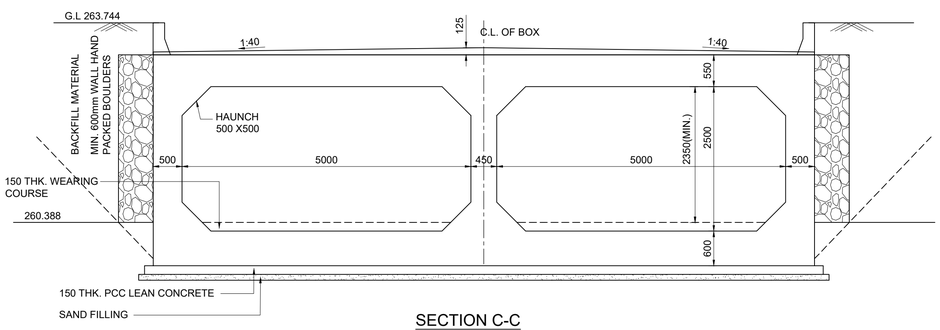
KEY PLAN

(NOT TO SCALE)



SECTION B-B

SCALE 1:50



SECTION C-C

SCALE 1:50

NOTES :

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12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
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LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:

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CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

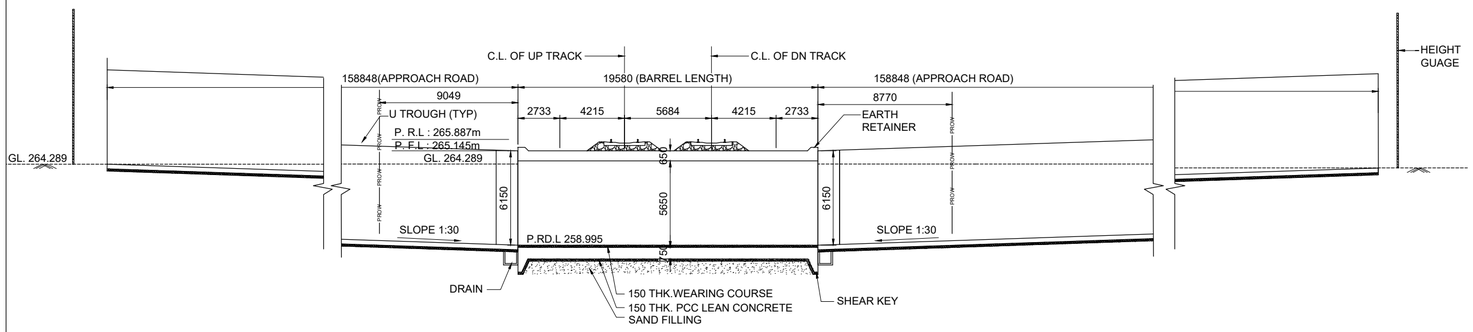
RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING

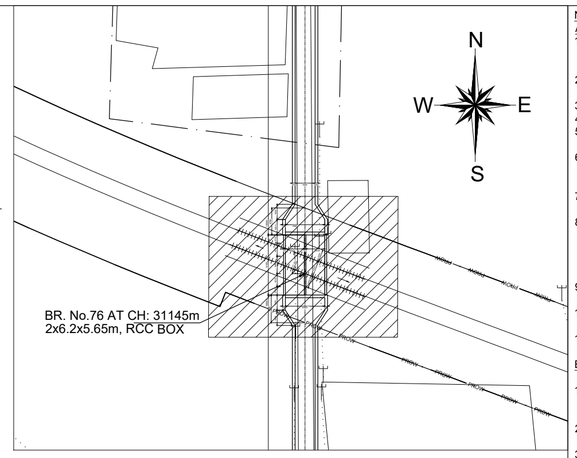
PROPOSED BR. NO. 075 SPAN 2×5.0×2.5 RCC BOX (SYPHON) AT CH: 30839

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01075_A1	1 OF 1

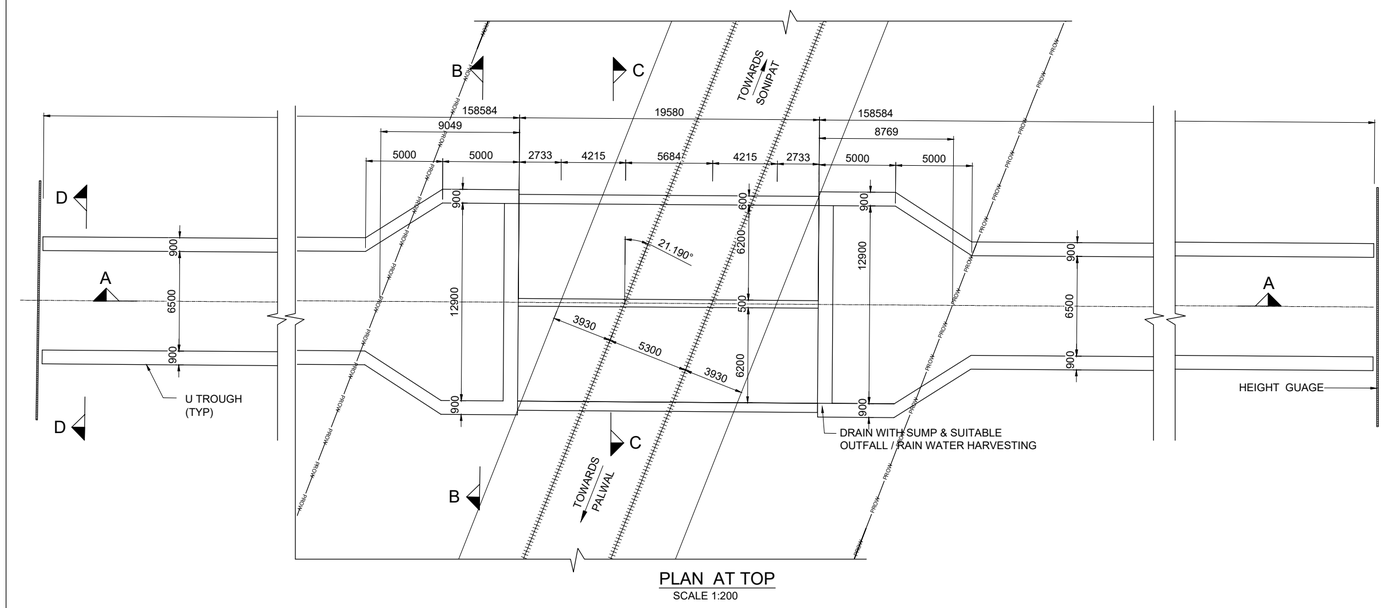
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



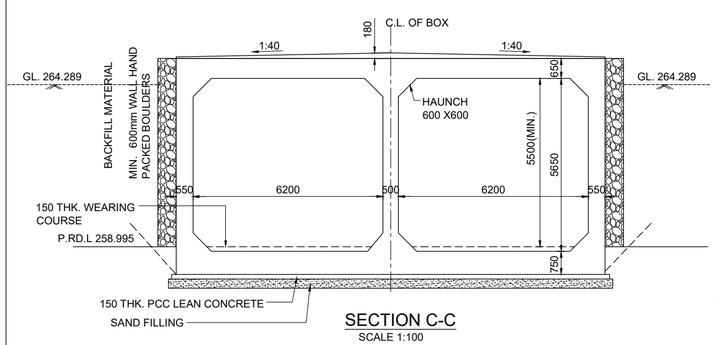
SECTIONAL ELEVATION AT A-A
SCALE 1:200



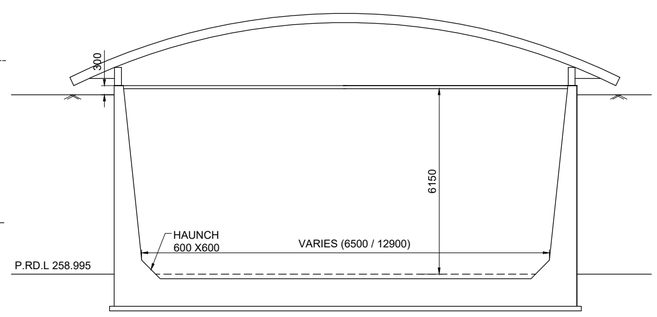
KEY PLAN
(NOT TO SCALE)



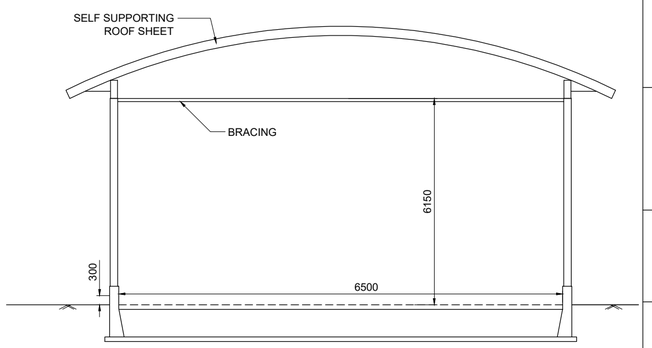
PLAN AT TOP
SCALE 1:200



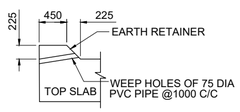
SECTION C-C
SCALE 1:100



SECTION B-B
NTS
DETAIL OF COVER SHED ON APPROACH ROAD



SECTION D-D
NTS
DETAIL OF COVER SHED ON APPROACH ROAD



EARTH RETAINER
SCALE 1:50

NOTES :

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B) TECHNICAL NOTES :

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7. SEISMIC ZONE- IV
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    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.
16. RETAINING WALL ALONG THE ROAD SHALL BE MIN 300 ABOVE GROUND LEVEL. NO WEEP HOLE SHALL BE PROVIDED IN RETAINING WALL.
17. DRAIN WITH SUMP & SUITABLE OUTFALL SHALL BE PROVIDED FOR PROPER DRAINAGE. HUMP SHALL BE PROVIDED AT BOTH ENDS OF THE RAMP.
18. SELF SUPPORTING COVER SHED SHALL BE PROVIDED OVER THE APPROACH ROAD.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
PRDL	PROPOSED ROAD LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

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CONSULTANT:
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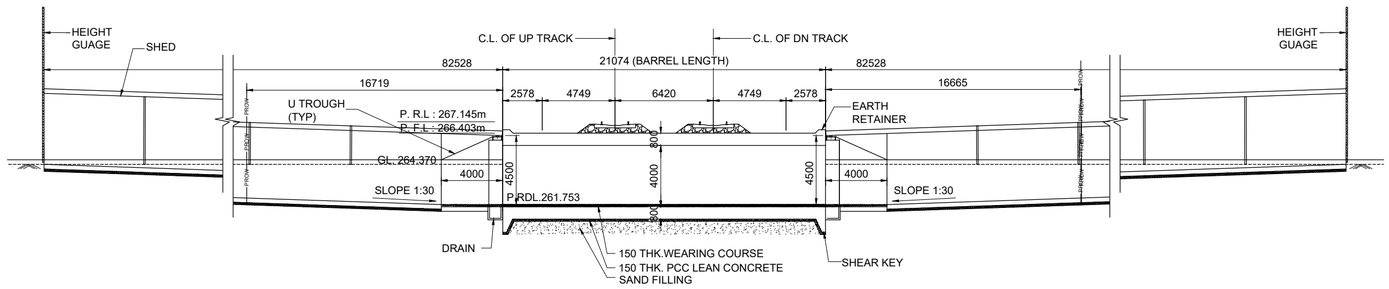
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC

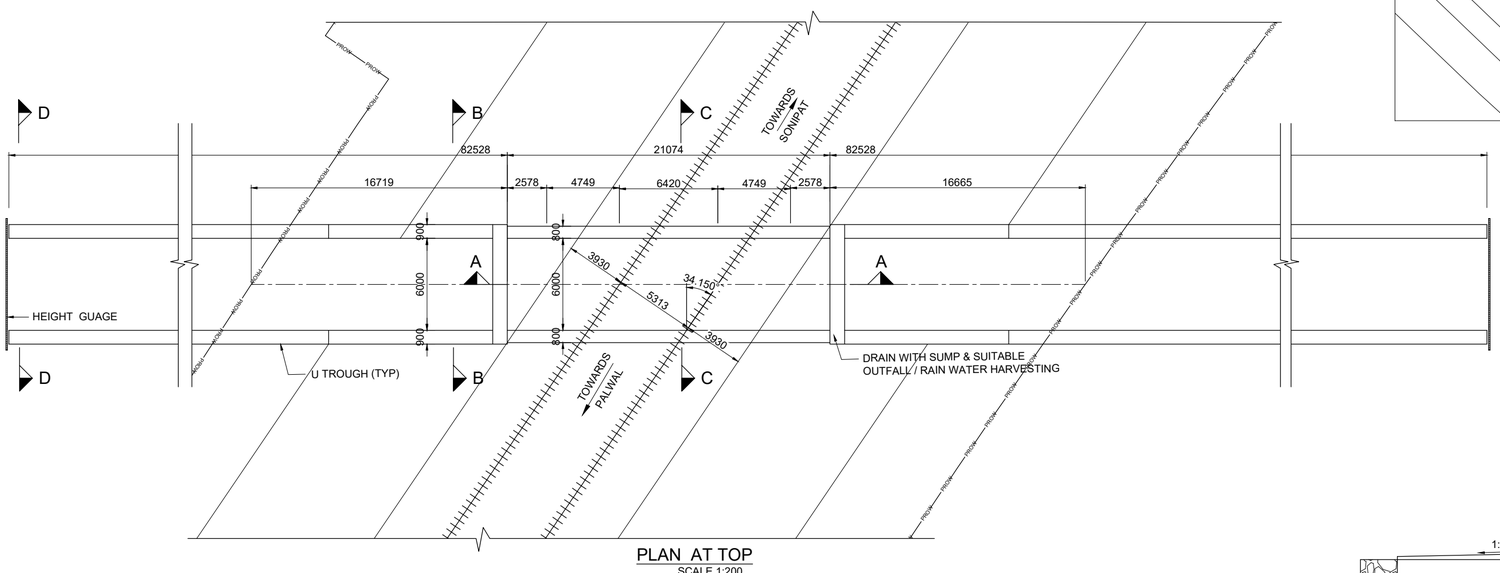
TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 076 SPAN
2×6.2×5.650 RCC BOX AT CH: 31145

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01076_A1	1 OF 1

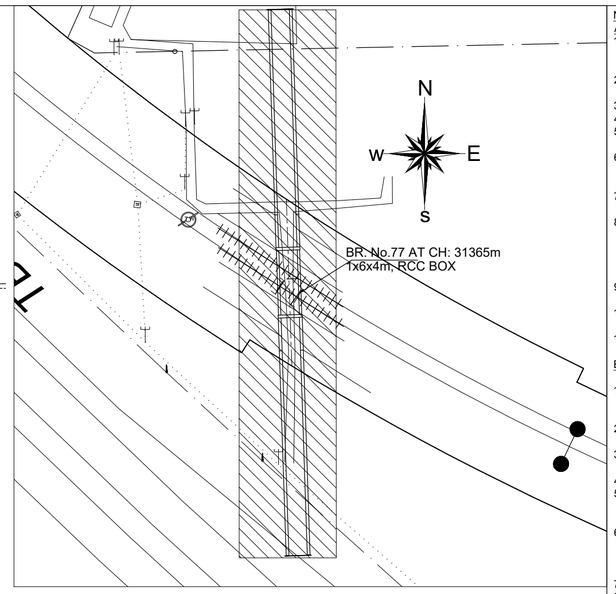
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



SECTIONAL ELEVATION AT A-A
SCALE 1:200



PLAN AT TOP
SCALE 1:200



KEY PLAN
(NOT TO SCALE)

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
PRDL	PROPOSED ROAD LEVEL

NOTES :

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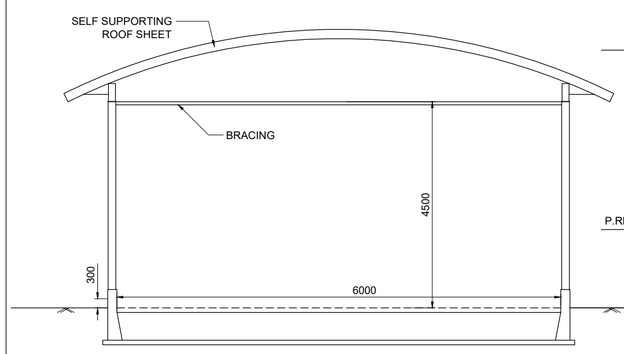
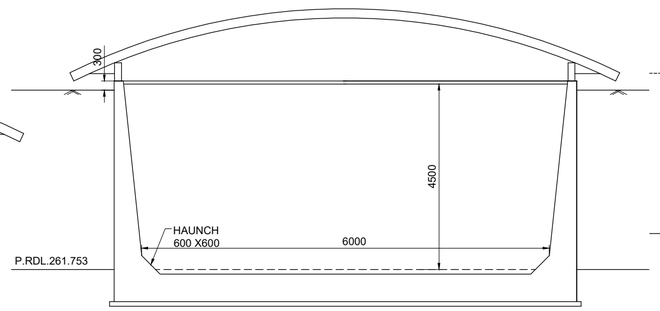
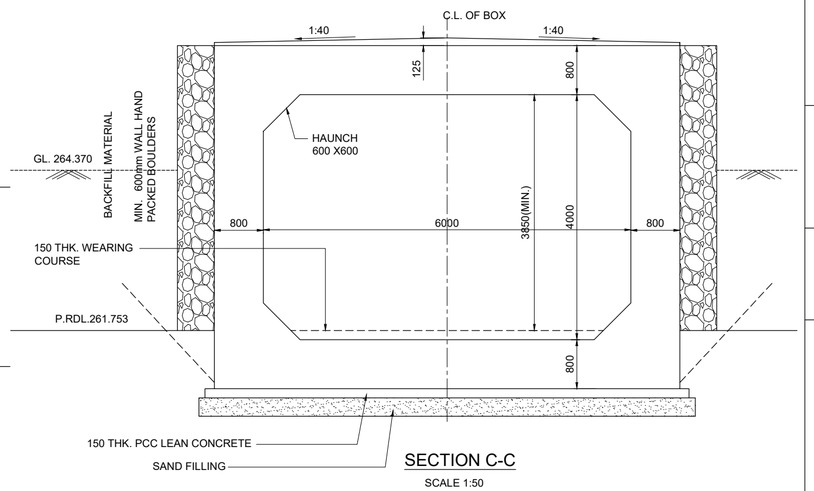
7. SEISMIC ZONE- IV.
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.
16. RETAINING WALL ALONG THE ROAD SHALL BE MIN 300 ABOVE GROUND LEVEL.NO WEEP HOLE SHALL BE PROVIDED IN RETAINING WALL.
17. DRAIN WITH SUMP & SUITABLE OUTFALL SHALL BE PROVIDED FOR PROPER DRAINAGE. HUMP SHALL BE PROVIDED AT BOTH ENDS OF THE RAMP.
18. SHED SHALL BE PROVIDED OVER THE RAMP.



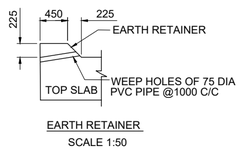
SECTION D-D
NTS
DETAIL OF COVER SHED ON APPROACH ROAD



SECTION B-B
NTS
DETAIL OF COVER SHED ON APPROACH ROAD



SECTION C-C
SCALE 1:50



EARTH RETAINER
SCALE 1:50

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

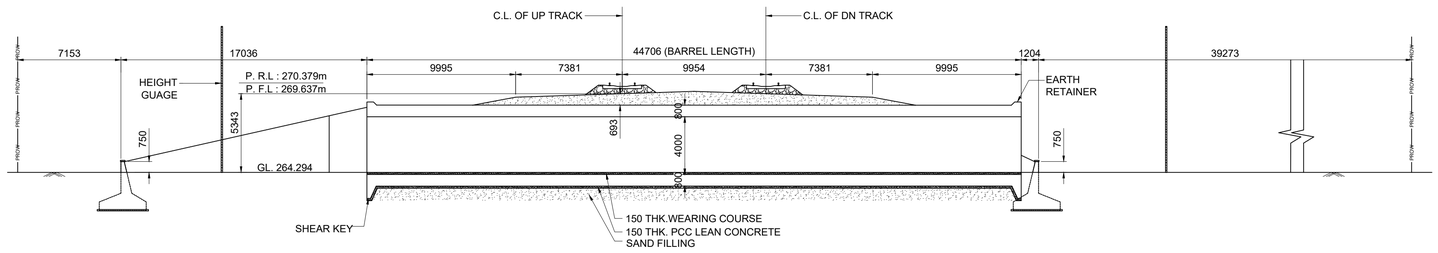
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

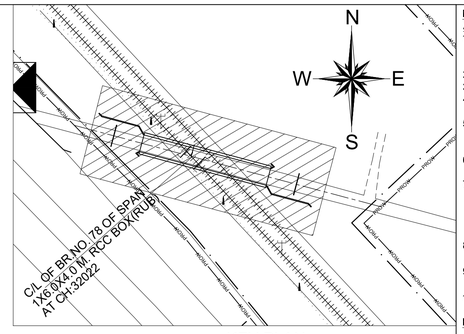
TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 077 SPAN
1×6.0×4.0 RCC BOX AT CH: 31365

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01077_A1	1 OF 1

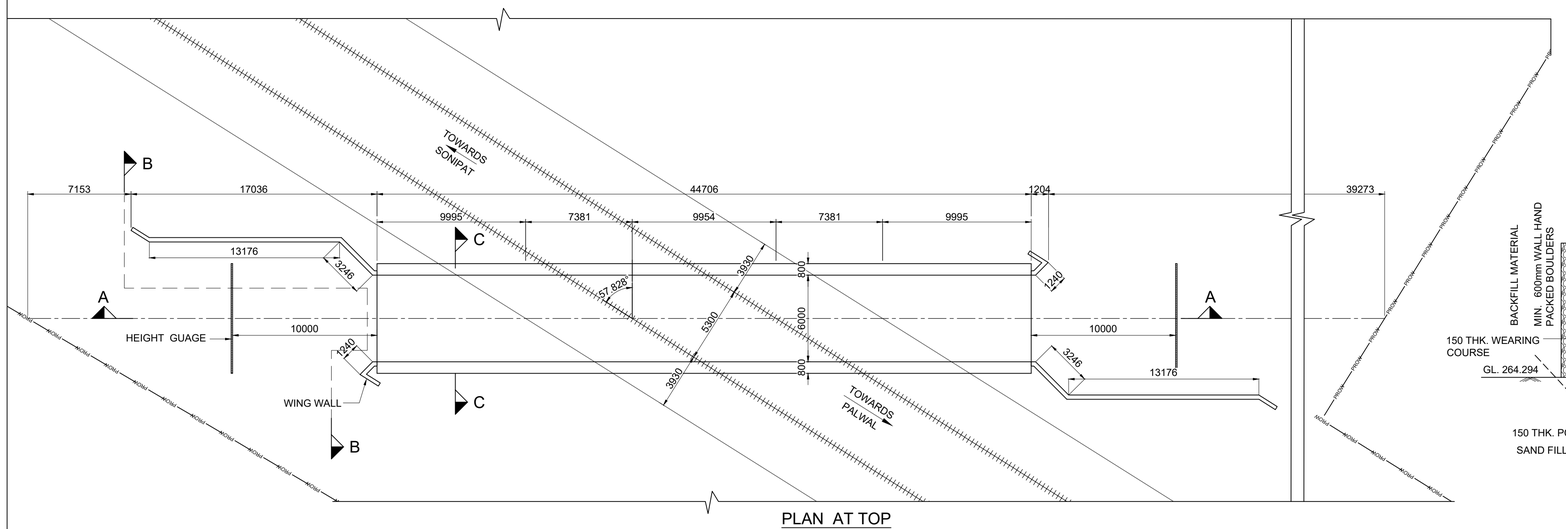
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



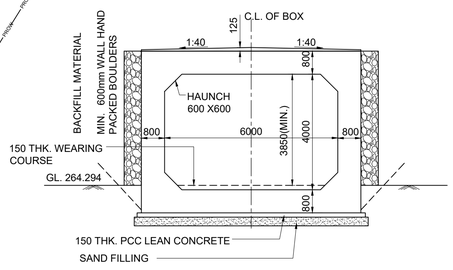
SECTIONAL ELEVATION AT A-A
SCALE 1:200



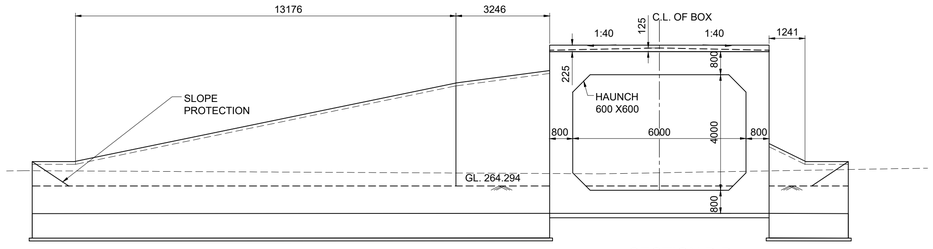
KEY PLAN
(NOT TO SCALE)



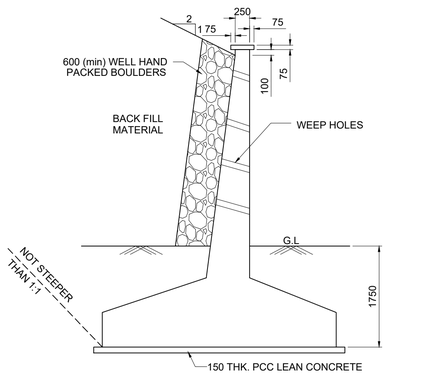
PLAN AT TOP
SCALE 1:200



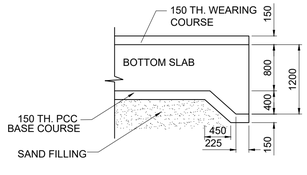
SECTION C-C
SCALE 1:100



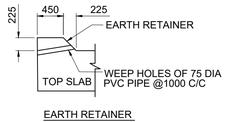
SECTION B-B
SCALE 1:100



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
3. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
4. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
5. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
6. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
7. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
8. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
9. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
10. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
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7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
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12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

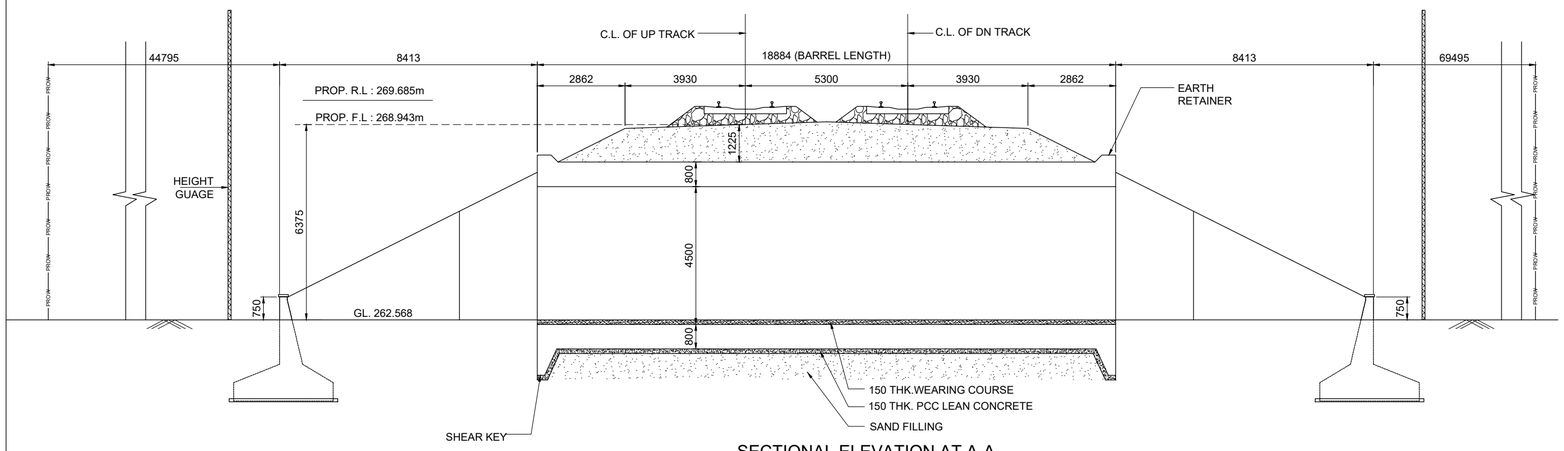
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC

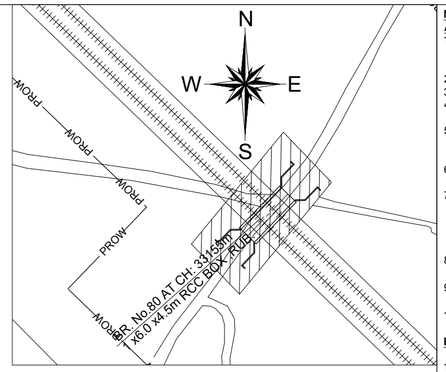
TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 078 SPAN
1×6.0×4.0 RCC BOX AT CH: 32022

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01078_A1	1 OF 1

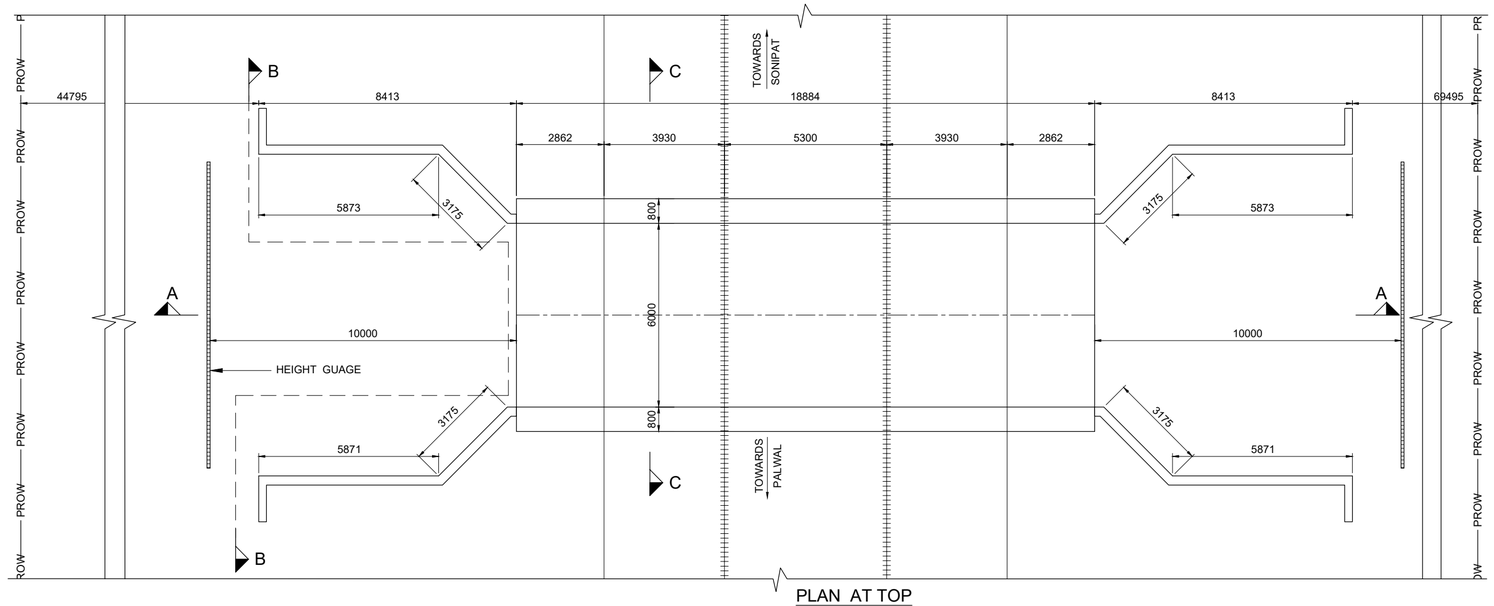
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



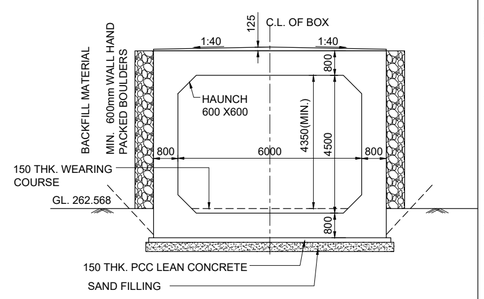
SECTIONAL ELEVATION AT A-A
SCALE 1:100



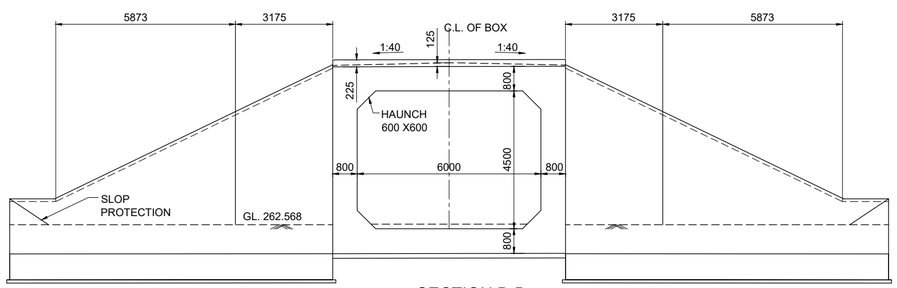
KEY PLAN
(NOT TO SCALE)



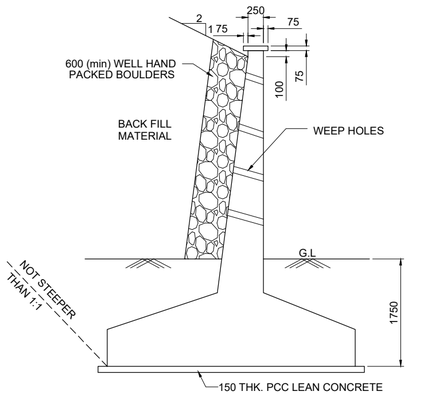
PLAN AT TOP
SCALE 1:100



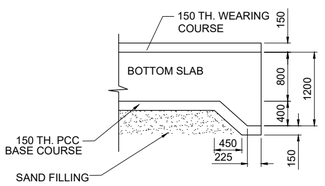
SECTION C-C
SCALE 1:100



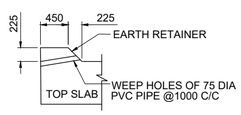
SECTION B-B
SCALE 1:100



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

NOTES :

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7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
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    GRADE OF CONCRETE :
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    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
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LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
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CLIENT:
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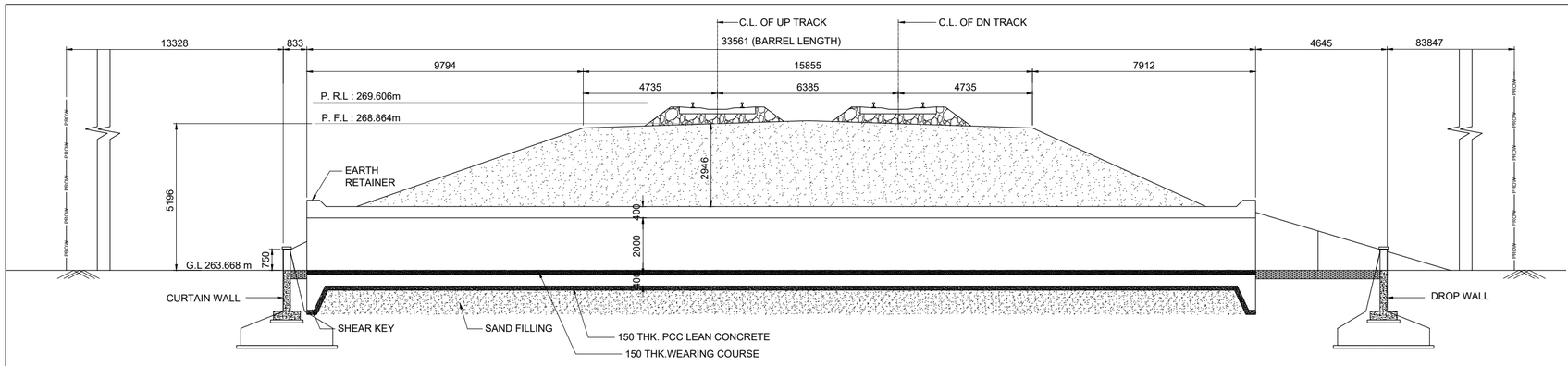
CONSULTANT:
GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 080
SPAN 1×6.0×4.50 RCC BOX AT CH: 33155

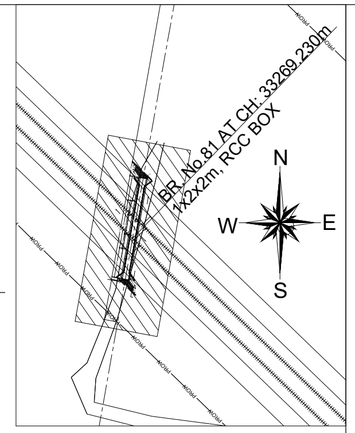
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01080_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



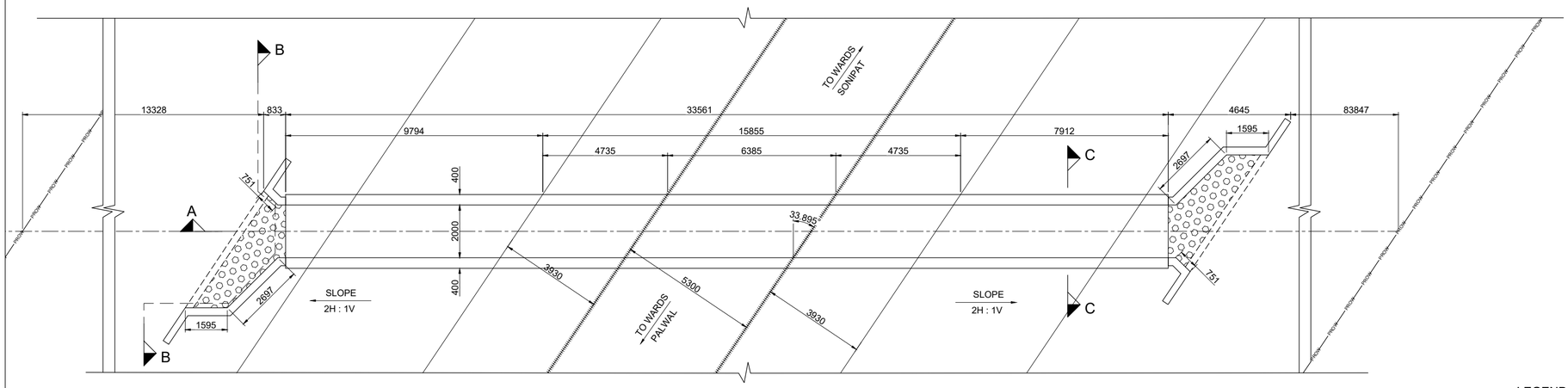
SECTIONAL ELEVATION AT A-A

SCALE 1:100



KEY PLAN

(NOT TO SCALE)

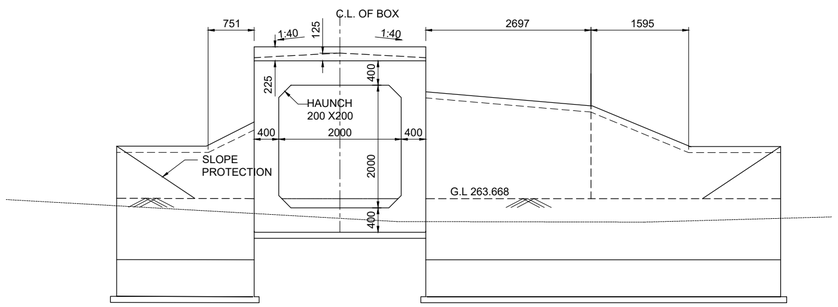


PLAN AT TOP

SCALE 1:100

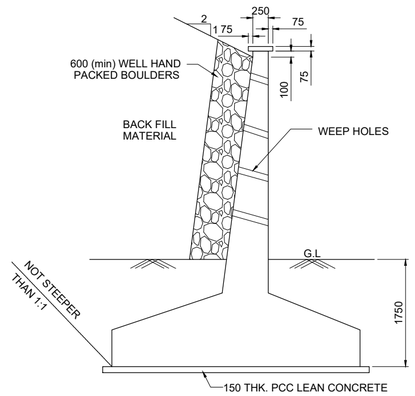
LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL



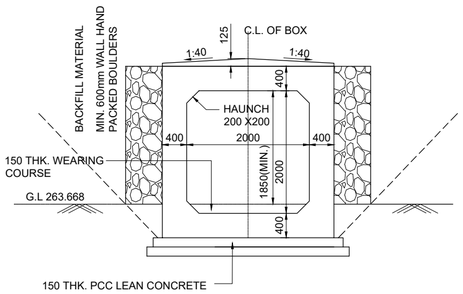
VIEW AT B-B

SCALE 1:50



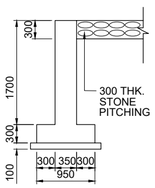
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



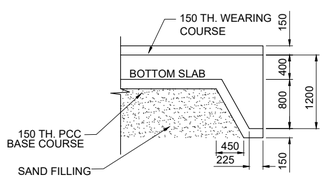
SECTION C-C

SCALE 1:50



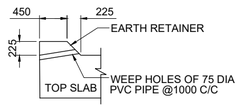
DROP / CURTAIN WALL DETAILS

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER,SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE. GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. GROUND IMPROVEMENT SHALL BE CARRIED OUT AS PER GT REPORT AND CONFIRMED THROUGH FIELD TESTING.
16. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
17. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

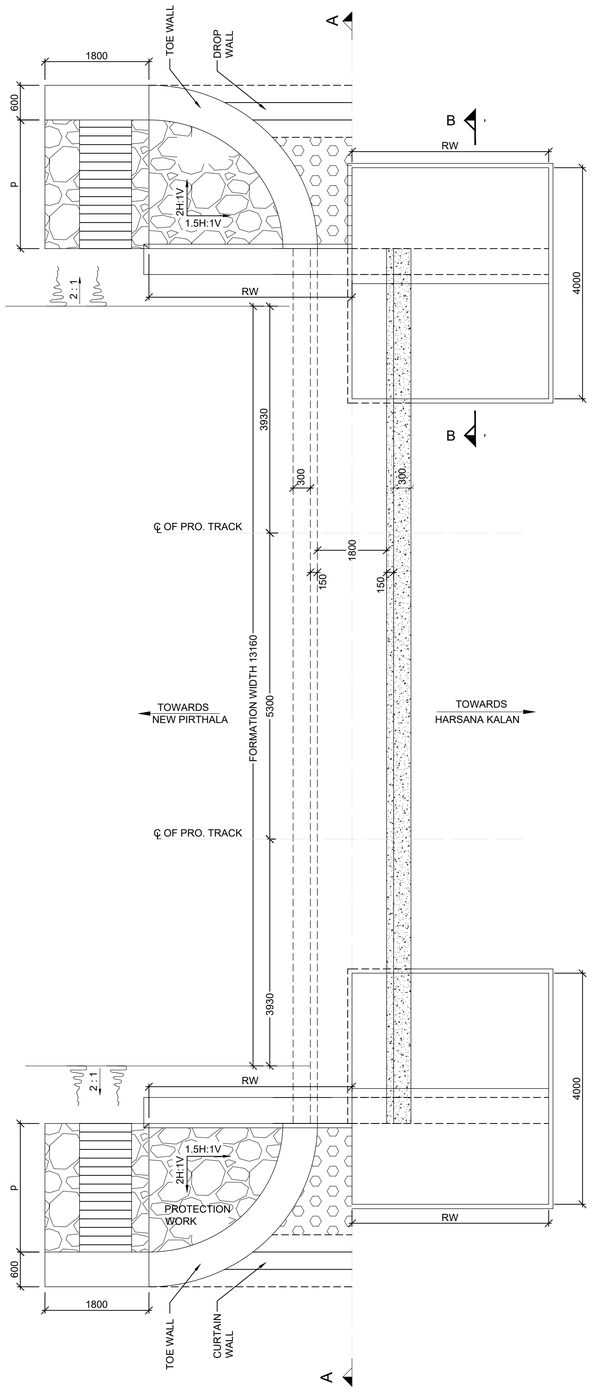
RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR BALANCING CULVERT BRIDGE NO. 081
SPAN 1×2.0×2.0 RCC BOX AT CH: 33269.230

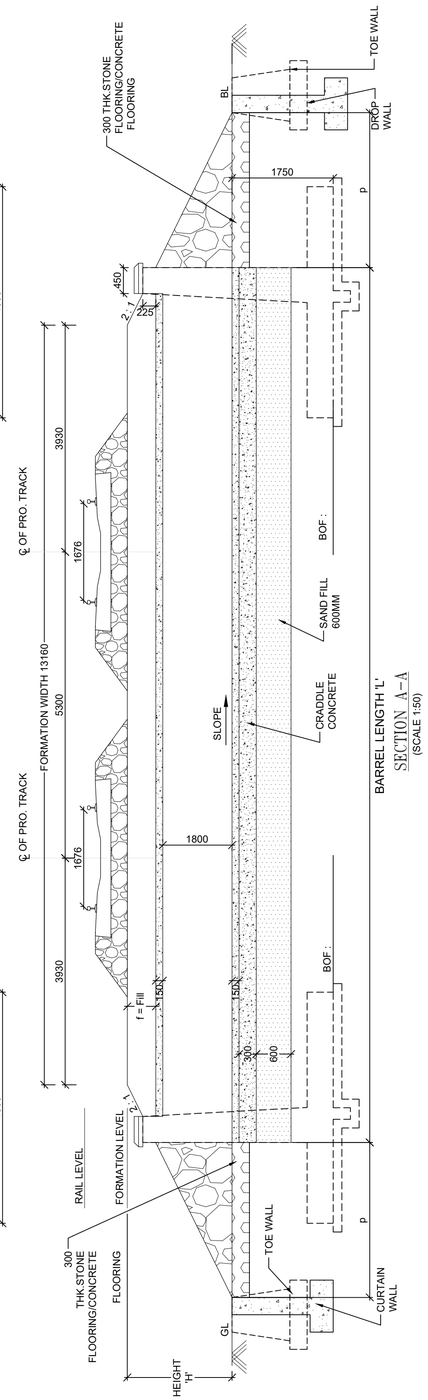
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01081_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



HALF PLAN AT TOP HALF PLAN AT BOTTOM

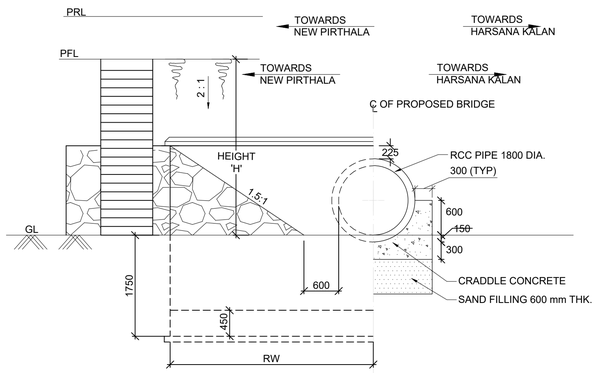
(SCALE 1:50)



BARREL LENGTH 'L'

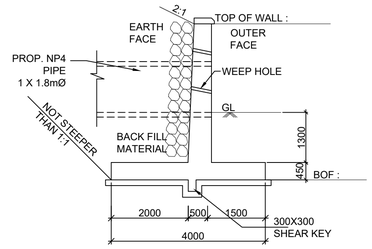
SECTION A–A

(SCALE 1:50)



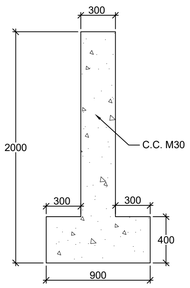
HALF ELEVATION HALF SECTION

(SCALE 1:50)



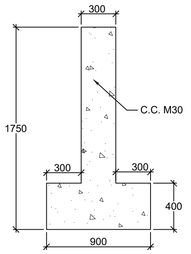
SECTION B-B

(SCALE 1:75)



DROP WALL

(SCALE 1:25)



CURTAIN WALL

(SCALE 1:25)

LEGEND

F.L	FORMATION LEVEL
R.L	RAIL LEVEL
G.L	GROUND LEVEL
BOF	BOTTOM OF FOUNDATION
PROP.	PROPOSED
EXG.	EXISTING
THK.	THICKNESS
CH.	CHAINAGE
PCC	PLAIN CEMENT CONCRETE
RCC	REINFORCED CEMENT CONCRETE
BR.	BRIDGE

CONSTRUCTION DEPTH

1) RAIL (60kg)	172 mm
2) RUBBER PAD	10 mm
3) WIDER PSC SLEEPER HEIGHT AT RAIL SEAT	210 mm
4) MINIMUM BALLAST THK.	350 mm
TOTAL	742 mm

COLOR CODE LEGEND

RED	-	PROPOSED
CONTINUOUS	-	VISIBLE
DOTTED	-	INVISIBLE
BLACK	-	EXISTING

Sr. No.	Chainage (in m)	Br. No.	Span	Prop. RL	Prop. FL	GL	Clear Height	Track on	No. of tracks	T c/c	RW	P	f	H	L	REMARK
1	33450.000	82	1 x 1.8m	269.494	268.752	263.704	1.800	Straight	2	5.3	4.425	3.9	3.098	5.048	45.795	56.1°, SKEW
2	37317.678	90	1 x 1.8m	263.671	262.929	257.025	1.800	Curve	2	5.34	4.425	3.9	3.954	5.904	50.305	55.19°, SKEW
3	40357.531	96	1 x 1.8m	258.271	257.529	252.484	1.800	Curve	2	5.674	4.425	3.9	3.095	5.045	25.616	
4	41666.651	99	1 x 1.8m	261.692	260.950	254.888	1.800	Straight	2	5.3	4.425	3.9	4.112	6.062	29.157	
5	48594.592	122	1 x 1.8m	259.892	259.150	253.423	1.800	Straight	2	5.3	4.425	3.9	3.777	5.727	27.817	

NOTES :

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2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. STRUCTUIRE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
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2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
4. PLACEMENT LEVEL OF PIPE AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF DRAINAGE &NATURAL GROUND PROFILE.
5. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
6. SEISMIC ZONE- IV
7. EXPOSURE CONDITION- MODERATE.
8. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
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10. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
11. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
12. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-1	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

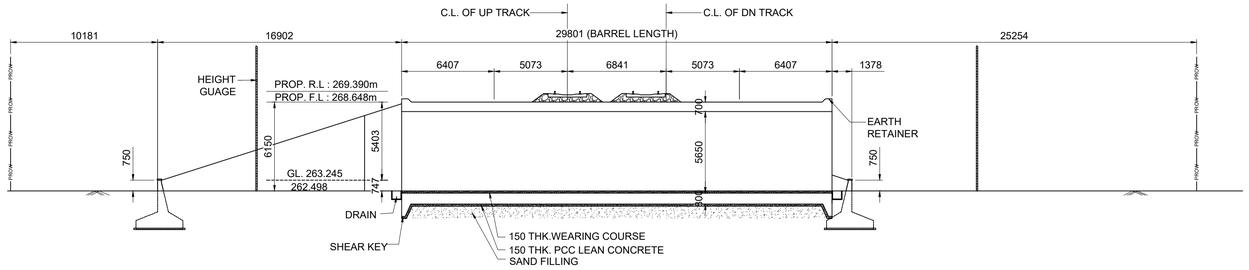
TITLE:-

GENERAL ARRANGEMENT DRAWING
BRIDGE NO. 82,90,96,99,&122 PIPE CULVERT 1X1.8 SPAN

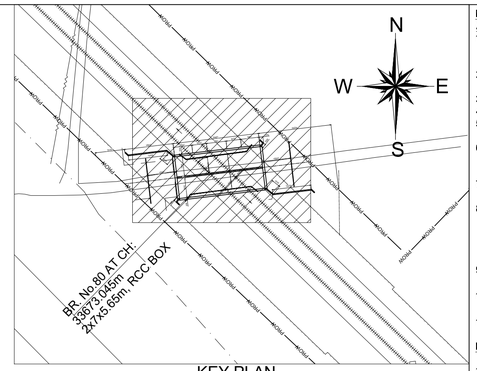
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-PIPE_A1

SHEET NO. 1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	08-12-2022



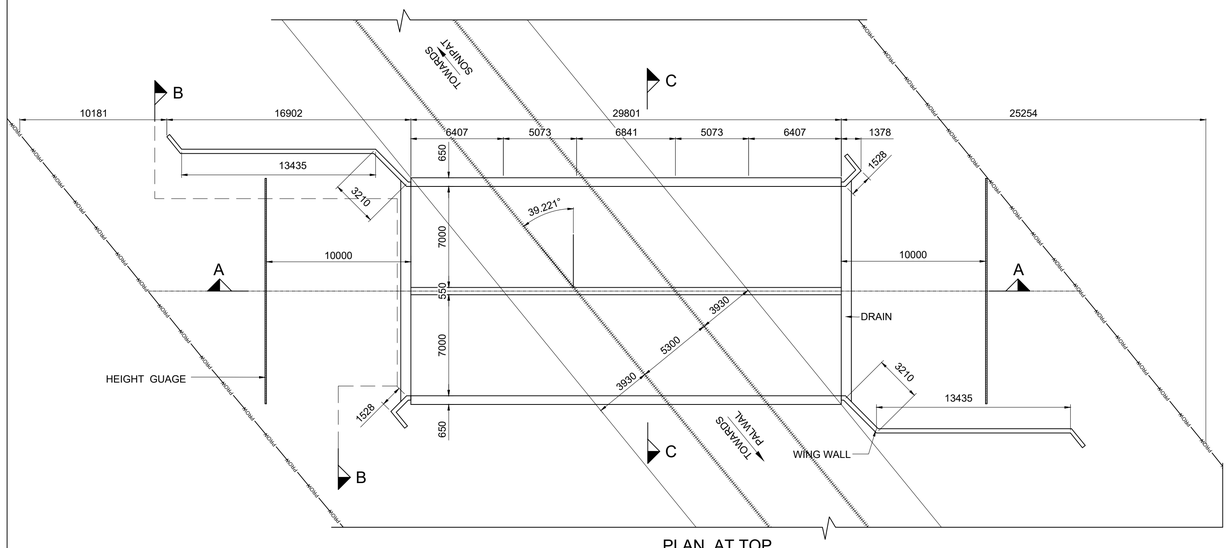
SECTIONAL ELEVATION AT A-A
SCALE 1:200



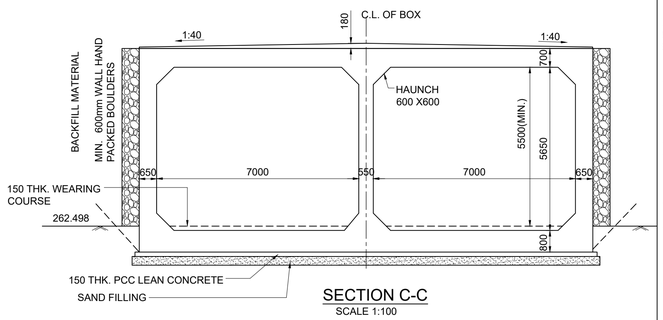
KEY PLAN
(NOT TO SCALE)

LEGEND

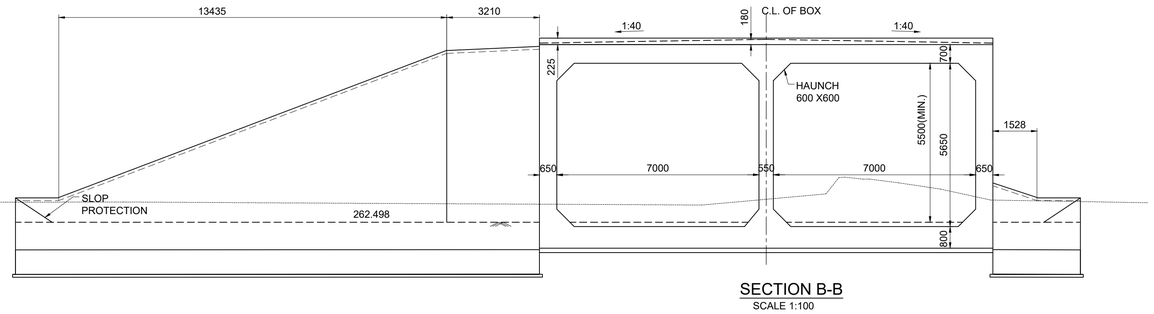
PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL



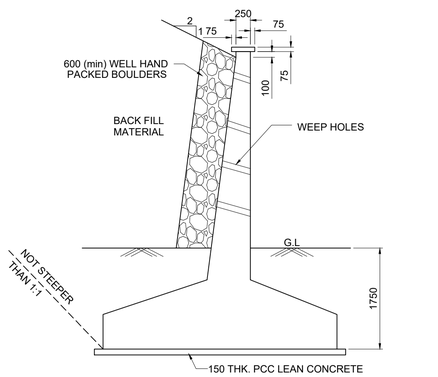
PLAN AT TOP
SCALE 1:200



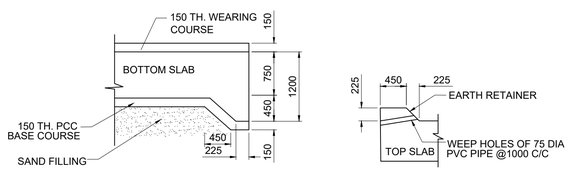
SECTION C-C
SCALE 1:100



SECTION B-B
SCALE 1:100



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50

EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

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B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
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    GRADE OF CONCRETE :
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    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.
16. RETAINING WALL ALONG THE ROAD SHALL BE MIN 300 ABOVE GROUND LEVEL.
17. DRAIN WITH SUMP & SUITABLE OUTFALL SHALL BE PROVIDED FOR PROPER DRAINAGE. HUMP SHALL BE PROVIDED AT BOTH ENDS OF THE RAMP.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

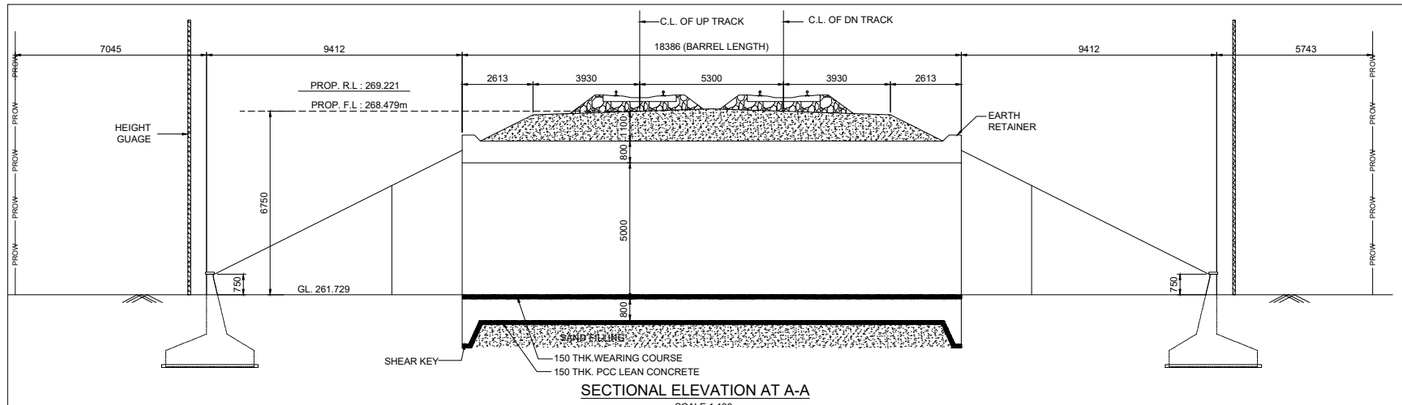
CONSULTANT:
GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 083 SPAN
2×7.0×5.650 RCC BOX AT CH: 33673.045

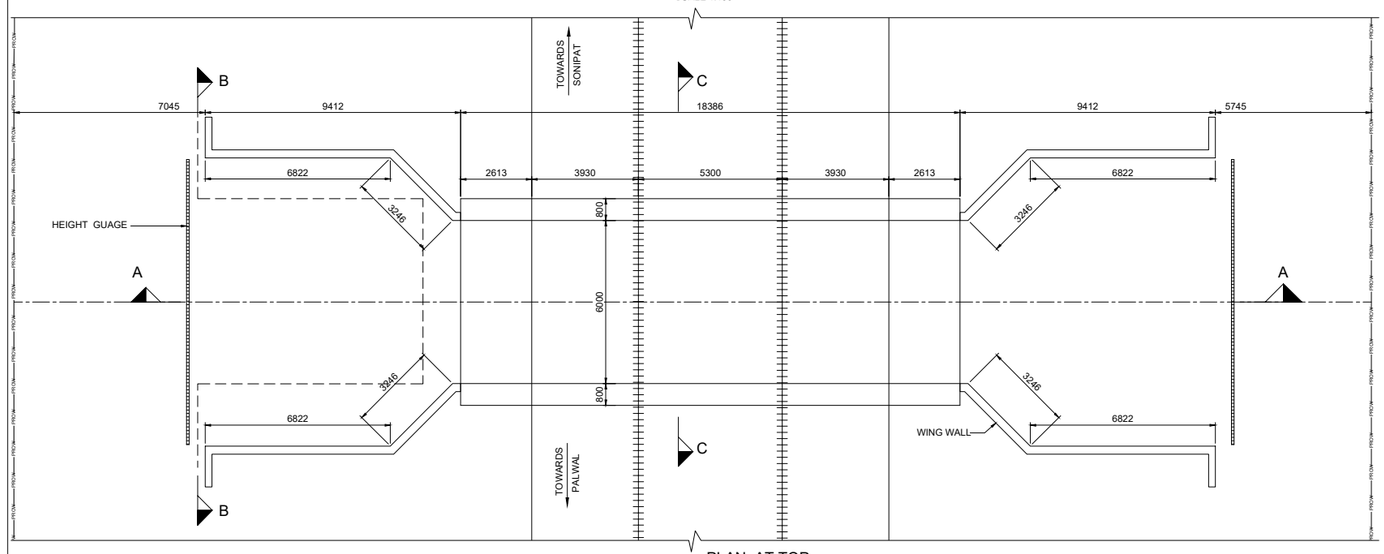
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01083_A1
SHEET NO. 1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



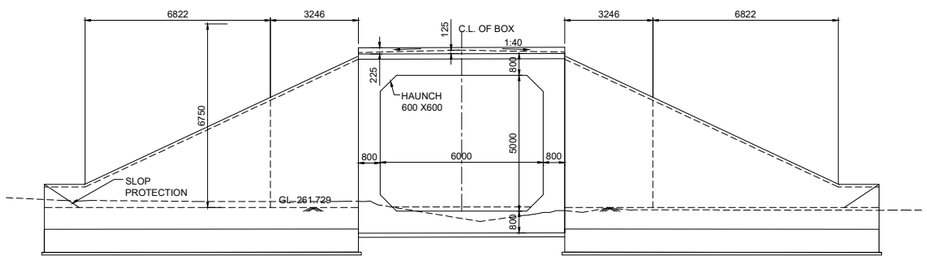
SECTIONAL ELEVATION AT A-A

SCALE 1:100



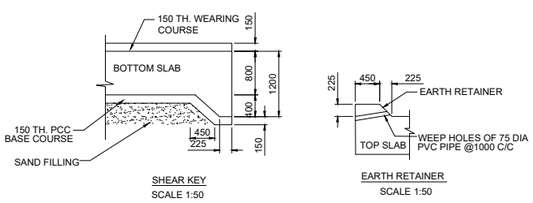
PLAN AT TOP

SCALE 1:100



SECTION B-B

SCALE 1:100

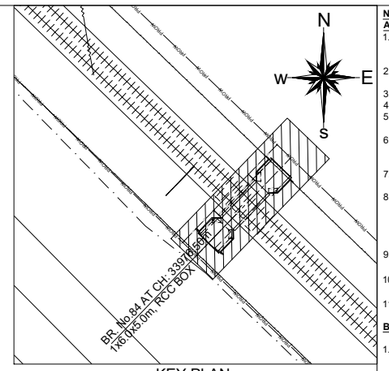


SHEAR KEY

SCALE 1:50

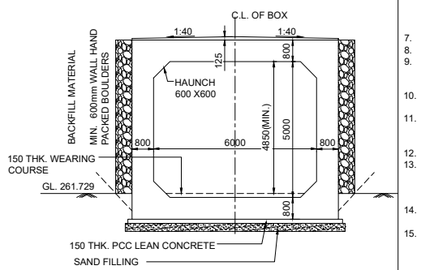
EARTH RETAINER

SCALE 1:50



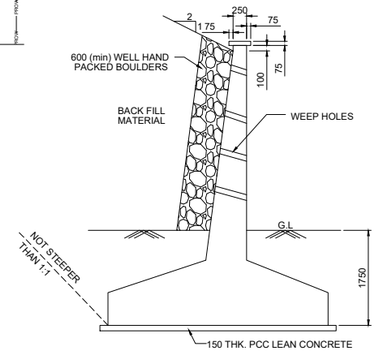
KEY PLAN

(NOT TO SCALE)



SECTION C-C

SCALE 1:100



TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

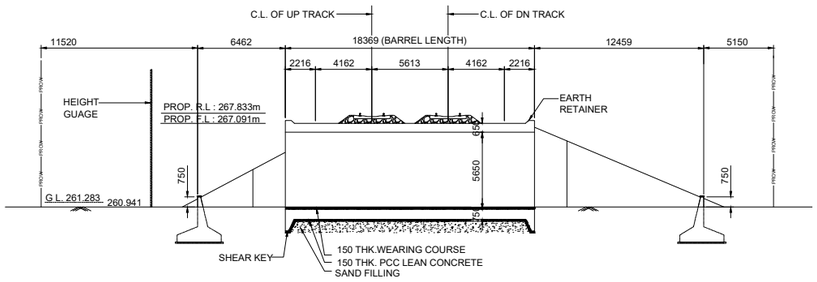
RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING

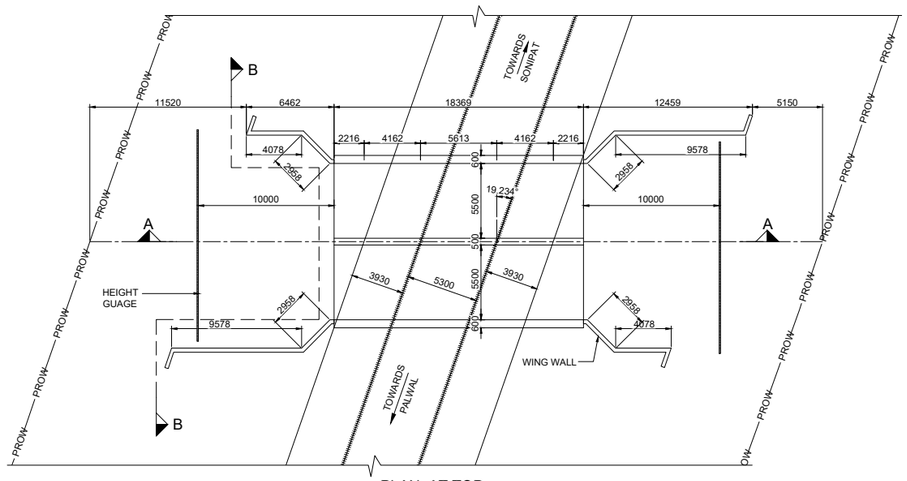
PROPOSED RUB NO. 084 SPAN
1×6.0×5.0 RCC BOX AT CH: 33976.50

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01084_A1	1 OF 1

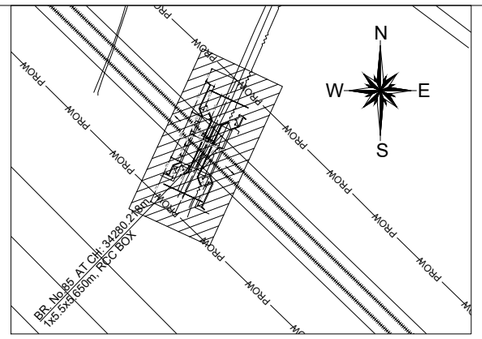
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



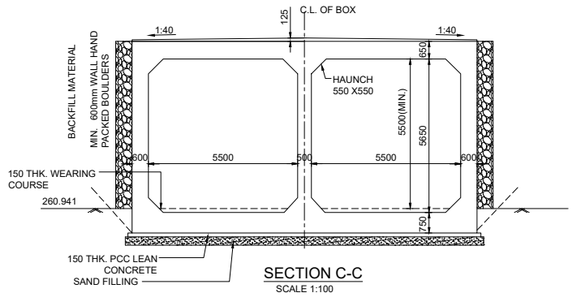
SECTIONAL ELEVATION AT A-A
SCALE 1:200



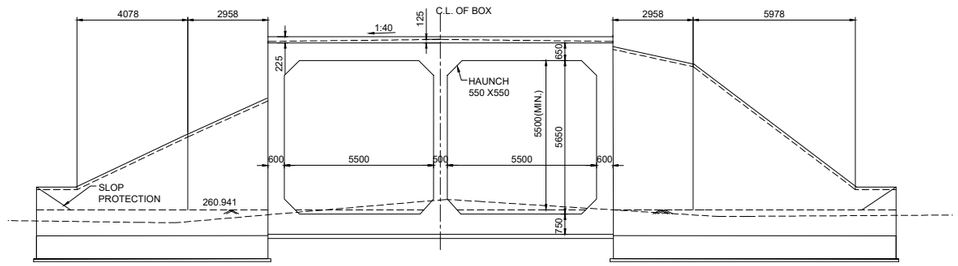
PLAN AT TOP
SCALE 1:200



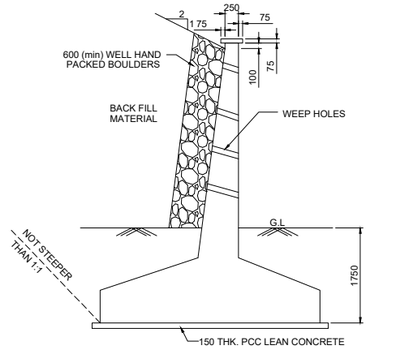
KEY PLAN
(NOT TO SCALE)



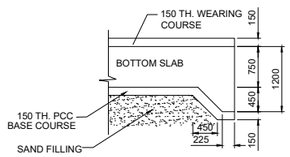
SECTION C-C
SCALE 1:100



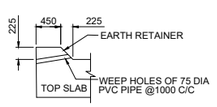
SECTION B-B
SCALE 1:100



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

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2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
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7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
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B) TECHNICAL NOTES :

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7. SEISMIC ZONE- IV
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12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
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LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

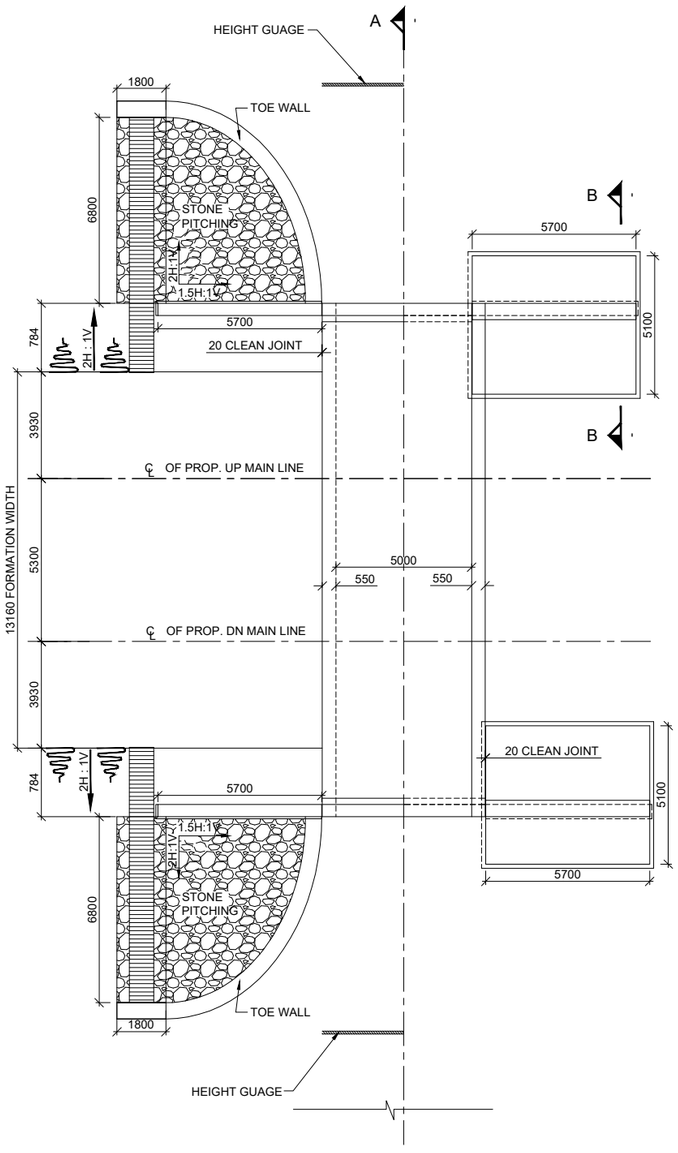
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 085 SPAN
2×5.5×5.650 RCC BOX AT CH: 34280.218

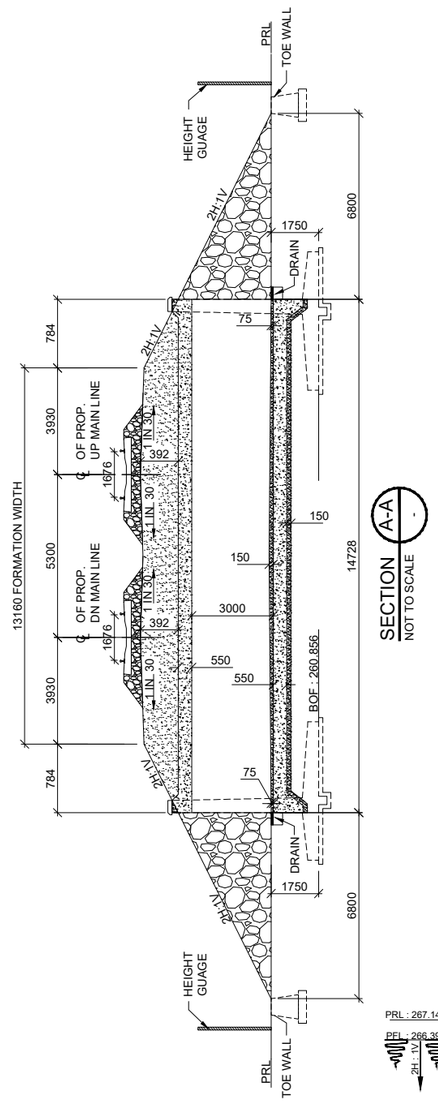
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01085_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



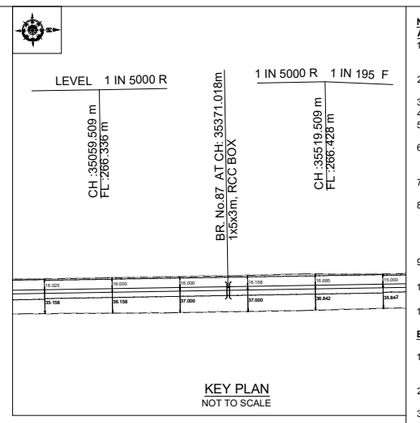
HALF PLAN AT TOP HALF PLAN AT BOTTOM

NOT TO SCALE



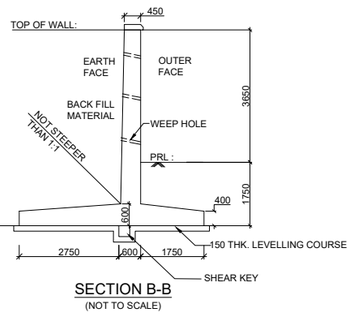
SECTION A-A

NOT TO SCALE



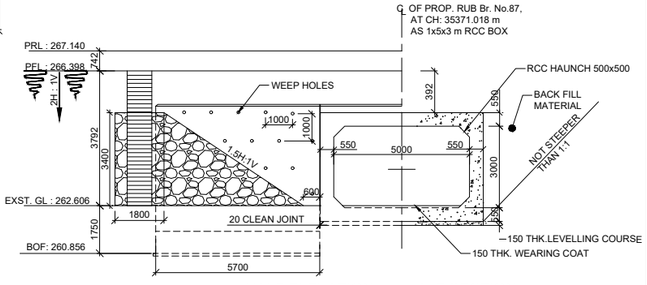
KEY PLAN

NOT TO SCALE



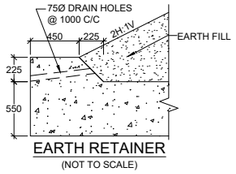
SECTION B-B

(NOT TO SCALE)



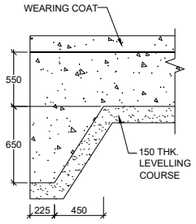
HALF ELEVATION HALF SECTION

NOT TO SCALE



EARTH RETAINER

(NOT TO SCALE)



SHEAR KEY

(NOT TO SCALE)

NOTES :

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5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
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    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR

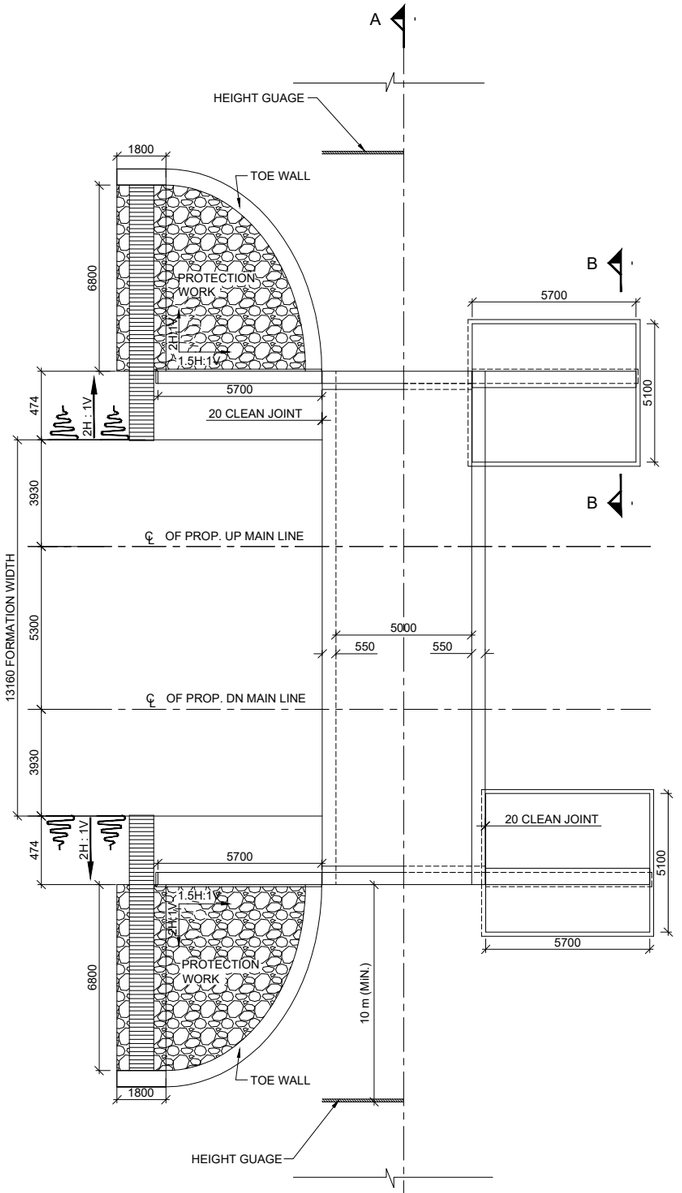
RITES Limited in consortium with SMEC International Pty. Ltd.

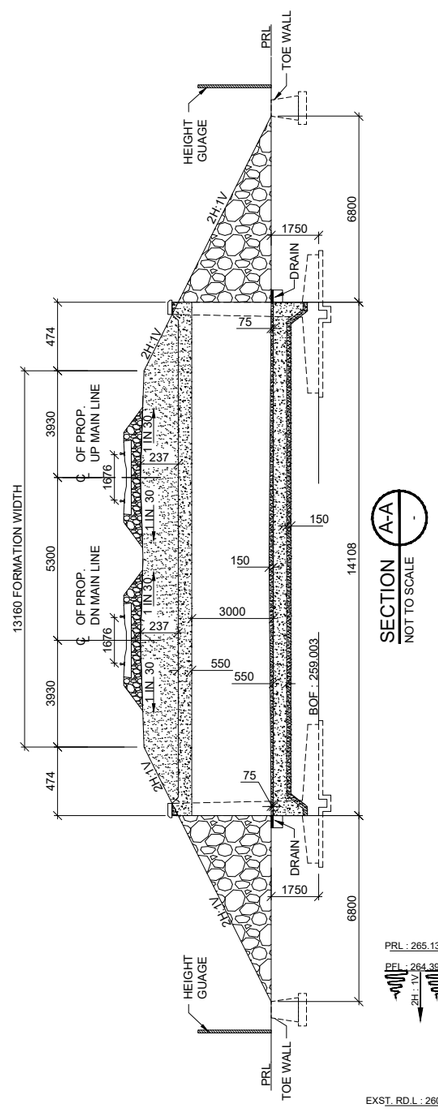
RITES THE INFRASTRUCTURE PEOPLE | SMEC

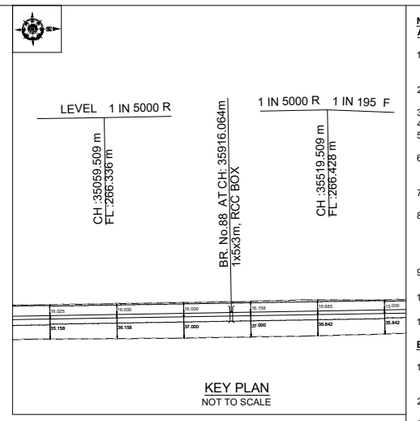
TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO 87 SPAN 1.0X5.0X3.0 RCC BOX AT CH: 35371.018m

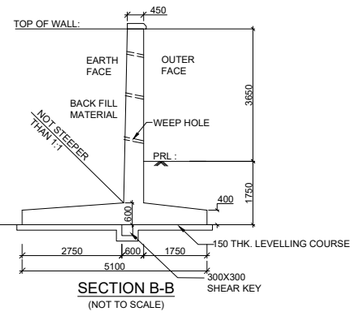
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-0087_A1	1 OF 1

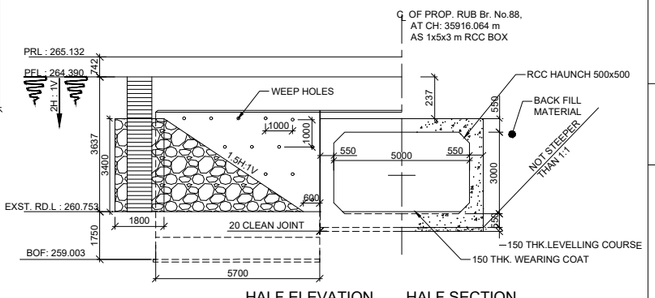
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

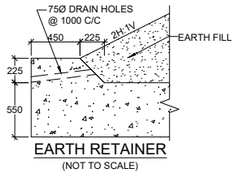


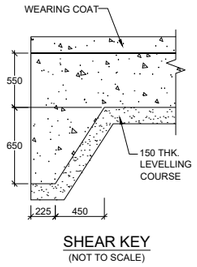












NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

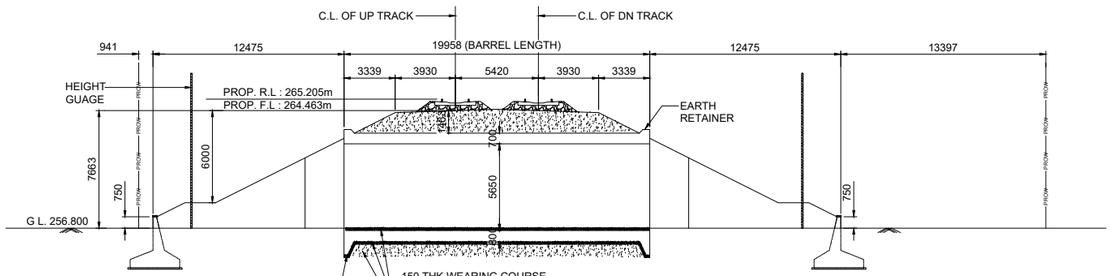
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

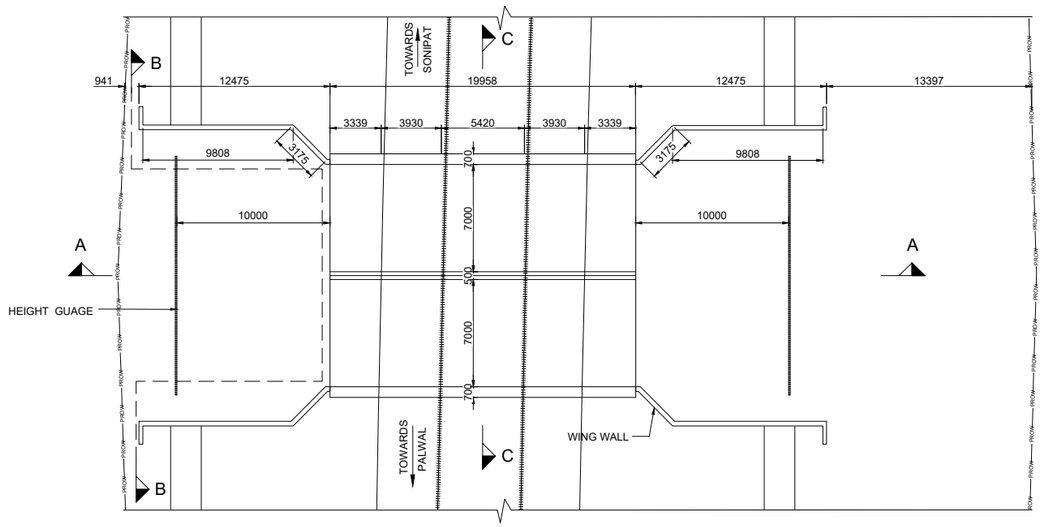
TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO 88 SPAN 1.0X5.0X3.0 RCC BOX AT CH: 35916.064m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-0088_A1	1 OF 1

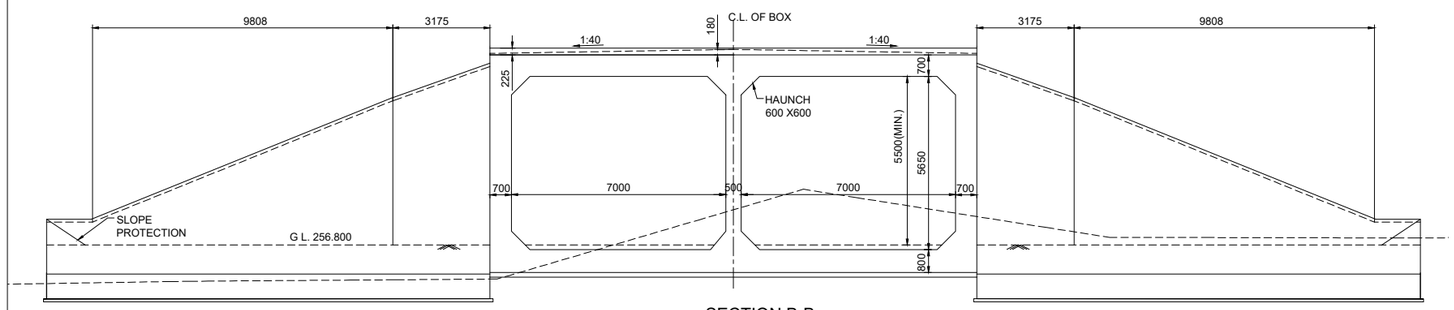
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



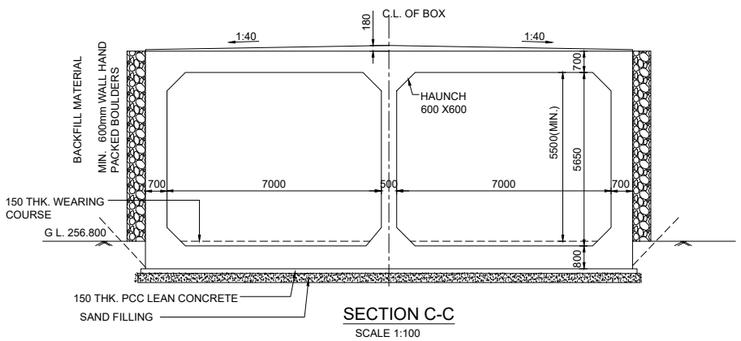
SECTIONAL ELEVATION AT A-A
SCALE 1:200



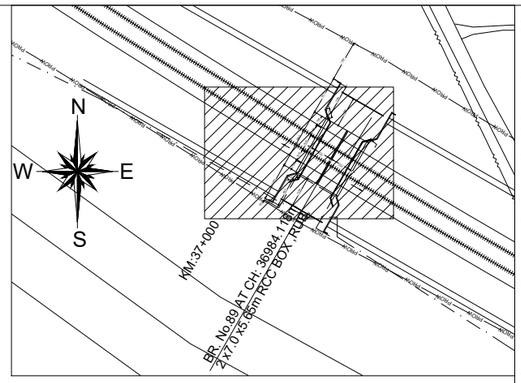
PLAN AT TOP
SCALE 1:200



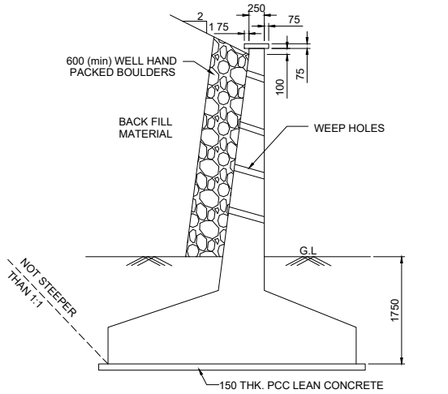
SECTION B-B
SCALE 1:100



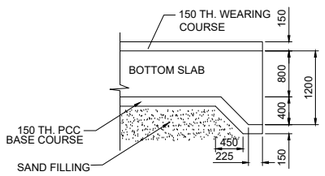
SECTION C-C
SCALE 1:100



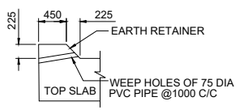
KEY PLAN
(NOT TO SCALE)



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
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CLIENT:
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CONSULTANT:
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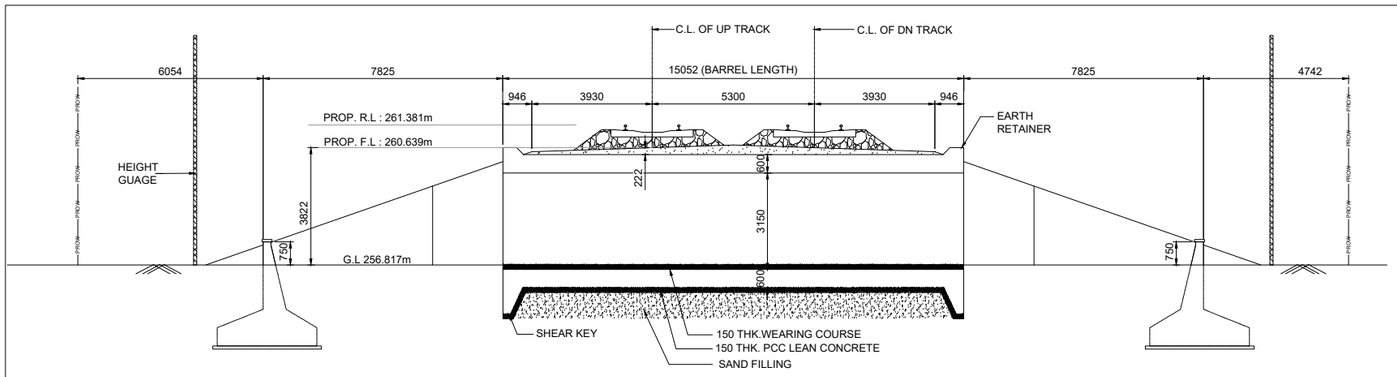
RITES THE INFRASTRUCTURE PEOPLE
SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 089 SPAN 2×7.0×5.65
RCC BOX AT CH: 36984.118

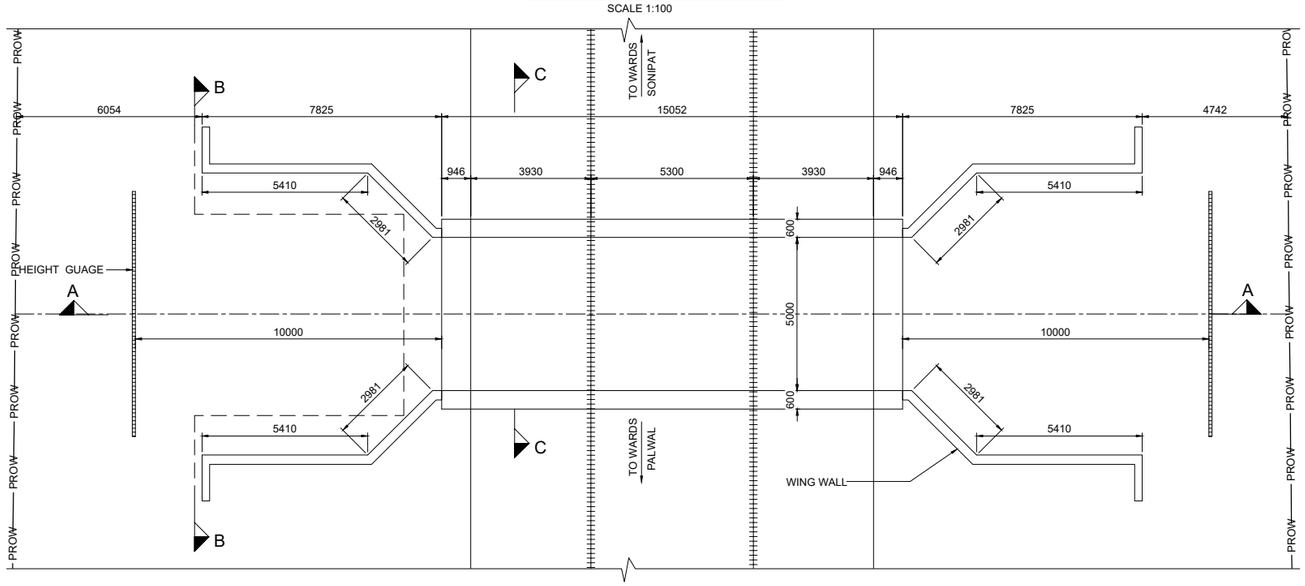
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01089_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



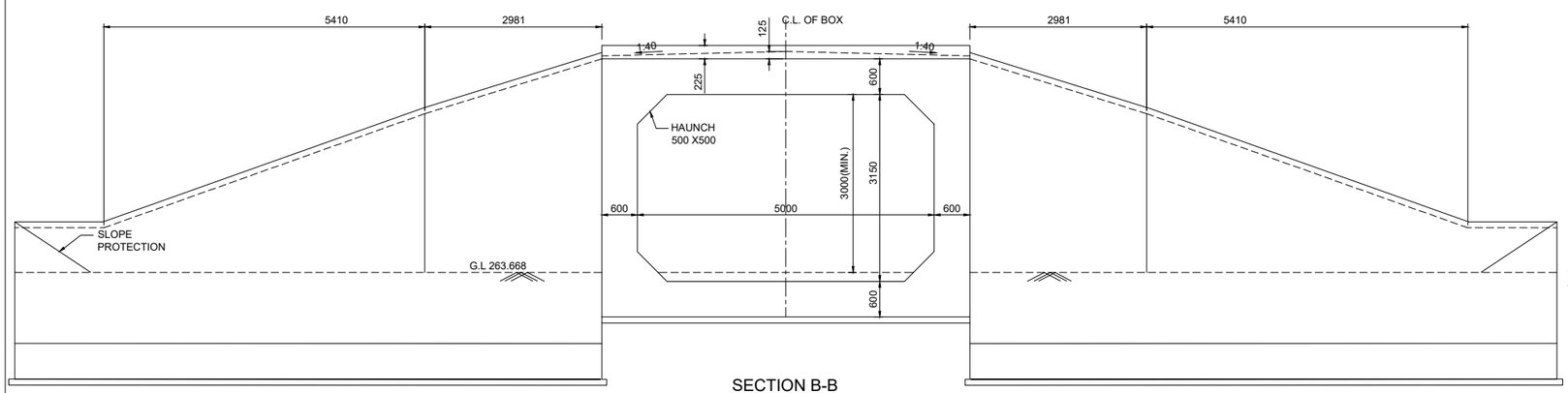
SECTIONAL ELEVATION AT A-A

SCALE 1:100



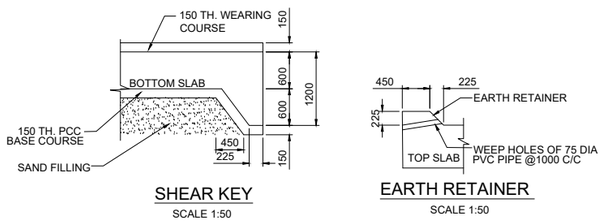
PLAN AT TOP

SCALE 1:100



SECTION B-B

SCALE 1:50

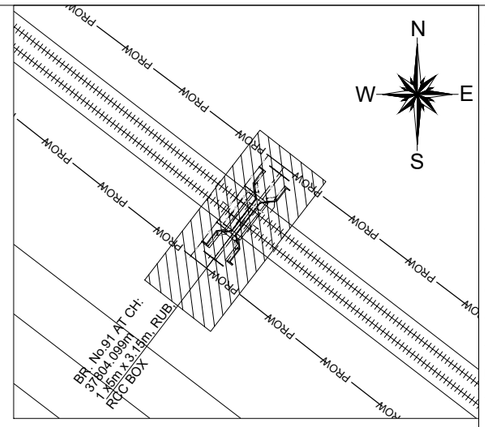


SHEAR KEY

SCALE 1:50

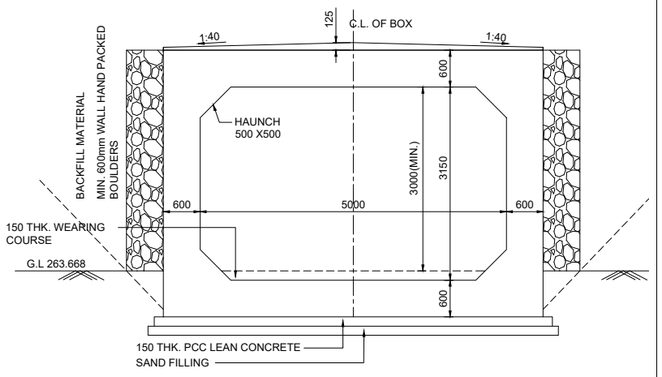
EARTH RETAINER

SCALE 1:50



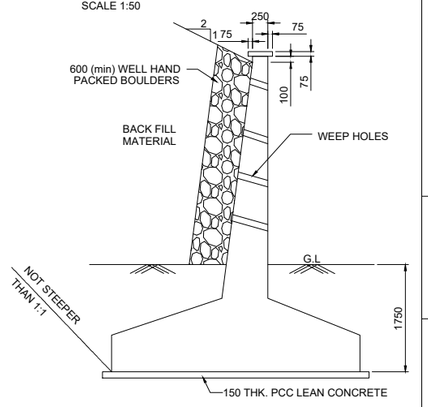
KEY PLAN

(NOT TO SCALE)



SECTION C-C

SCALE 1:50



TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
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11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
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7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
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    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:

TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

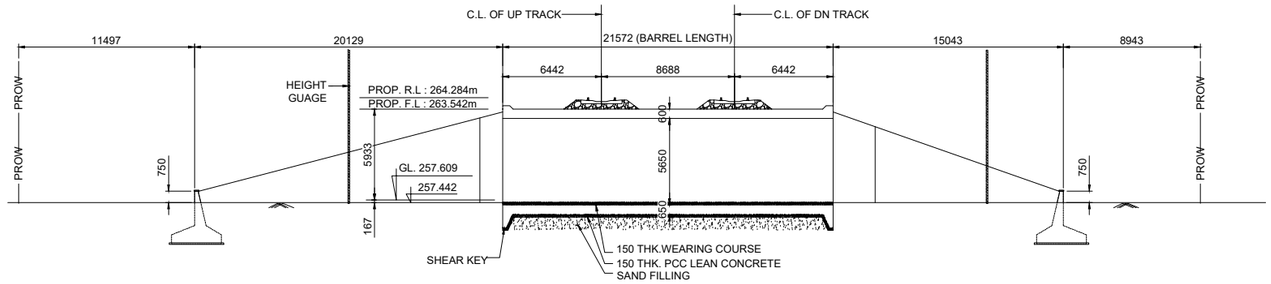
TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING

PROPOSED RUB NO. 091 SPAN
1×5.0×3.15 RCC BOX AT CH: 37804.099

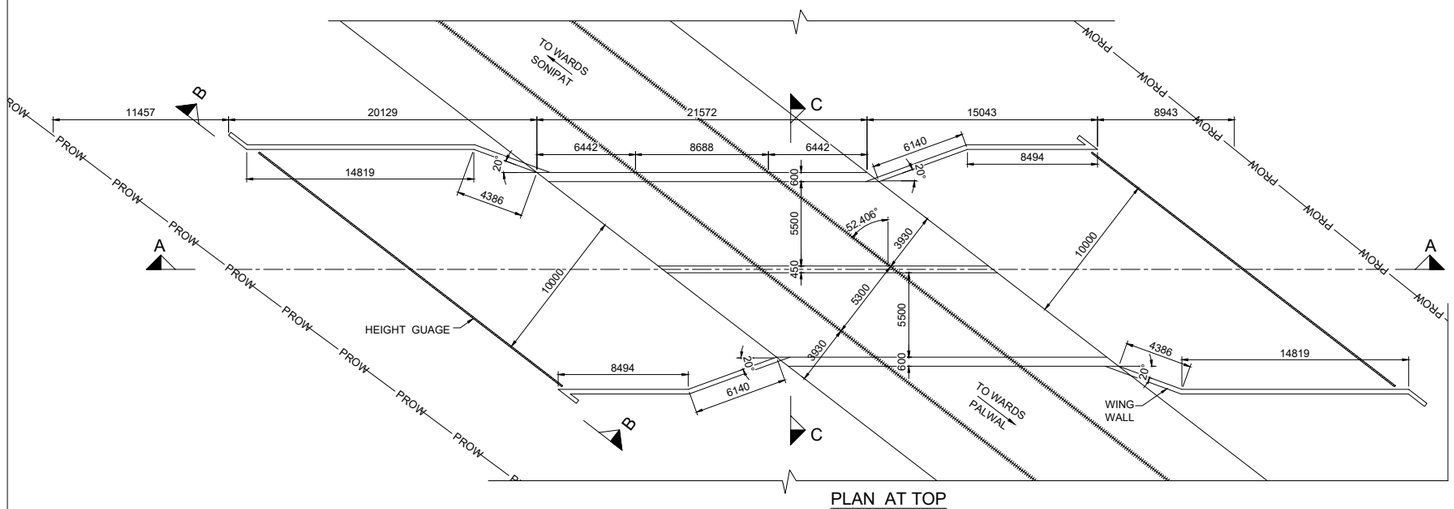
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01091_A1

SHEET NO. 1 OF 1

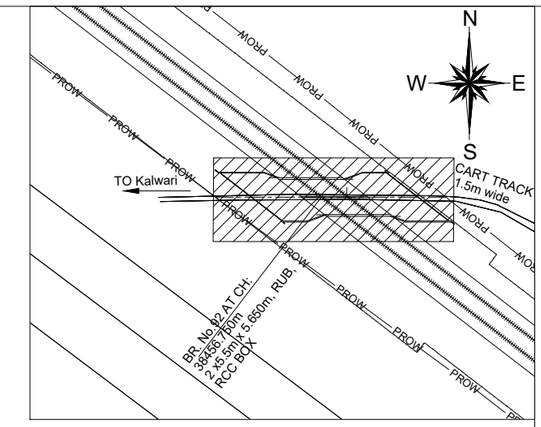
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



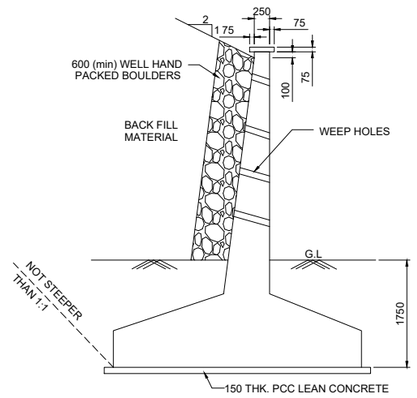
SECTIONAL ELEVATION AT A-A
SCALE 1:200



PLAN AT TOP
SCALE 1:200



KEY PLAN
(NOT TO SCALE)



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50

NOTES :

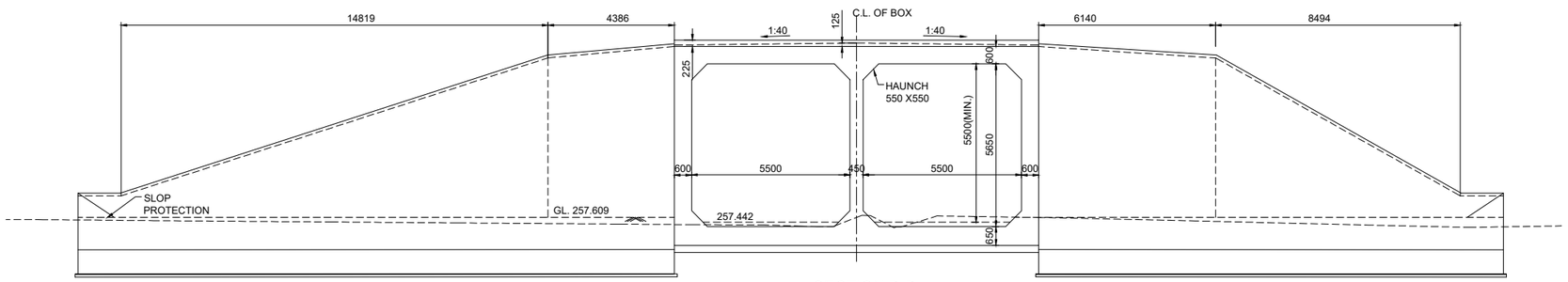
A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

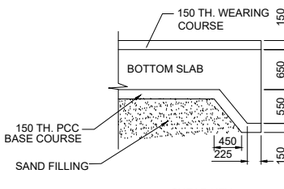
B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

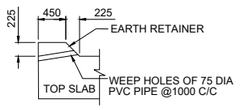
IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY THE HEIGHT OF



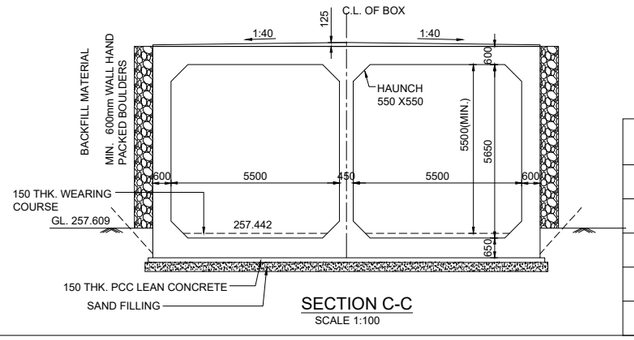
SECTION B-B
SCALE 1:100



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50



SECTION C-C
SCALE 1:100

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

THE INFRASTRUCTURE PEOPLE

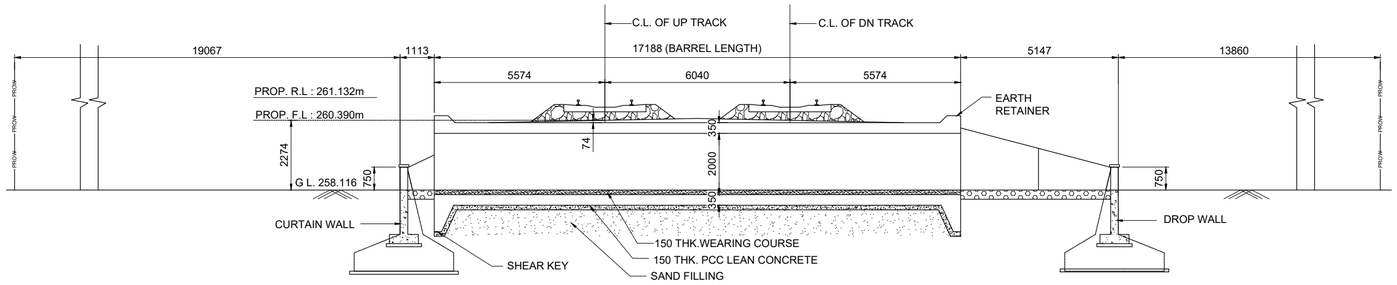
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 092 SPAN
2×5.5×5.650 RCC BOX AT CH: 38456.750

DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01092_A1

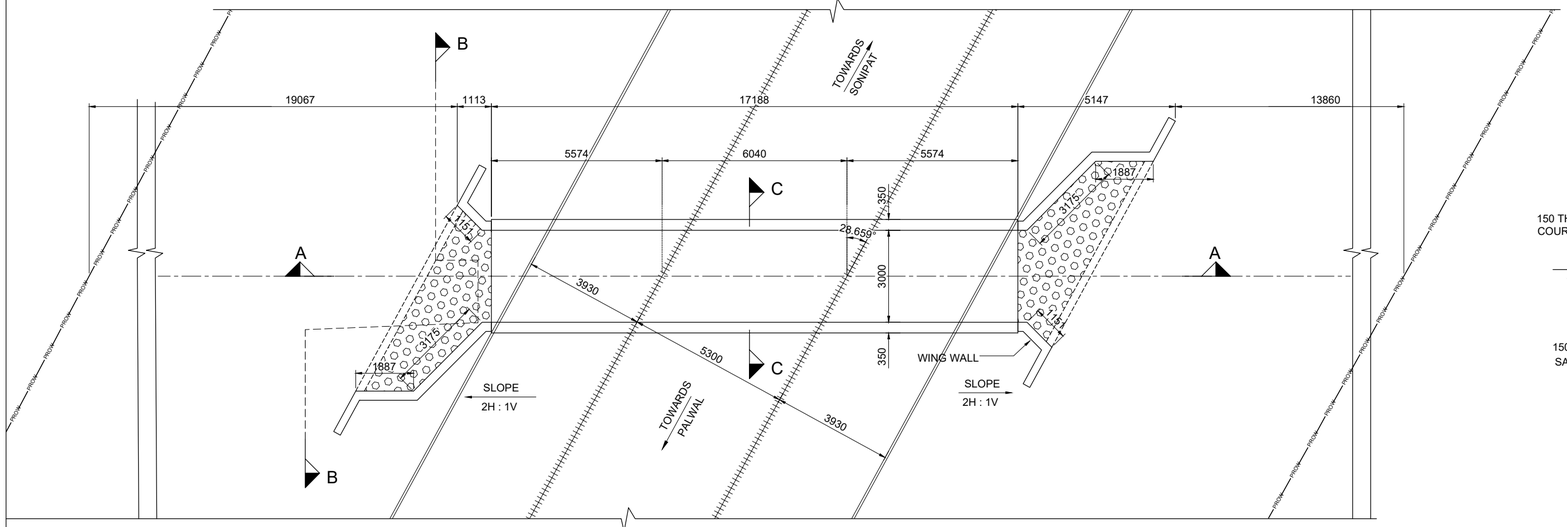
SHEET NO. 1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



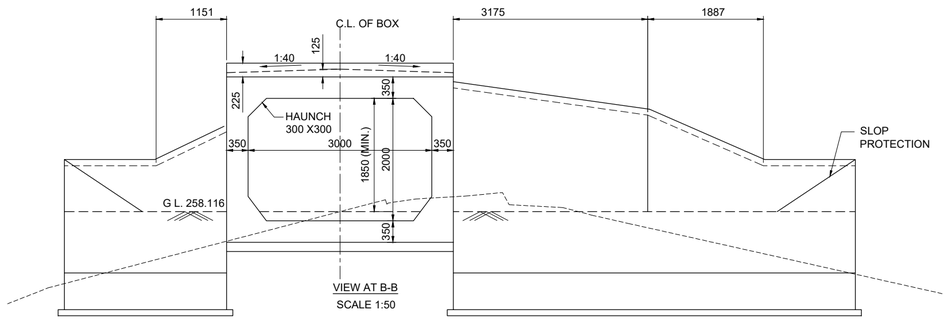
SECTIONAL ELEVATION AT A-A

SCALE 1:100



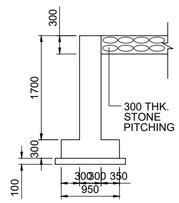
PLAN AT TOP

SCALE 1:100



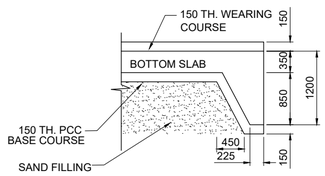
VIEW AT B-B

SCALE 1:50



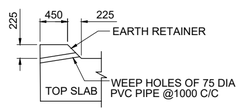
DROP / CURTAIN WALL DETAILS

SCALE 1:50



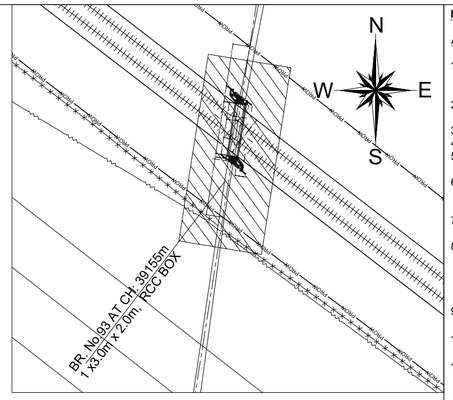
SHEAR KEY

SCALE 1:50



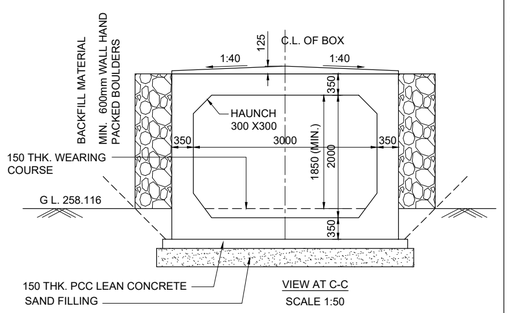
EARTH RETAINER

SCALE 1:50



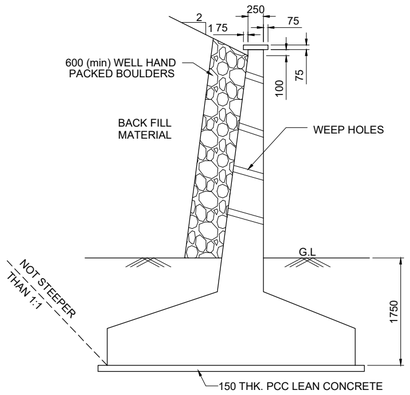
KEY PLAN

(NOT TO SCALE)



VIEW AT C-C

SCALE 1:50



TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS.
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. GROUND IMPROVEMENT SHALL BE CARRIED OUT AS PER GT REPORT AND CONFIRMED THROUGH FIELD TESTING.
16. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
17. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

SMEC Powered with Specialist Expertise

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO. 093 SPAN 1×3.0×2.0 RCC BOX AT CH: 39155

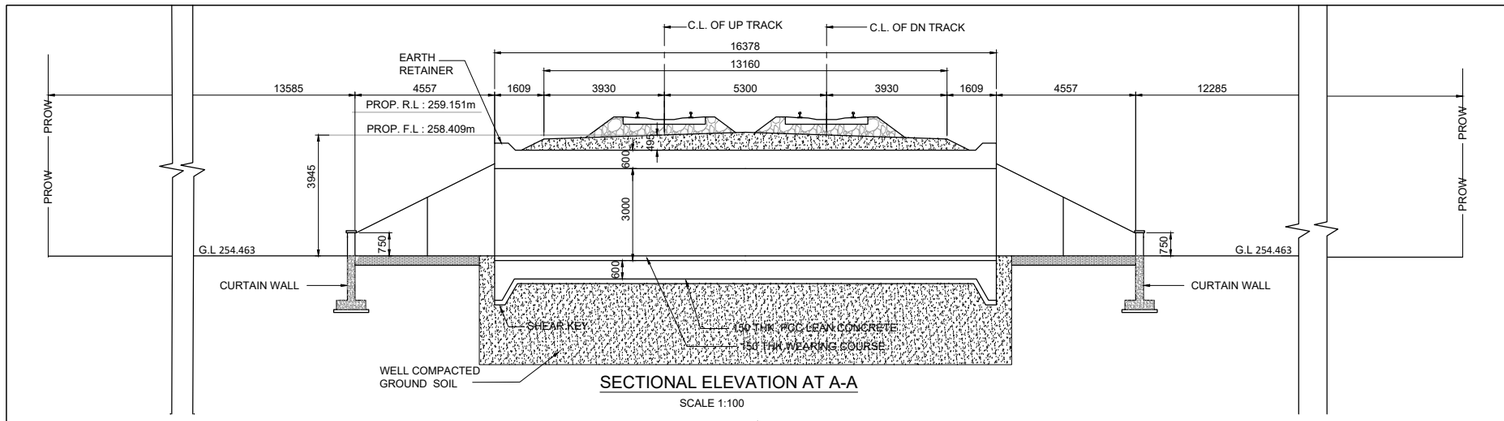
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01093_A1

SHEET NO. 1 OF 1

SCALE : AS SHOWN

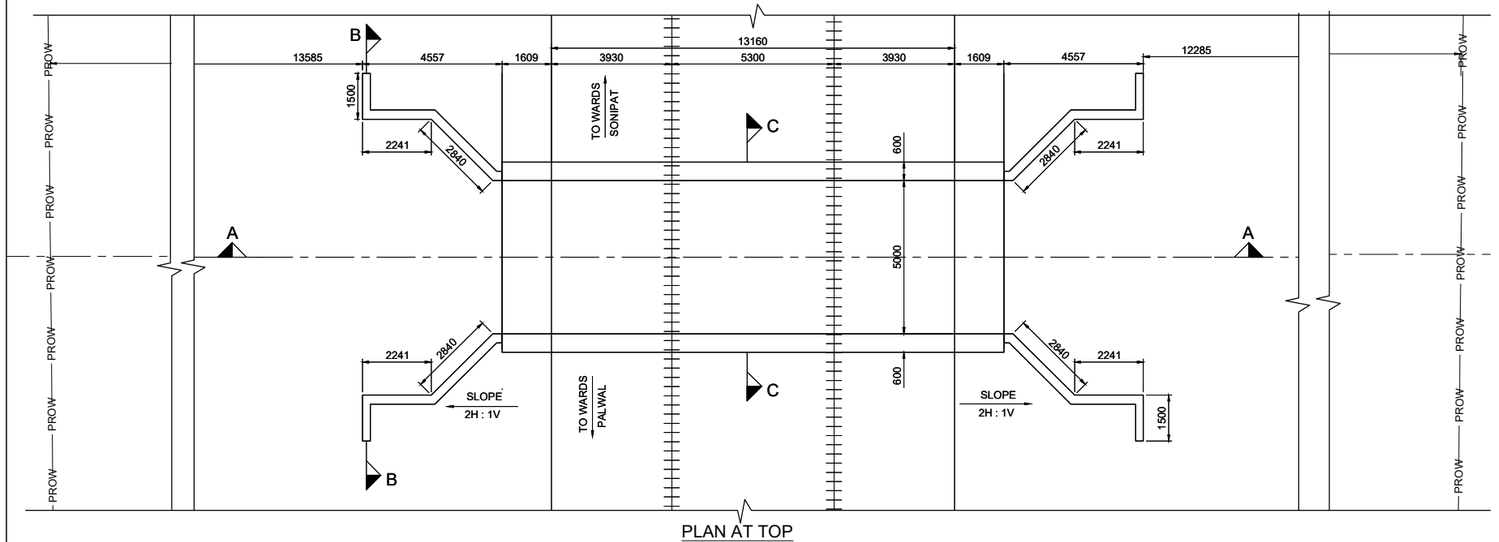
ISSUE DATE 11-11-2022

REVISED DATE 16-12-2022



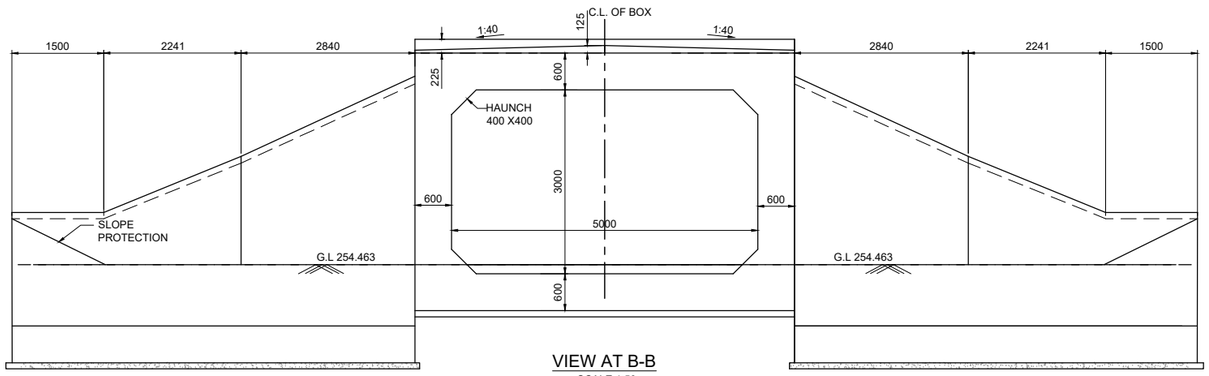
SECTIONAL ELEVATION AT A-A

SCALE 1:100



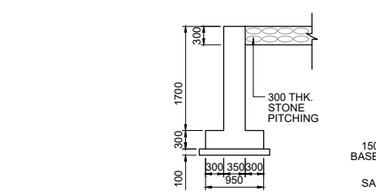
PLAN AT TOP

SCALE 1:100



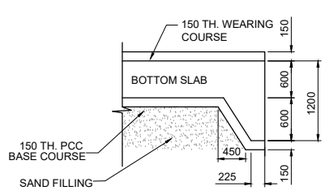
VIEW AT B-B

SCALE 1:50



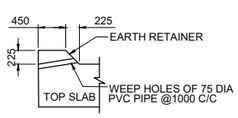
DROP / CURTAIN WALL DETAILS

SCALE 1:50



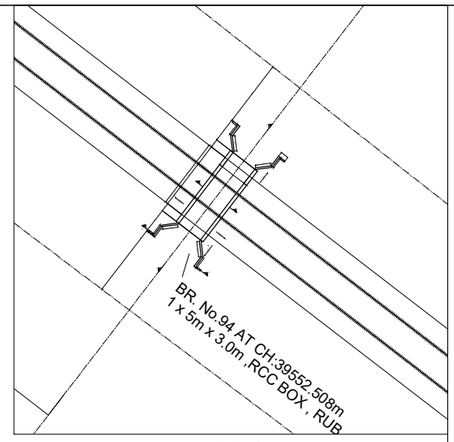
SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

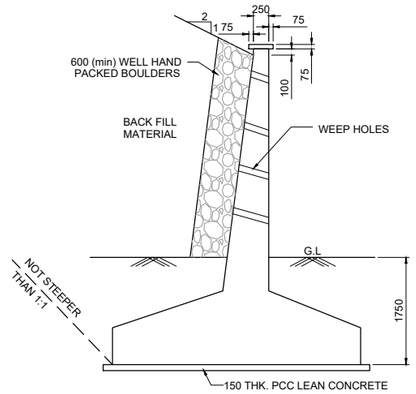


KEY PLAN

(NOT TO SCALE)

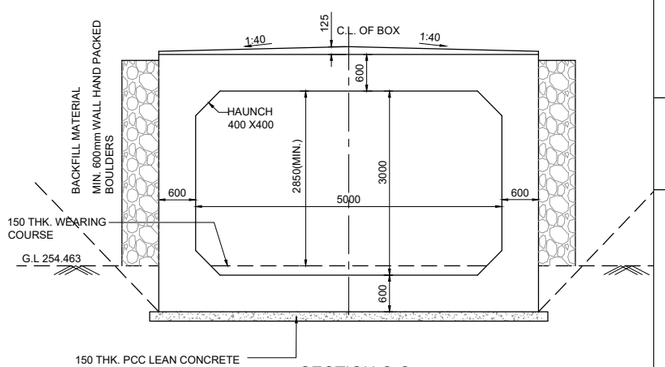
LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL



TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



SECTION C-C

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, SUITABLE SLOPE TO PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE. GRADE OF CONCRETE :
   (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
   (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. GROUND IMPROVEMENT SHALL BE CARRIED OUT AS PER GT REPORT AND CONFIRMED THROUGH FIELD TESTING.
16. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
17. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.
18. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
19. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

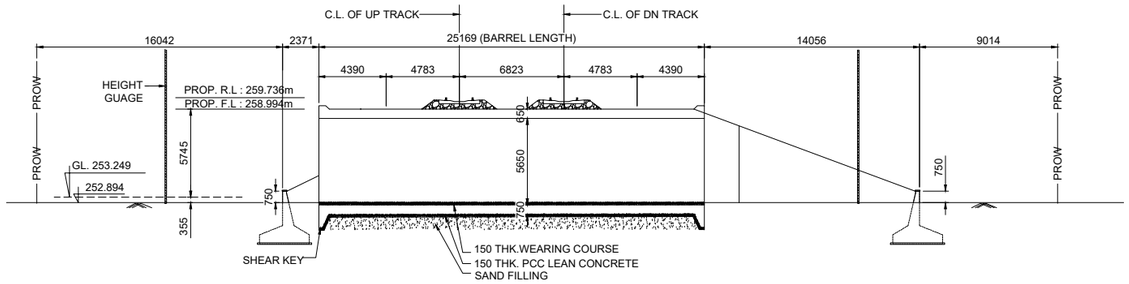
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR ROAD UNDER BRIDGE NO. 094 SPAN 1.0X5.0X3.0 RCC BOX AT CH: 39552.508

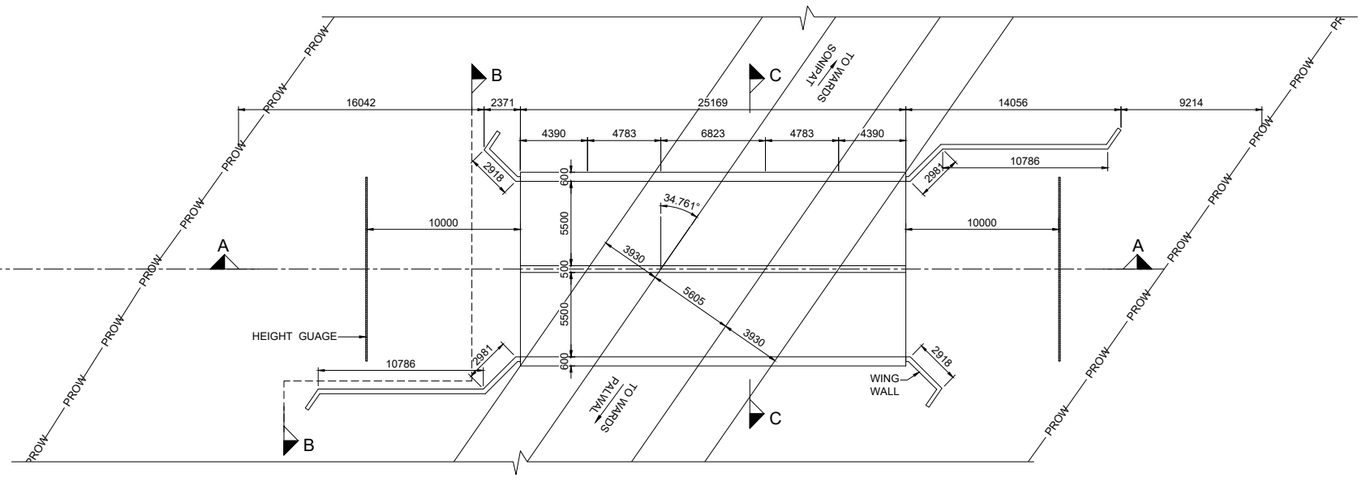
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01094_A1

SHEET NO. 1 OF 1

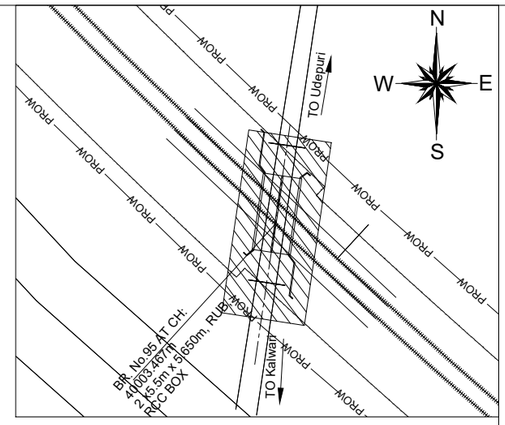
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



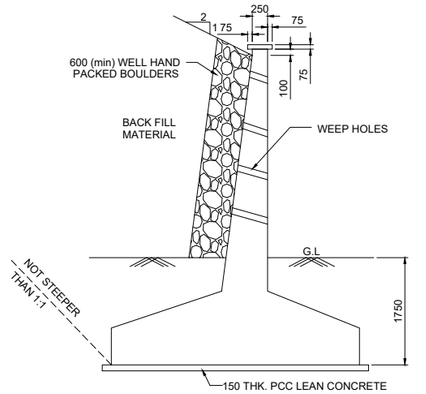
SECTIONAL ELEVATION AT A-A
SCALE 1:200



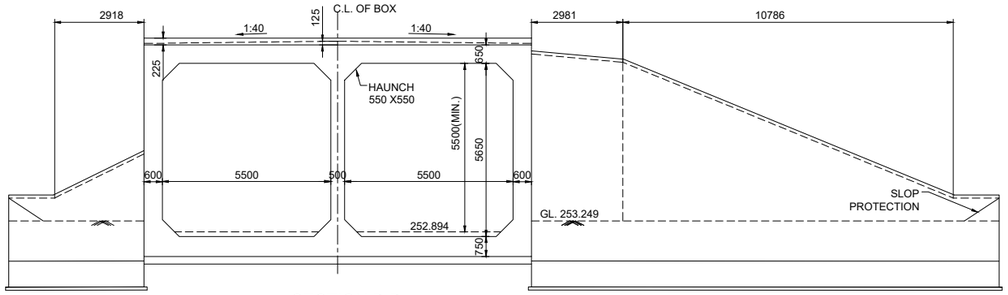
PLAN AT TOP
SCALE 1:200



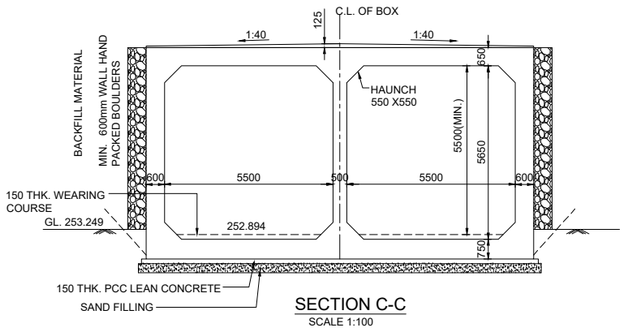
KEY PLAN
(NOT TO SCALE)



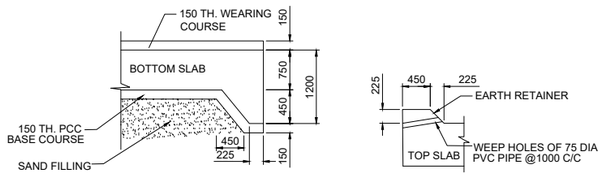
TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SECTION B-B
SCALE 1:100



SECTION C-C
SCALE 1:100



SHEAR KEY
SCALE 1:50

EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
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7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
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11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
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14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY THE HEIGHT OF

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

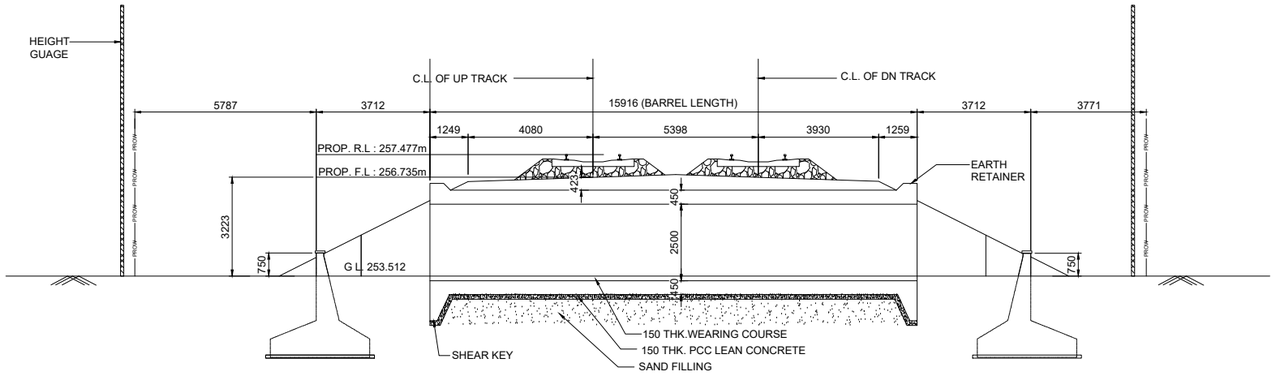
CONSULTANT:
GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

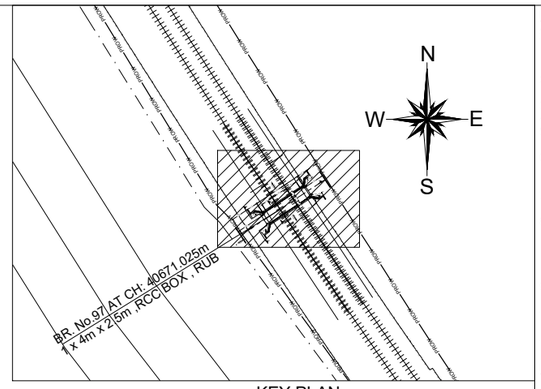
TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 095 SPAN
2×5.5×5.650 RCC BOX AT CH: 40003.467

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01095_A1	1 OF 1

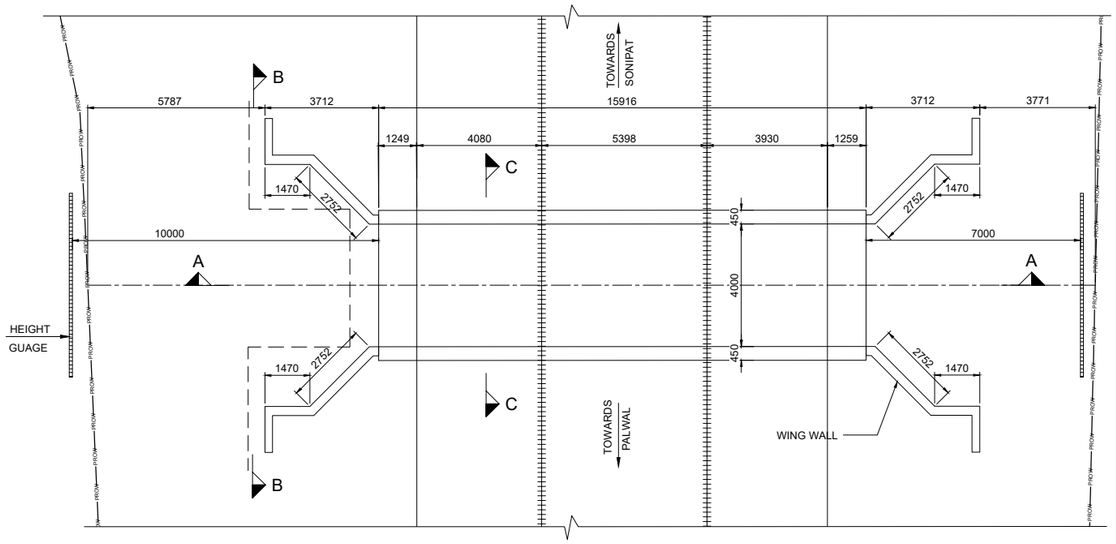
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



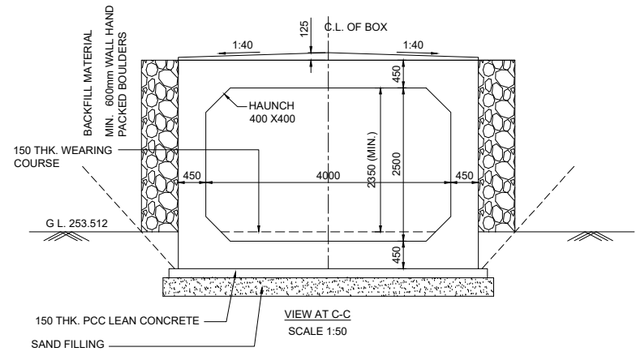
SECTIONAL ELEVATION AT A-A
SCALE 1:100



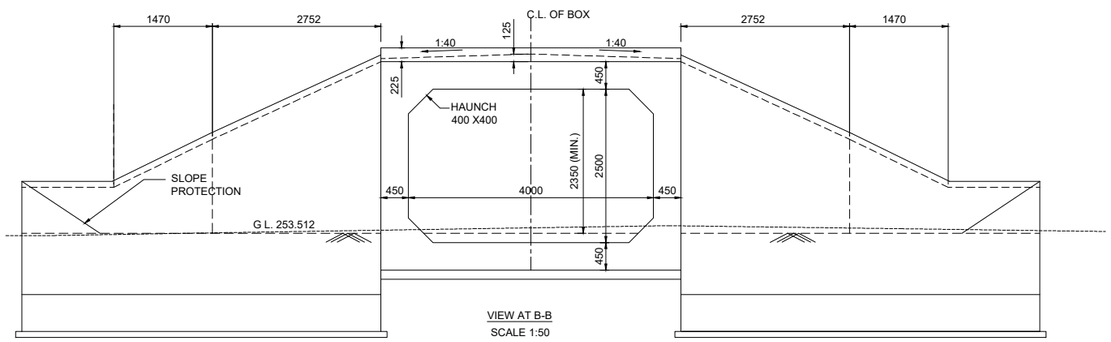
KEY PLAN
(NOT TO SCALE)



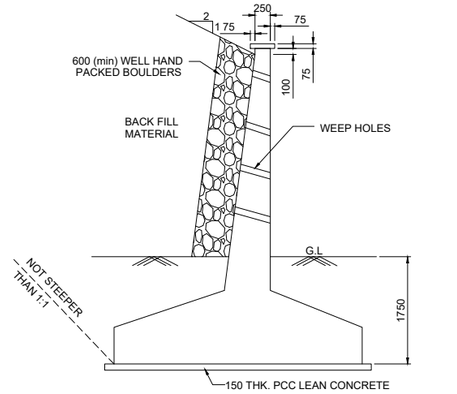
PLAN AT TOP
SCALE 1:100



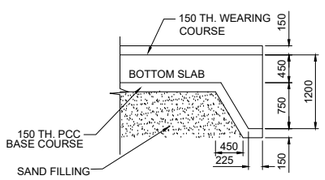
VIEW AT C-C
SCALE 1:50



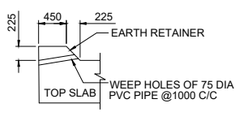
VIEW AT B-B
SCALE 1:50



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

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6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
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9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
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7. SEISMIC ZONE- IV
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13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

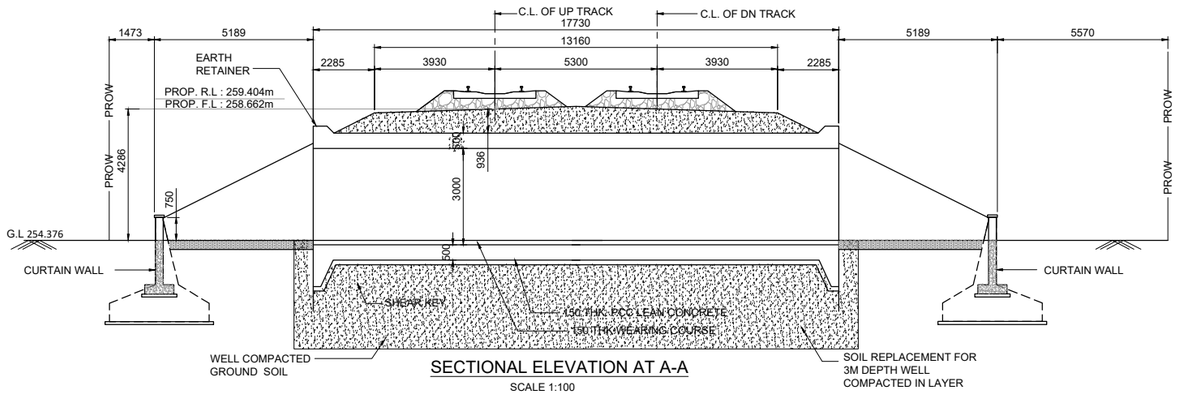
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 097 SPAN
1×4.0×2.5 RCC BOX AT CH: 40671.025

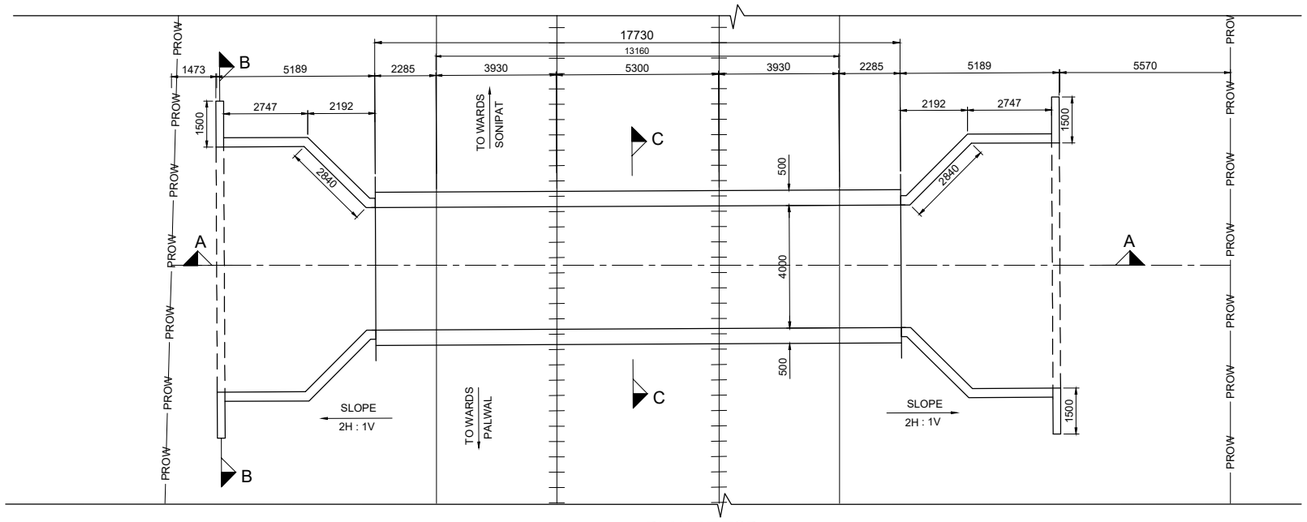
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01097_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



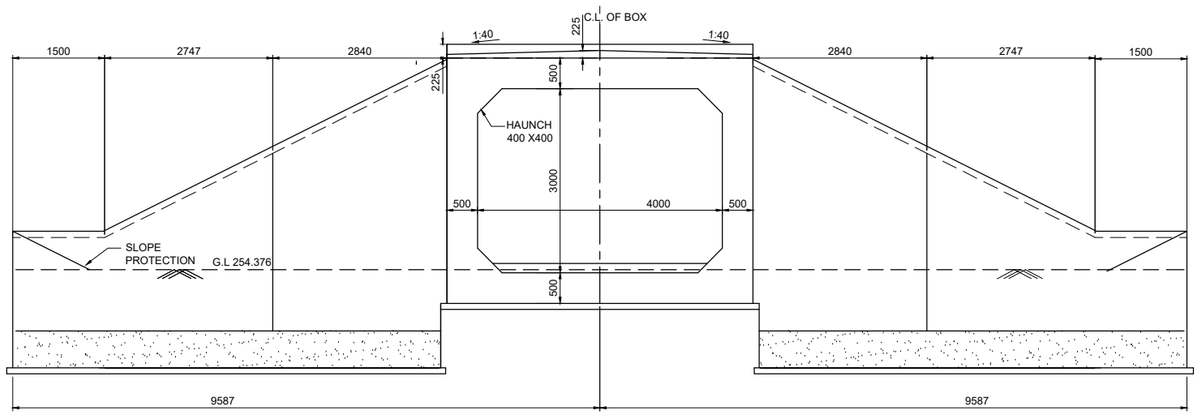
SECTIONAL ELEVATION AT A-A

SCALE 1:100



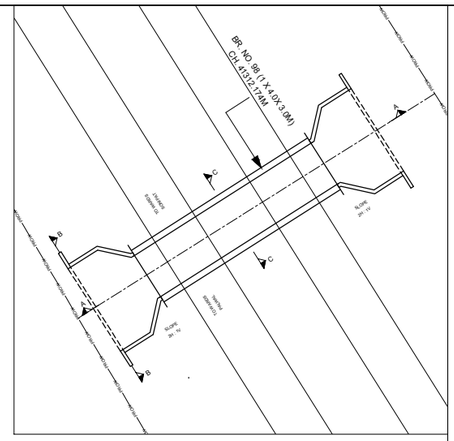
PLAN AT TOP

SCALE 1:100



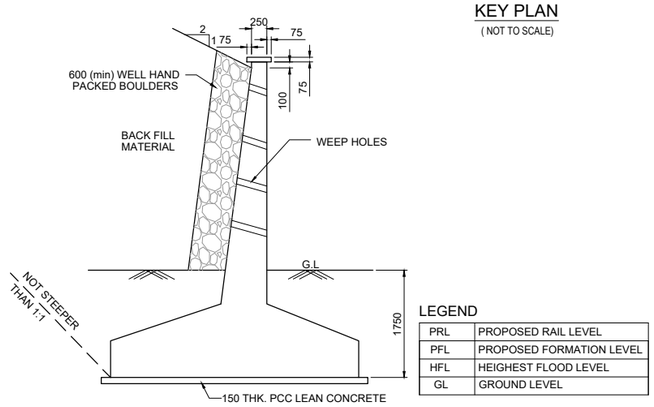
VIEW AT B-B

SCALE 1:50



KEY PLAN

(NOT TO SCALE)

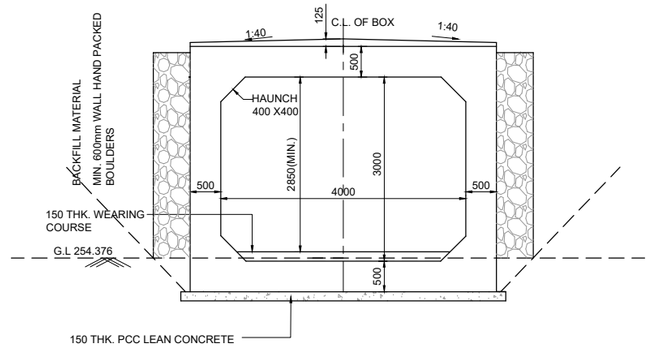


TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50

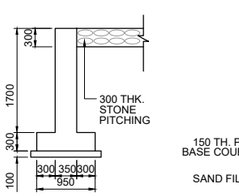
LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL



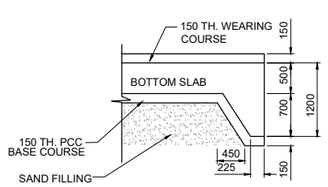
SECTION C-C

SCALE 1:50



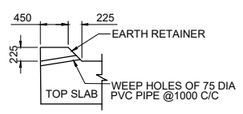
DROP / CURTAIN WALL DETAILS

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
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3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
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7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES, DIVERSION OF ROAD IF ANY, REQRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE. GRADE OF CONCRETE :
   (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
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17. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.
18. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
19. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

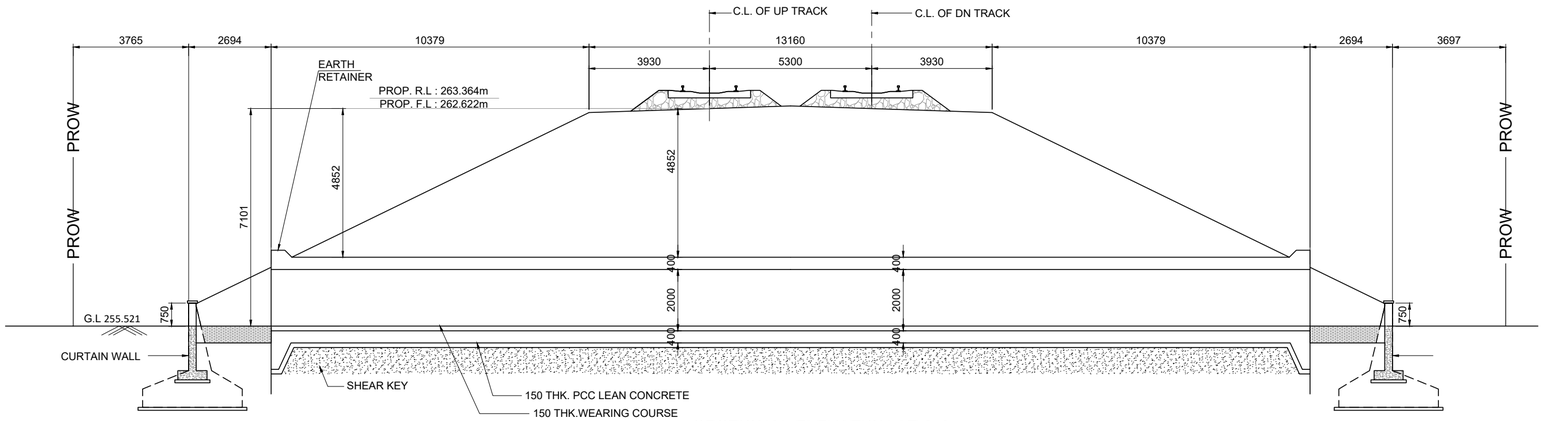
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	ChahateyRam	R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR ROAD UNDER BRIDGE NO. 098 SPAN 1.0X4.0X3.0 RCC BOX AT CH: 41312.174

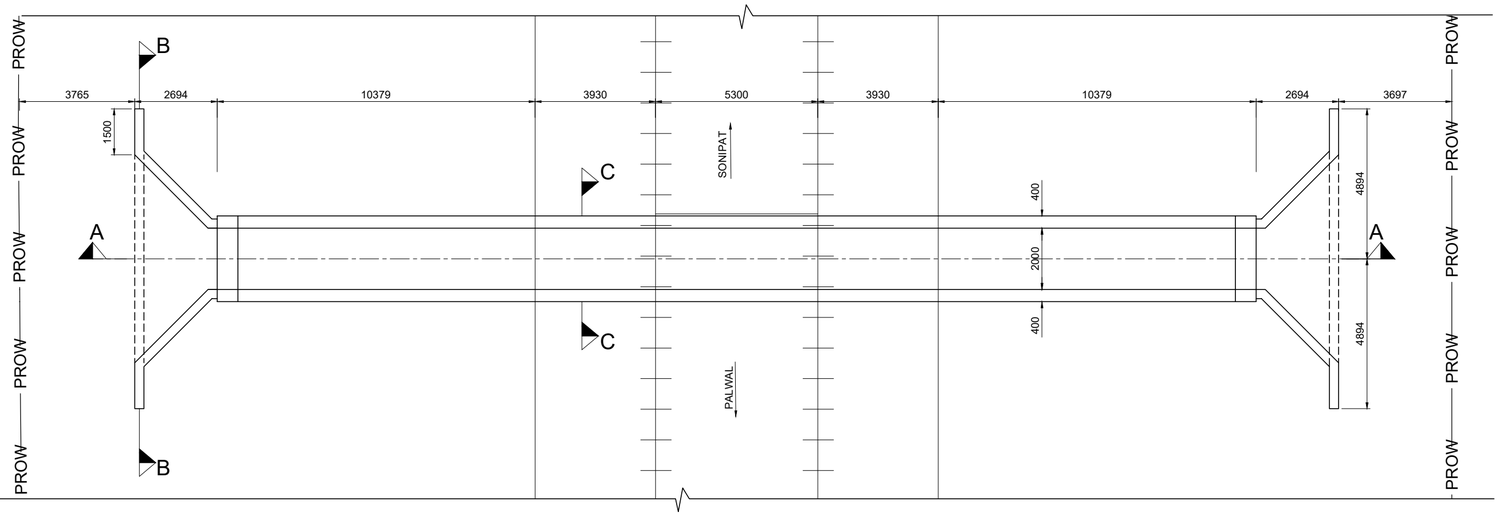
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01098_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



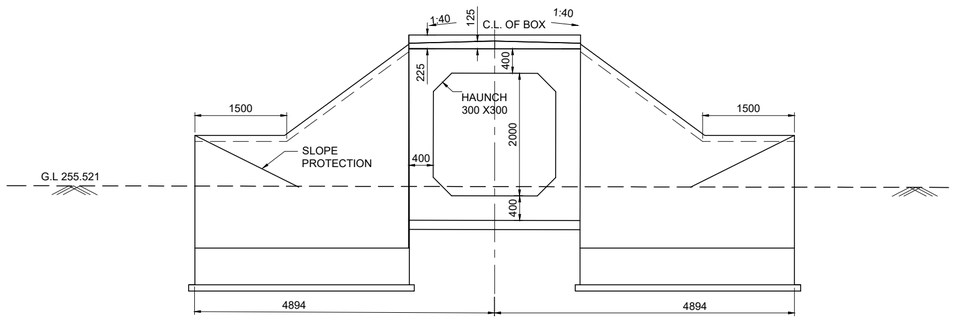
SECTIONAL ELEVATION AT A-A

SCALE 1:100



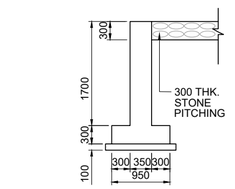
PLAN AT TOP

SCALE 1:100



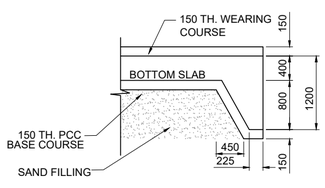
VIEW AT B-B

SCALE 1:50



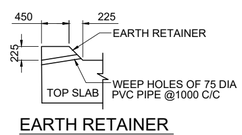
DROP / CURTAIN WALL DETAILS

SCALE 1:50



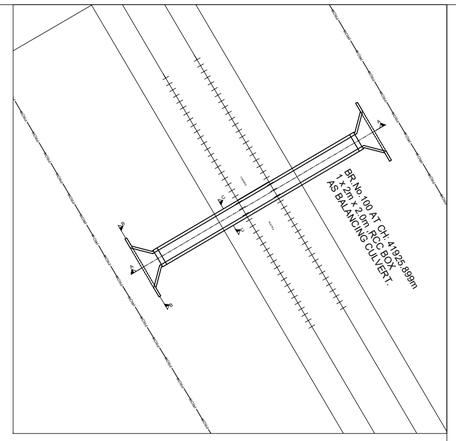
SHEAR KEY

SCALE 1:50



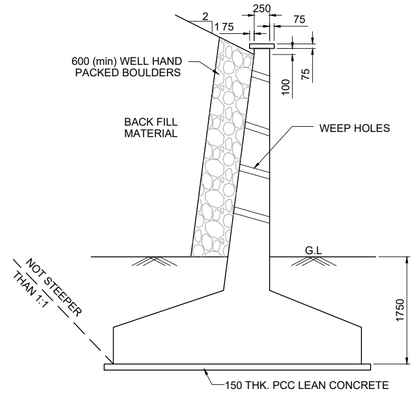
EARTH RETAINER

SCALE 1:50



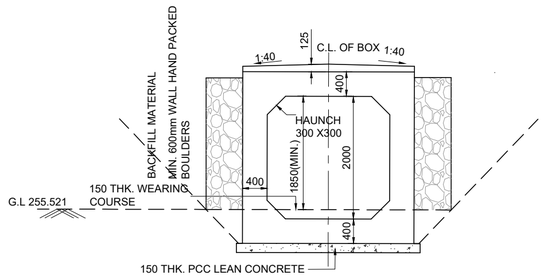
KEY PLAN

(NOT TO SCALE)



TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



SECTION C-C

SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

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14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE. GRADE OF CONCRETE :
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GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

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HARYANA ORBITAL RAIL CORRIDOR

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CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

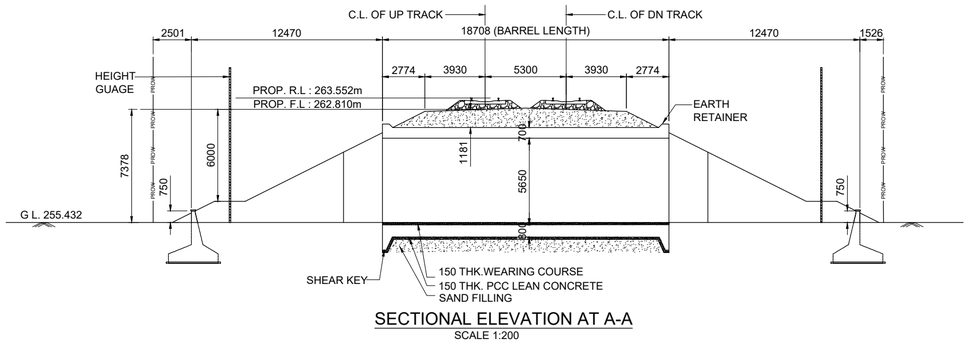
SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

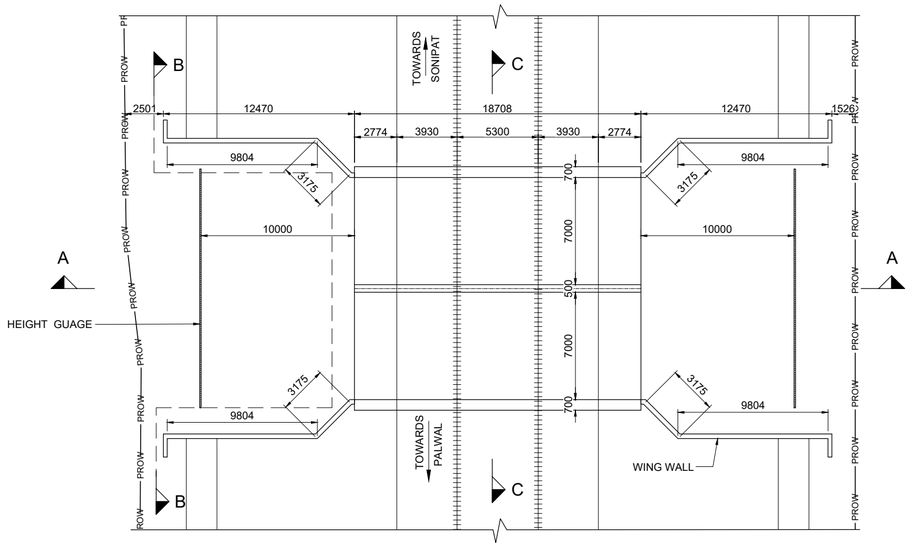
FOR BALANCING CULVERT BRIDGE NO. 100
SPAN 1.0X2.0X2.0 RCC BOX AT CH: 41925.899

DRG. NO.	SHEET NO.
GC-HRIDC-C2-3-DRW-BRD-GAD-01100_A1	

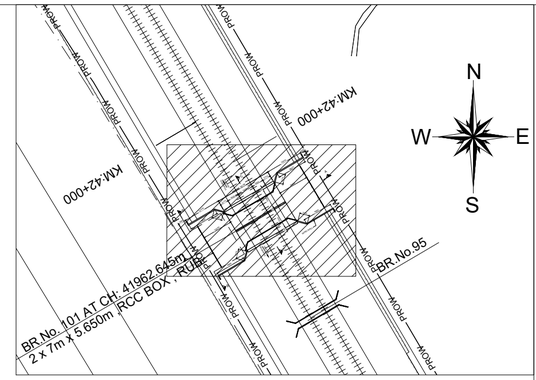
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



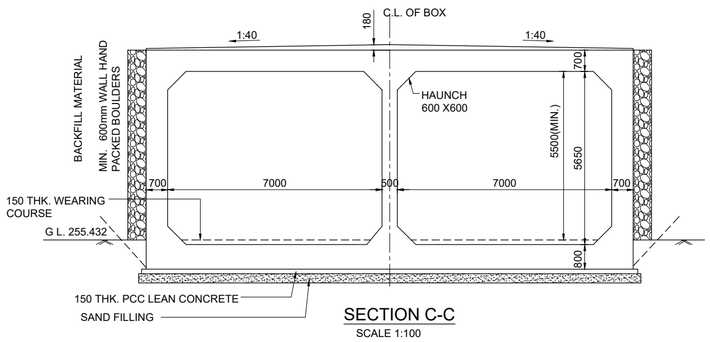
SECTIONAL ELEVATION AT A-A
SCALE 1:200



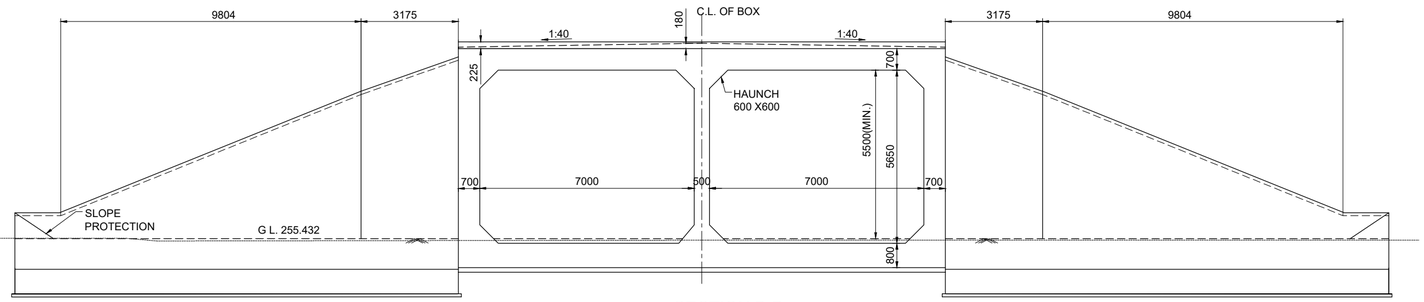
PLAN AT TOP
SCALE 1:200



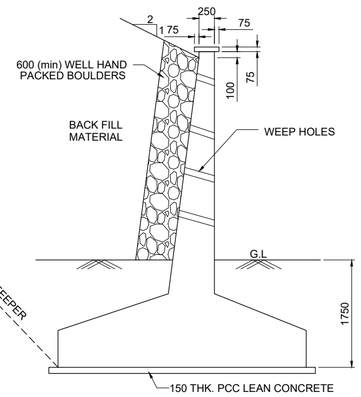
KEY PLAN
(NOT TO SCALE)



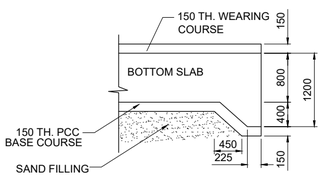
SECTION C-C
SCALE 1:100



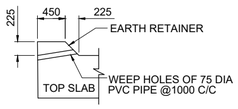
SECTION B-B
SCALE 1:100



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

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15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

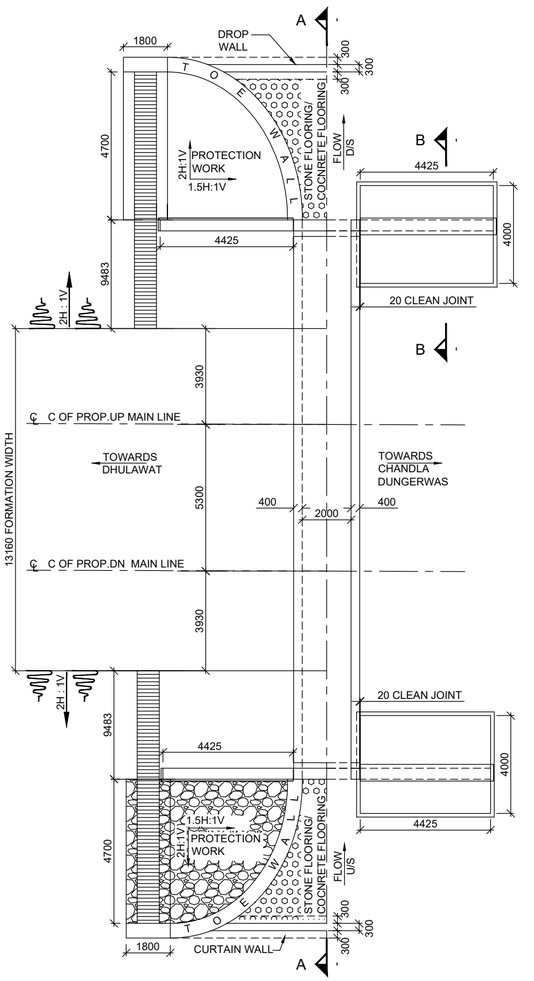
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE
SMEC Results with Sustainability

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 101 SPAN
2×7.0×5.650 RCC BOX AT CH: 41962.645

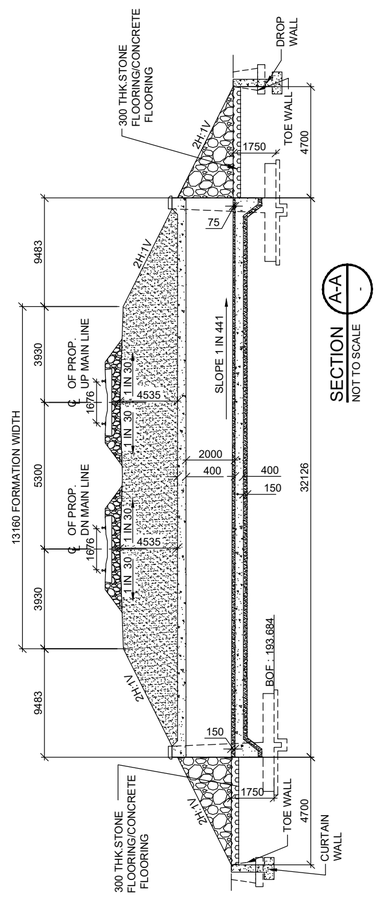
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01101_A1
SHEET NO. 1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



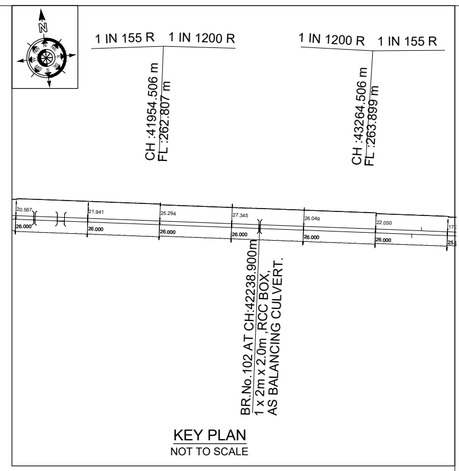
HALF PLAN AT TOP HALF PLAN AT BOTTOM

NOT TO SCALE



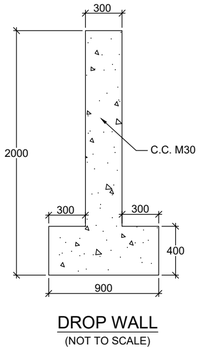
SECTION A-A

NOT TO SCALE



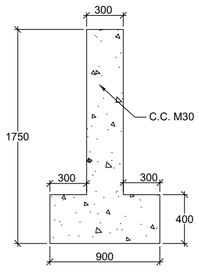
KEY PLAN

NOT TO SCALE



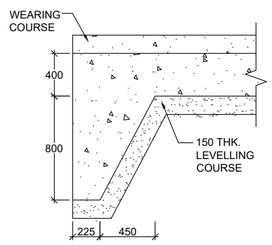
DROP WALL

(NOT TO SCALE)



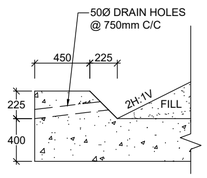
CURTAIN WALL

(NOT TO SCALE)



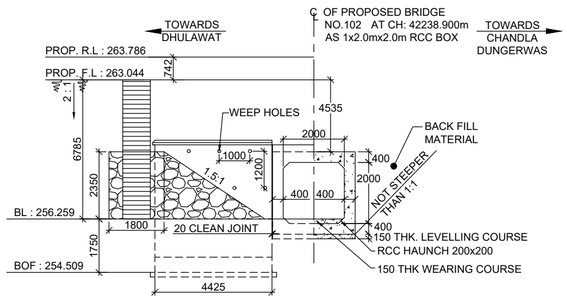
SHEAR KEY

(NOT TO SCALE)



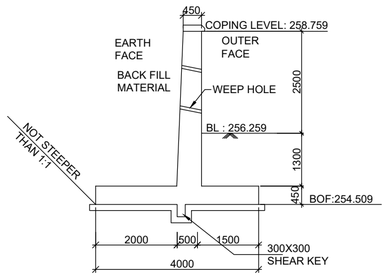
BALLAST RETAINER

(NOT TO SCALE)



HALF ELEVATION HALF SECTION

NOT TO SCALE



SECTION B-B

(NOT TO SCALE)

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER. UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

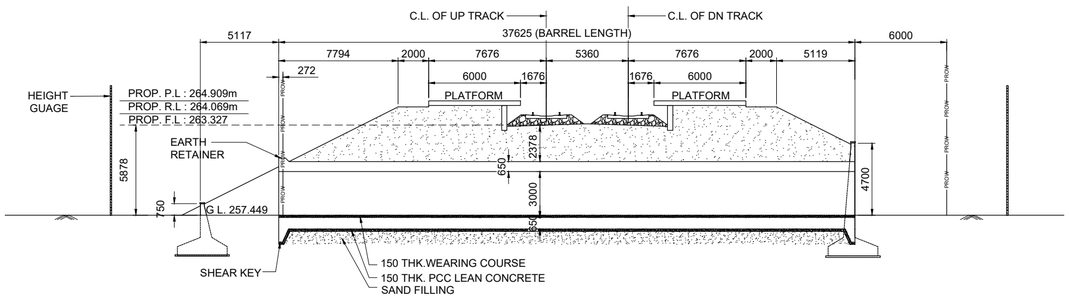
RITES THE INFRASTRUCTURE PEOPLE | SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO 102 SPAN 1.0X2.0X2.0 RCC BOX AT CH: 42238.900m

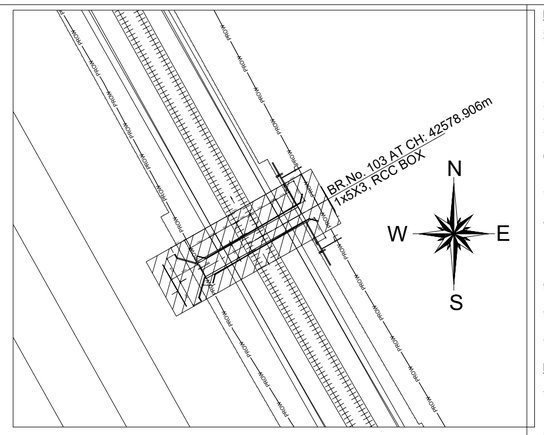
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01102_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



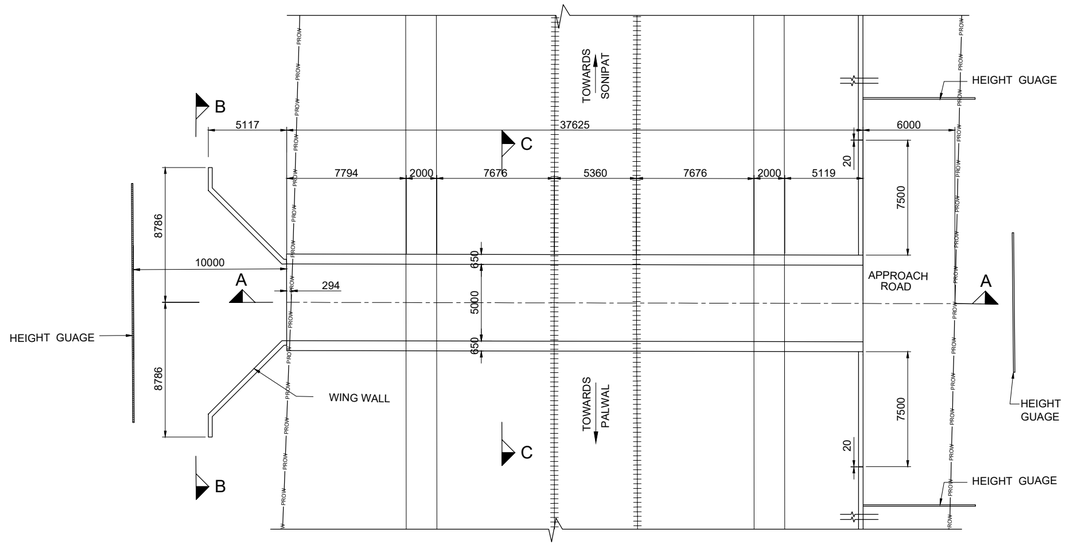
SECTIONAL ELEVATION AT A-A

SCALE 1:200



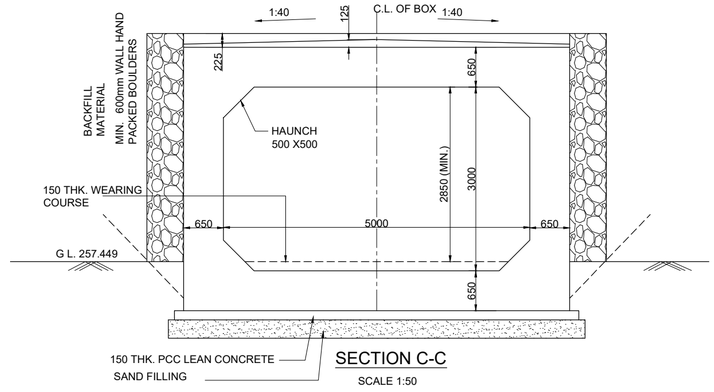
KEY PLAN

(NOT TO SCALE)



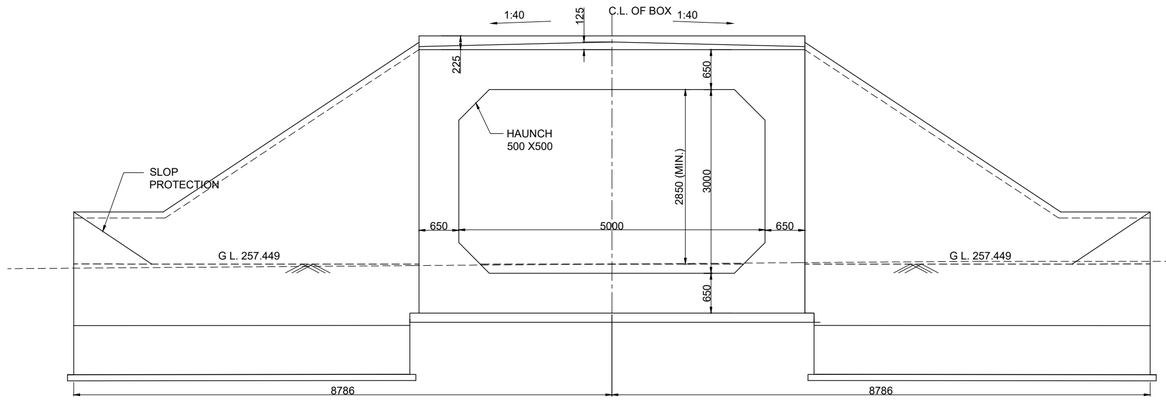
PLAN AT TOP

SCALE 1:200



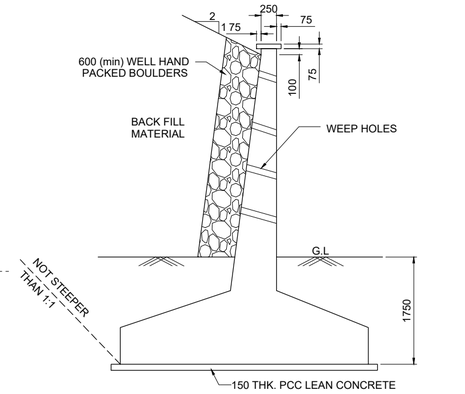
SECTION C-C

SCALE 1:50



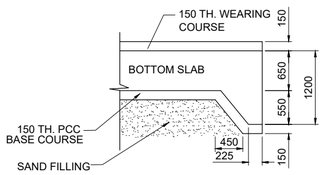
SECTION B-B

SCALE 1:50



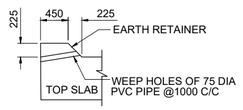
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE. GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:

TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

SMEC

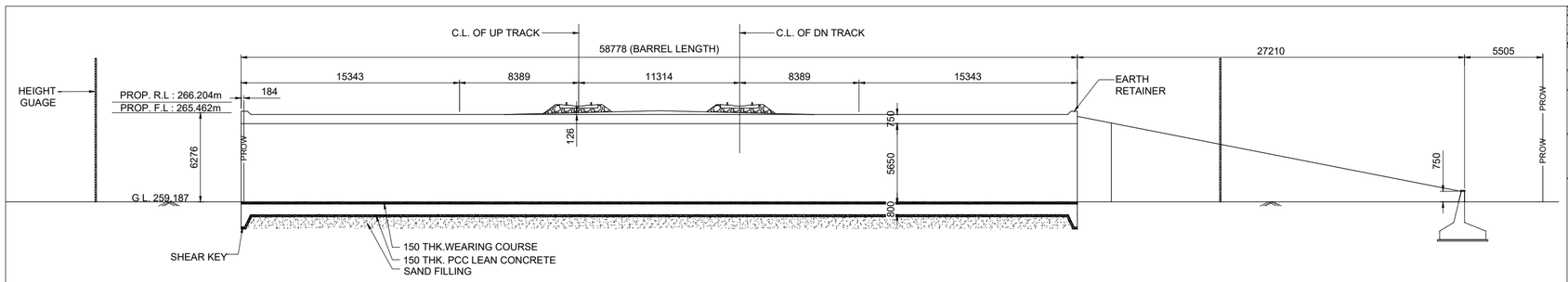
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

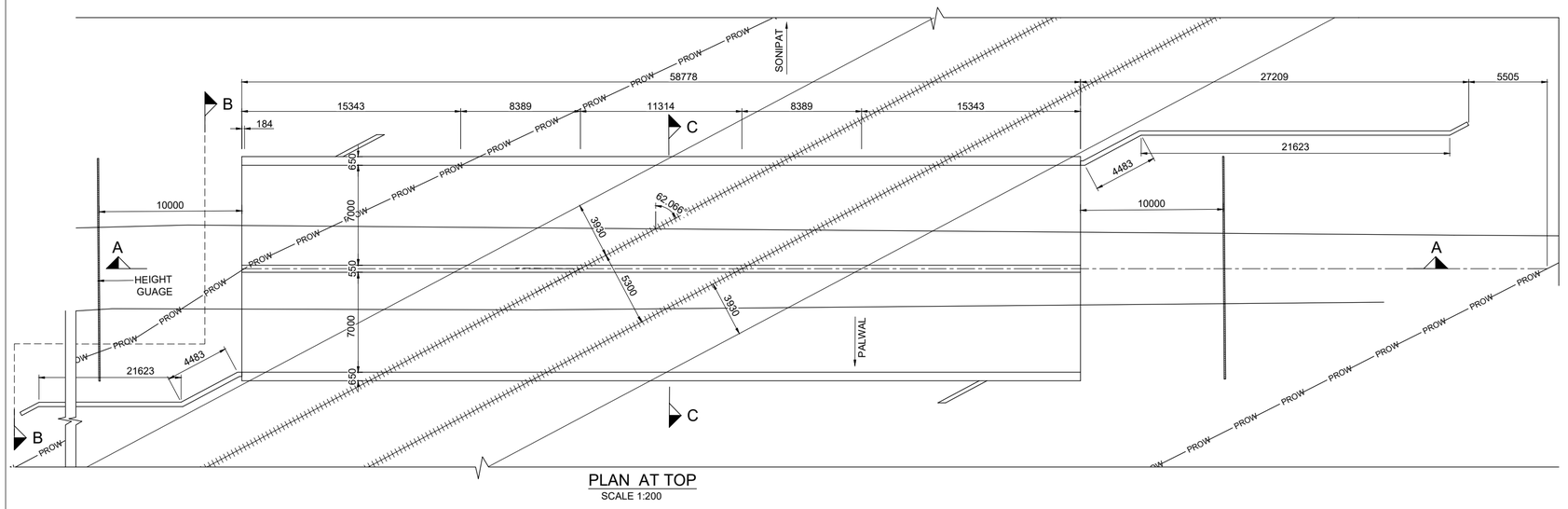
PROPOSED RUB NO. 103 SPAN 1×5.0×3.0 RCC BOX AT CH: 42578.906

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01103_A1	1 OF 1

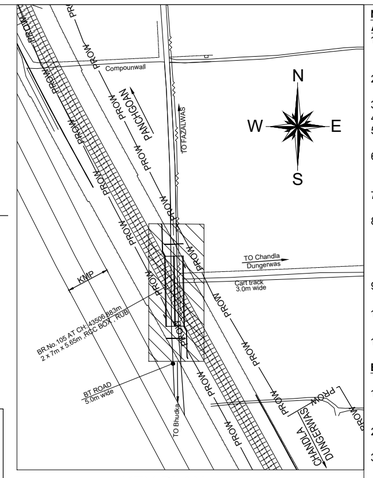
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



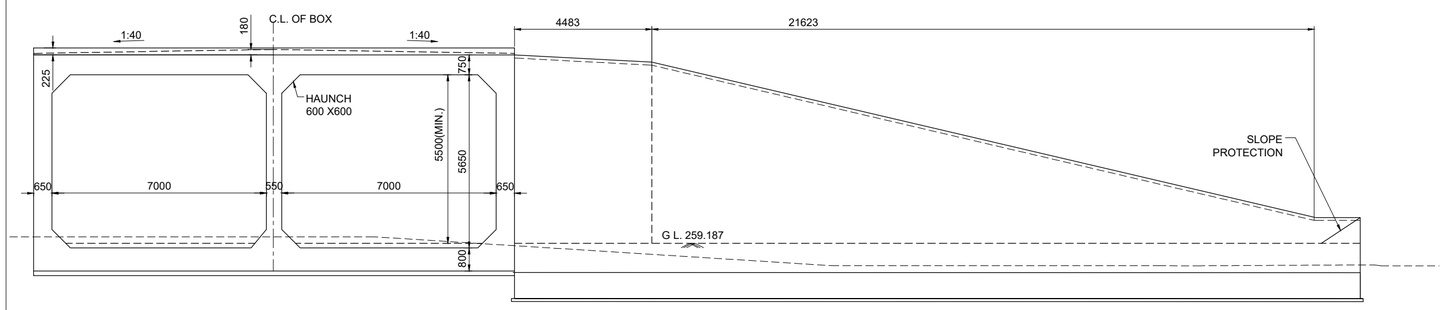
SECTIONAL ELEVATION AT A-A
SCALE 1:200



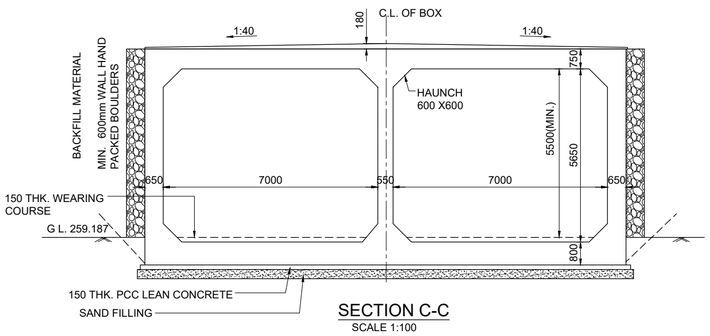
PLAN AT TOP
SCALE 1:200



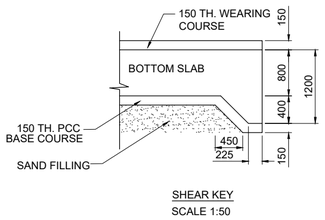
KEY PLAN
(NOT TO SCALE)



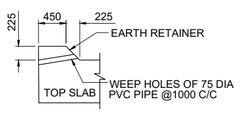
SECTION B-B
SCALE 1:100



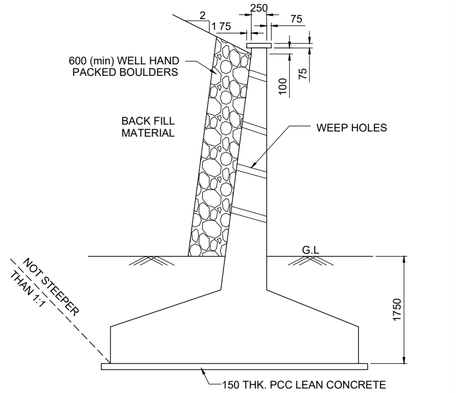
SECTION C-C
SCALE 1:100



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

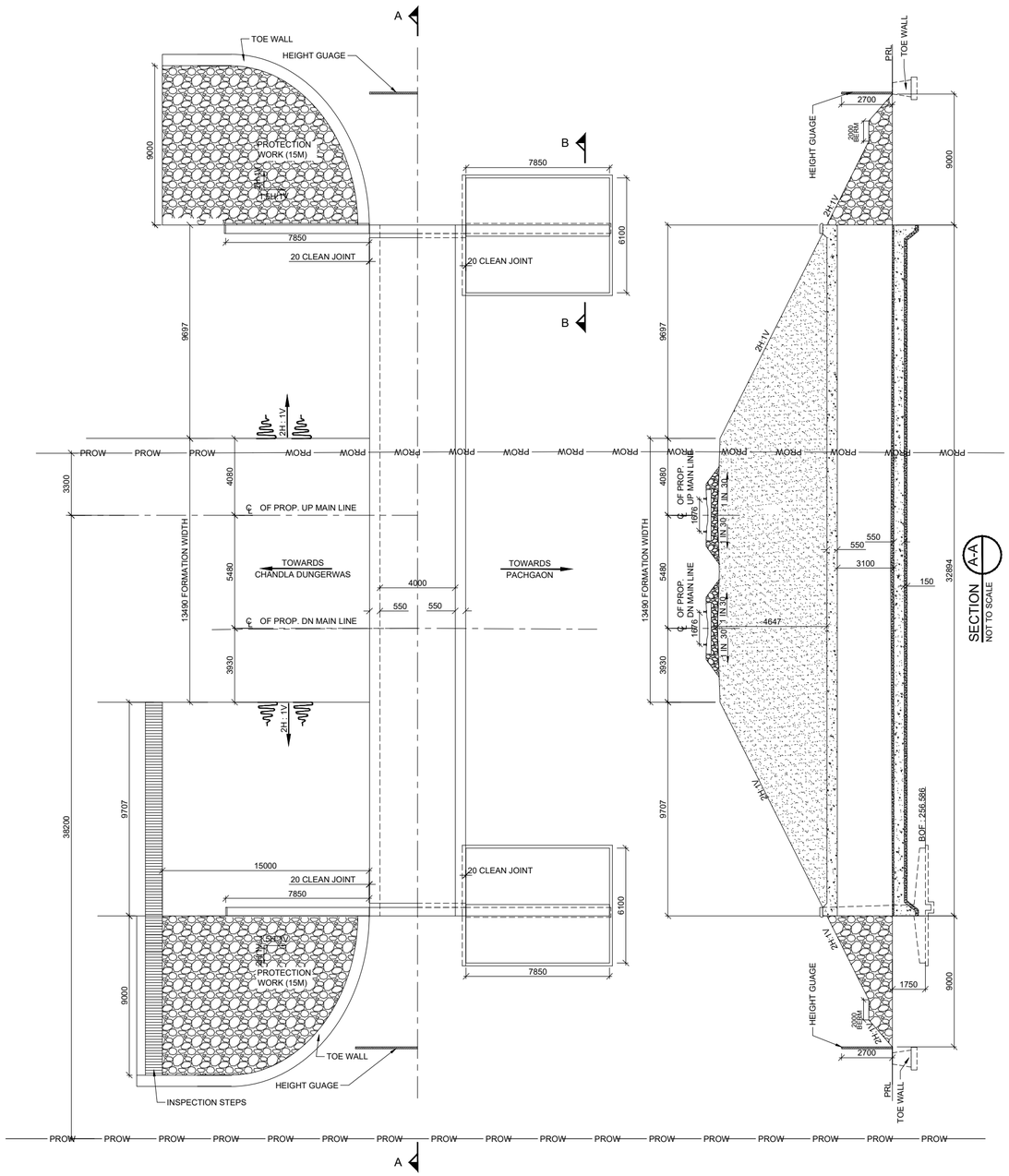
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC

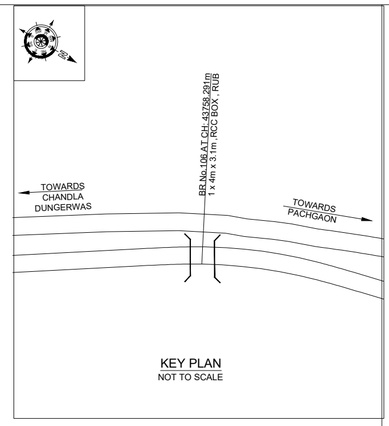
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 105 SPAN
2×7.0×5.650 RCC BOX AT CH: 43506.883

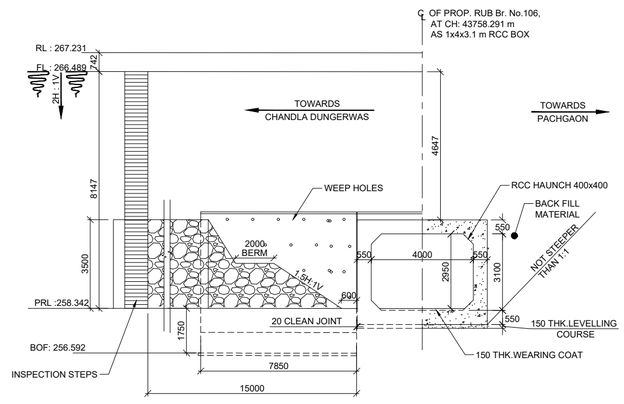
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01105_A1
SHEET NO. 1 OF 1

SCALE : AS SHOWN
ISSUE DATE 11-11-2022
REVISED DATE 16-12-2022

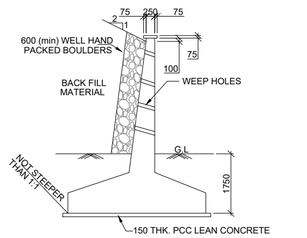




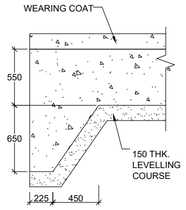
KEY PLAN
NOT TO SCALE



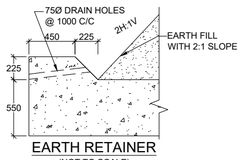
HALF ELEVATION HALF SECTION
NOT TO SCALE



SECTION B-B
(NOT TO SCALE)



SHEAR KEY
(NOT TO SCALE)



EARTH RETAINER
(NOT TO SCALE)

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE. GRADE OF CONCRETE :
   (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
   (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
17. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

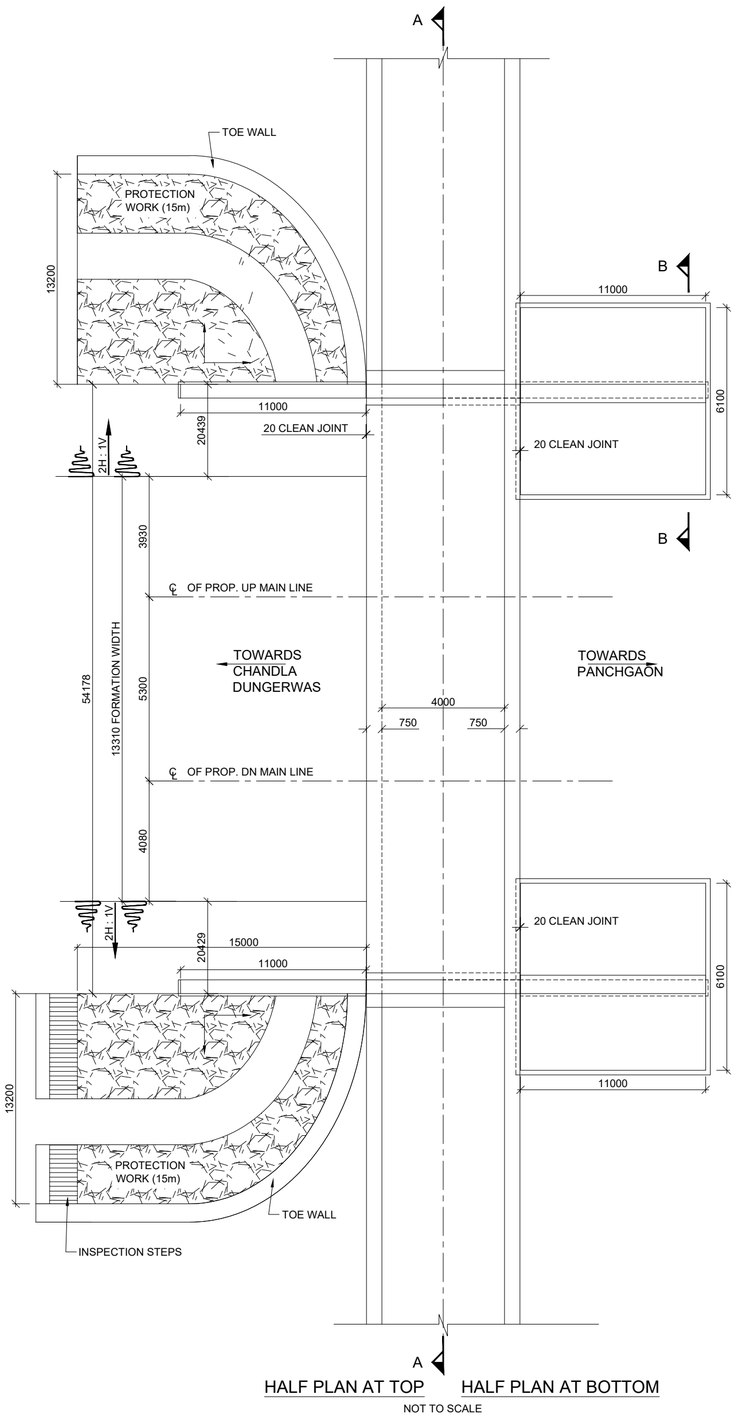
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

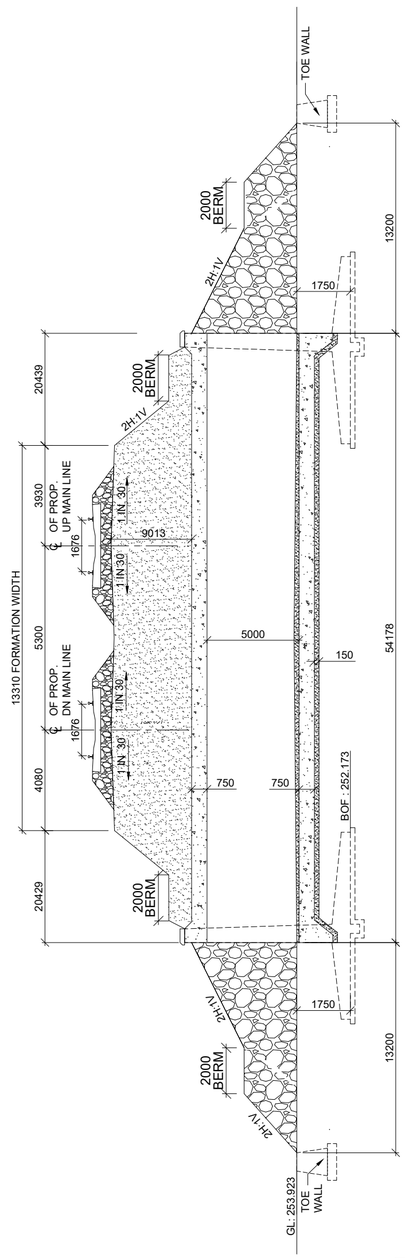
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

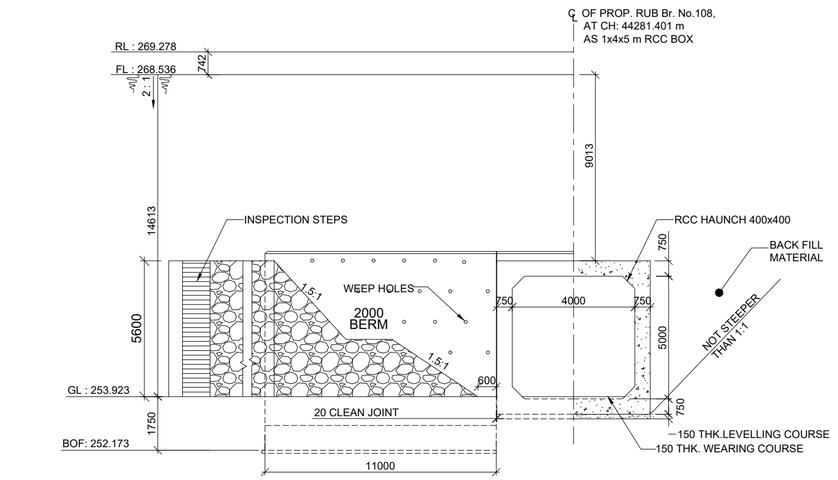
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO 106 SPAN 1.0X4.0X3.1 RCC BOX AT CH: 43758.291m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01106_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

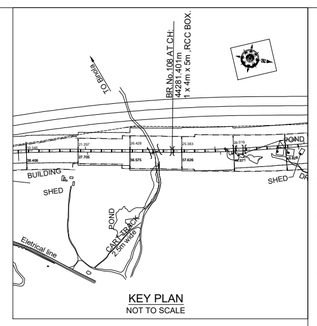






HALF ELEVATION HALF SECTION

NOT TO SCALE

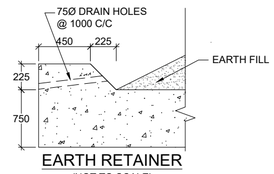


KEY PLAN

NOT TO SCALE

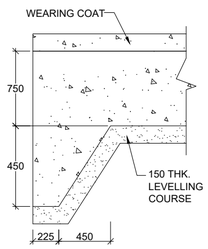
SECTION A-A

NOT TO SCALE



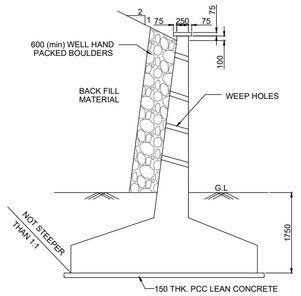
EARTH RETAINER

(NOT TO SCALE)



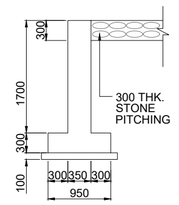
SHEAR KEY

(NOT TO SCALE)



TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



DROP / CURTAIN WALL DETAILS

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M. WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

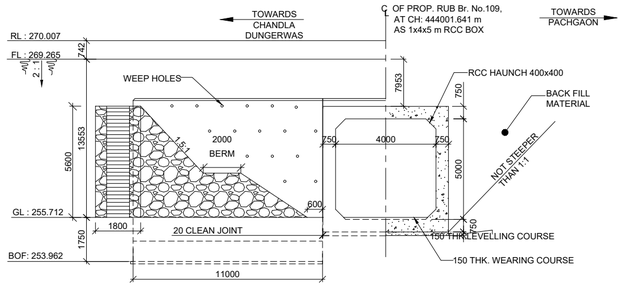
THE INFRASTRUCTURE PEOPLE

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO 108 SPAN 1.0X4.0X5.0 RCC BOX AT CH: 44281.401m

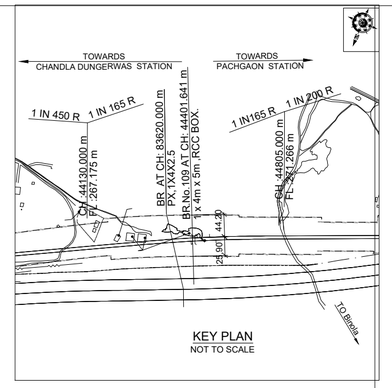
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01108_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



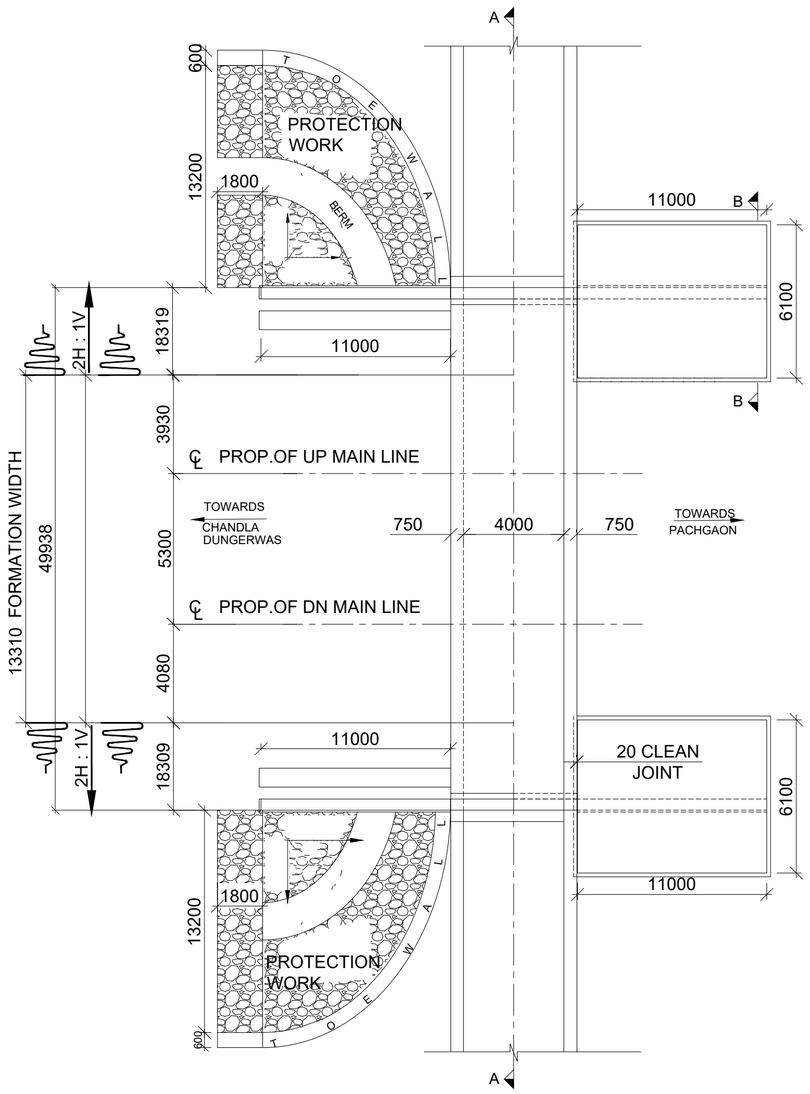
HALF ELEVATION HALF SECTION

NOT TO SCALE



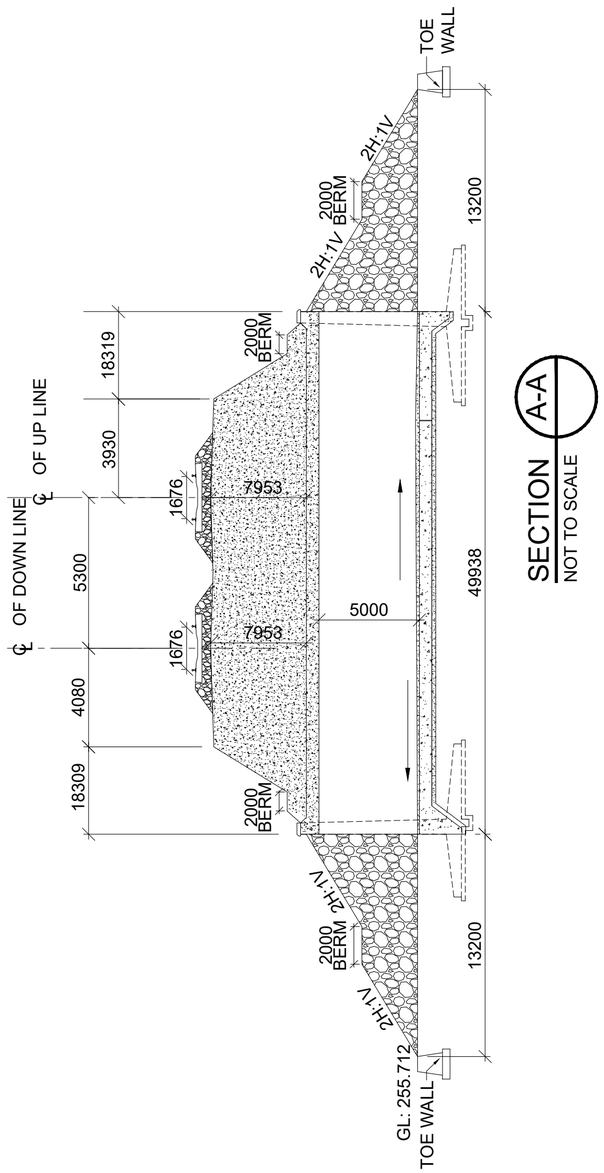
KEY PLAN

NOT TO SCALE



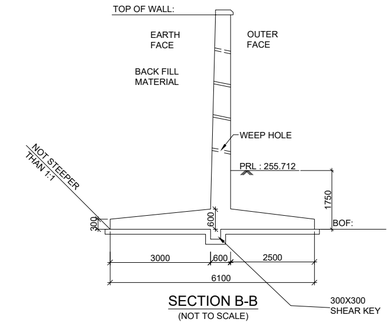
HALF PLAN AT TOP HALF PLAN AT BOTTOM

NOT TO SCALE



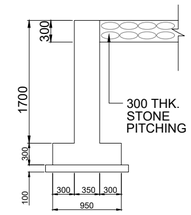
SECTION A-A

NOT TO SCALE



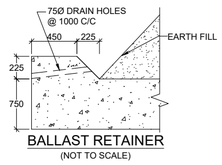
SECTION B-B

(NOT TO SCALE)



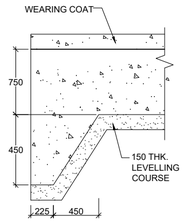
DROP / CURTAIN WALL DETAILS

SCALE 1:50



BALLAST RETAINER

(NOT TO SCALE)



SHEAR KEY

(NOT TO SCALE)

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO 109 SPAN 1.0X4.0X5.0 RCC BOX AT CH: 44401.641m

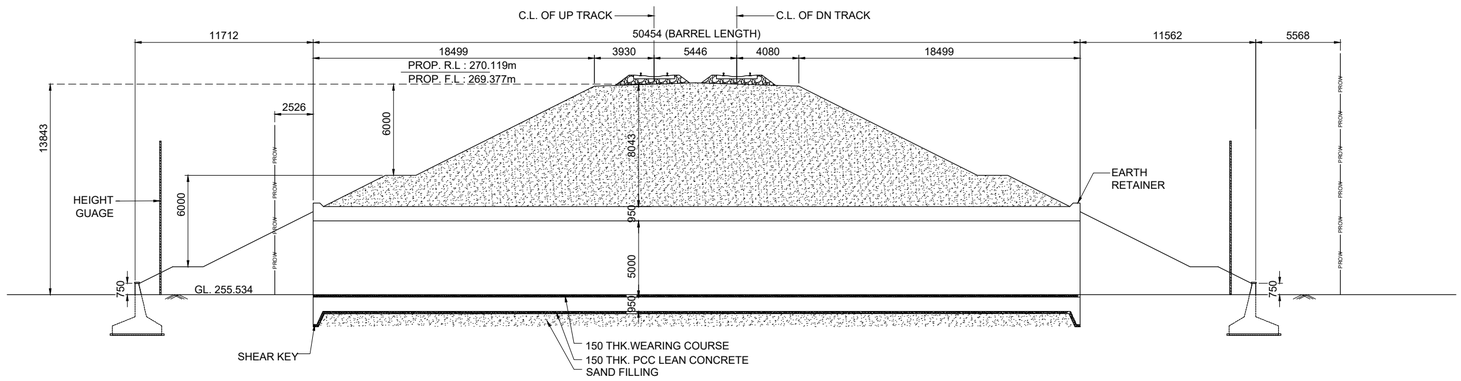
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01109_A1

SHEET NO. 1 OF 1

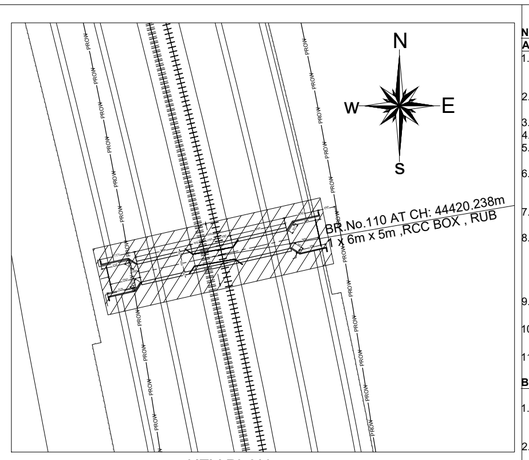
SCALE : AS SHOWN

ISSUE DATE 11-11-2022

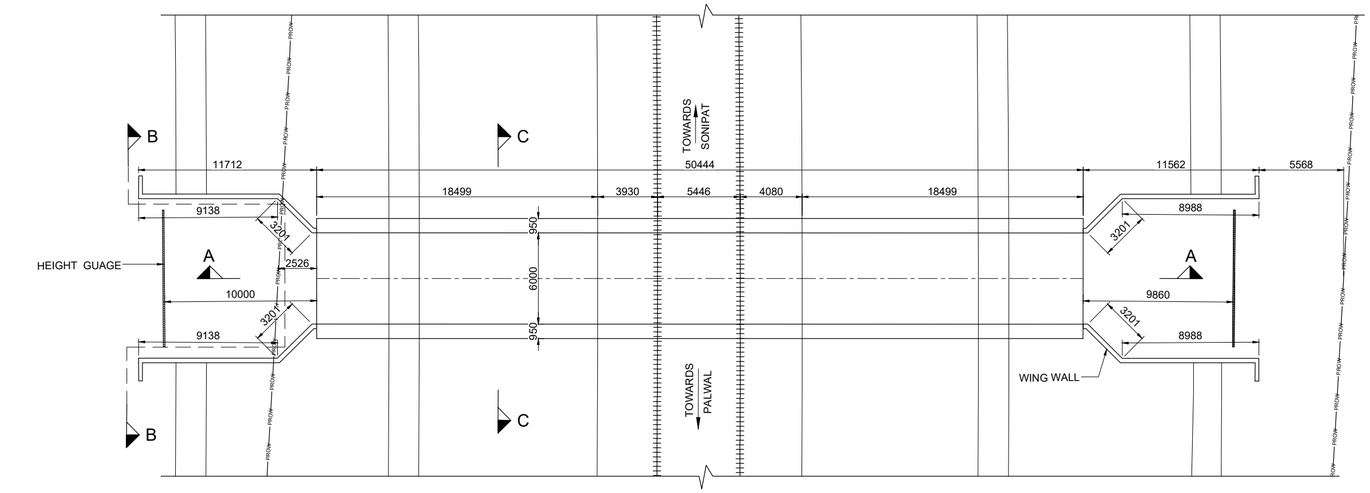
REVISED DATE 16-12-2022



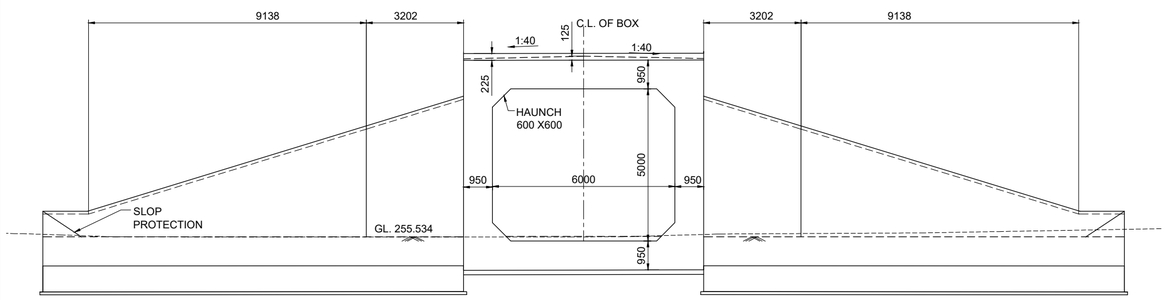
SECTIONAL ELEVATION AT A-A
SCALE 1:200



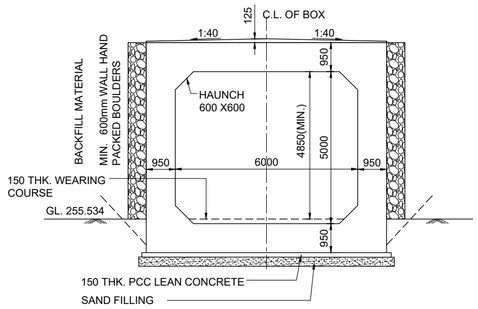
KEY PLAN
(NOT TO SCALE)



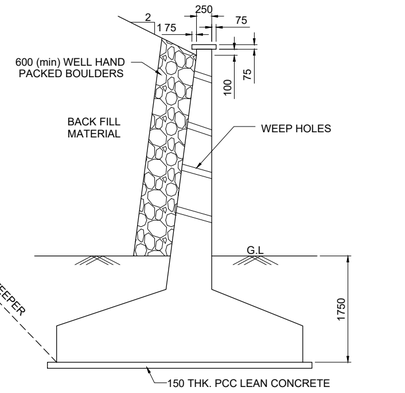
PLAN AT TOP
SCALE 1:200



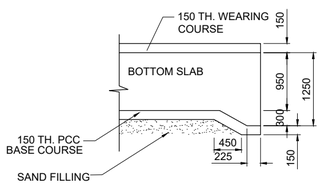
SECTION B-B
SCALE 1:100



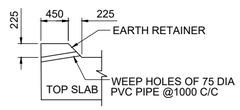
SECTION C-C
SCALE 1:100



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
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10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD..
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
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4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
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10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

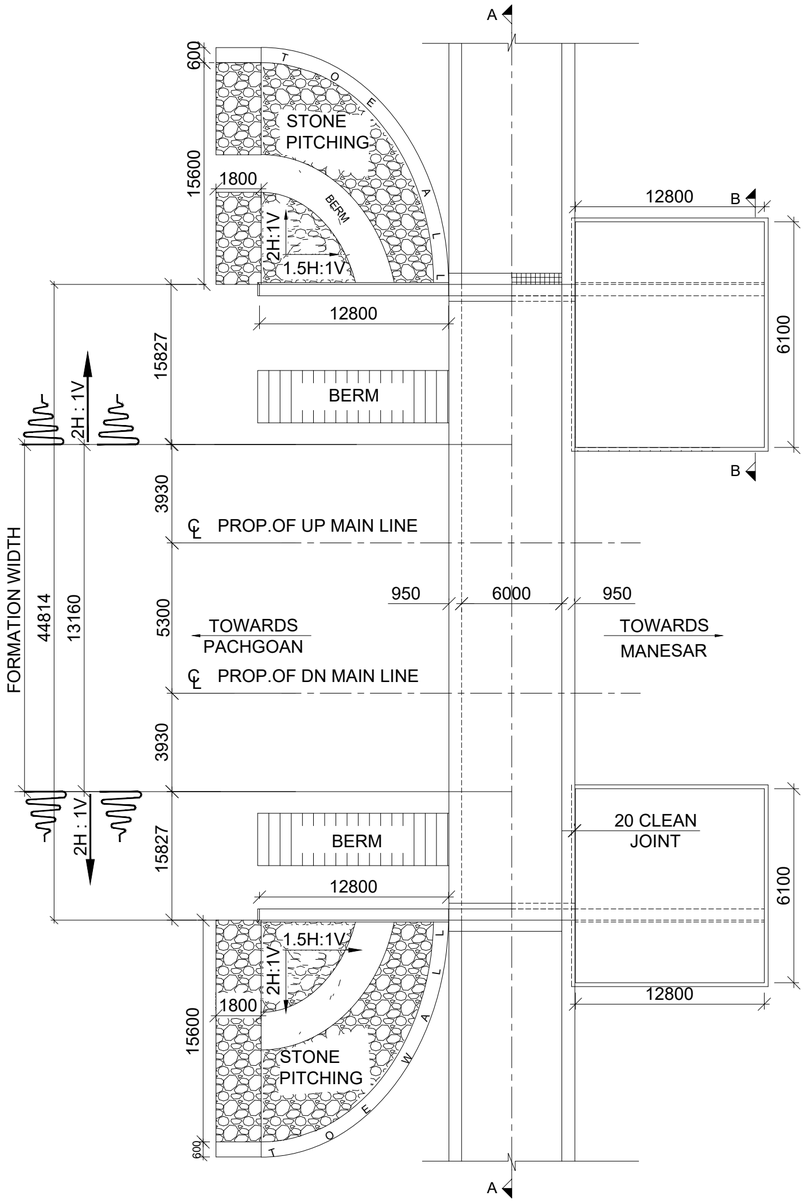
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

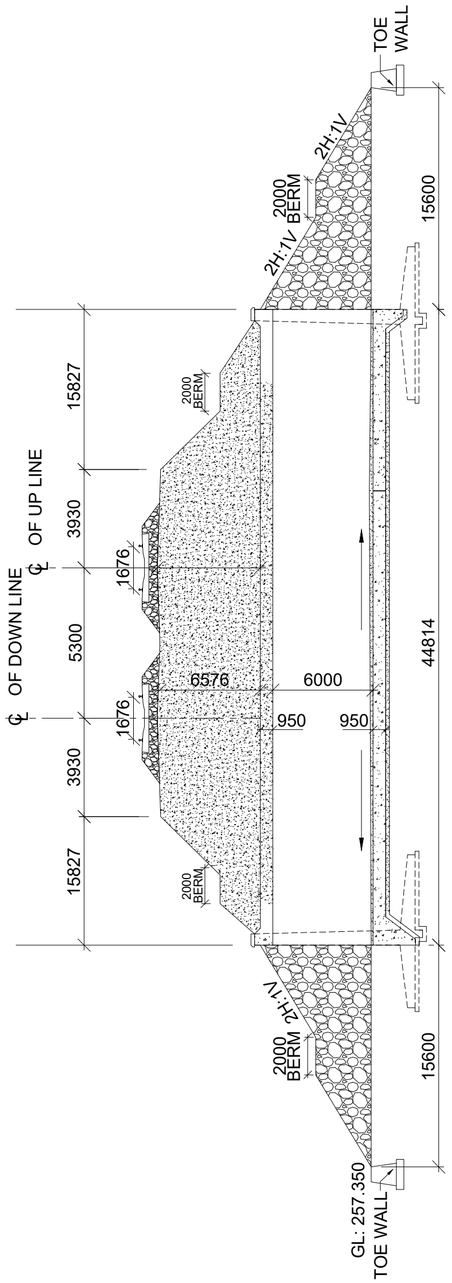
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

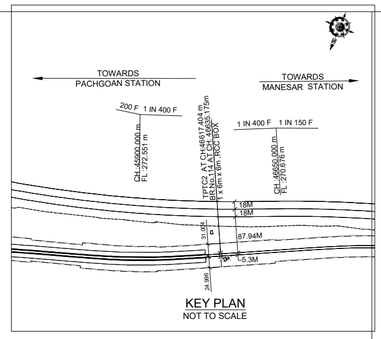
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
PROPOSED RUB NO. 110 SPAN
1×6.0×5.0RCC BOX AT CH: 44420.238

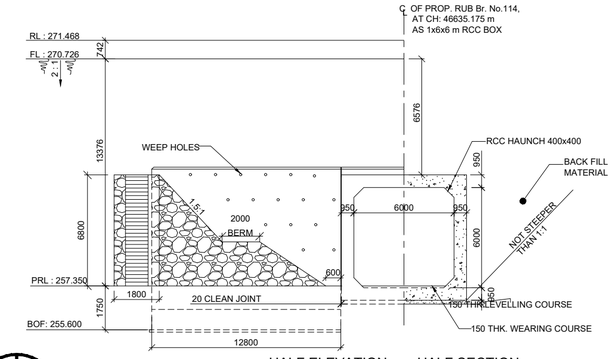
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01110_A1	1 OF 1

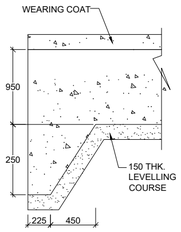
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

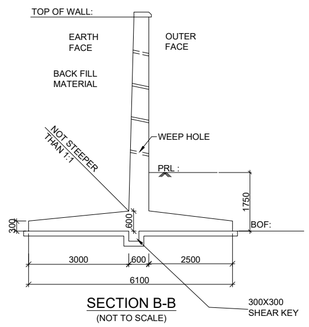


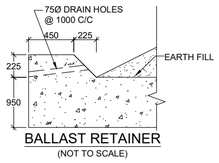


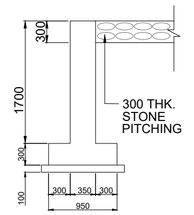












HALF PLAN AT TOP HALF PLAN AT BOTTOM

NOT TO SCALE

NOTES :

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16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

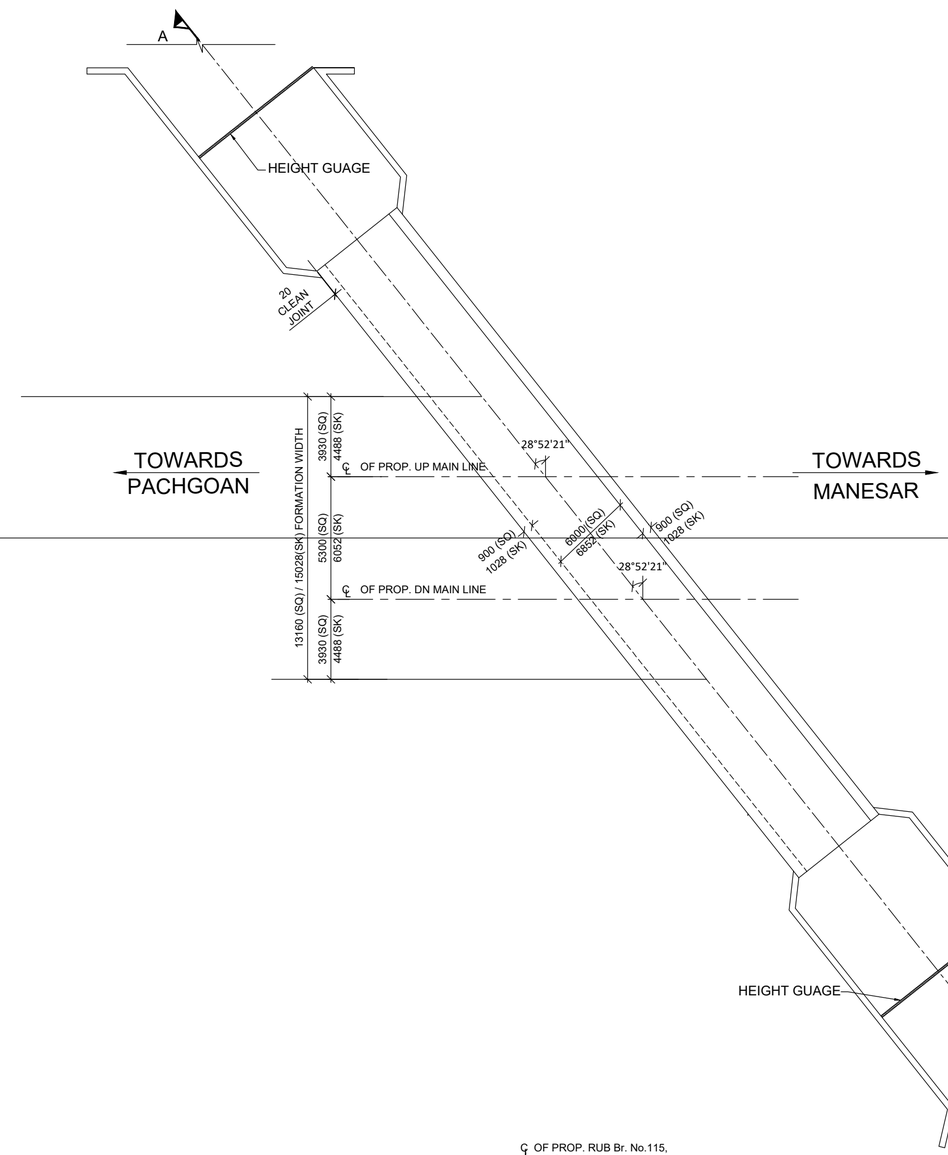
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO 114 SPAN 1.0X6.0X6.0 RCC BOX AT CH: 46635.175m

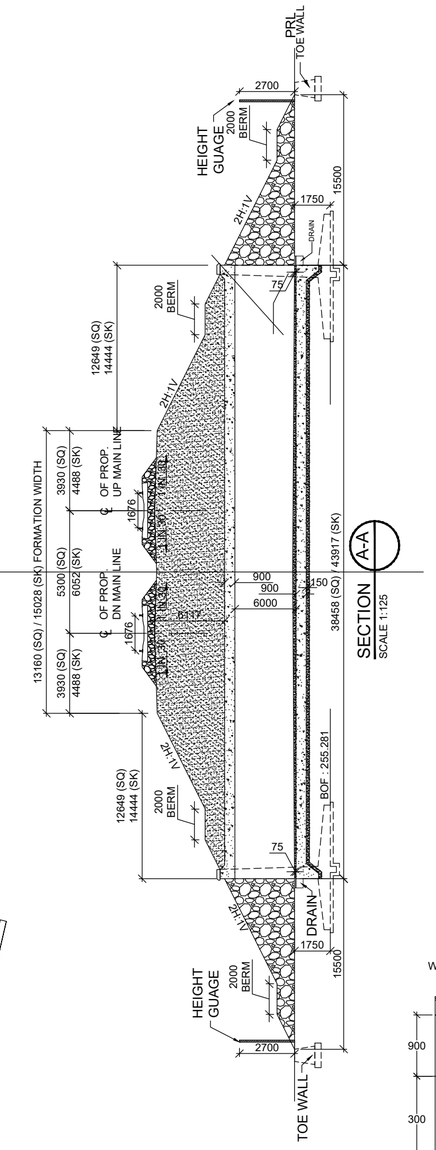
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01114_A1	1 OF 1

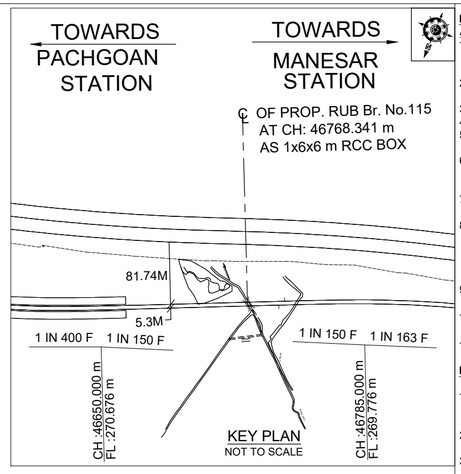
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

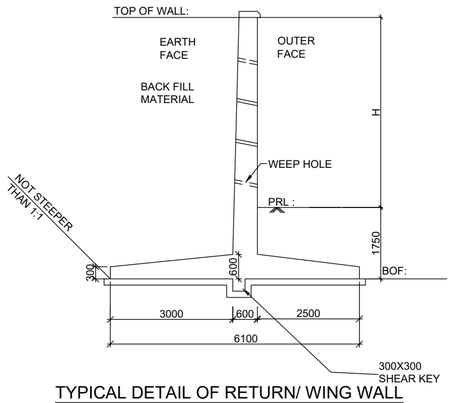


PLAN AT TOP

SCALE 1 : 125

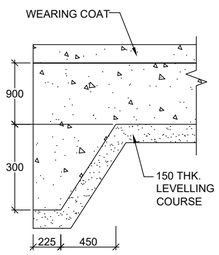






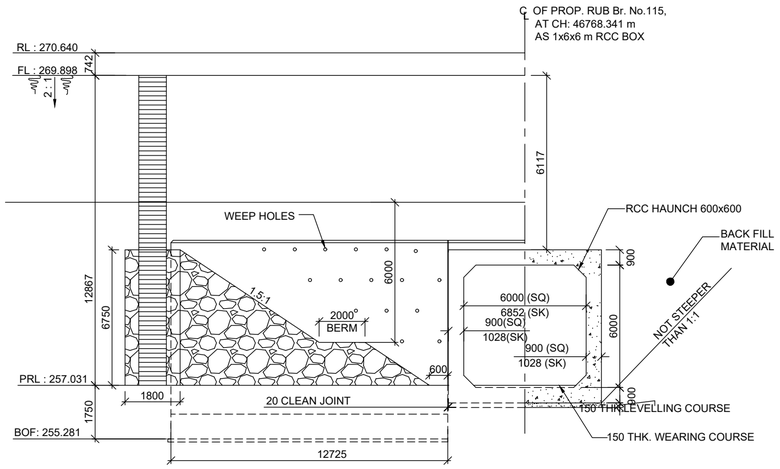
TYPICAL DETAIL OF RETURN/ WING WALL

(NOT TO SCALE)



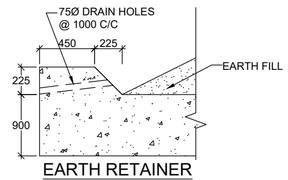
SHEAR KEY

(NOT TO SCALE)



HALF ELEVATION HALF SECTION

NOT TO SCALE



EARTH RETAINER

(NOT TO SCALE)

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.

IMPORTANT NOTE:

TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR

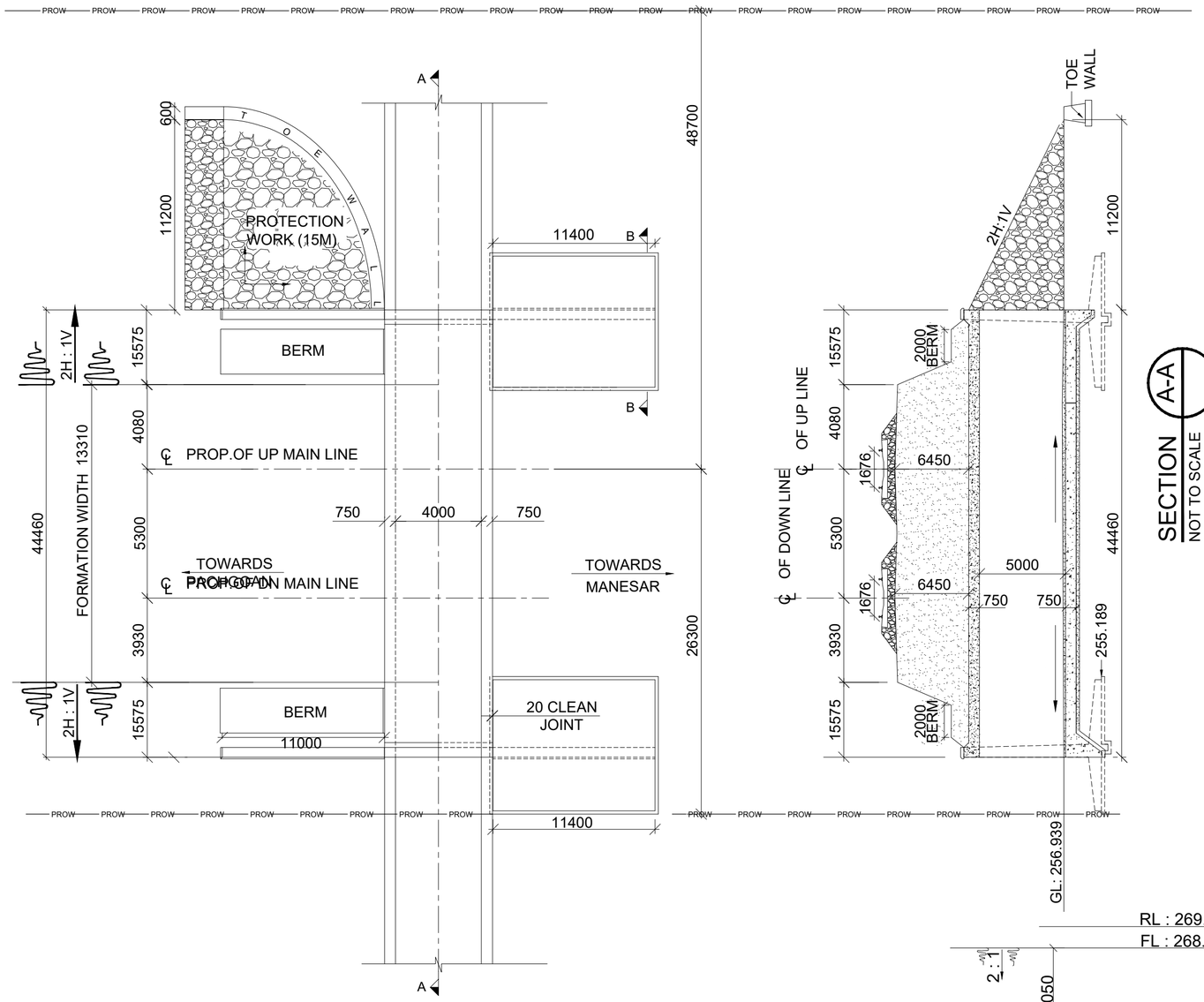
RITES Limited in consortium with SMEC International Pty. Ltd.

THE INFRASTRUCTURE PEOPLE

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO 115
SPAN 1.0X6.0X6.0 RCC BOX AT CH: 46768.341m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01115_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

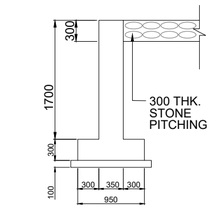


HALF PLAN AT TOP HALF PLAN AT BOTTOM

NOT TO SCALE

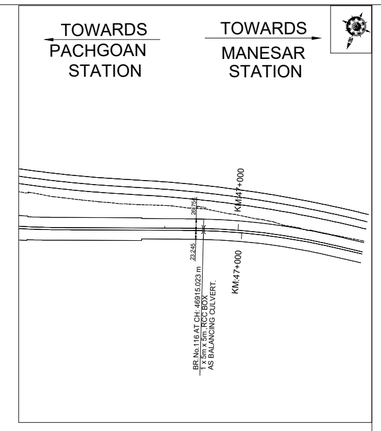
SECTION A-A

NOT TO SCALE



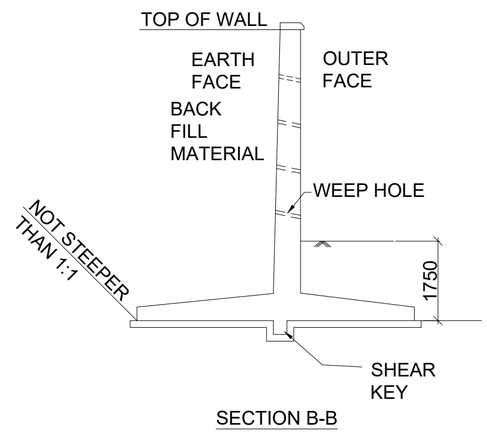
DROP / CURTAIN WALL DETAILS

SCALE 1:50



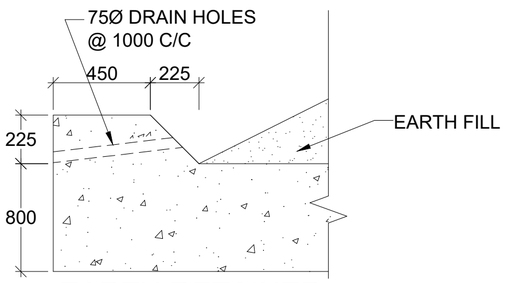
KEY PLAN

NOT TO SCALE



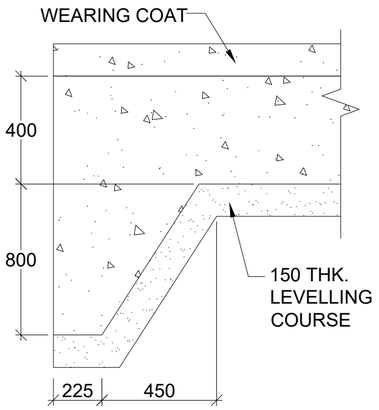
SECTION B-B

(NOT TO SCALE)



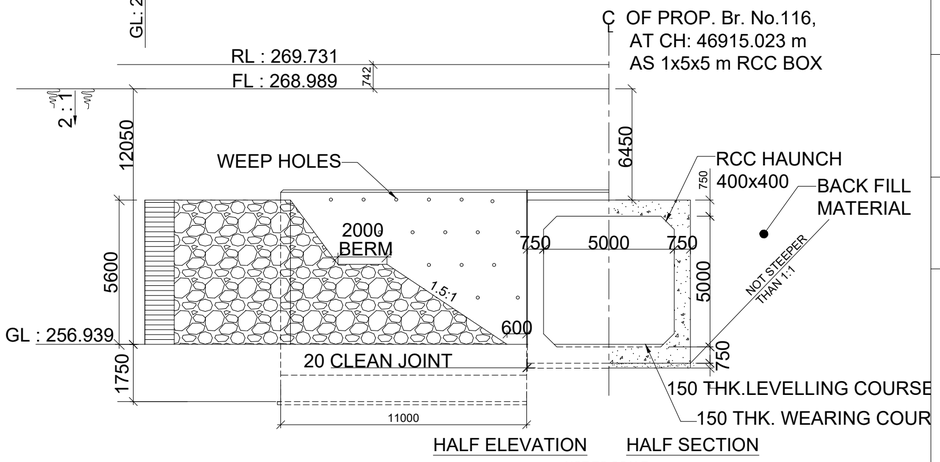
EARTH RETAINER

(NOT TO SCALE)



SHEAR KEY

(NOT TO SCALE)



HALF ELEVATION HALF SECTION

NOT TO SCALE

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

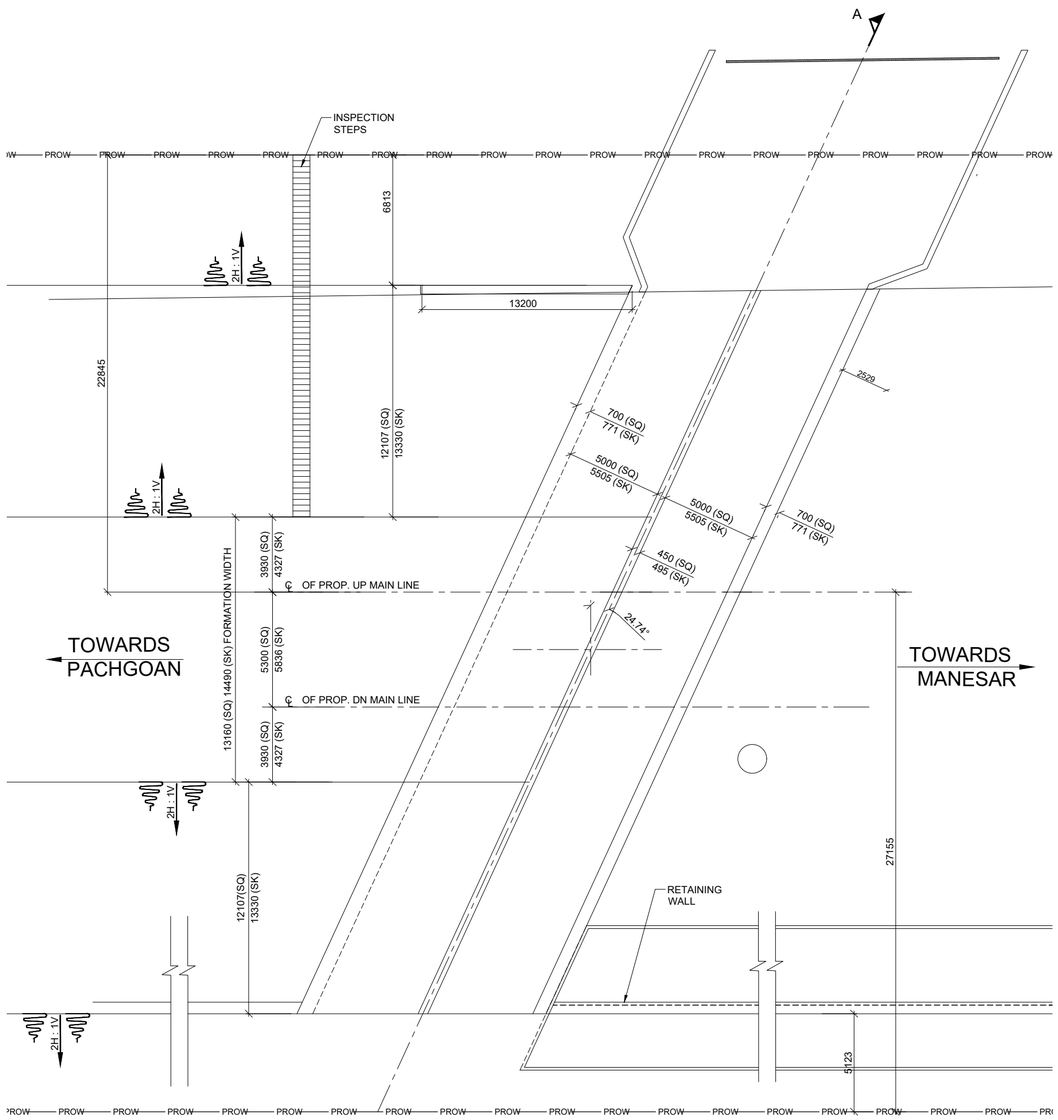
RITES THE INFRASTRUCTURE PEOPLE

SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO 116 SPAN 1.0X5.0X5.0 RCC BOX AT CH: 46915.023m

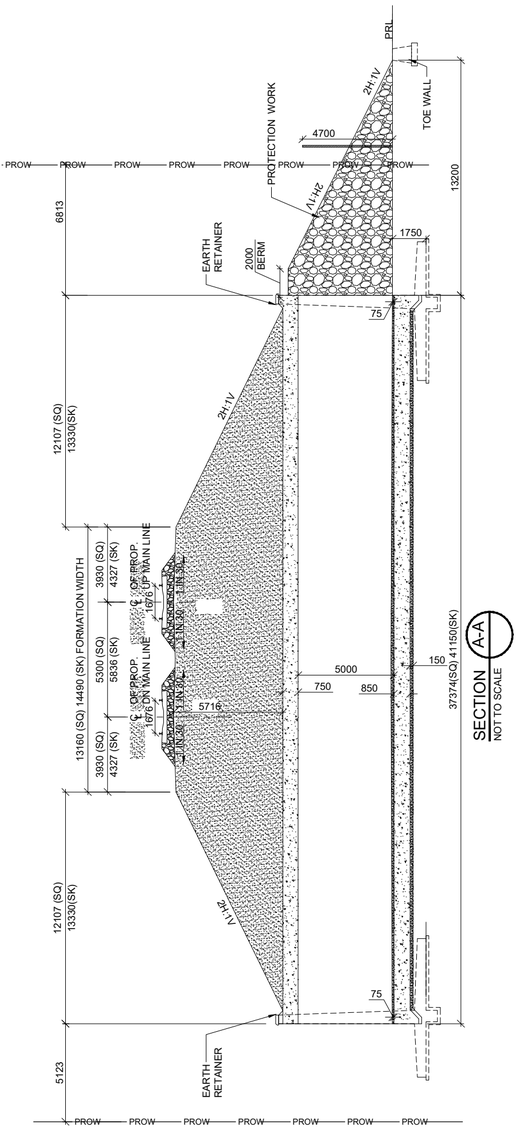
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01116_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



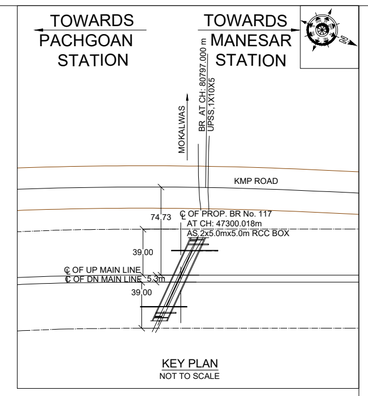
HALF PLAN AT TOP HALF PLAN AT BOTTOM

NOT TO SCALE



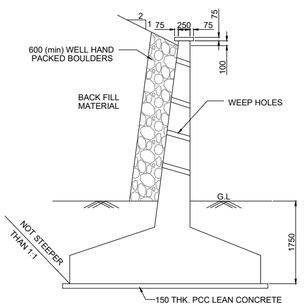
SECTION A-A

NOT TO SCALE



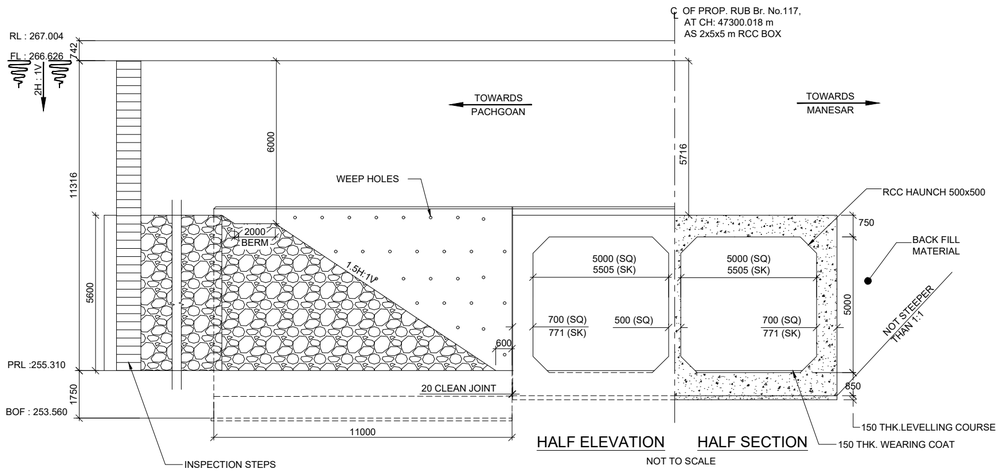
KEY PLAN

NOT TO SCALE



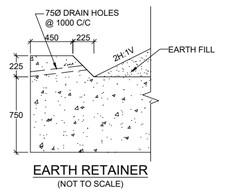
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



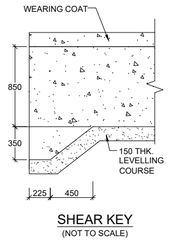
HALF ELEVATION HALF SECTION

NOT TO SCALE



EARTH RETAINER

(NOT TO SCALE)



SHEAR KEY

(NOT TO SCALE)

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE / OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
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7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.

IMPORTANT NOTE:

TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR

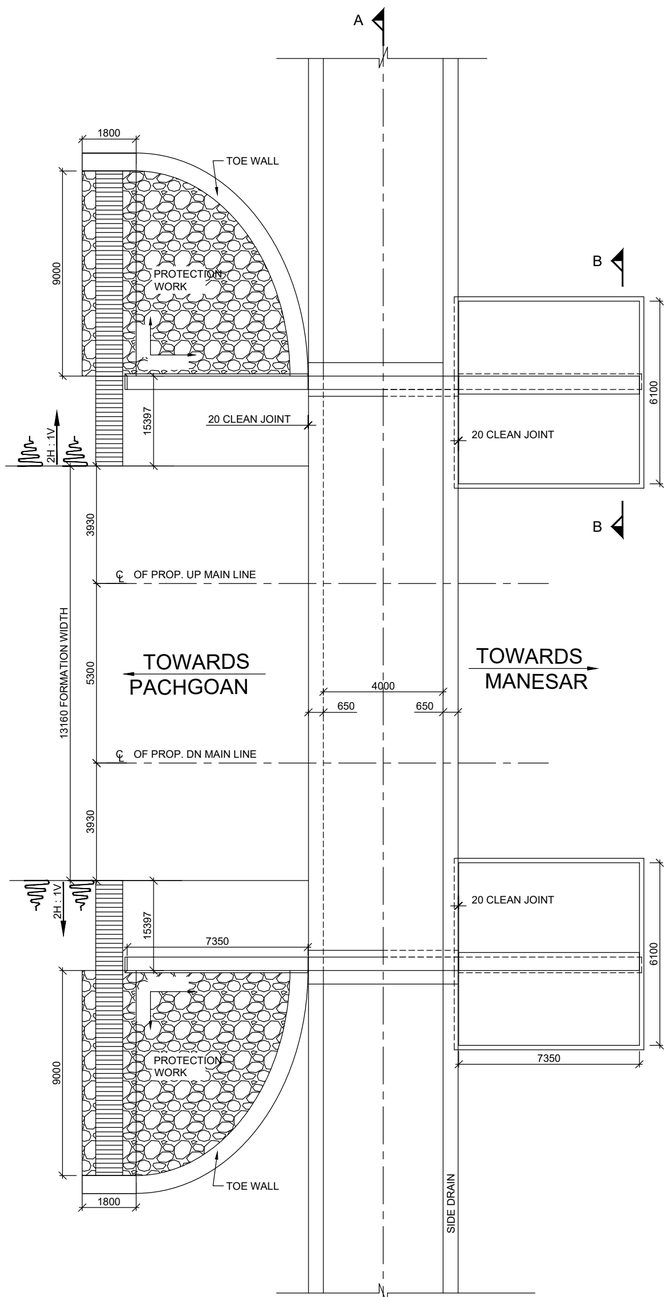
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO 117 SPAN 2.0X5.0X5.0 RCC BOX AT CH: 47300.018m

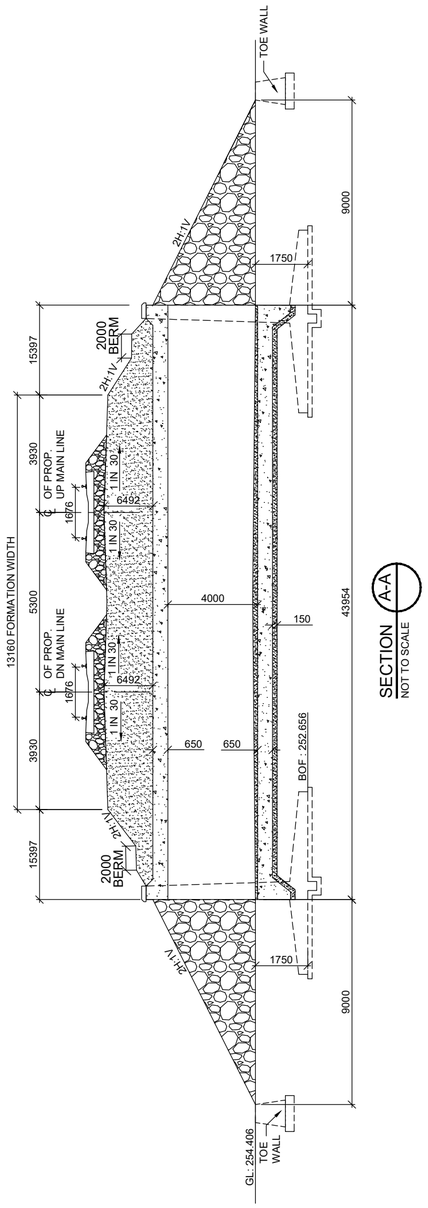
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01117_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



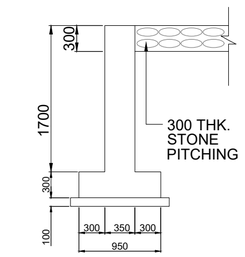
HALF PLAN AT TOP HALF PLAN AT BOTTOM

NOT TO SCALE



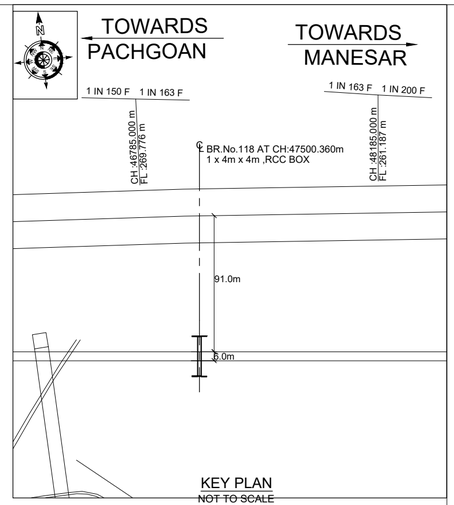
SECTION A-A

NOT TO SCALE



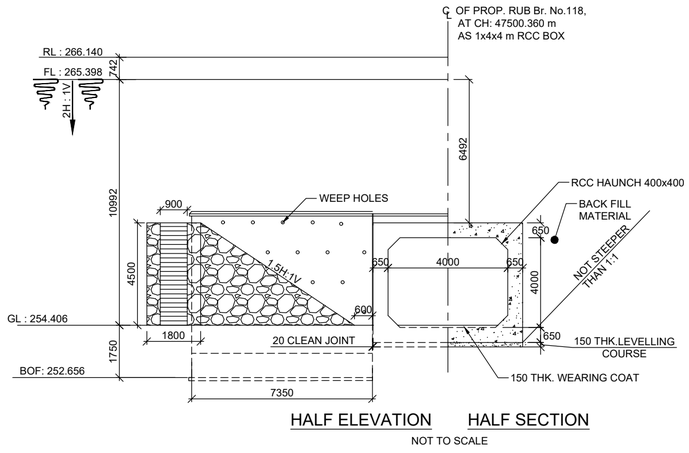
DROP / CURTAIN WALL DETAILS

SCALE 1:50



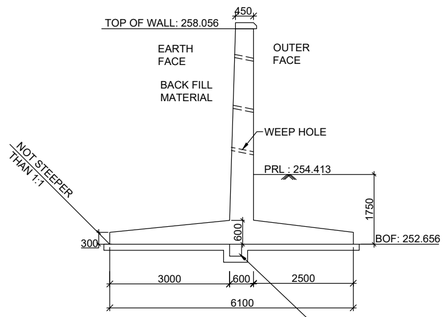
KEY PLAN

NOT TO SCALE



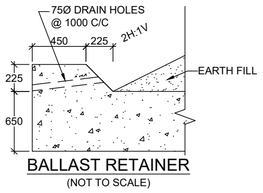
HALF ELEVATION HALF SECTION

NOT TO SCALE



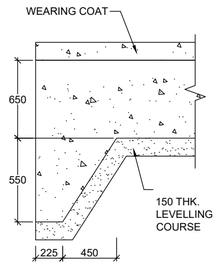
SECTION B-B

(NOT TO SCALE)



BALLAST RETAINER

(NOT TO SCALE)



SHEAR KEY

(NOT TO SCALE)

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT,HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE. GRADE OF CONCRETE :
   (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
   (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

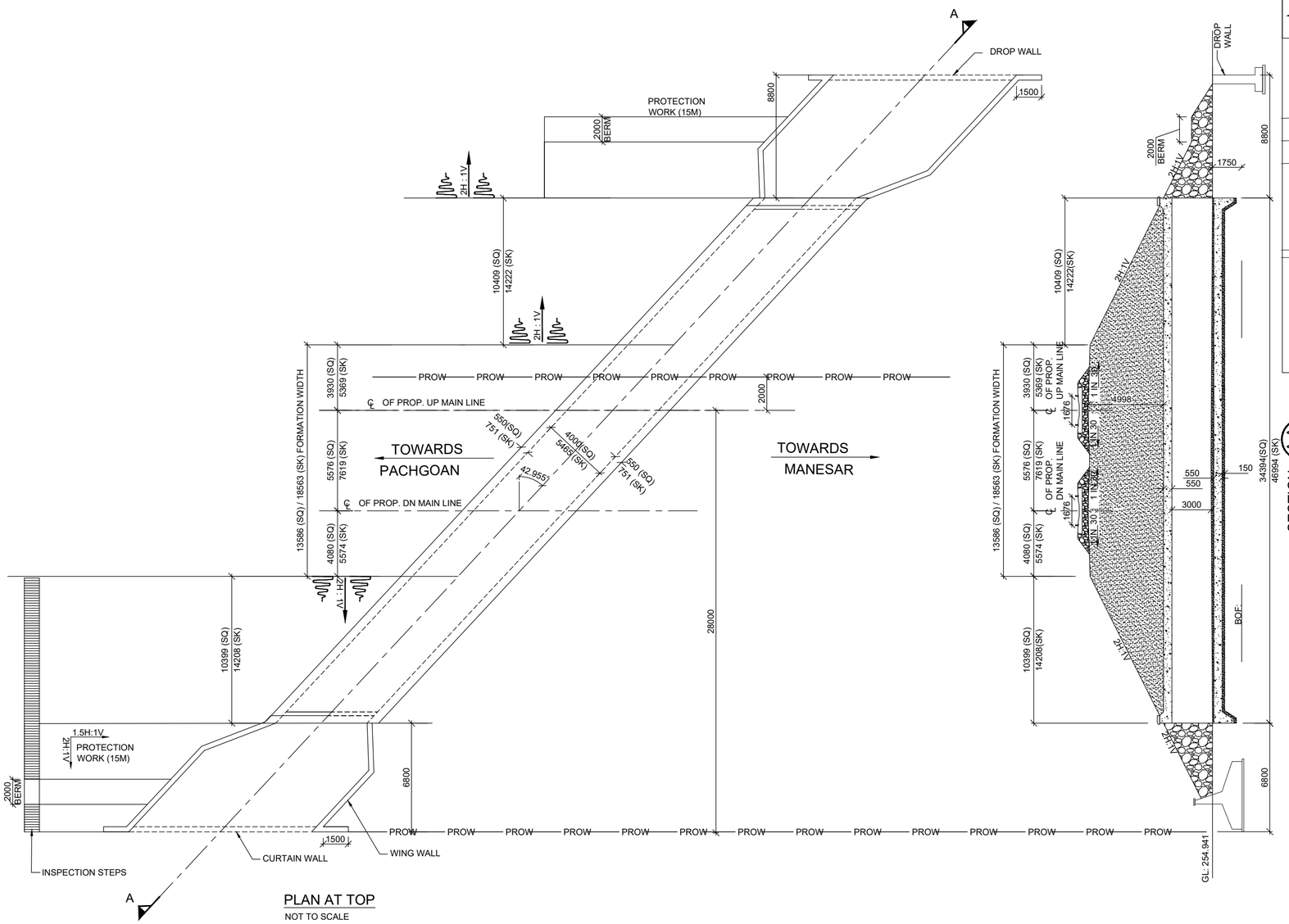
SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT NO 118 SPAN 1.0X4.0X4.0 RCC BOX AT CH: 47500.360m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01118_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

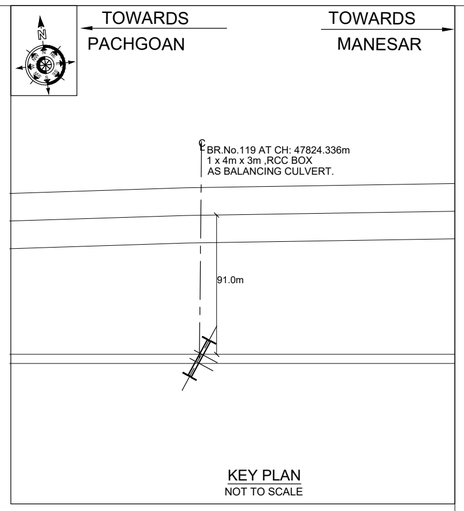


PLAN AT TOP

NOT TO SCALE

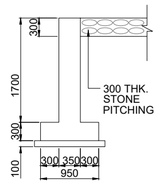
SECTION A-A

NOT TO SCALE



KEY PLAN

NOT TO SCALE



DROP/ CURTAIN WALL DETAILS

SCALE 1:50

NOTES :

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B) TECHNICAL NOTES :

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8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
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13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
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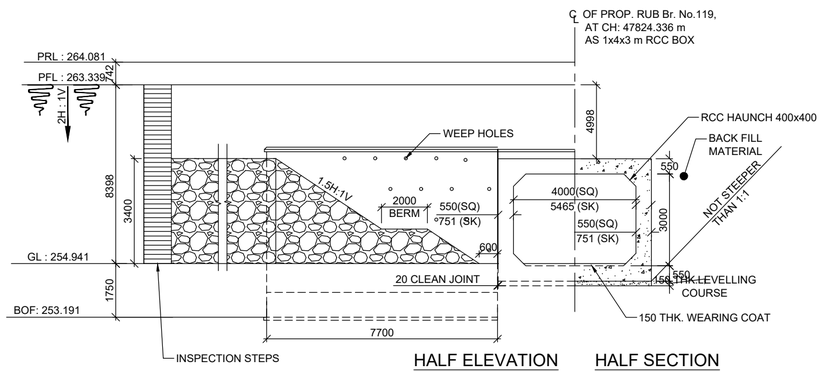
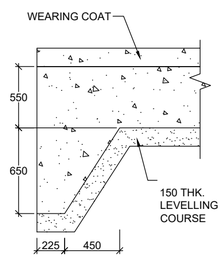
LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
BOF	BOTTOM OF FOUNDATION



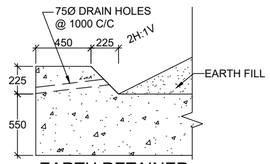
HALF ELEVATION HALF SECTION

NOT TO SCALE



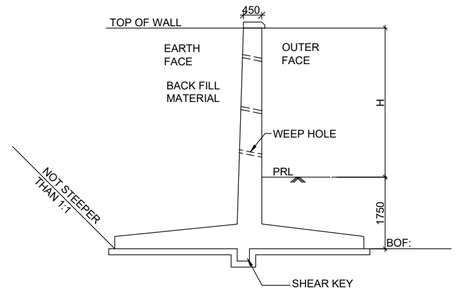
SHEAR KEY

(NOT TO SCALE)



EARTH RETAINER

(NOT TO SCALE)



TYPICAL DETAIL OF RETURN / WING WALL

(NOT TO SCALE)

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

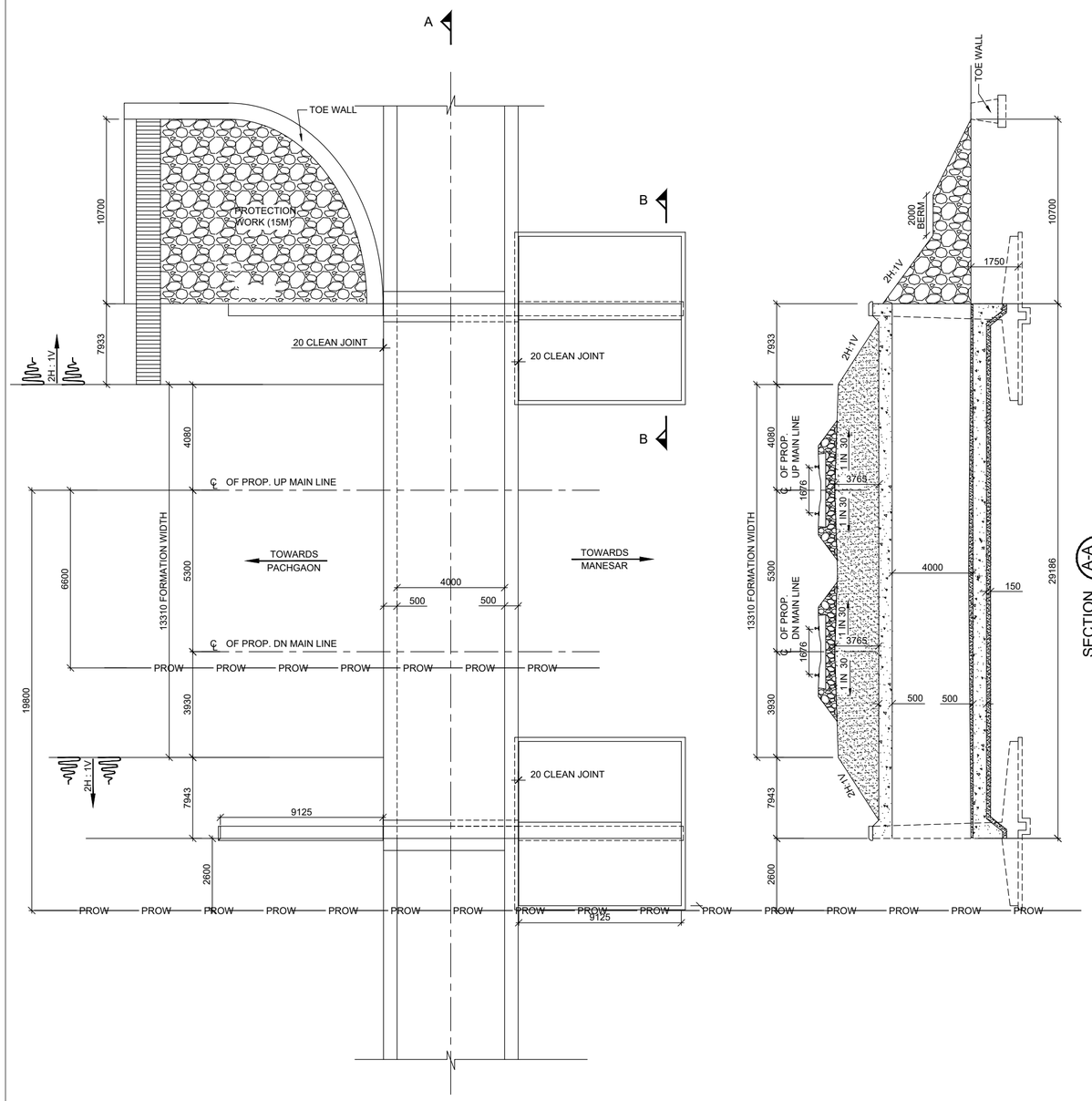
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO 119 SPAN 1.0X4.0X3.0 RCC BOX AT CH: 47824.336m

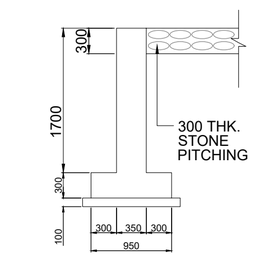
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01119_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

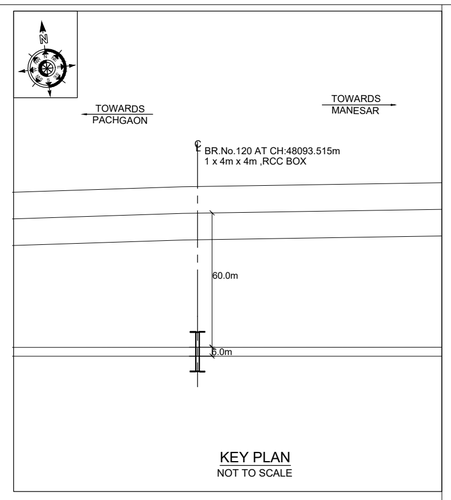


SECTION A-A
NOT TO SCALE

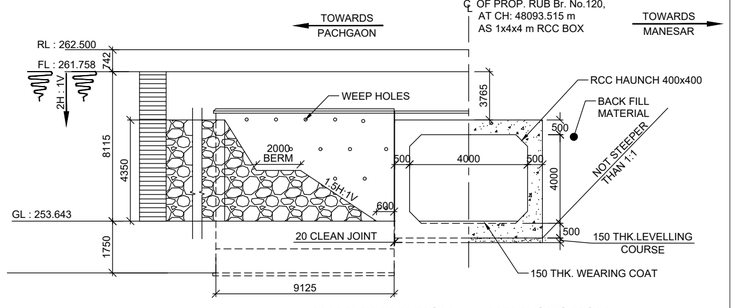
HALF PLAN AT TOP HALF PLAN AT BOTTOM
NOT TO SCALE



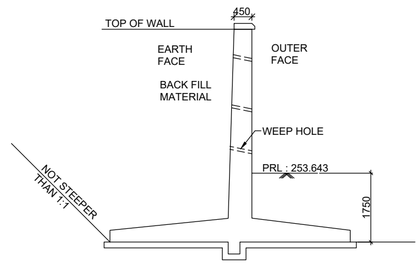
DROP / CURTAIN WALL DETAILS
SCALE 1:50



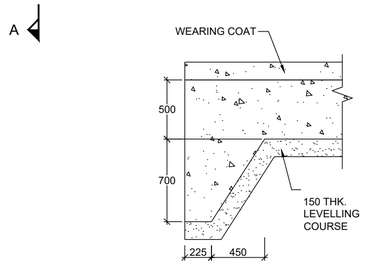
KEY PLAN
NOT TO SCALE



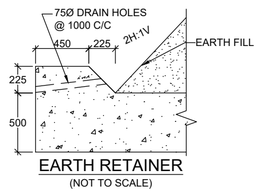
HALF ELEVATION HALF SECTION
NOT TO SCALE



SECTION B-B
(NOT TO SCALE)



SHEAR KEY
(NOT TO SCALE)



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(NOT TO SCALE)

NOTES :

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NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
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SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

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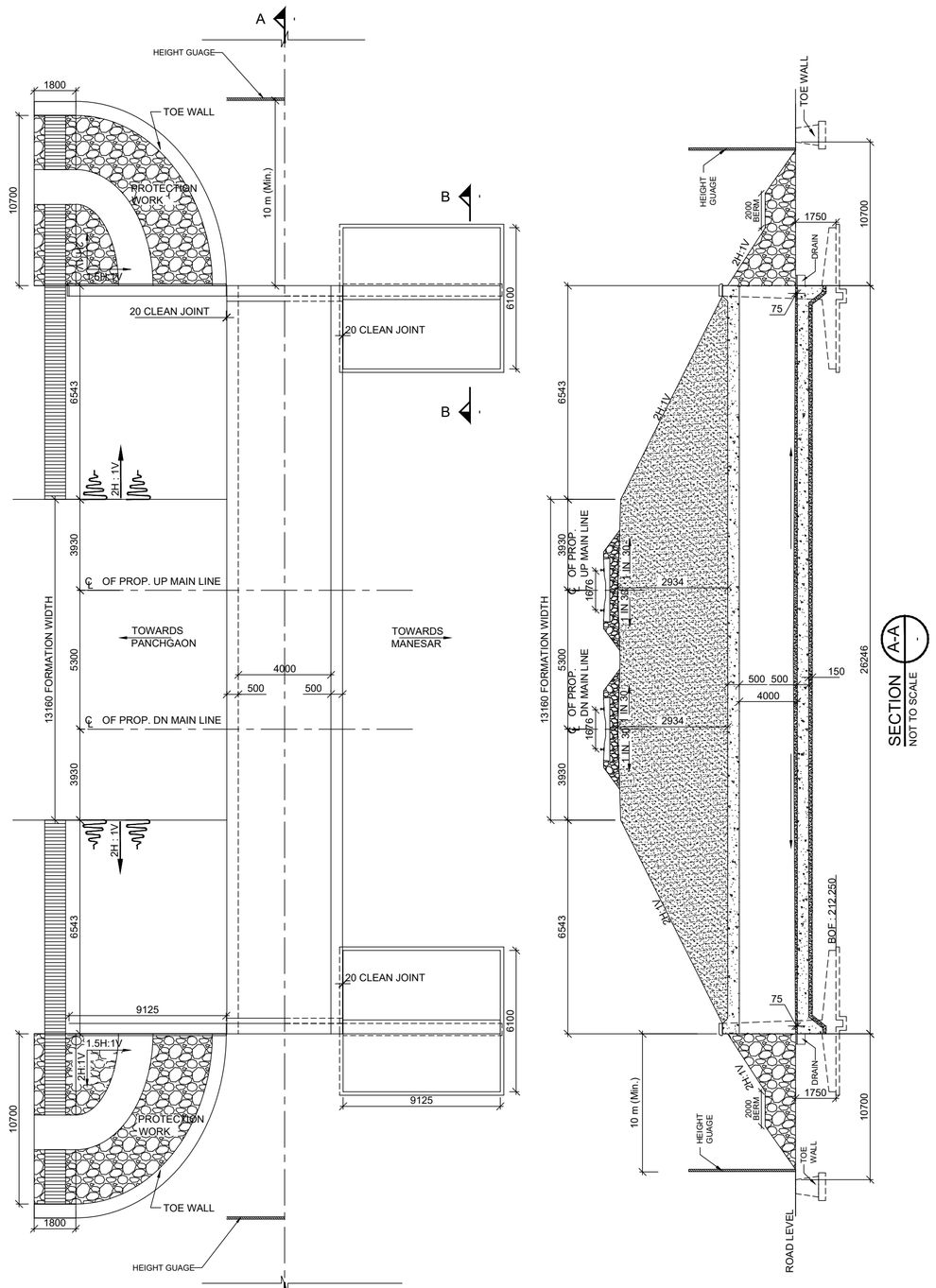
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE
SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO 120 SPAN 1.0X4.0X4.0 RCC BOX AT CH: 48093.515m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01120_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

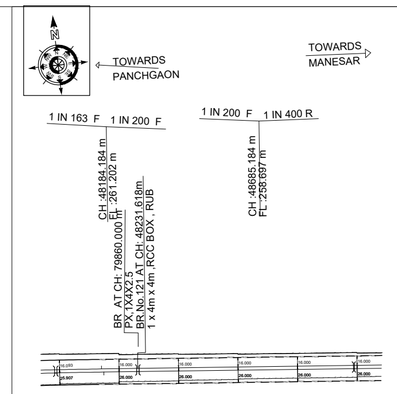


HALF PLAN AT TOP HALF PLAN AT BOTTOM

NOT TO SCALE

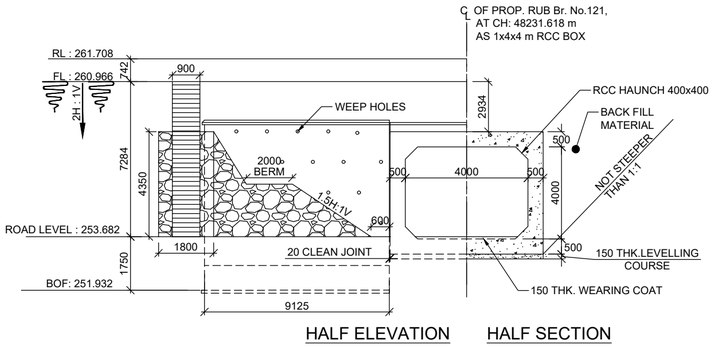
SECTION A-A

NOT TO SCALE



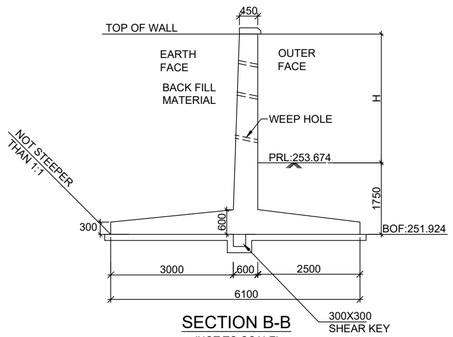
KEY PLAN

NOT TO SCALE



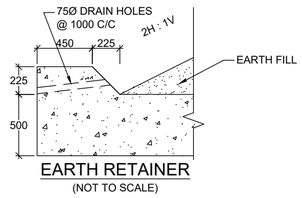
HALF ELEVATION HALF SECTION

NOT TO SCALE



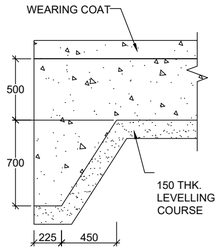
SECTION B-B

(NOT TO SCALE)



EARTH RETAINER

(NOT TO SCALE)



SHEAR KEY

(NOT TO SCALE)

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.

IMPORTANT NOTE:

TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

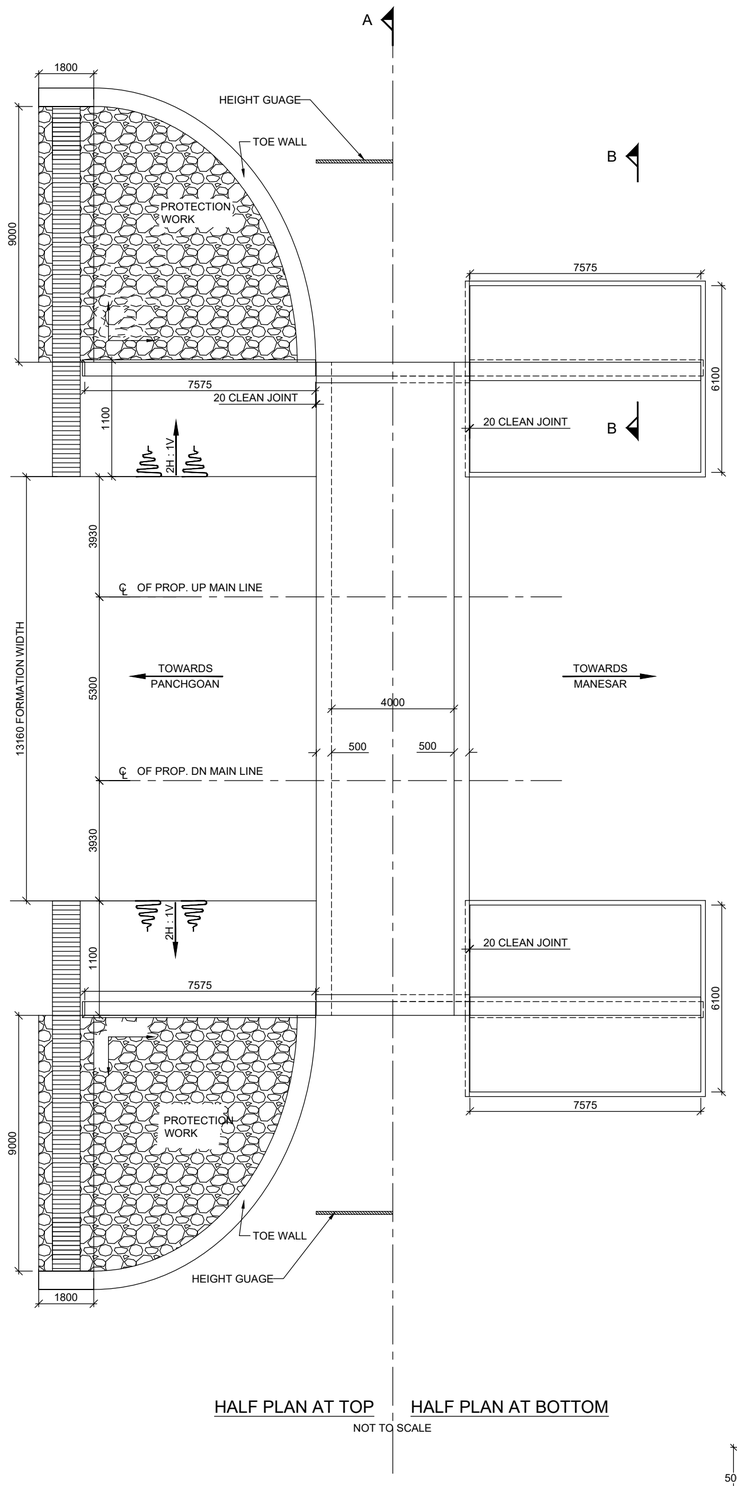
RITES THE INFRASTRUCTURE PEOPLE

SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO 121 SPAN 1.0X4.0X4.0 RCC BOX AT CH: 48231.618m

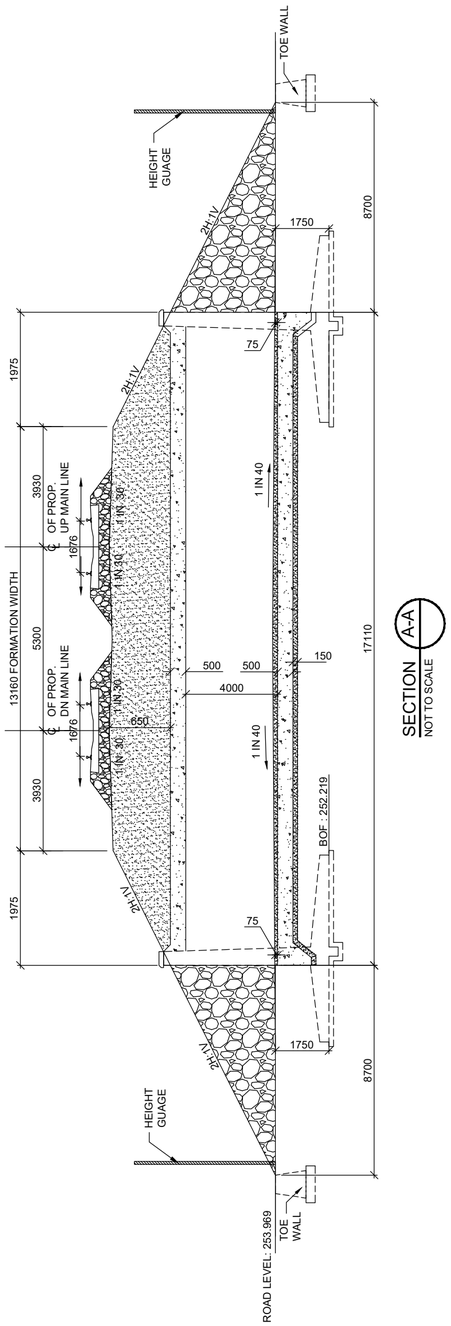
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01121_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



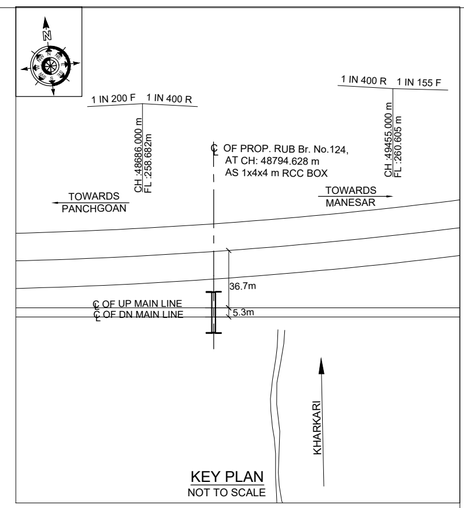
HALF PLAN AT TOP HALF PLAN AT BOTTOM

NOT TO SCALE



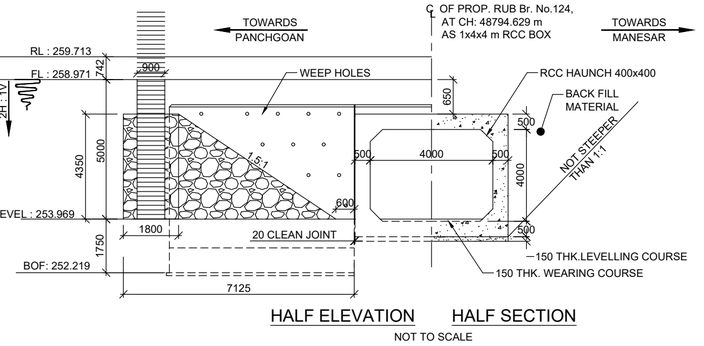
SECTION A-A

NOT TO SCALE



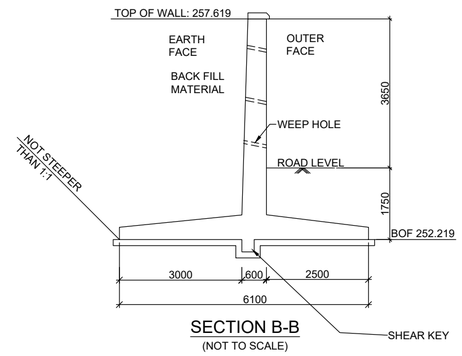
KEY PLAN

NOT TO SCALE



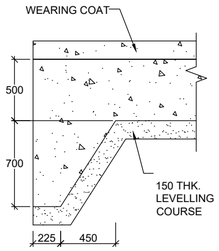
HALF ELEVATION HALF SECTION

NOT TO SCALE



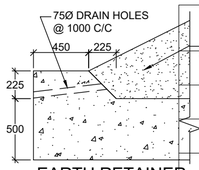
SECTION B-B

(NOT TO SCALE)



SHEAR KEY

(NOT TO SCALE)



EARTH RETAINER

(NOT TO SCALE)

NOTES :

A) GENERAL NOTES

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B) TECHNICAL NOTES :

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3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
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8. EXPOSURE CONDITION- MODERATE.
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12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
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GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

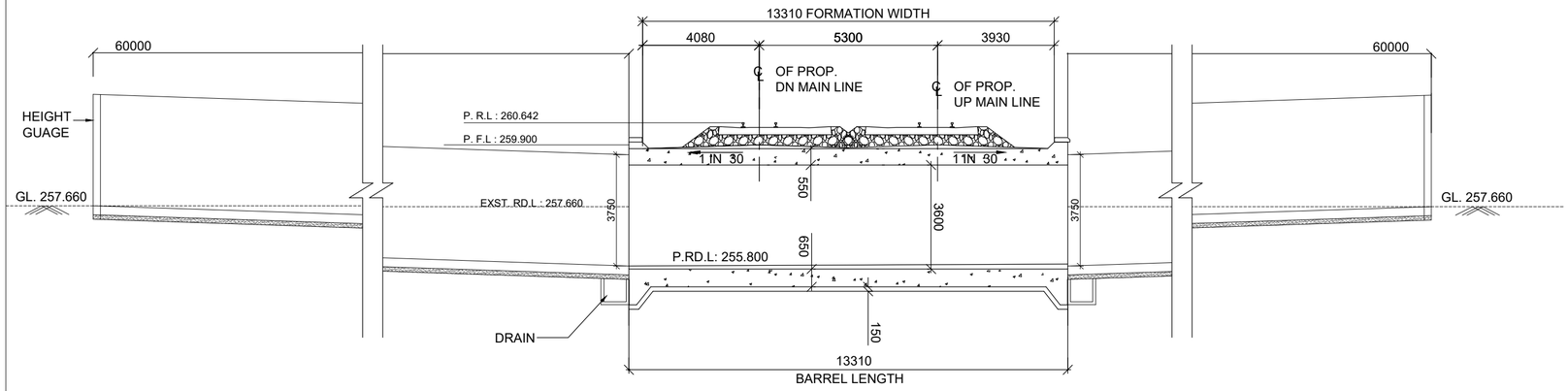
RITES THE INFRASTRUCTURE PEOPLE

SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO 124 SPAN 1.0X4.0X4.0 RCC BOX AT CH: 48794.629m

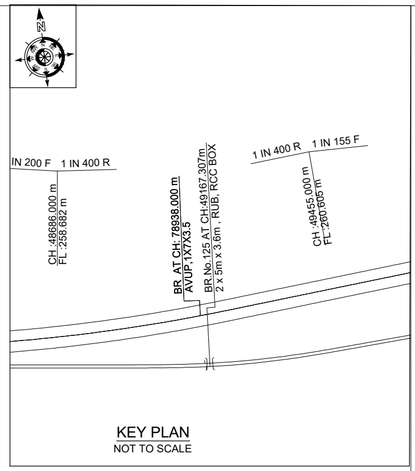
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01124_A0	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



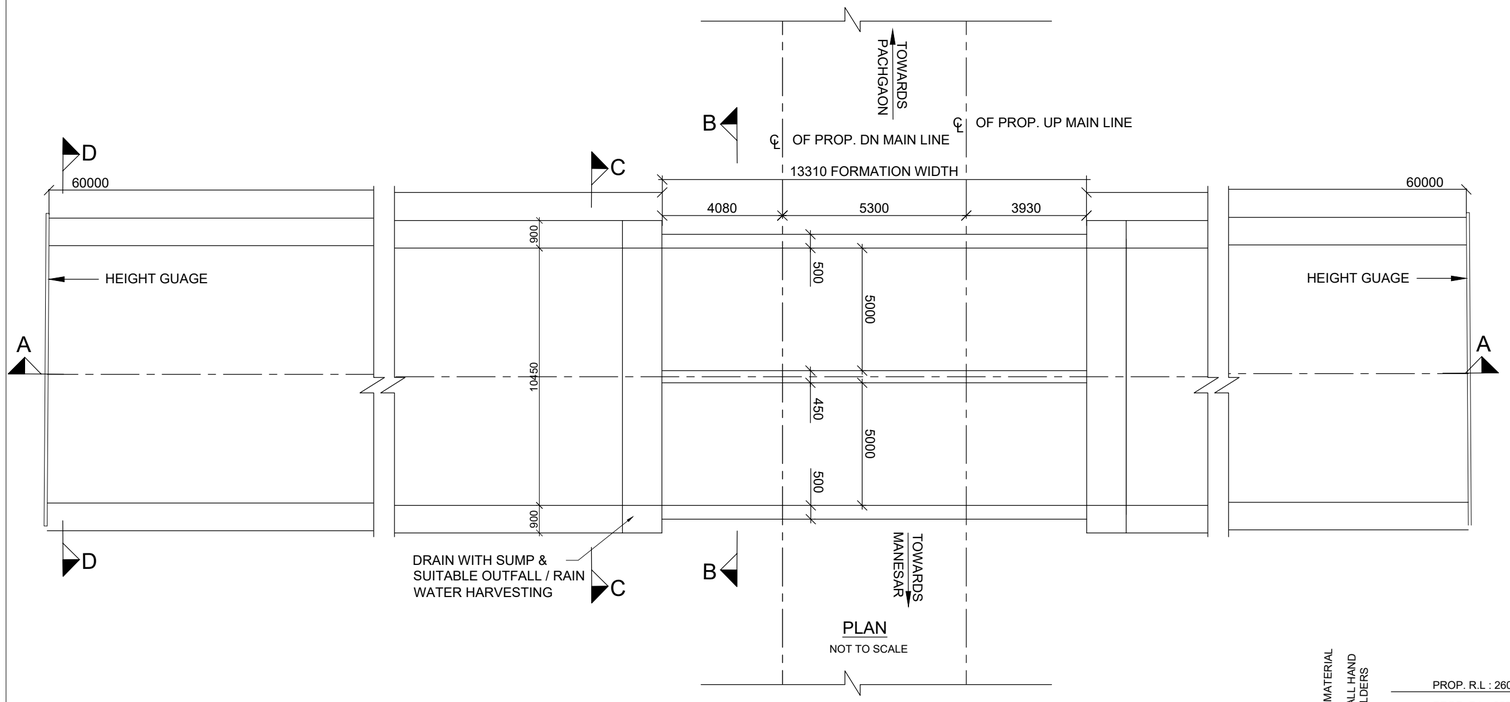
SECTION A-A

NOT TO SCALE



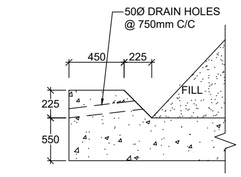
KEY PLAN

NOT TO SCALE



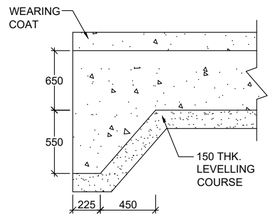
PLAN

NOT TO SCALE



EARTH RETAINER

(SCALE 1:25)

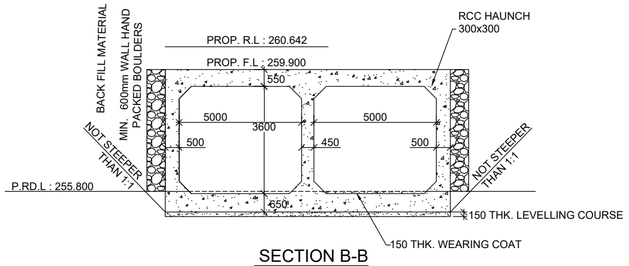


SHEAR KEY

(SCALE 1:25)

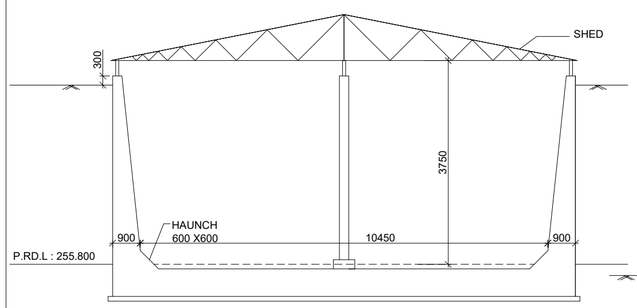
LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
PRDL	PROPOSED ROAD LEVEL



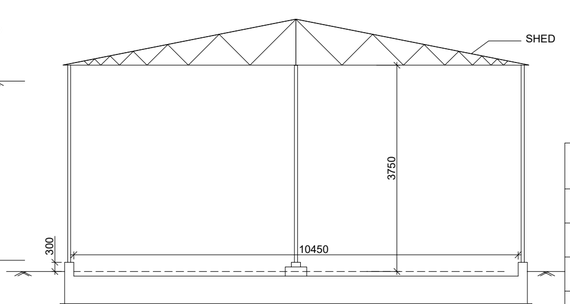
SECTION B-B

NOT TO SCALE



SECTION C-C

NOT TO SCALE



SECTION D-D

NOT TO SCALE

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK .
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
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   (ii) IRS CONCRETE BRIDGE CODE
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7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
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12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.
16. RETAINING WALL ALONG THE ROAD SHALL BE MIN 300 ABOVE GROUND LEVEL.NO WEEP HOLE SHALL BE PROVIDED IN RETAINING WALL.
17. DRAIN WITH SUMP & SUITABLE OUTFALL SHALL BE PROVIDED FOR PROPER DRAINAGE. HUMP SHALL BE PROVIDED AT BOTH ENDS OF THE RAMP.
18. SHED SHALL BE PROVIDED OVER THE RAMP.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

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CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

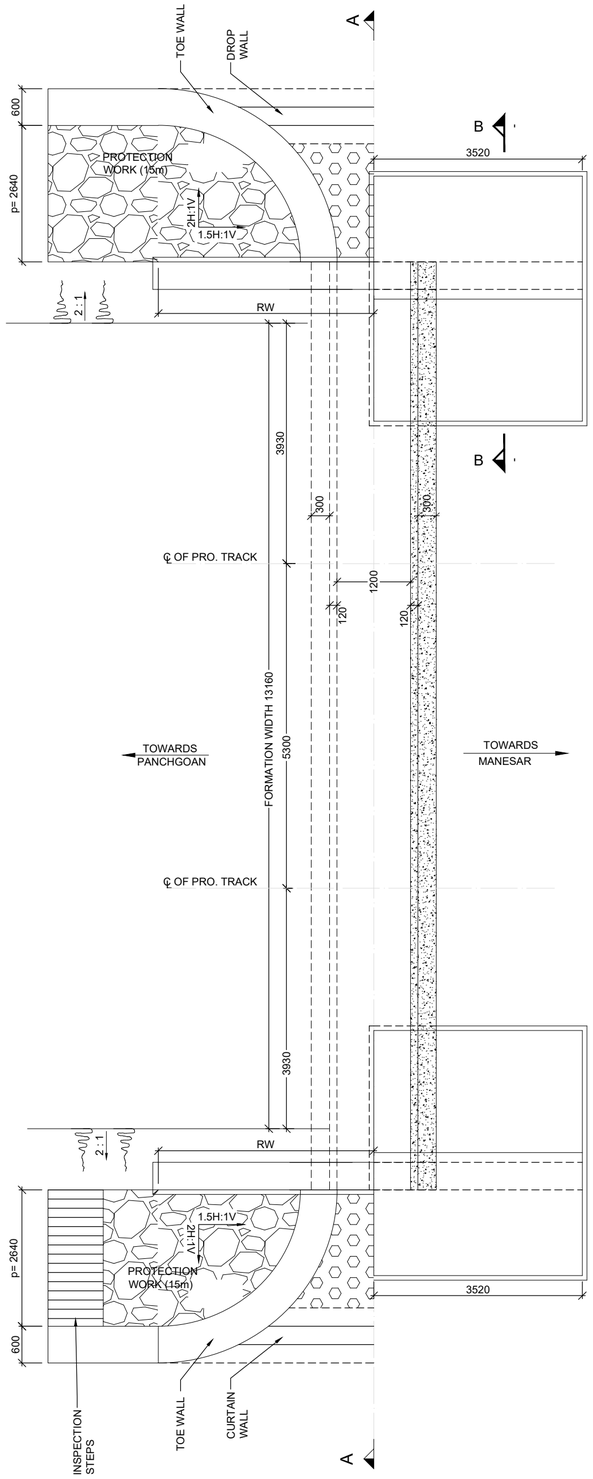
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO 125
SPAN 2.0X5.0X3.6 RCC BOX AT CH: 49167.307m

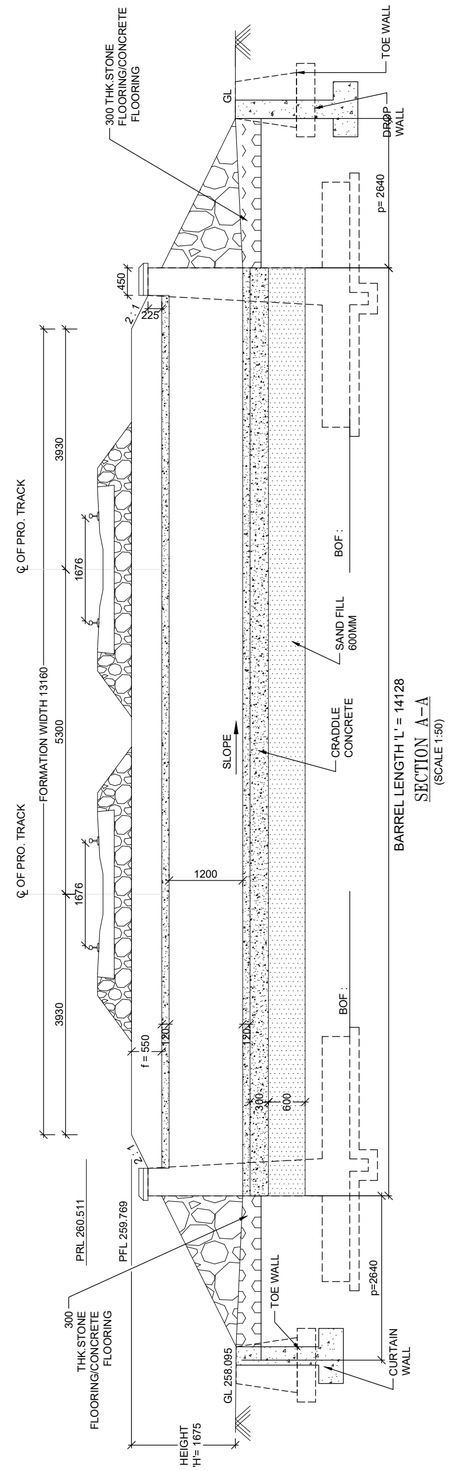
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01125_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



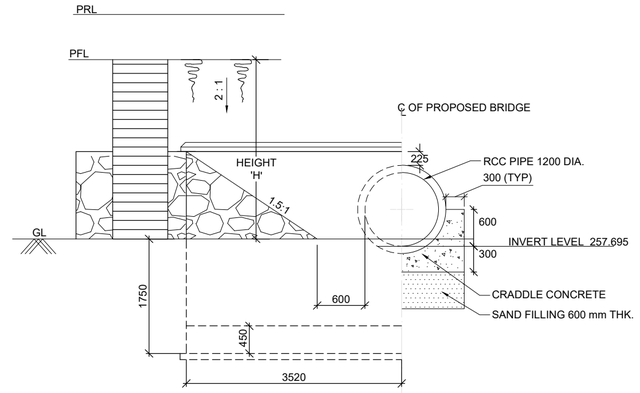
HALF PLAN AT TOP HALF PLAN AT BOTTOM

(SCALE 1:50)



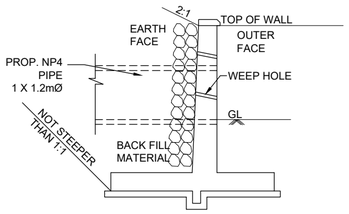
SECTION A–A

(SCALE 1:50)



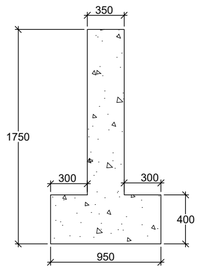
HALF ELEVATION HALF SECTION

(SCALE 1:50)



SECTION B-B

(SCALE 1:75)



CURTAIN / DROP WALL

(SCALE 1:25)

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
3. STRUCTUIRE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
4. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
5. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
6. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
7. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
8. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
9. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
10. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
4. PLACEMENT LEVEL OF PIPE AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF DRAINAGE &NATURAL GROUND PROFILE.
5. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
6. SEISMIC ZONE- IV
7. EXPOSURE CONDITION- MODERATE.
8. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
9. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
10. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
11. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
12. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	ChahateyRam	R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

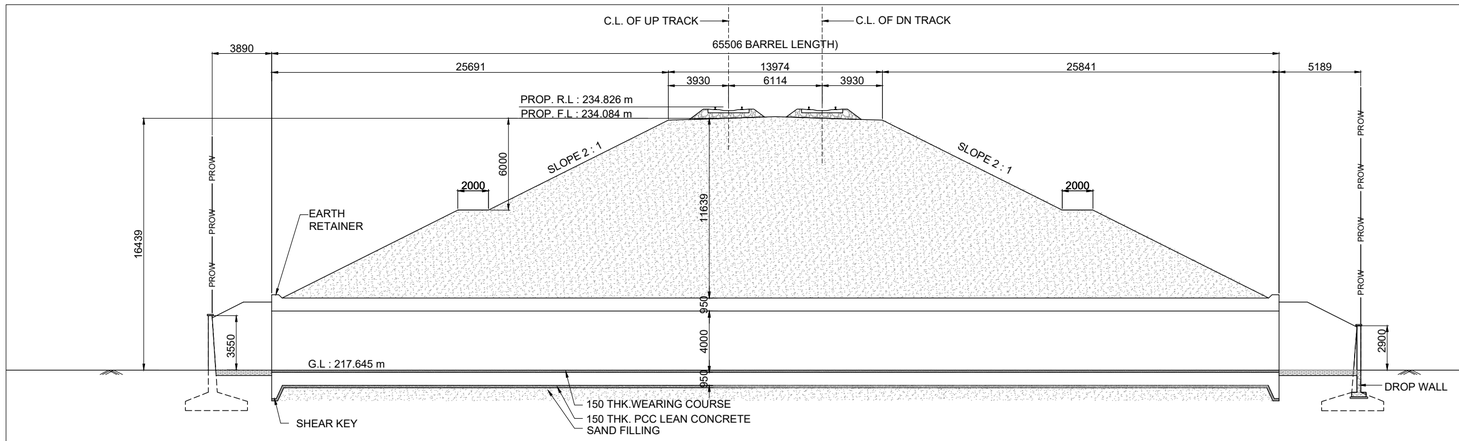
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT FOR BRIDGE NO. 126 PIPE CULVERT 1X1.2 SPAN, AT CH: 49583.348m

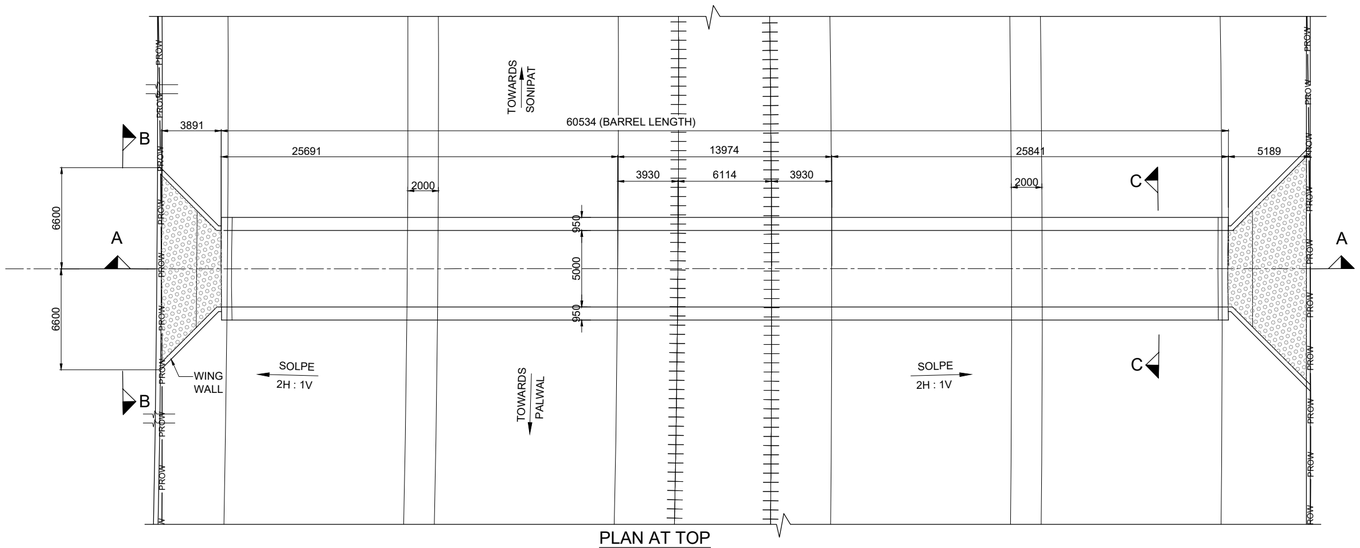
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01126_A0	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



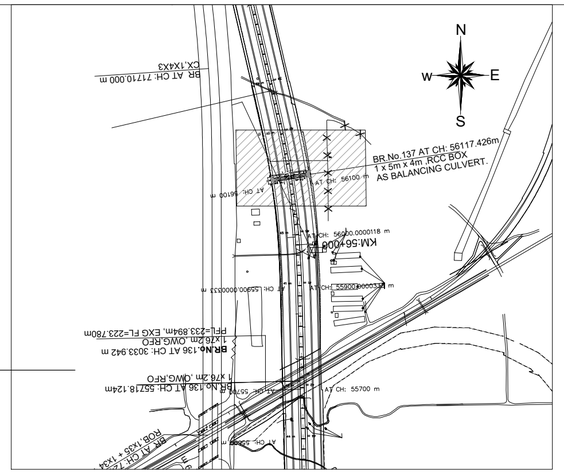
SECTIONAL ELEVATION AT A-A

SCALE 1:200



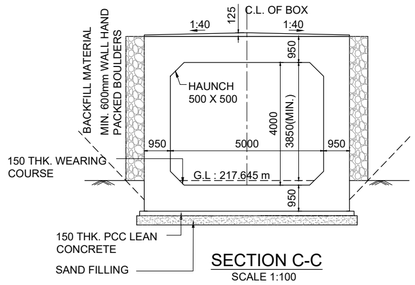
PLAN AT TOP

SCALE 1:200



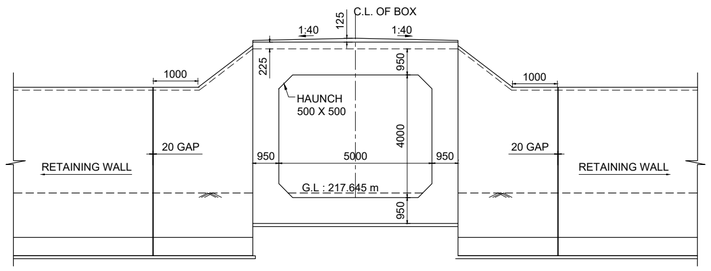
KEY PLAN

SCALE 1:NTS



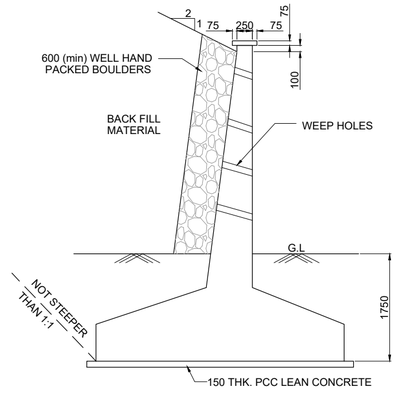
SECTION C-C

SCALE 1:100



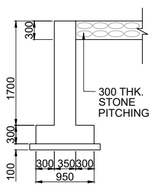
VIEW AT B-B

SCALE 1:100



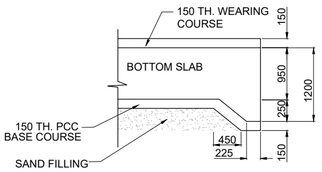
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



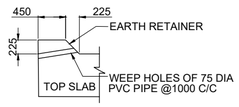
DROP / CURTAIN WALL DETAILS

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

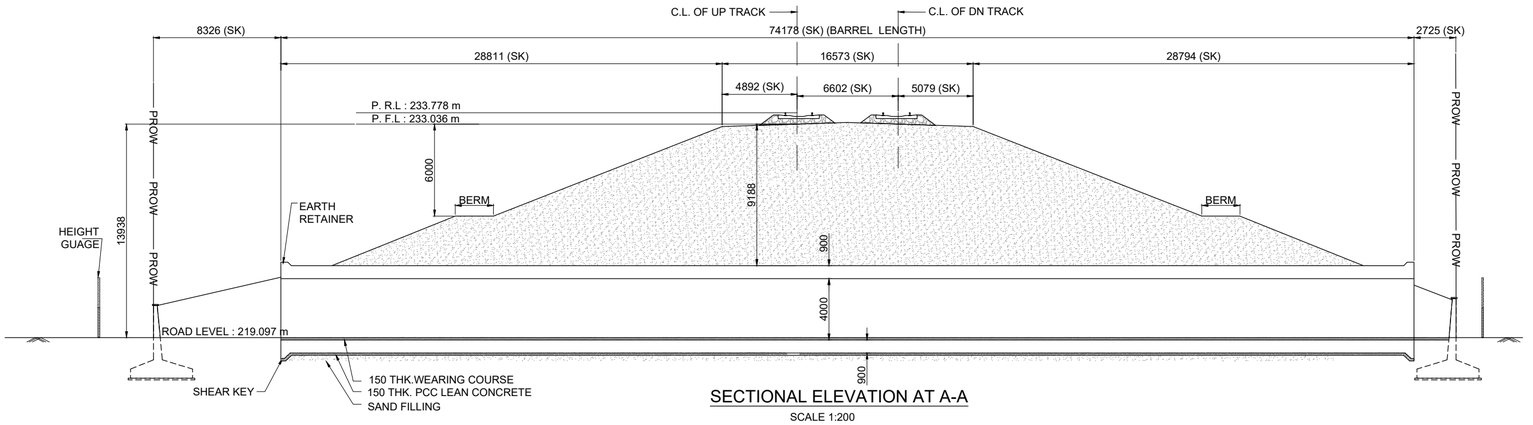
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR BALANCING CULVERT BRIDGE NO 137
SPAN 1.0X5.0X4.0 RCC BOX AT CH: 56117.426

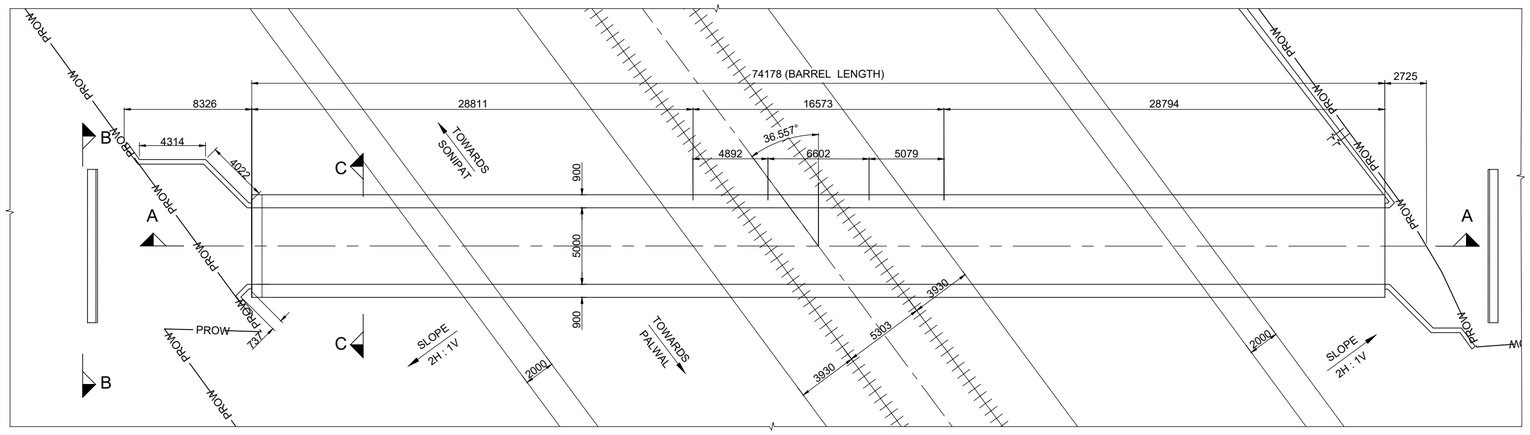
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01137_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



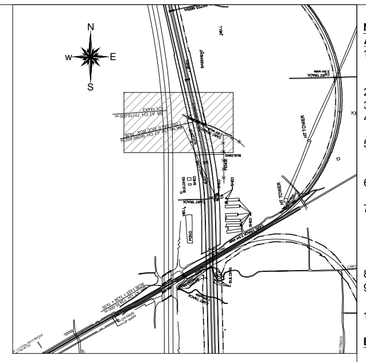
SECTIONAL ELEVATION AT A-A

SCALE 1:200



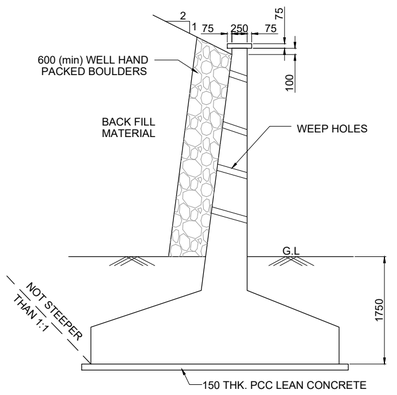
PLAN AT TOP

SCALE 1:200



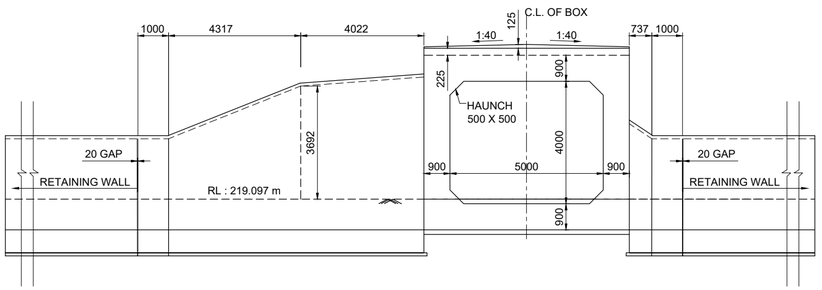
KEY PLAN

SCALE 1:NTS



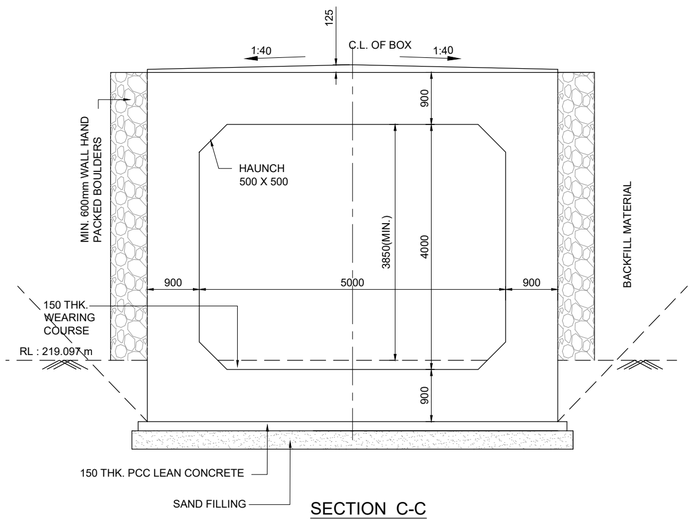
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



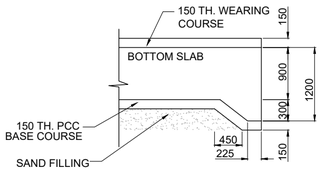
VIEW AT B-B

SCALE 1:50



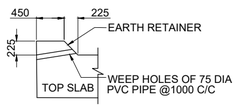
SECTION C-C

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
3. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
4. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
5. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
6. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
7. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
8. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
9. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
10. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER,SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

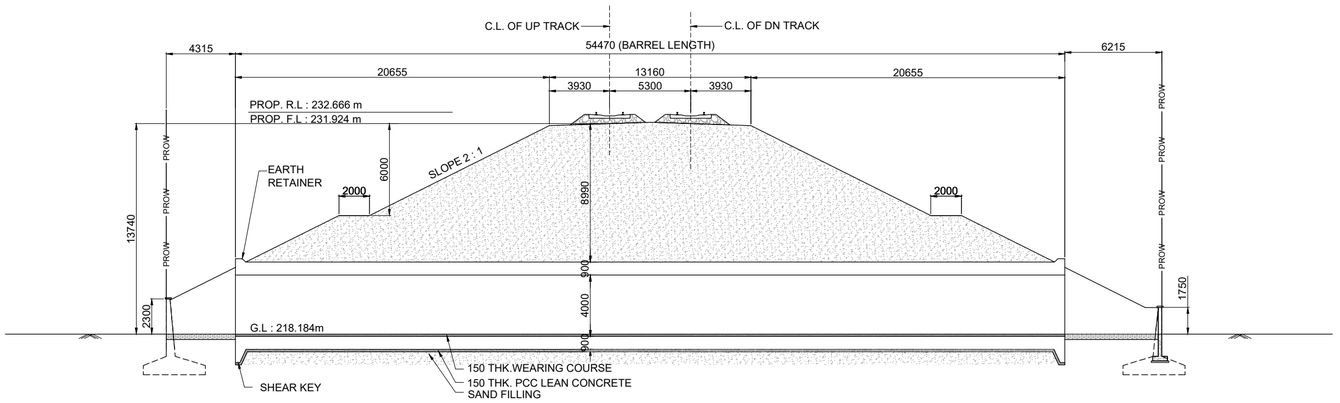
SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR ROAD UNDER BRIDGE NO 138
SPAN 1.0X5.0X4.0 RCC BOX AT CH: 56290.652

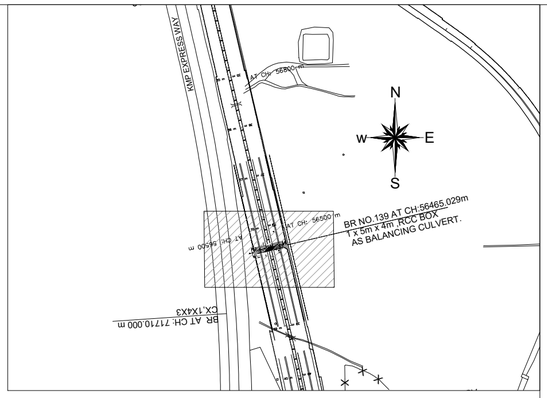
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01138_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



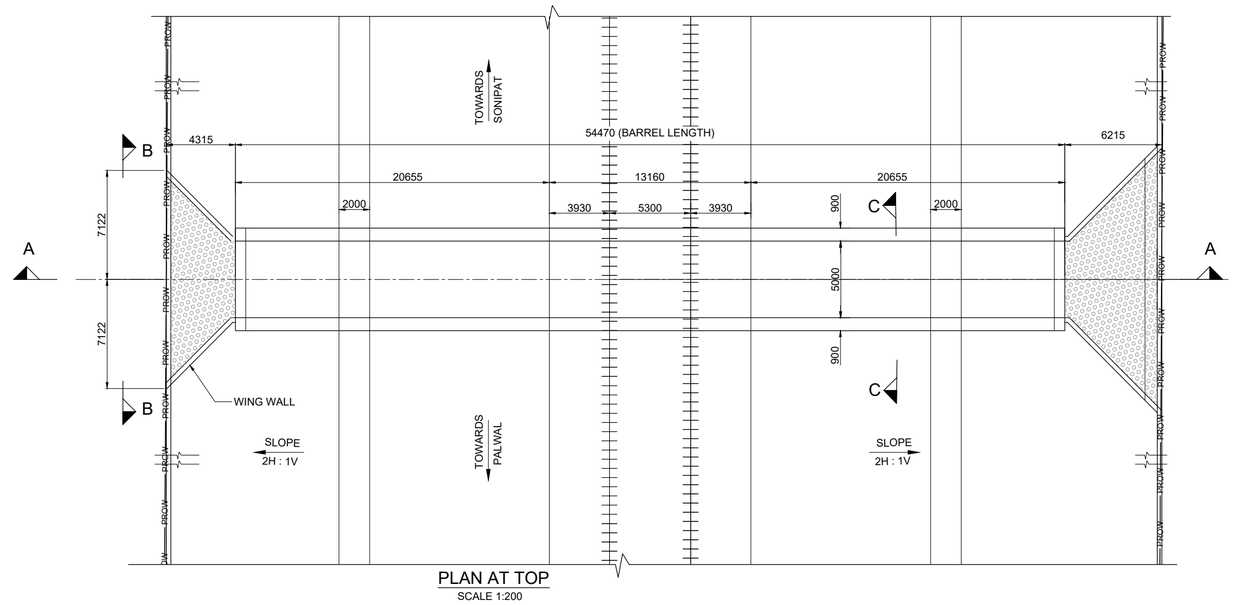
SECTIONAL ELEVATION AT A-A

SCALE 1:200



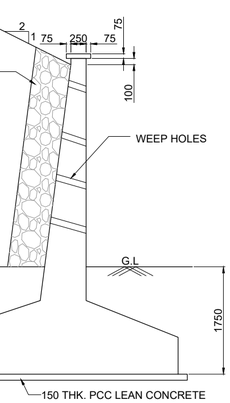
KEY PLAN

SCALE 1:NTS



PLAN AT TOP

SCALE 1:200

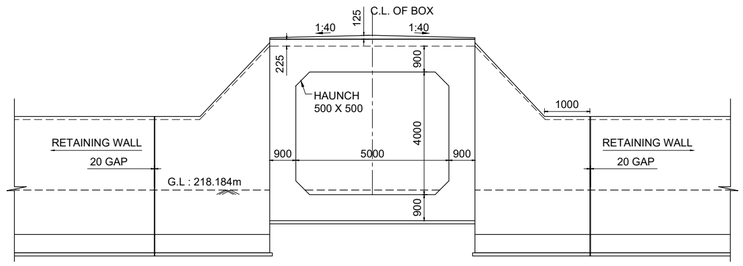


SECTION C-C

SCALE 1:100

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

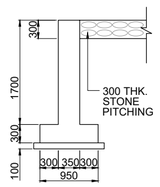


VIEW AT B-B

SCALE 1:100

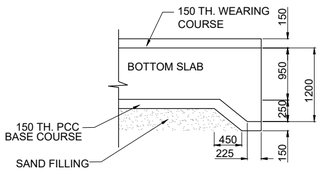
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



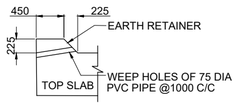
DROP / CURTAIN WALL DETAILS

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

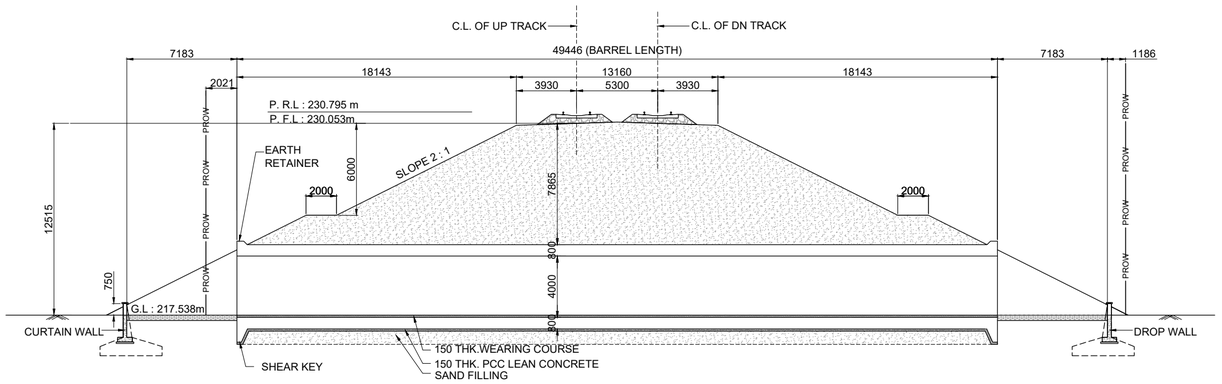
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR BALANCING CULVERT BRIDGE NO 139
SPAN 1.0X5.0X4.0 RCC BOX AT CH: 56465.029

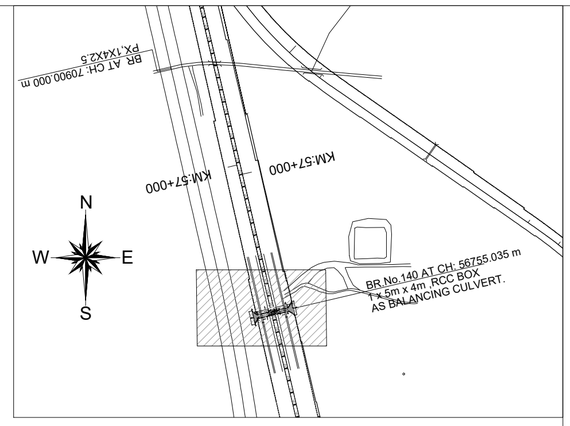
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01139_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



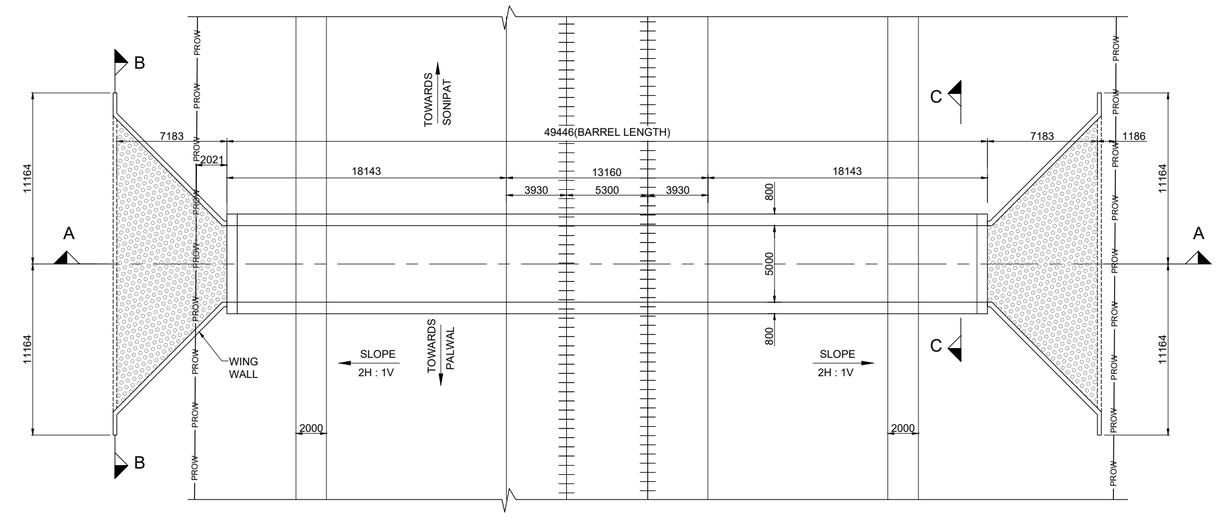
SECTIONAL ELEVATION AT A-A

SCALE 1:200



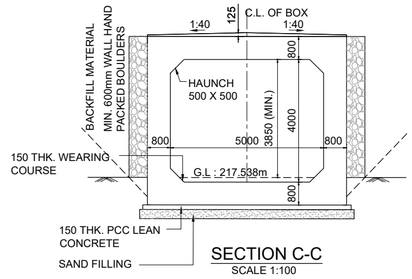
KEY PLAN

SCALE 1:NTS



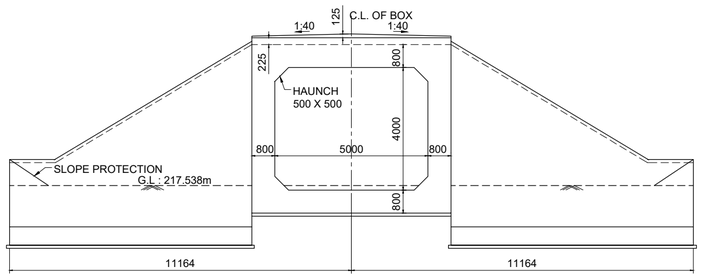
PLAN AT TOP

SCALE 1:200



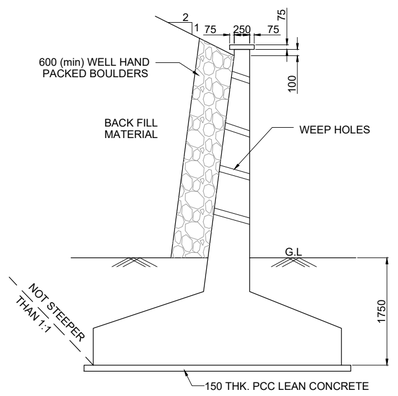
SECTION C-C

SCALE 1:100



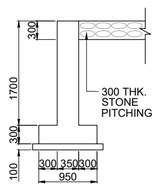
VIEW AT B-B

SCALE 1:100



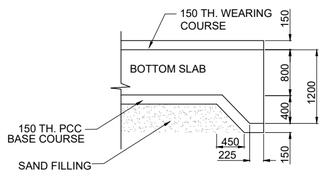
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



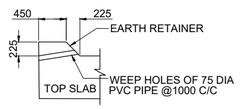
DROP / CURTAIN WALL DETAILS

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
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4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
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10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER,SUITABLE SLOPE TO BE PROPOSED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
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   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	ChahateyRam	R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

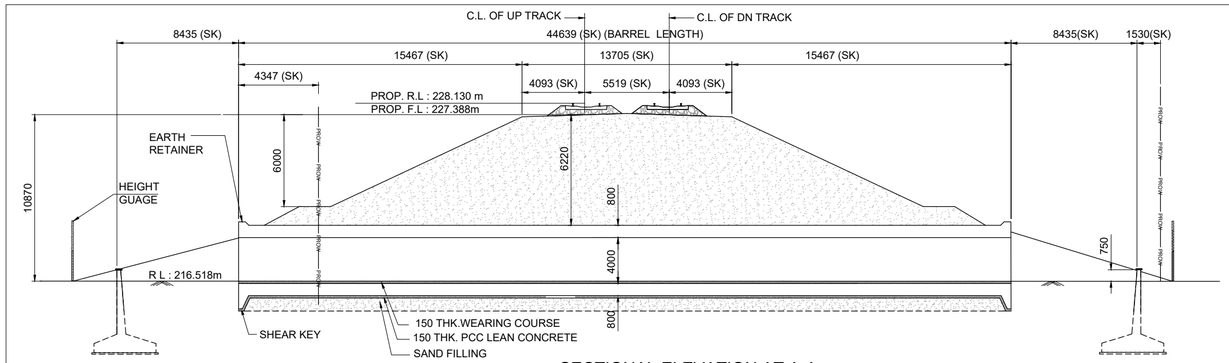
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR BALANCING CULVERT BRIDGE NO 140
SPAN 1.0X5.0X4.0 RCC BOX AT CH: 56755.035

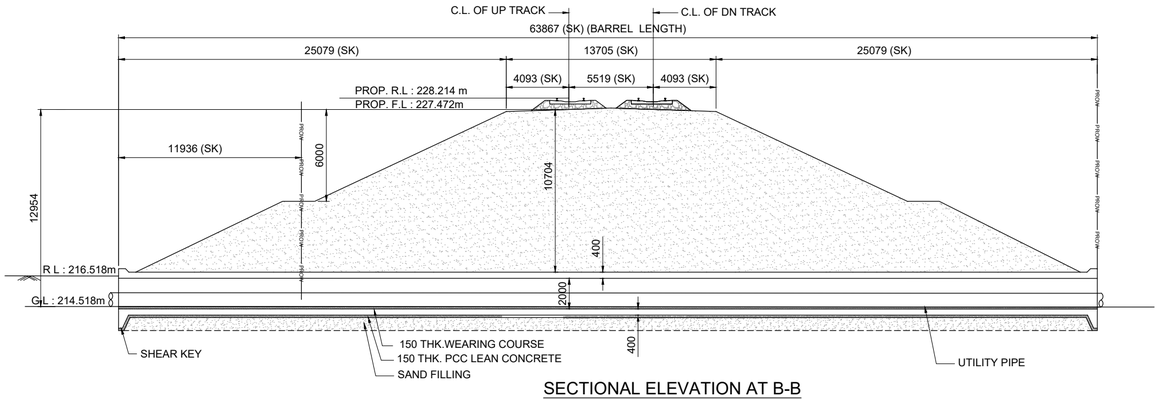
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01140_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



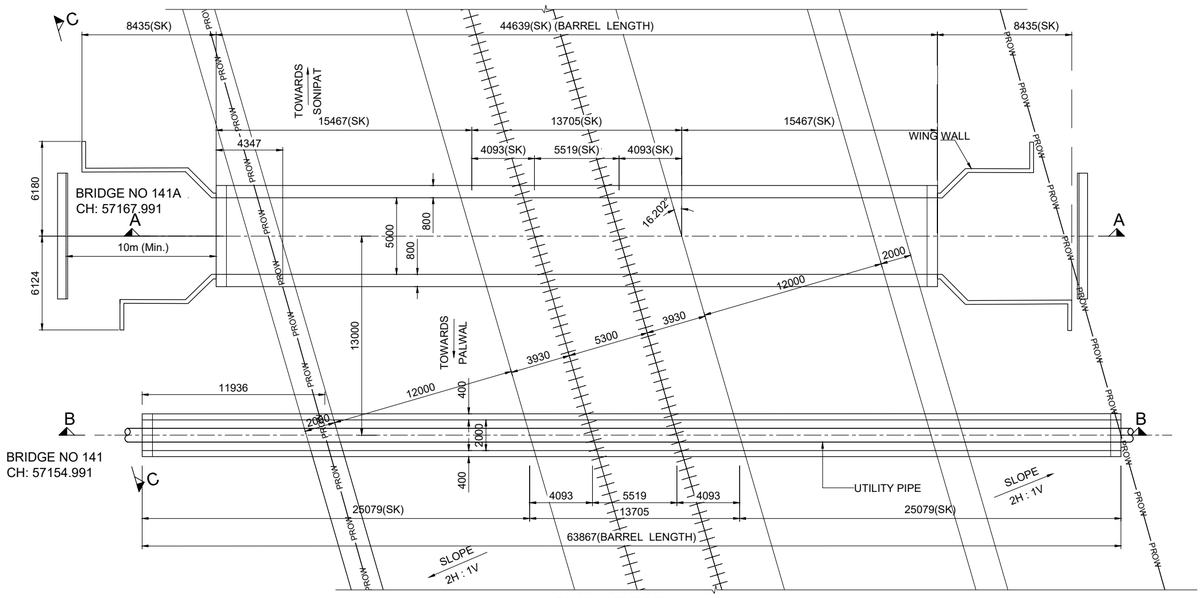
SECTIONAL ELEVATION AT A-A

SCALE 1:200



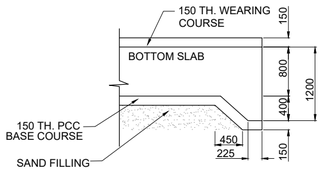
SECTIONAL ELEVATION AT B-B

SCALE 1:200



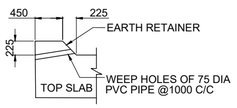
PLAN AT TOP

SCALE 1:200



SHEAR KEY

SCALE 1:50

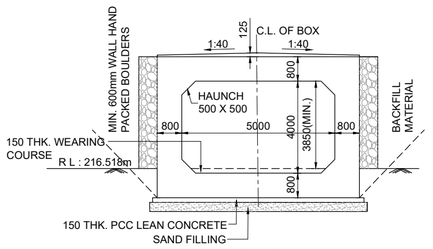


EARTH RETAINER

SCALE 1:50

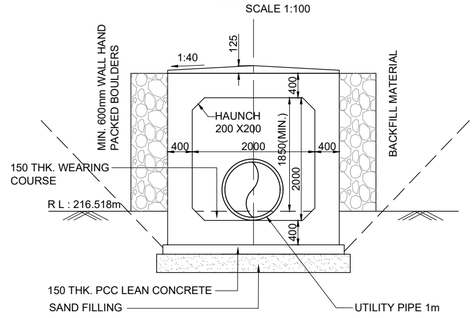
LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL



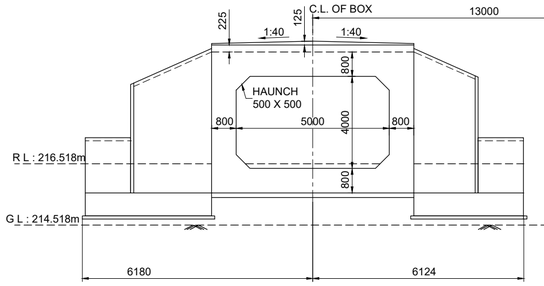
ELEVATION

SCALE 1:100



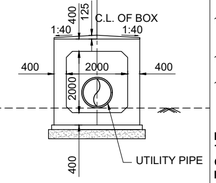
ELEVATION

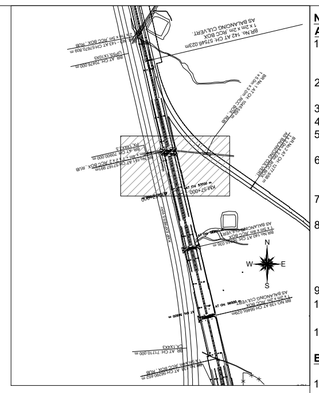
SCALE 1:50



SECTION C-C

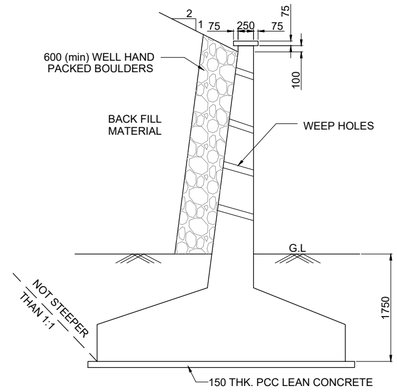
SCALE 1:100





KEY PLAN

SCALE 1:NTS



TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
17. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

SMEC Smarter with Sustainability

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD + BALANCING CULVERT BRIDGE NO 141/ 141A 1x2x2+1x5x4 RCC BOX AT CH: 57154.991/57167.991

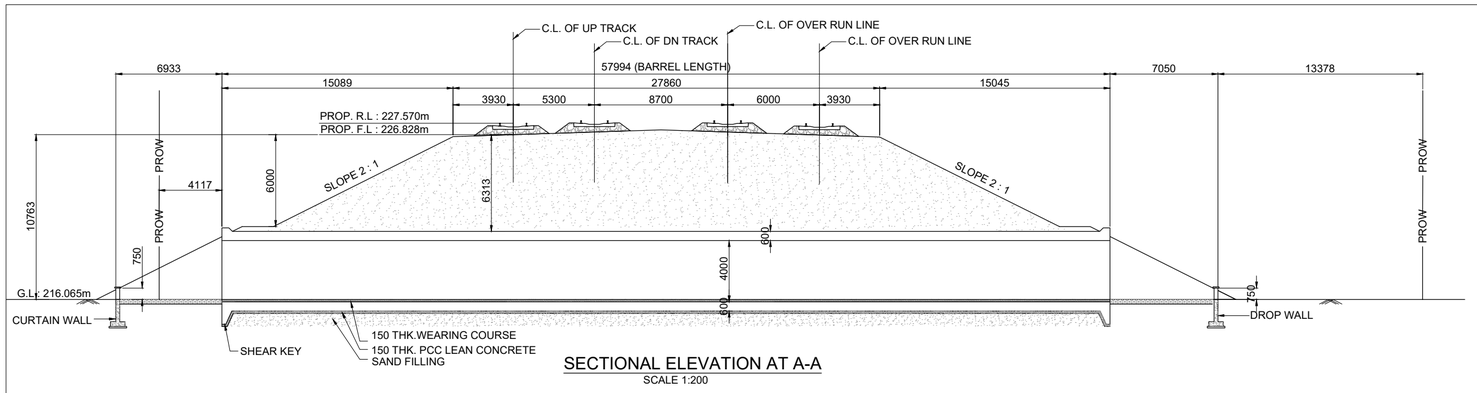
DRG. NO. GC-HRIDC-C23-DRW-BRD-GAD-01141_A1

SHEET NO. 1 OF 1

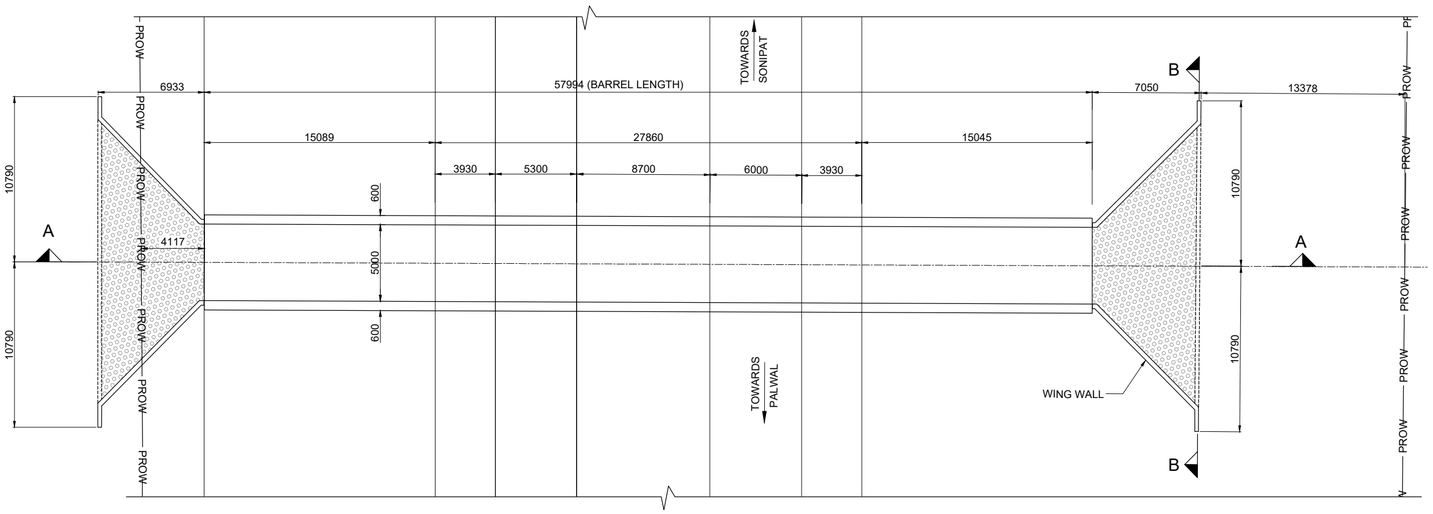
SCALE : AS SHOWN

ISSUE DATE 11-11-2022

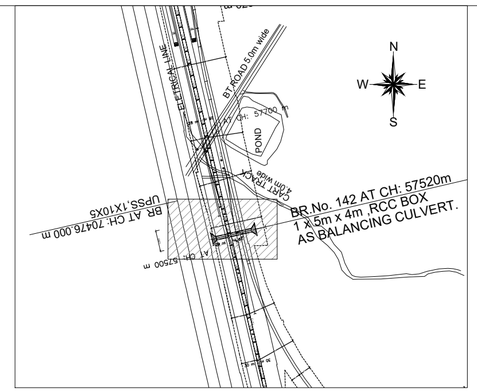
REVISED DATE 16-12-2022



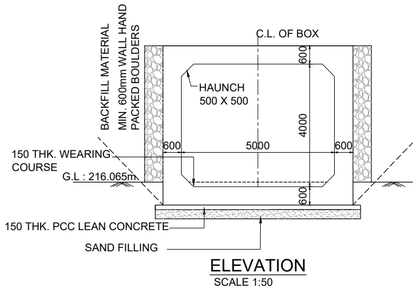
SECTIONAL ELEVATION AT A-A
SCALE 1:200



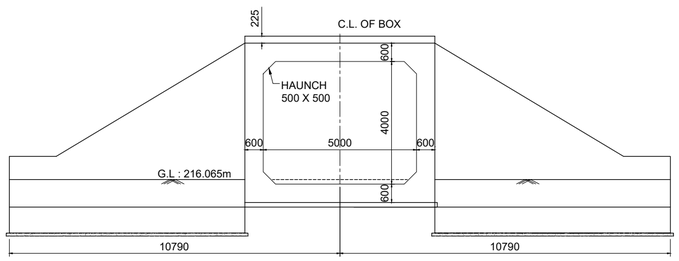
PLAN AT TOP
SCALE 1:200



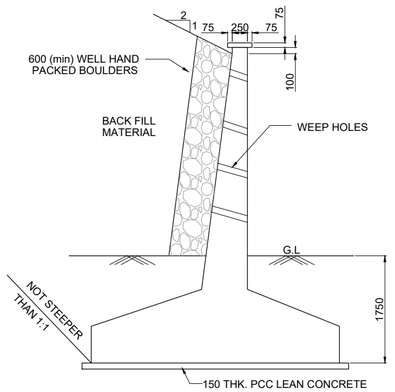
KEY PLAN
SCALE 1:NTS



ELEVATION
SCALE 1:50



VIEW AT B-B
SCALE 1:50

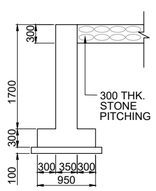


WING WALL (TO BE DESIGN AS PER SITE CONDITION)

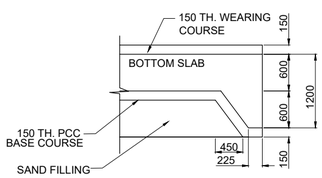
TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50

LEGEND

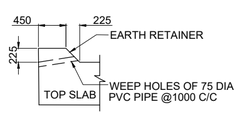
PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL



DROP / CURTAIN WALL DETAILS
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSIONS SHALL NOT BE SCALED FROM THE DRAWING. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF NEW PATLI STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

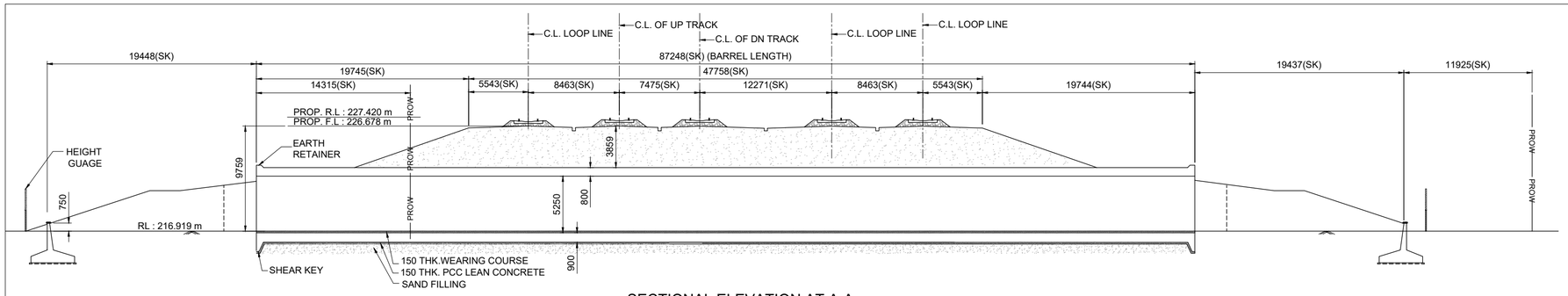
RITES THE INFRASTRUCTURE PEOPLE | SMEC

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:-CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO 142 1X5.0X4.0m RCC BOX AT CH.57520

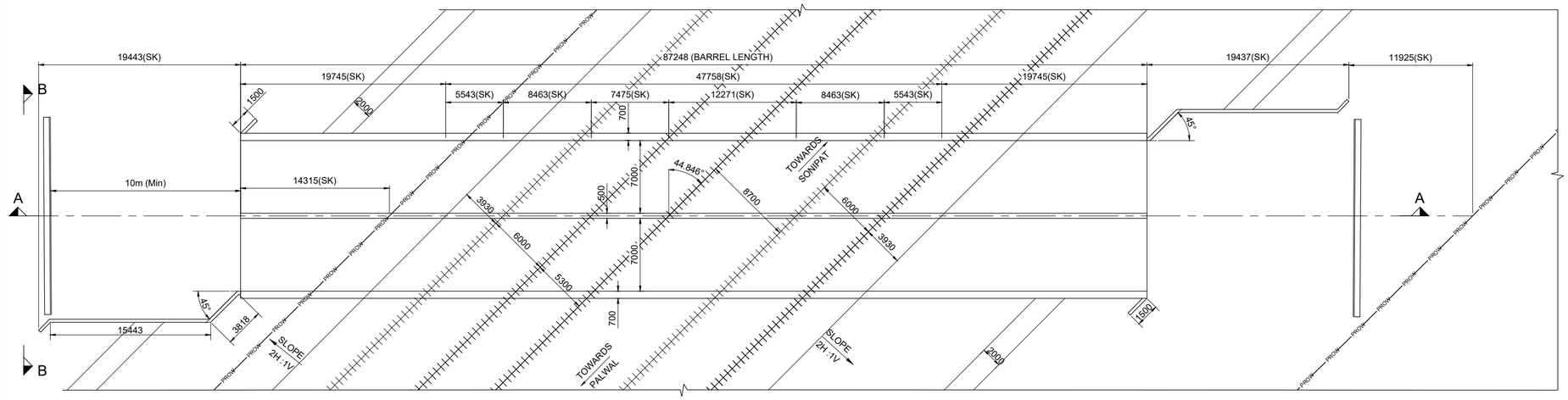
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01142_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



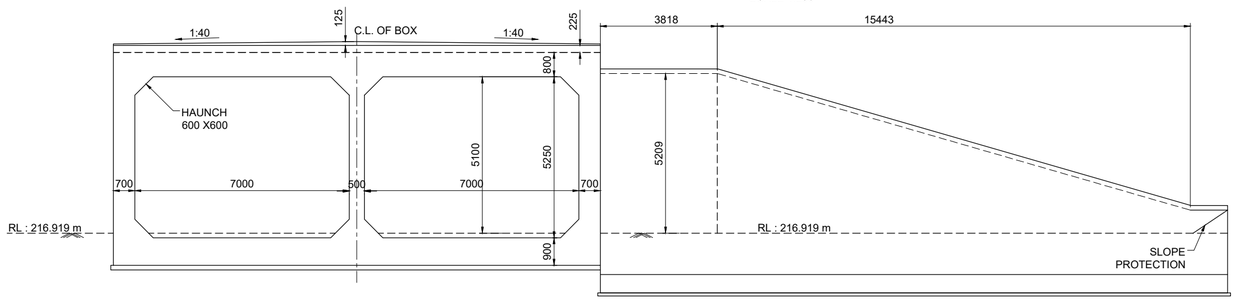
SECTIONAL ELEVATION AT A-A

SCALE 1:250



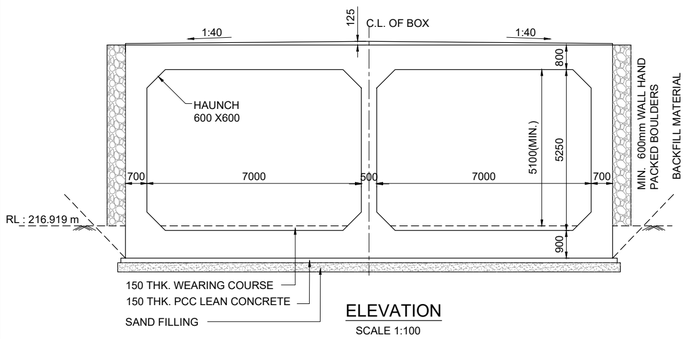
PLAN AT TOP

SCALE 1:250



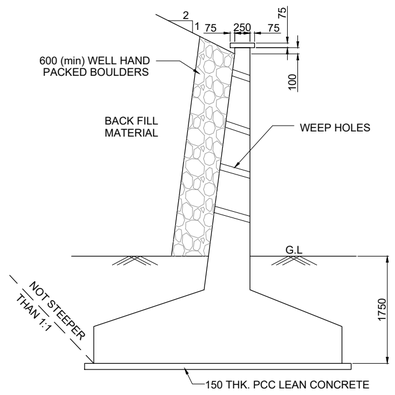
SECTION B-B

SCALE 1:100



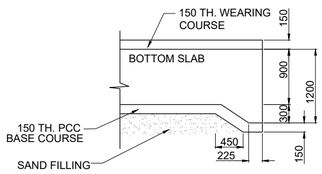
ELEVATION

SCALE 1:100



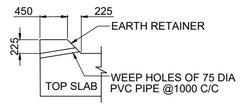
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



SHEAR KEY

SCALE 1:50

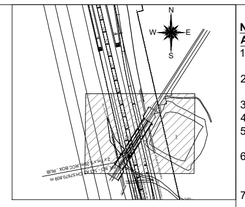


EARTH RETAINER

SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL



KEY PLAN

(NOT TO SCALE)

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
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6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
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B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
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7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
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11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
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13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
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14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
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17. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

THE INFRASTRUCTURE PEOPLE

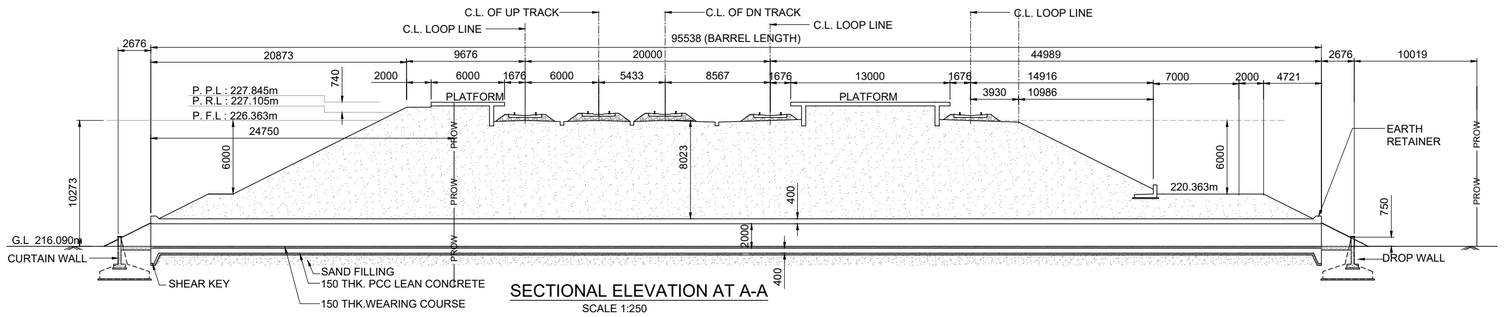
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

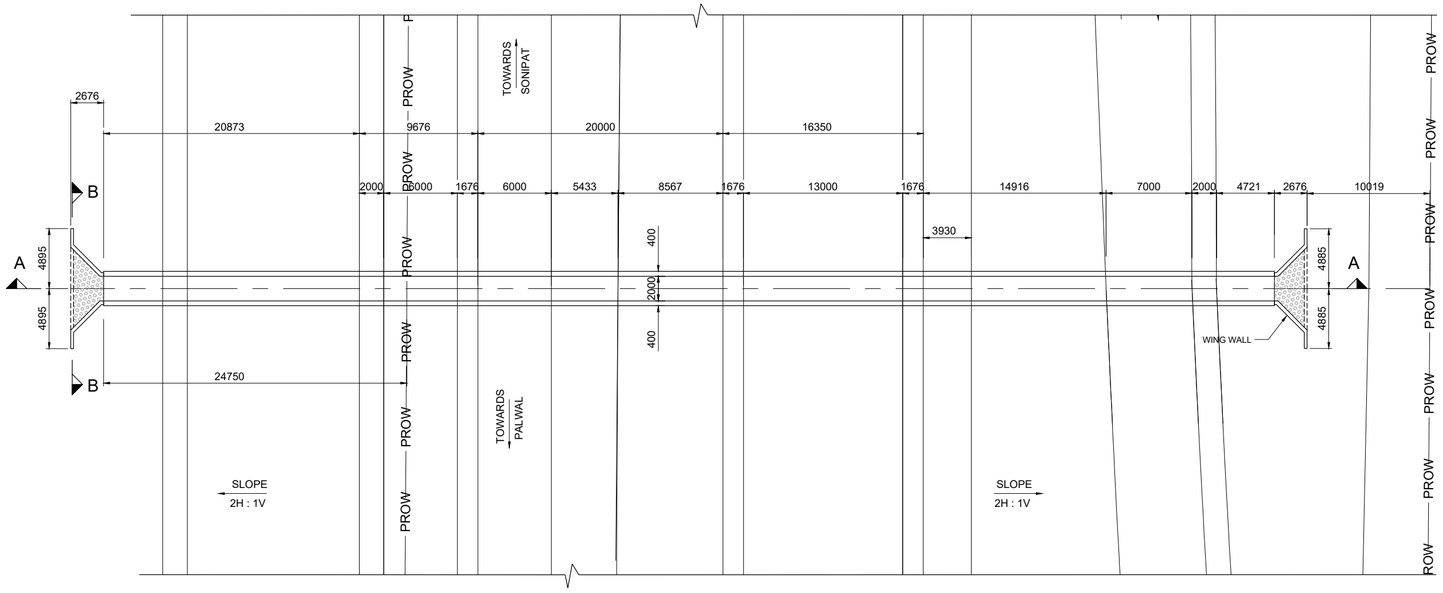
FOR ROAD UNDER BRIDGE NO 143 SPAN 2.0X7.0X5.25 RCC BOX AT CH: 57670.809

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01143_A1	1 OF 1

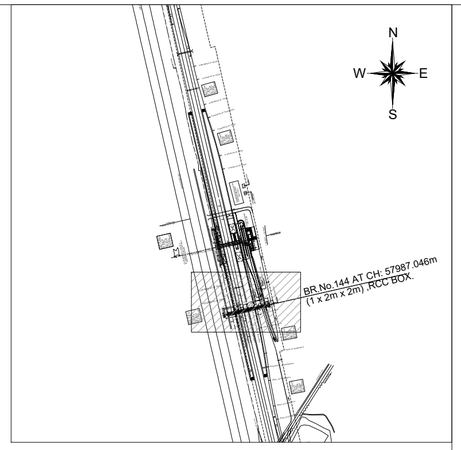
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



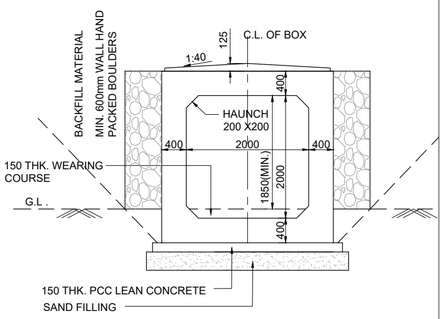
SECTIONAL ELEVATION AT A-A
SCALE 1:250



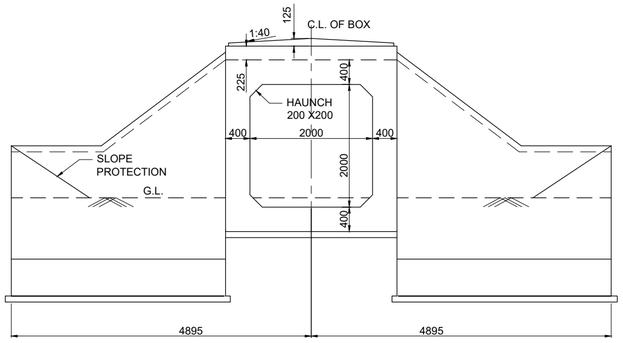
PLAN AT TOP
SCALE 1:250



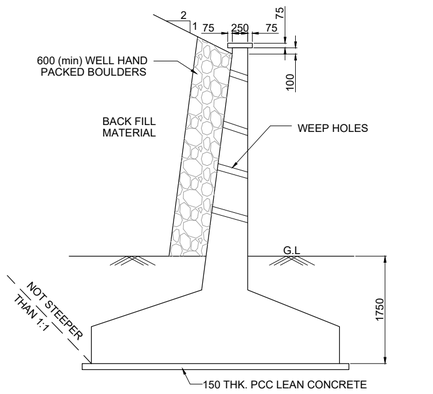
KEY PLAN
SCALE 1:NTS



ELEVATION
SCALE 1:50

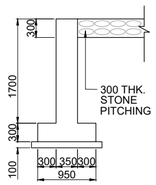


VIEW AT B-B
SCALE 1:50

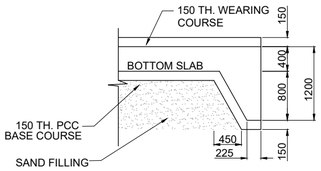


WING WALL (TO BE DESIGN AS PER SITE CONDITION)

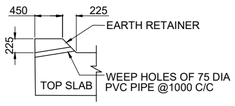
TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



DROP / CURTAIN WALL DETAILS
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER,SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

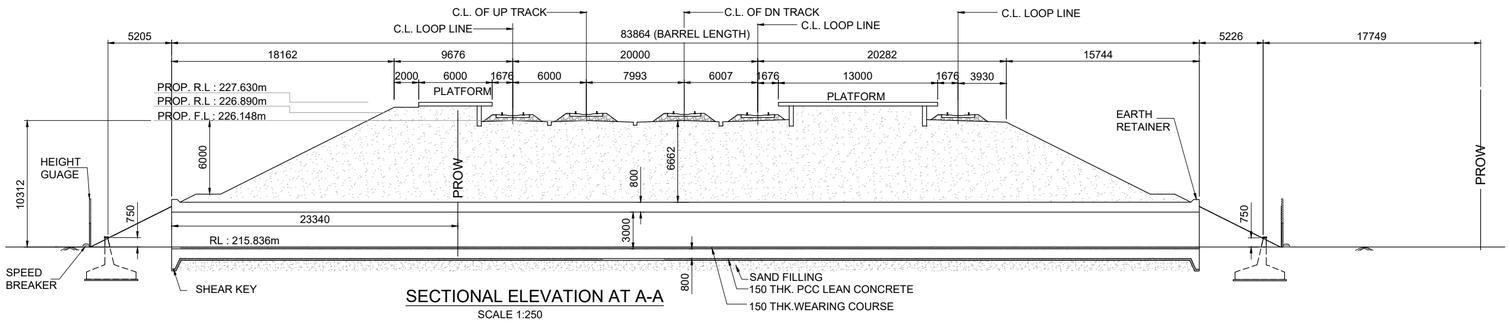
RITES THE INFRASTRUCTURE PEOPLE | SMEC Smarter Solutions for a Better World

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR BALANCING CULVERT BRIDGE NO 144
SPAN 1.0X2.0X2.0 RCC BOX AT CH: 57987.046

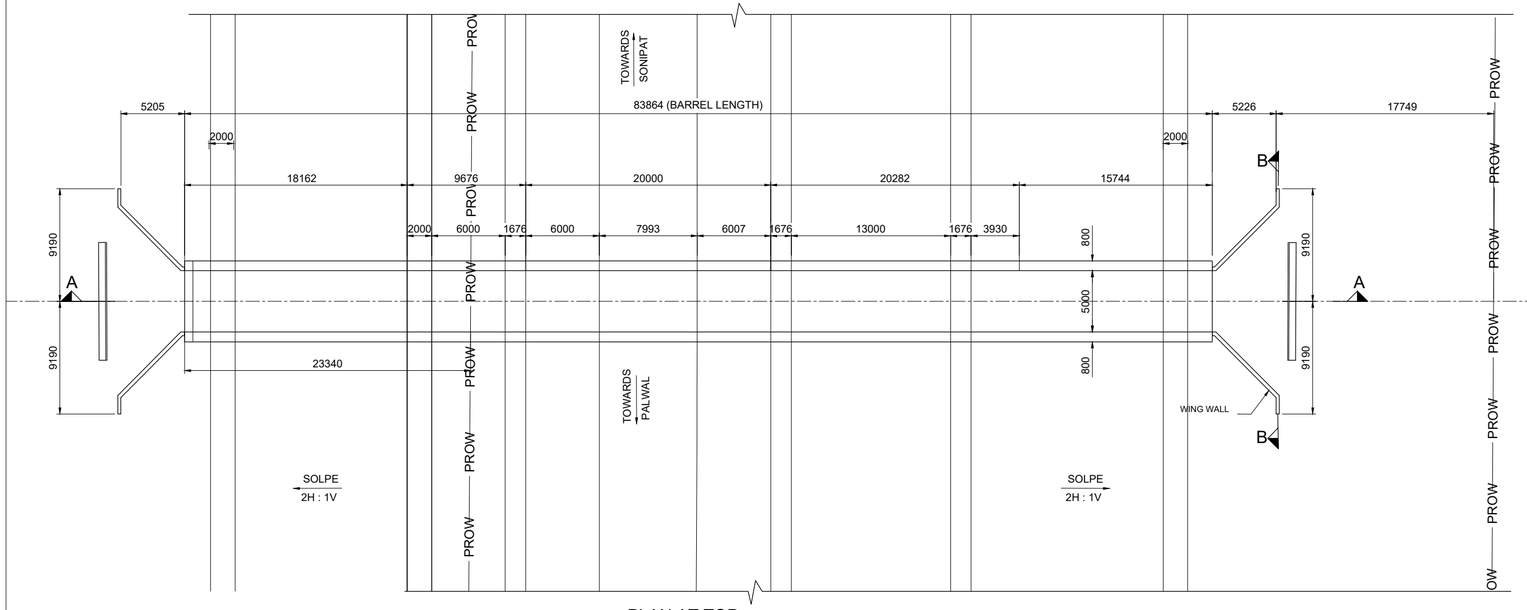
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD_01144_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



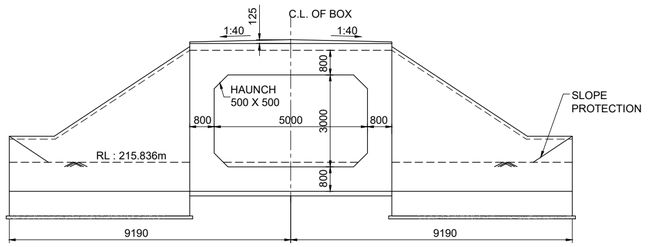
SECTIONAL ELEVATION AT A-A

SCALE 1:250



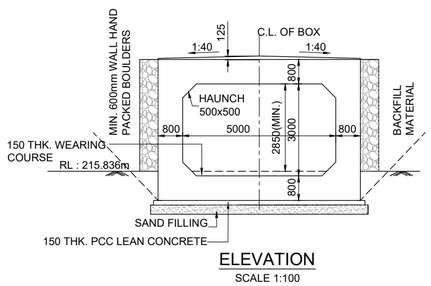
PLAN AT TOP

SCALE 1:250



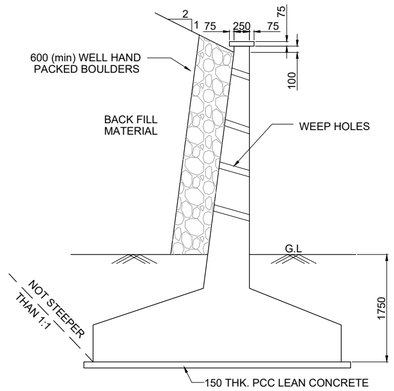
SECTION B-B

SCALE 1:100



ELEVATION

SCALE 1:100

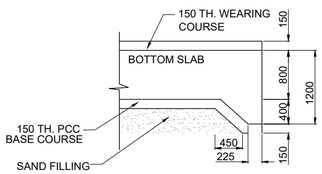


TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50

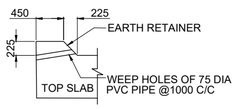
LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL



SHEAR KEY

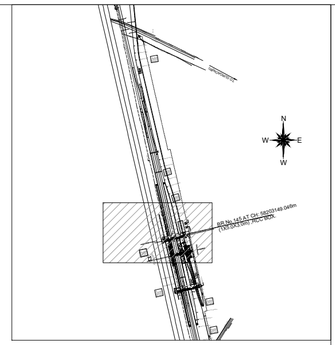
SCALE 1:50



EARTH RETAINER

SCALE 1:50

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	ChahateyRam	R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			



SCALE 1:NTS

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER,SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

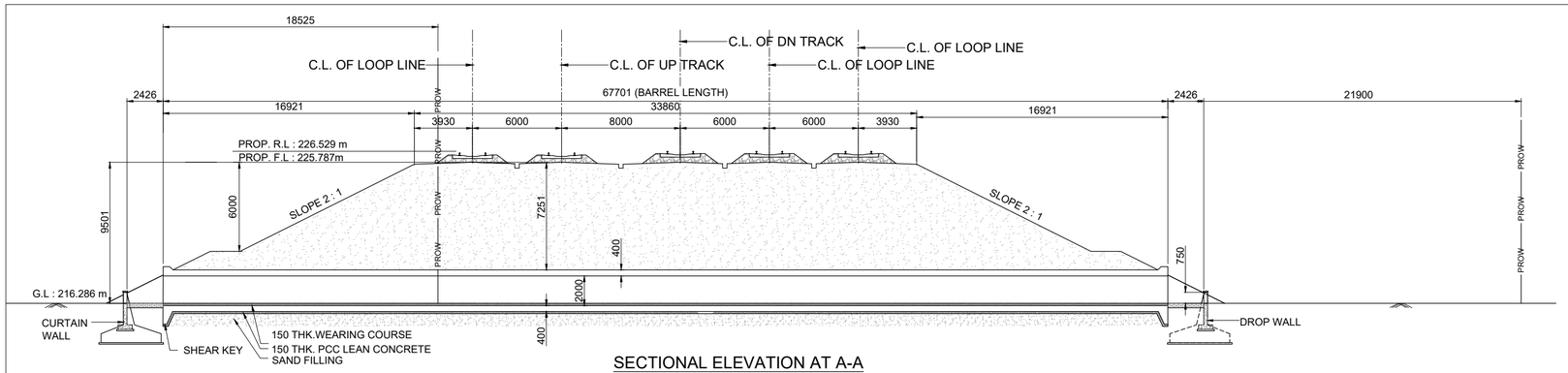
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

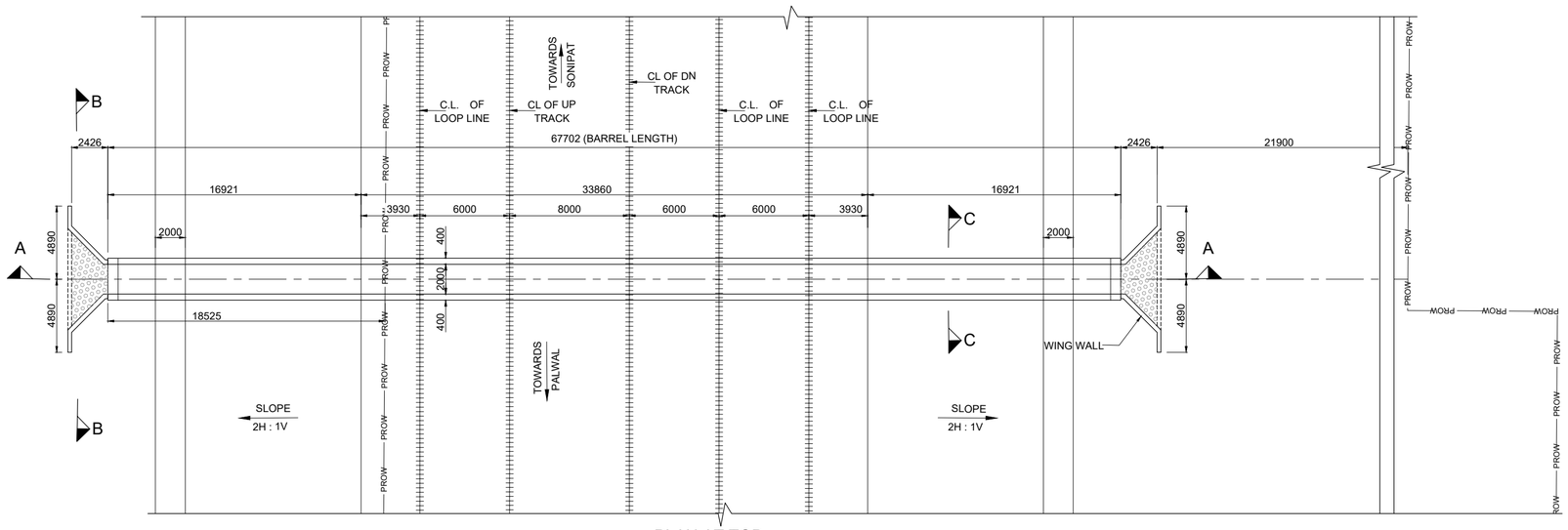
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR ROAD UNDER BRIDGE NO 145
1X5.0X3.0m RCC BOX AT CH. 58203.149m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01145_A1	1 OF 1

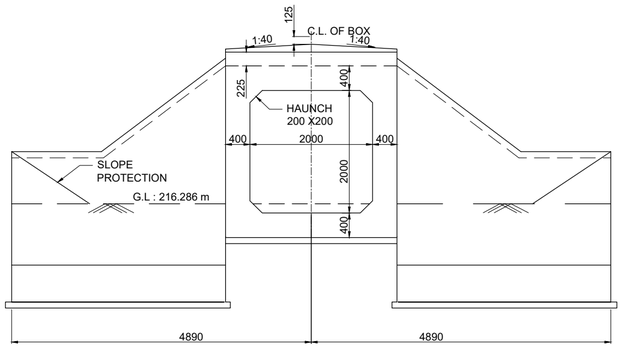
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



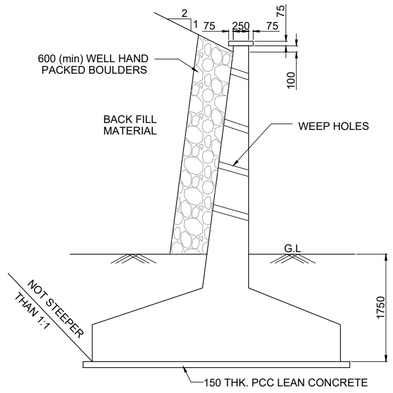
SECTIONAL ELEVATION AT A-A
SCALE 1:200



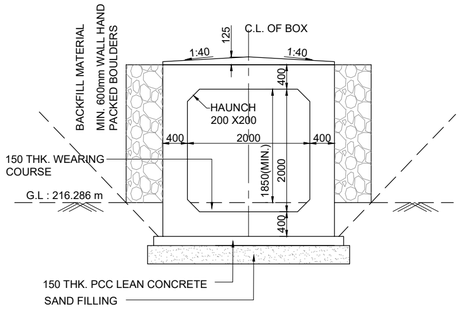
PLAN AT TOP
SCALE 1:200



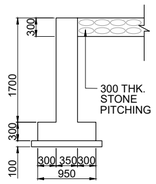
VIEW AT B-B
SCALE 1:50



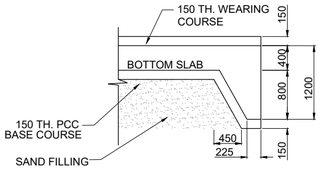
TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



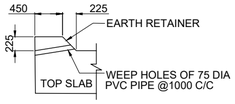
SECTION
SCALE 1:50



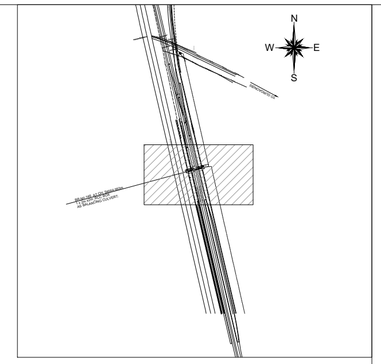
DROP / CURTAIN WALL DETAILS
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50



KEY PLAN
SCALE 1:NTS

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

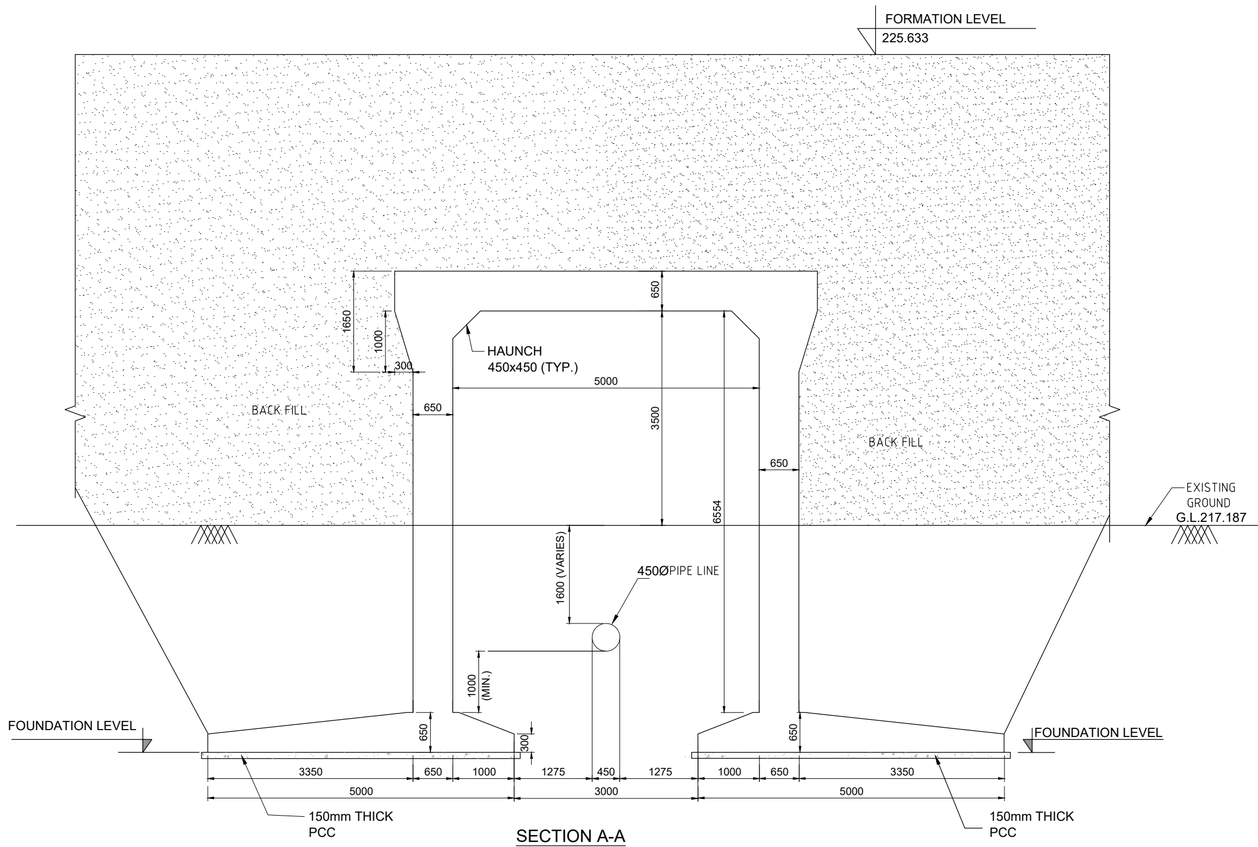
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR BALANCING CULVERT BRIDGE NO 146
1X2.0X2.0m RCC BOX AT CH. 58564.993m

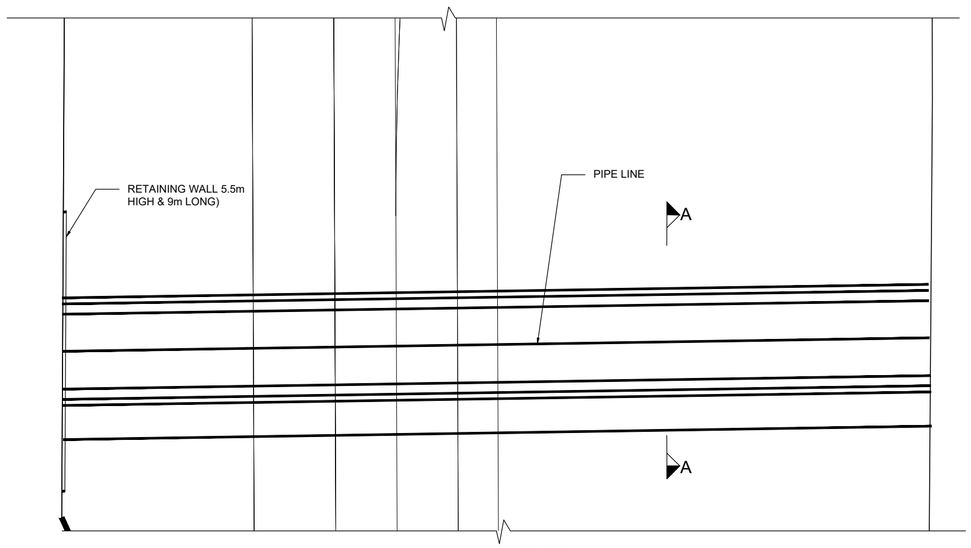
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01146_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



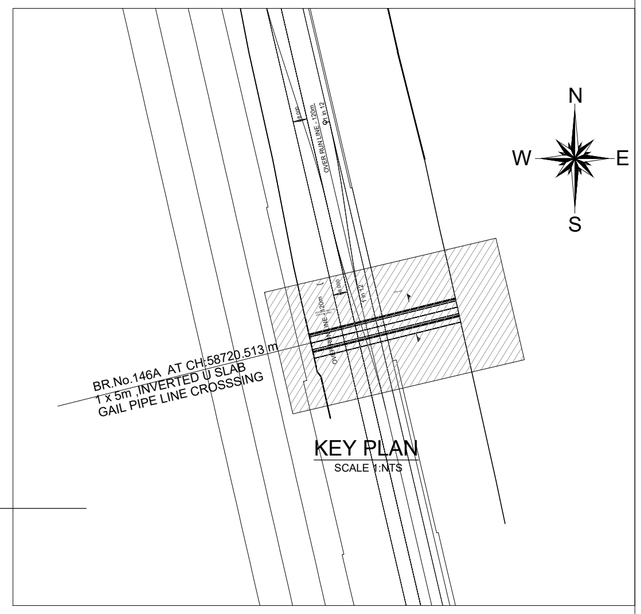
SECTION A-A

SCALE 1:50



PLAN

SCALE 1:300



NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
3. BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING.
4. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
5. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
6. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
7. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSESIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
8. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
9. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
10. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BRIDGE AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF STRUCTURE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
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   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
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12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
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GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

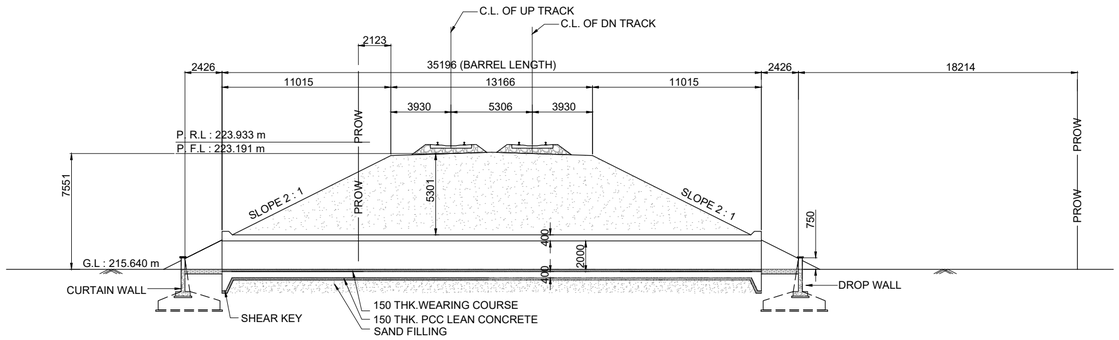
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

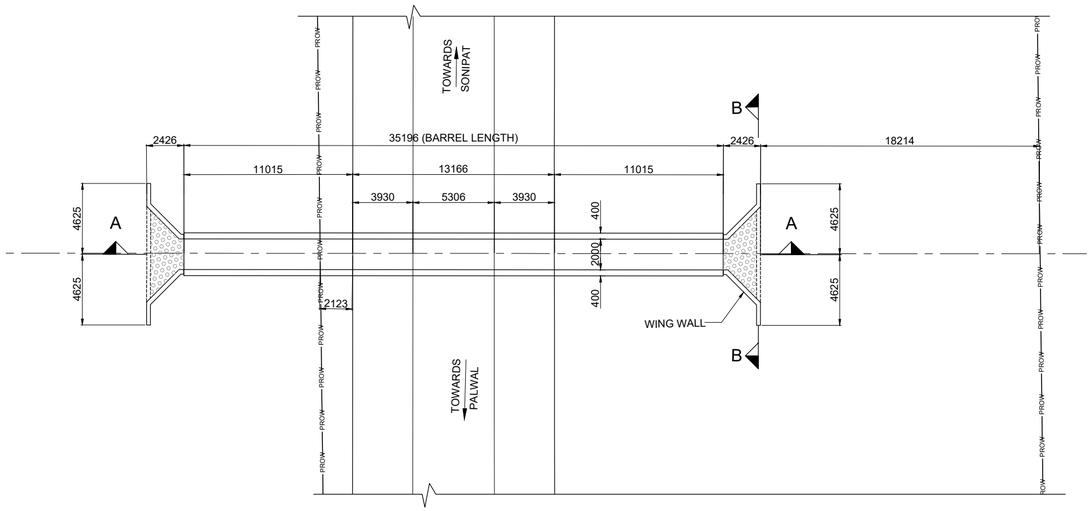
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BRIDGE NO.146A - 5 m CLEAR SPAN INVERTED U OVER GAIL PIPE LINE CROSSING AT CH. 58720.513m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01146_A0	1 OF 1

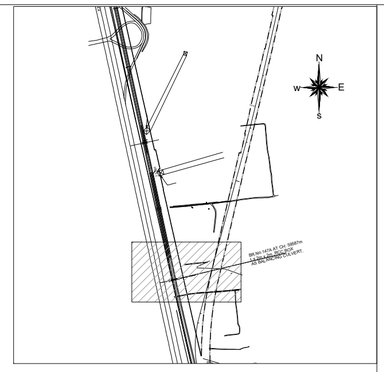
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



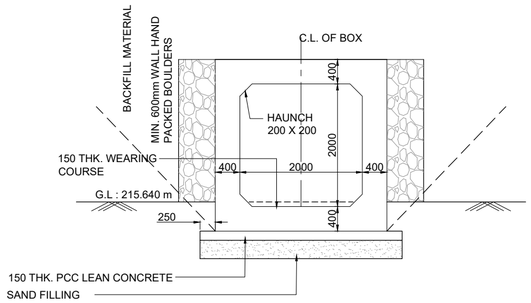
SECTIONAL ELEVATION AT A-A
SCALE 1:200



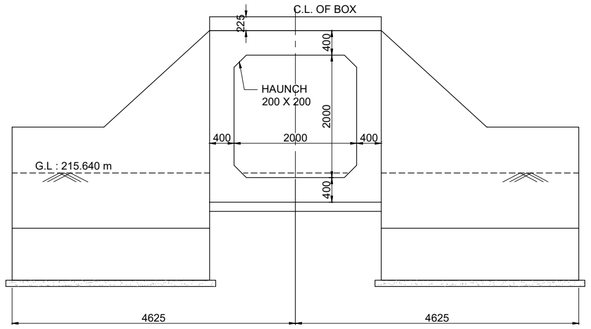
PLAN AT TOP
SCALE 1:200



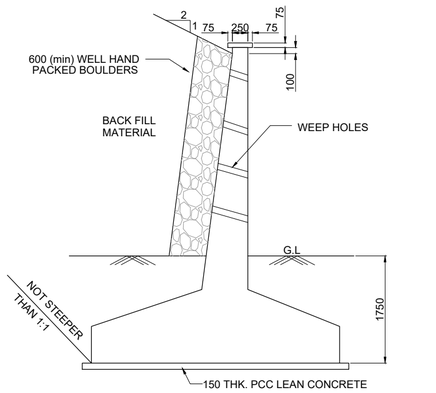
KEY PLAN
SCALE 1:NTS



ELEVATION
SCALE 1:50

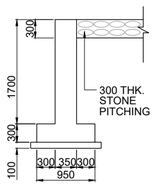


VIEW AT B-B
SCALE 1:50

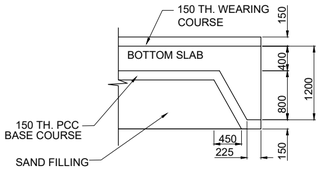


WING WALL (TO BE DESIGN AS PER SITE CONDITION)

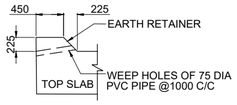
TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



DROP / CURTAIN WALL DETAILS
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
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6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
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B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, SUITABLE SLOPE TO BE PROVIDE ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
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9. EXPOSURE CONDITION- MODERATE.
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15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
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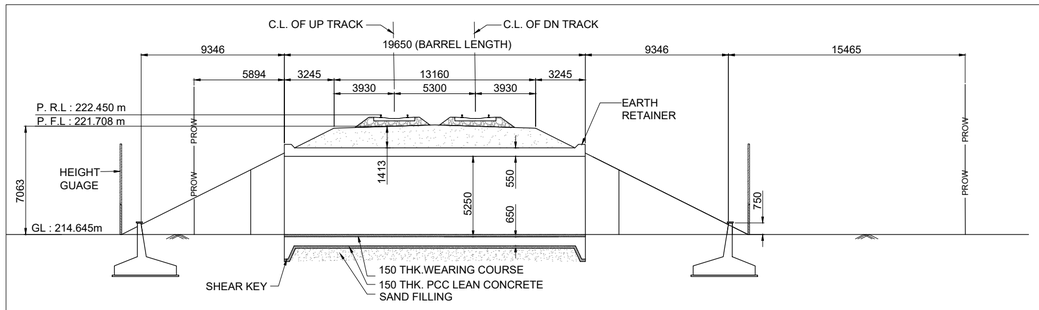
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

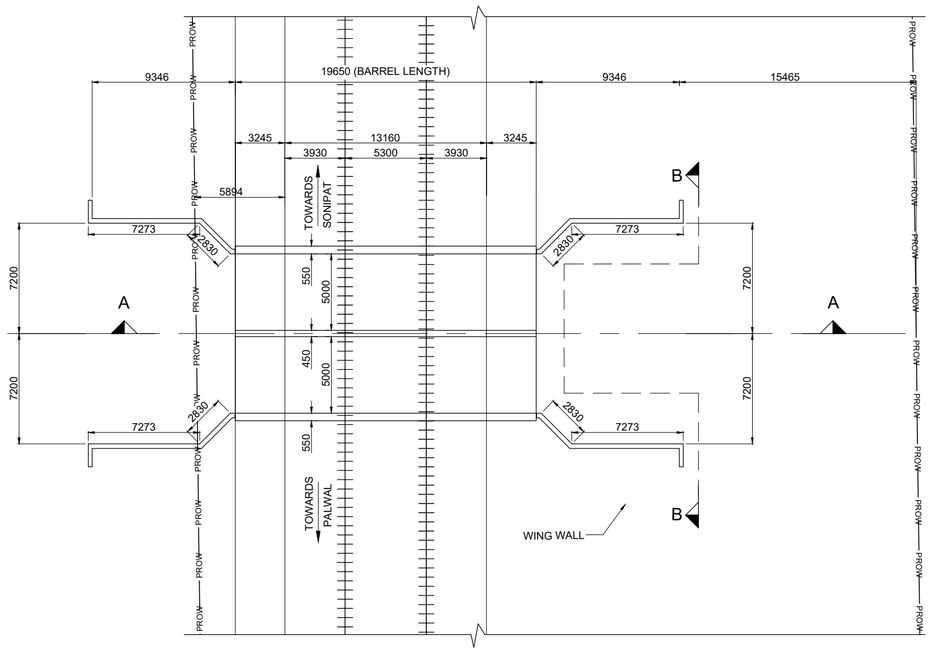
TITLE:-GENERAL ARRANGEMENT DRAWING
FOR BALANCING CULVERT BRIDGE NO 147A
1X2.0X2.0m RCC BOX AT CH. 59587.000m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRW-GAD-01147A_A0	1 OF 1

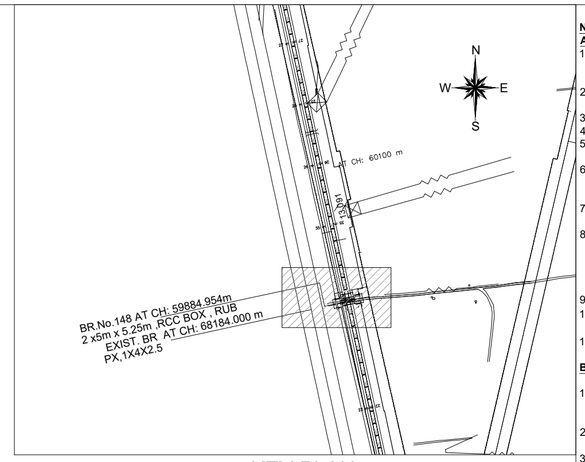
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



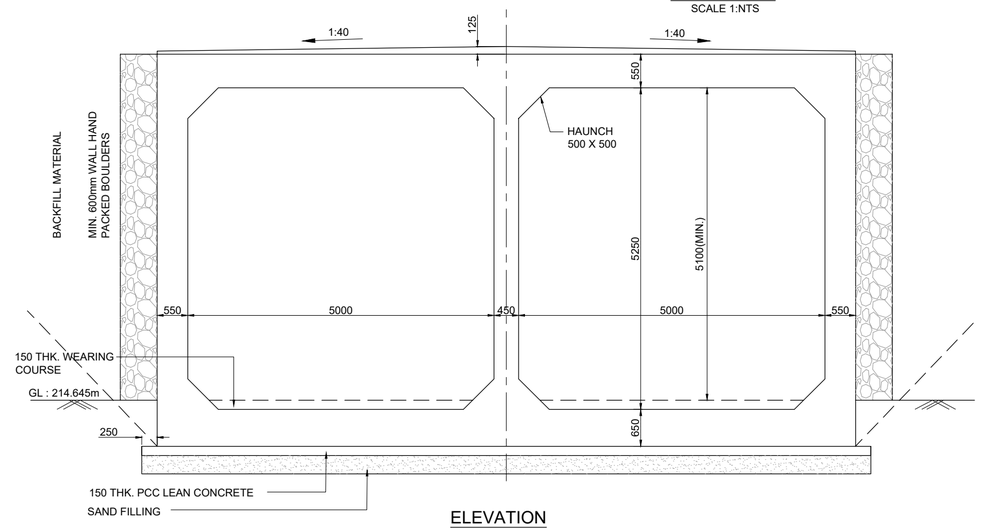
SECTIONAL ELEVATION AT A-A
SCALE 1:200



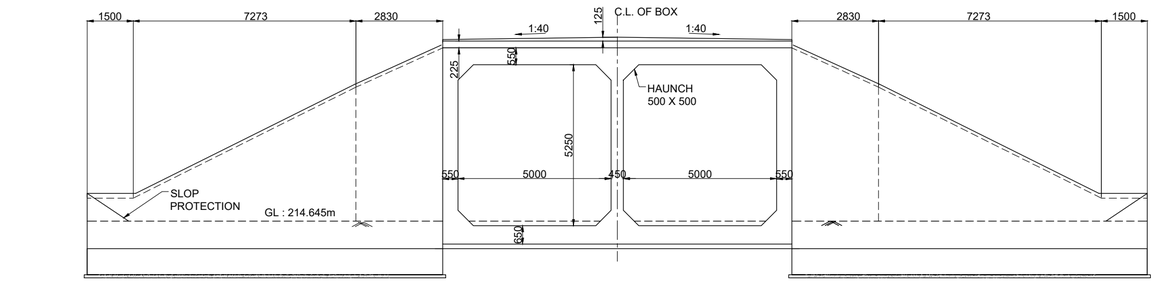
PLAN AT TOP
SCALE 1:200



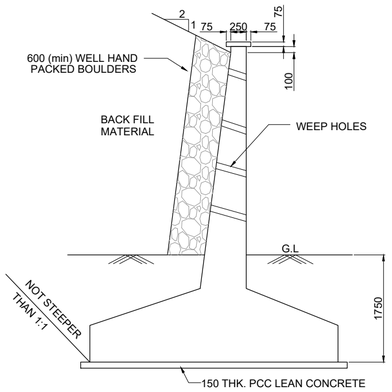
KEY PLAN
SCALE 1:NTS



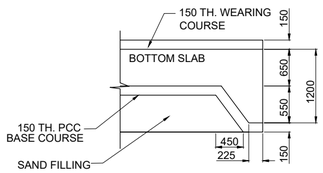
ELEVATION
SCALE 1:50



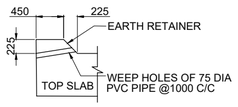
VIEW AT B-B
SCALE 1:100



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL

NOTES :

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7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M/0001.
17. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

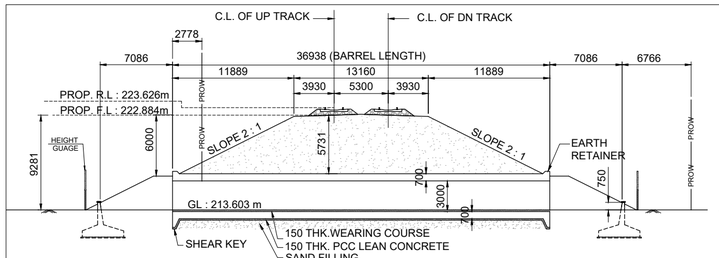
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR ROAD UNDER BRIDGE NO 148 SPAN
2.0X5.0X5.25 RCC BOX AT CH.59884.954

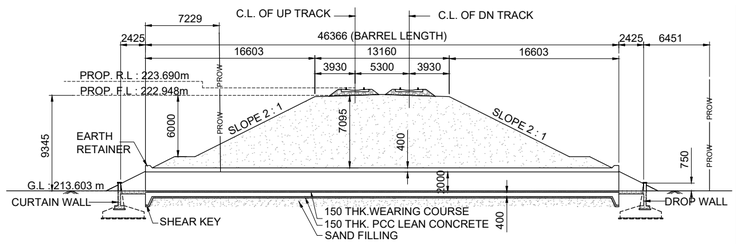
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01148_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



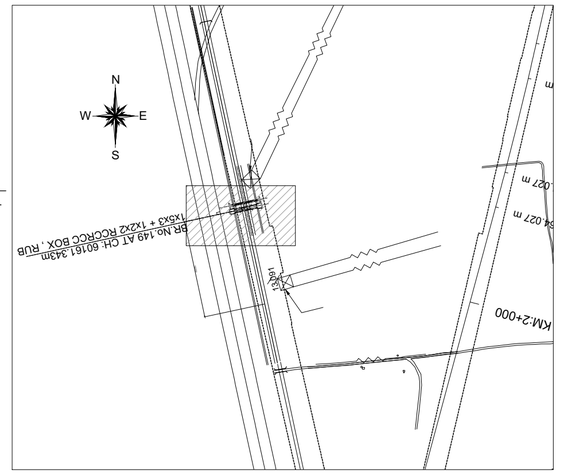
SECTIONAL ELEVATION AT A-A

SCALE 1:300



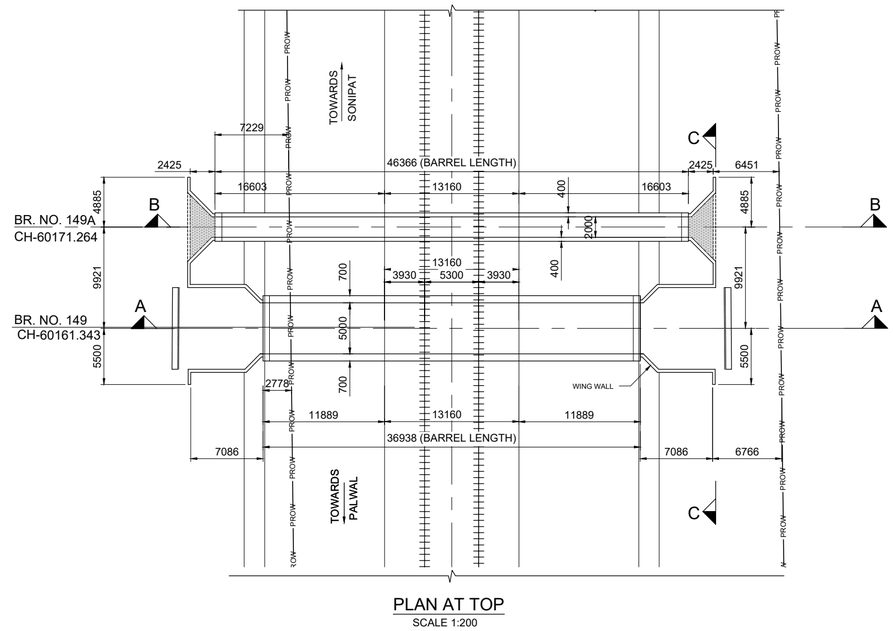
SECTIONAL ELEVATION AT B-B

SCALE 1:300



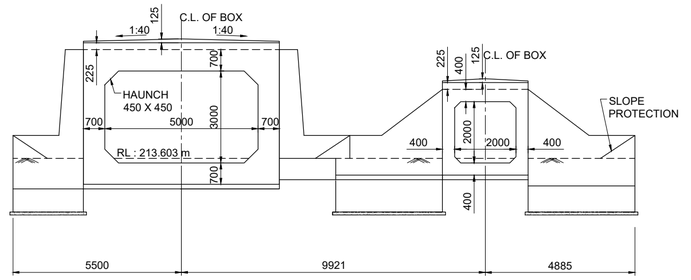
KEY PLAN

SCALE 1:NTS



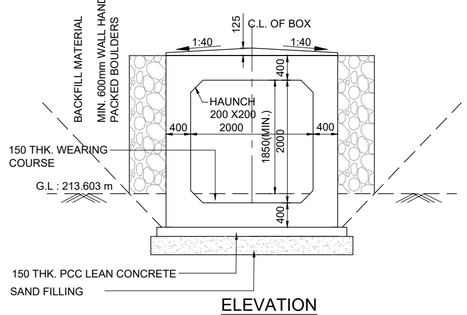
PLAN AT TOP

SCALE 1:200



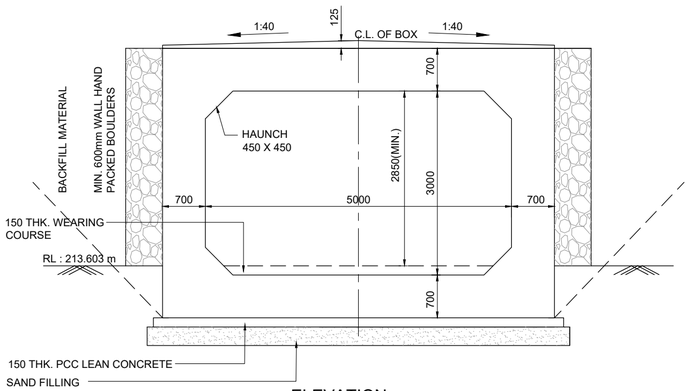
VIEW AT C-C

SCALE 1:100



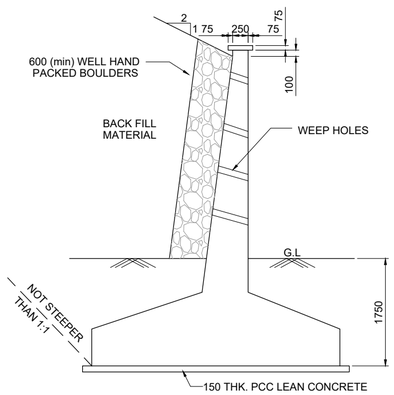
ELEVATION

SCALE 1:50



ELEVATION

SCALE 1:50

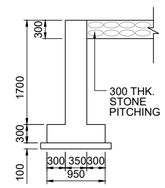


TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50

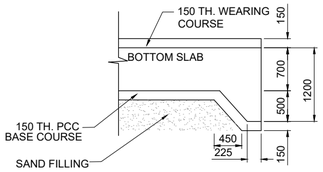
LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL



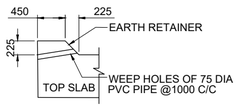
DROP / CURTAIN WALL DETAILS

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
17. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

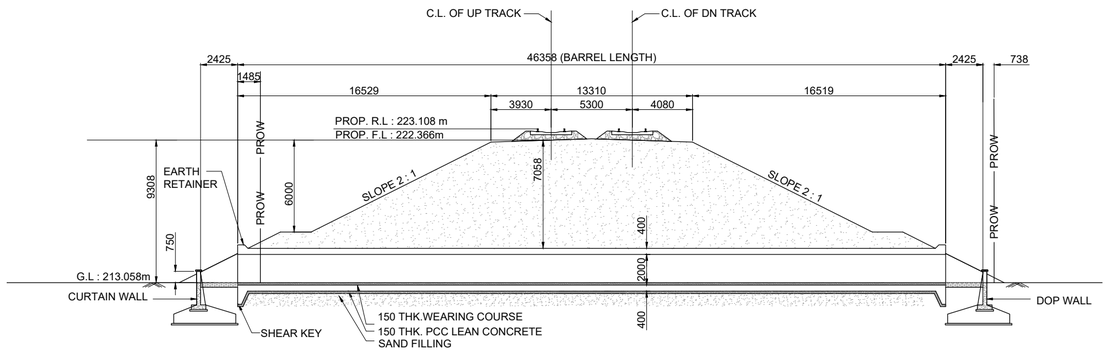
RITES THE INFRASTRUCTURE PEOPLE

SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD+BALANCING CULVERT BRIDGE NO 149/149A 1x5x3 + 1x2x2 RCC BOX AT CH. 60161.343m/60171.264m

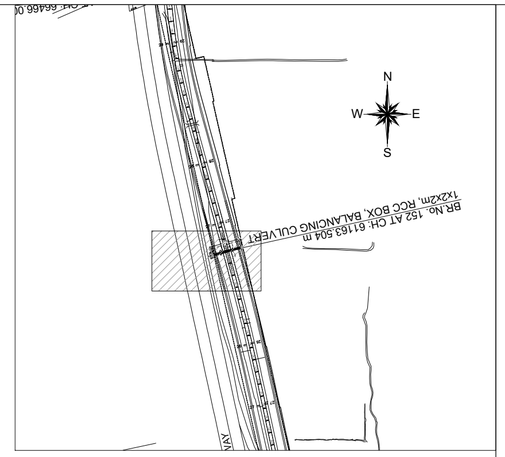
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01149_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



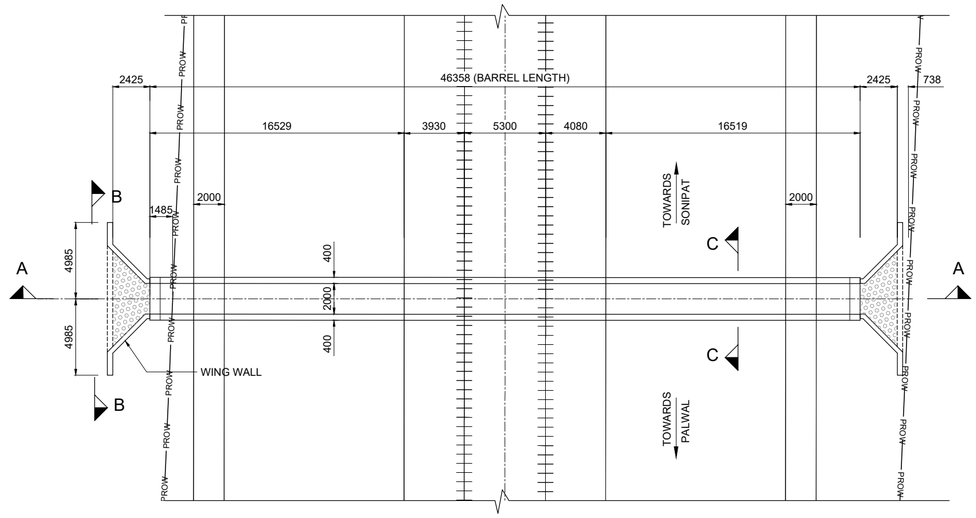
SECTIONAL ELEVATION AT A-A

SCALE 1:200



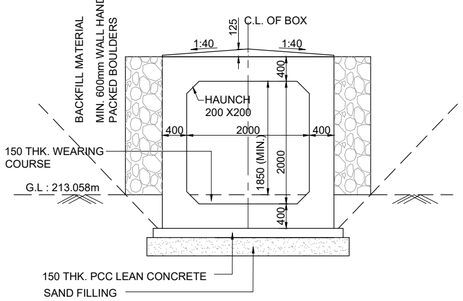
KEY PLAN

SCALE 1:NTS



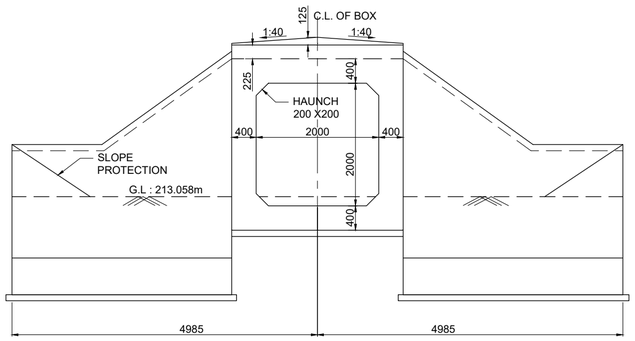
PLAN AT TOP

SCALE 1:200



ELEVATION

SCALE 1:50

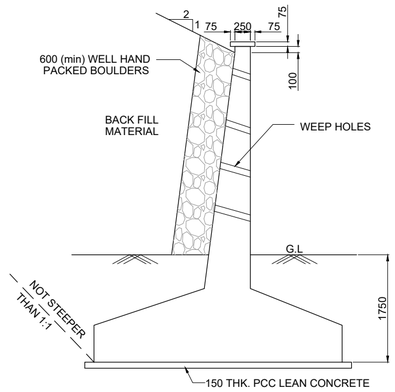


VIEW AT B-B

SCALE 1:50

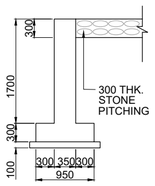
LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL



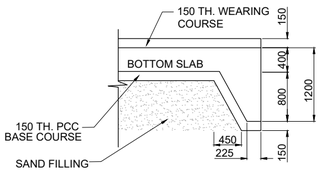
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



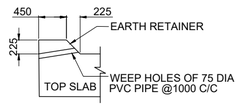
DROP / CURTAIN WALL DETAILS

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, 50mm PCC M-20 WITH SUITABLE SLOPE TO BE USED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE. GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

SMEC Smarter with Sustainability

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR BALANCING CULVERT BRIDGE NO 154
SPAN 1.0X2.0X2.0 RCC BOX AT CH.61163.504

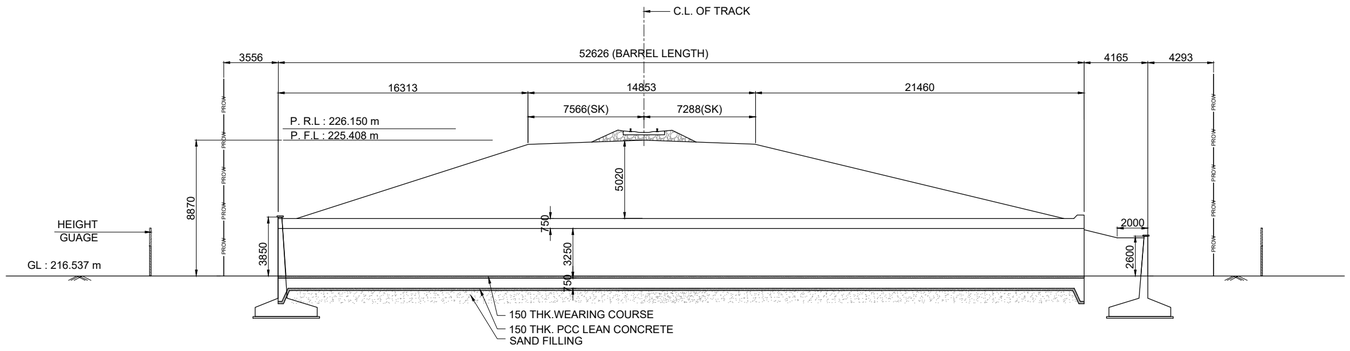
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01154_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

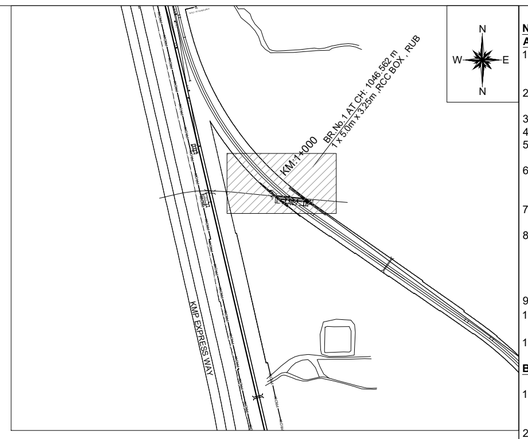
4 Minor Bridges

4.1.2 Connecting Line

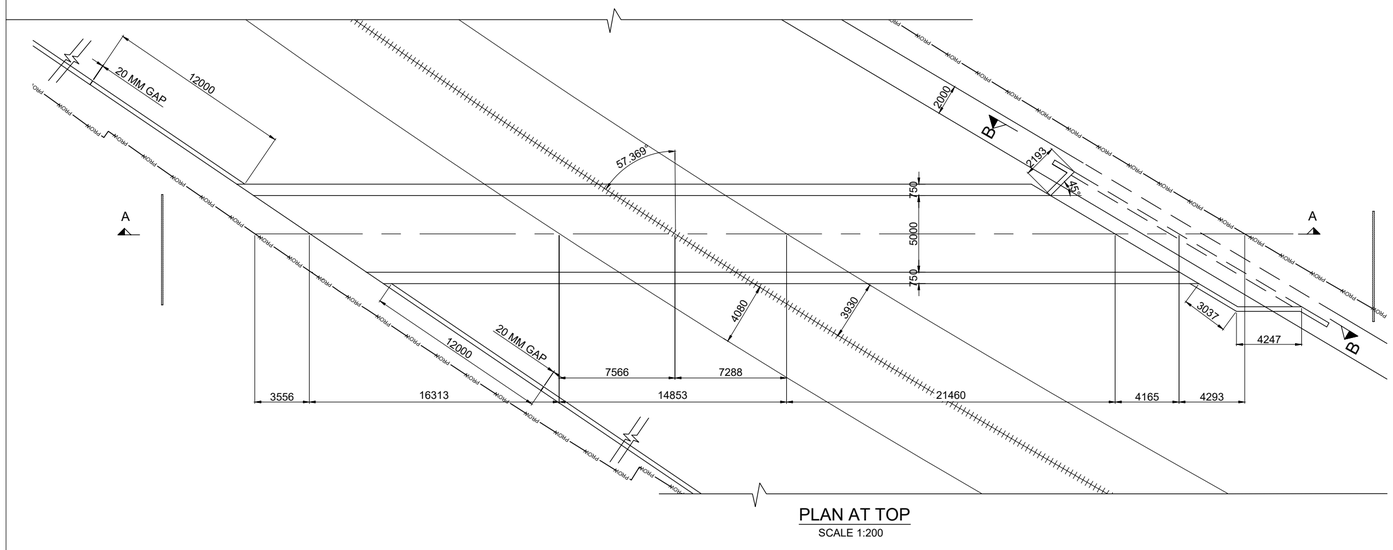
A. New Patli to Patli



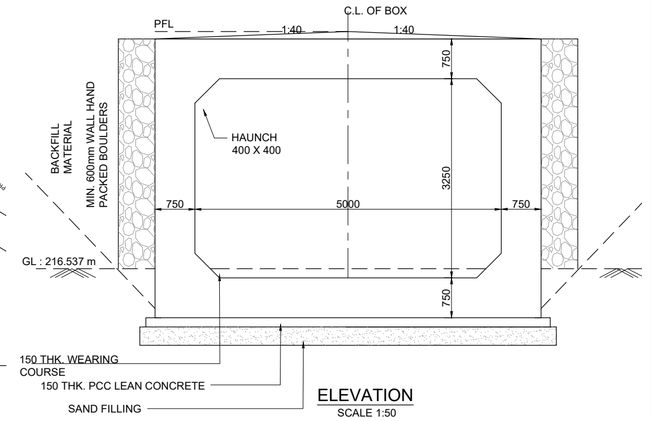
SECTIONAL ELEVATION AT A-A
SCALE 1:200



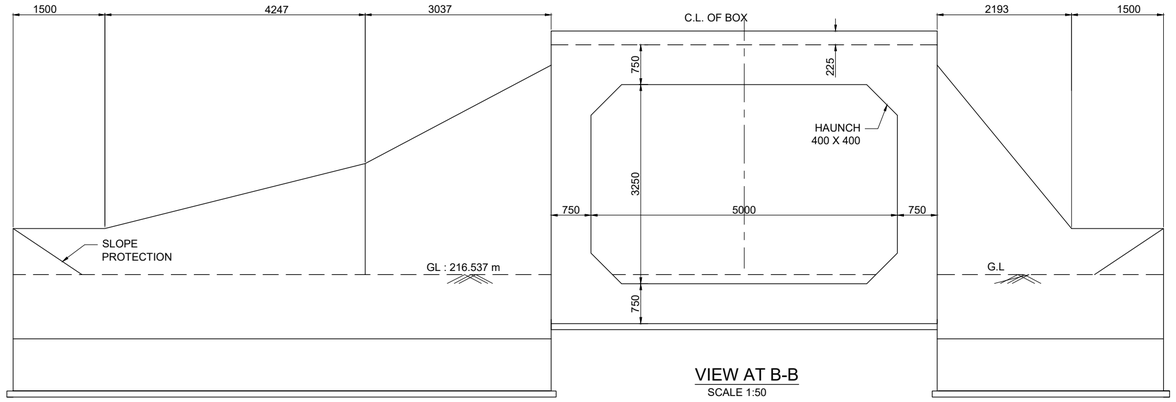
KEY PLAN
SCALE 1:NTS



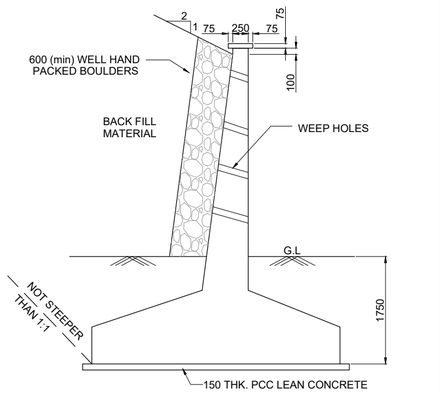
PLAN AT TOP
SCALE 1:200



ELEVATION
SCALE 1:50

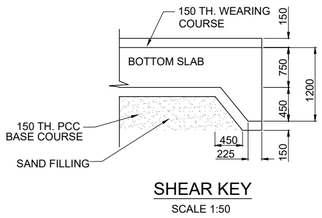


VIEW AT B-B
SCALE 1:50

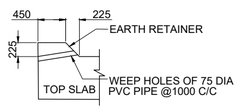


WING WALL (TO BE DESIGN AS PER SITE CONDITION)

TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER,SUITABLE SLOPE TO BE PRPPOSED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.

IMPORTANT NOTE:

TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

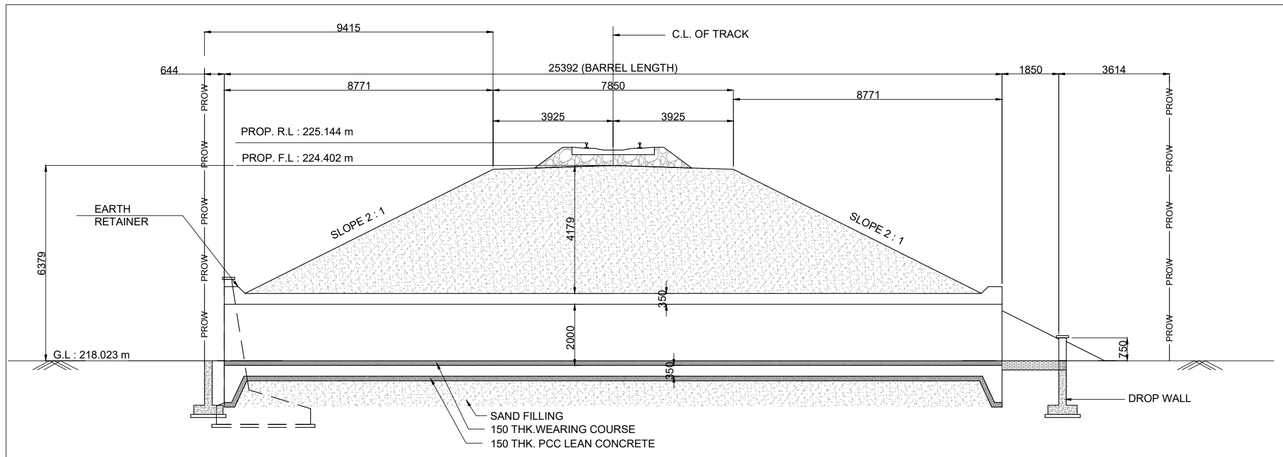
RITES THE INFRASTRUCTURE PEOPLE

SMEC

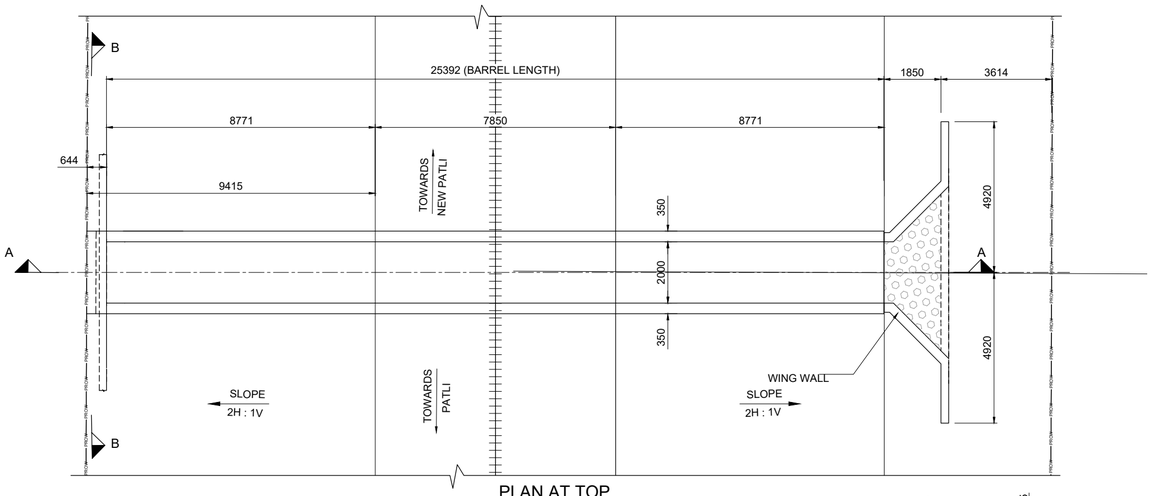
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO.1 - 1X5.0X3.25m RCC BOX AT CH. 1046.562m (CONNECTING LINE NEW PATLI TO PATLI)

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-03001_A1	1 OF 1

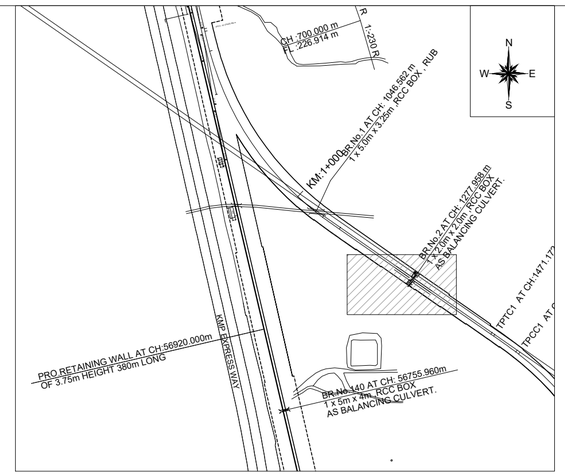
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



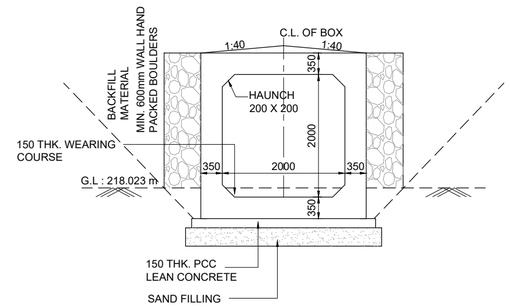
SECTIONAL ELEVATION AT A-A
SCALE 1:100



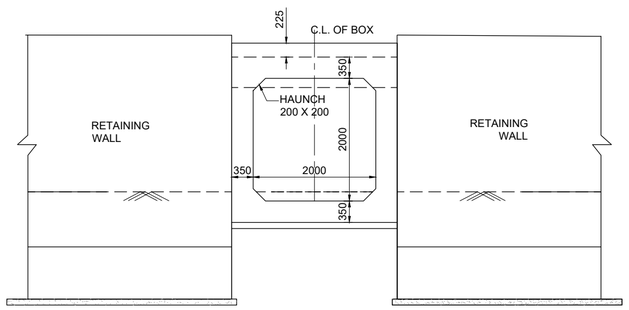
PLAN AT TOP
SCALE 1:100



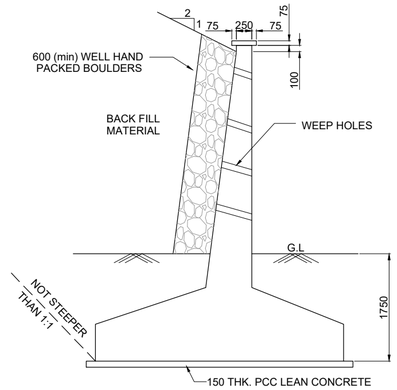
KEY PLAN
SCALE 1:NTS



ELEVATION
SCALE 1:50

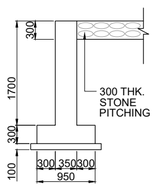


VIEW B-B
SCALE 1:50

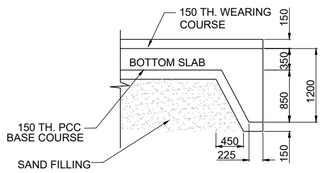


WING WALL (TO BE DESIGN AS PER SITE CONDITION)

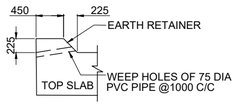
TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



DROP / CURTAIN WALL DETAILS
SCALE 1:50



SHEAR KEY
SCALE 1:50



EARTH RETAINER
SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT CHINAGE & LEVELS WHICH ARE IN METERS. NO DIMENSIONS SHALL NOT BE SCALED FROM THE DRAWING. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF NEW PATLI STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	ChahateyRam	R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

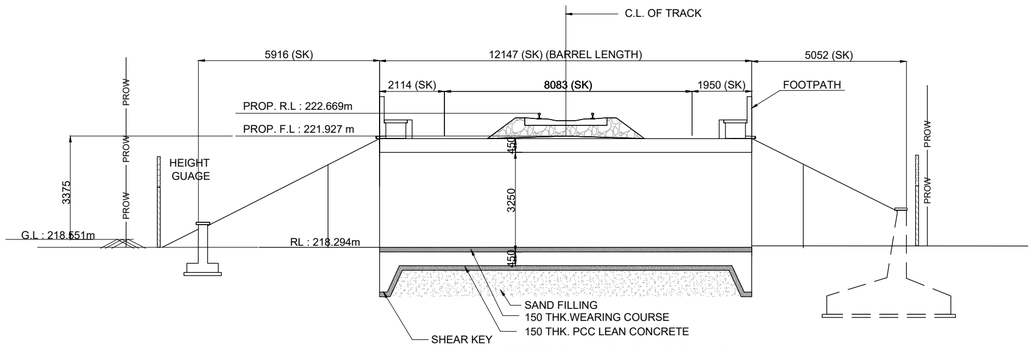
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT NO.2 -1X2.0X2.0m RCC BOX AT CH. 1277.958m (CONNECTING LINE NEW PATLI TO PATLI)

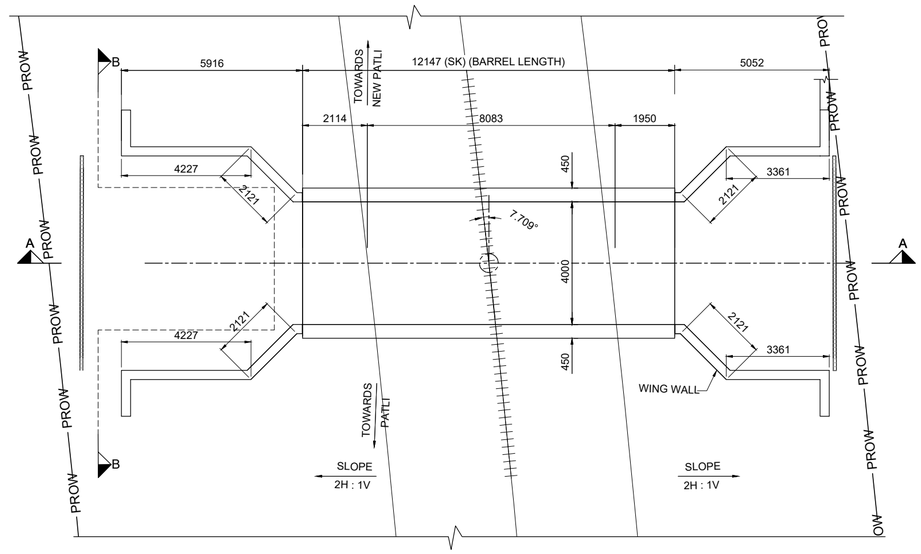
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD_03002_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



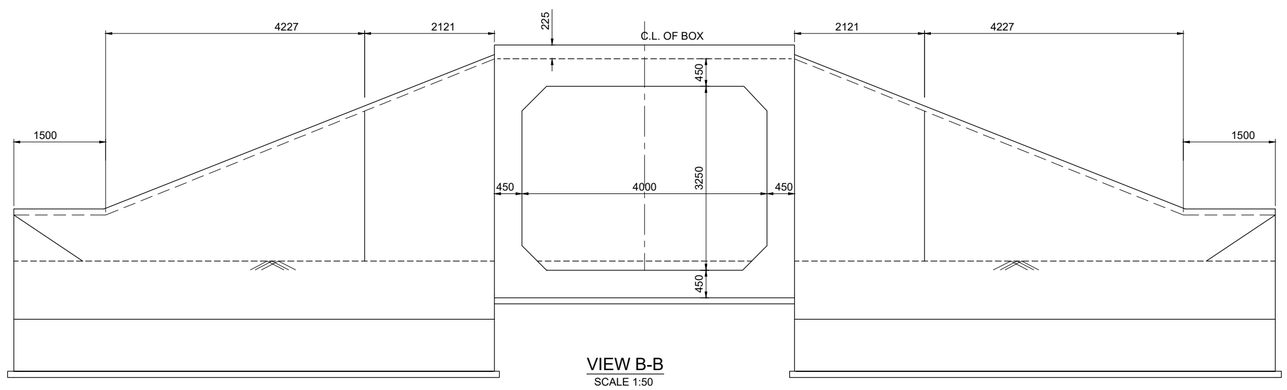
SECTIONAL ELEVATION AT A-A

SCALE 1:100



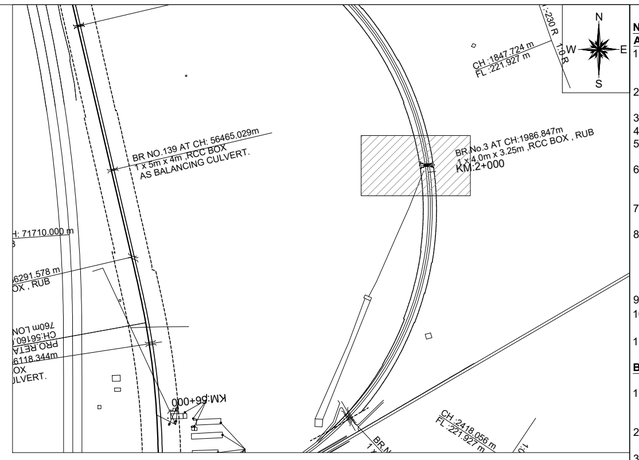
PLAN AT TOP

SCALE 1:100



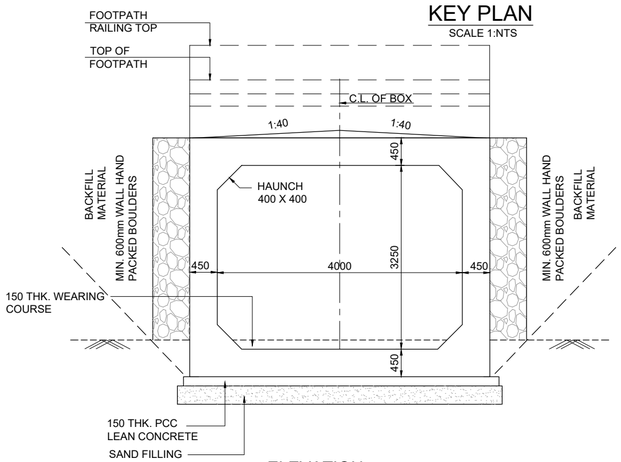
VIEW B-B

SCALE 1:50



KEY PLAN

SCALE 1:NTS

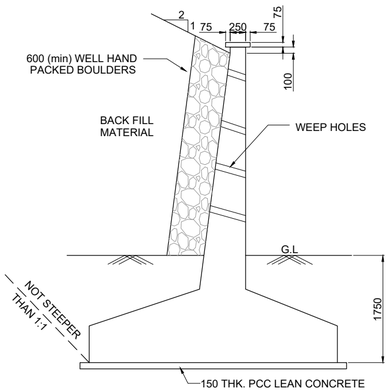


ELEVATION

SCALE 1:50

LEGEND

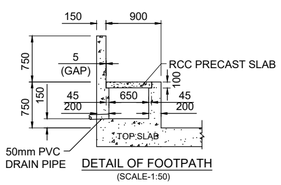
PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL



WING WALL (TO BE DESIGN AS PER SITE CONDITION)

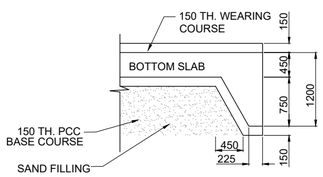
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



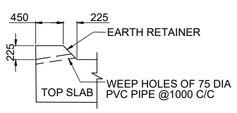
DETAIL OF FOOTPATH

(SCALE-1:50)



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT CHAINAGE & LEVELS WHICH ARE IN METERS. NO DIMENSION SHALL BE SCALED FROM THE DRAWING. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF NEW PATLI STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
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3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
17. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL.HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE

SMEC

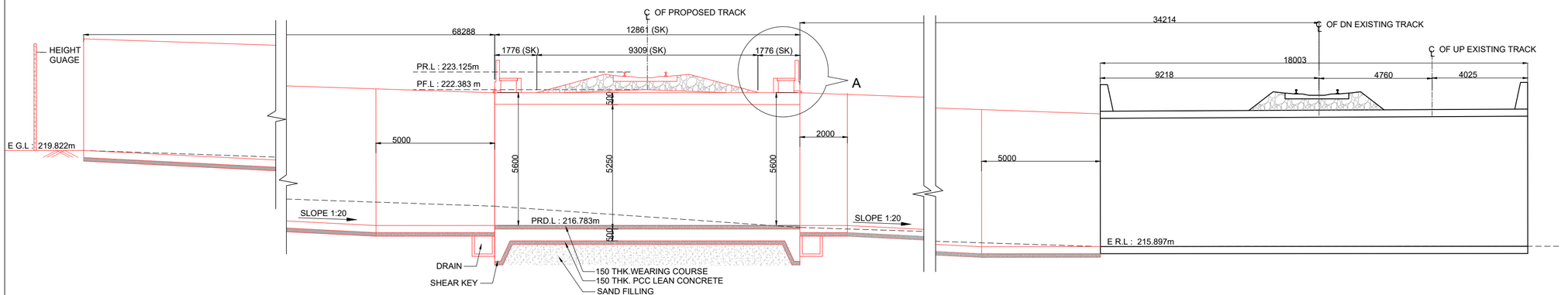
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR ROAD UNDER BRIDGE NO.3 - 1X4.0X3.25m RCC BOX AT CH. 1986.847m (CONNECTING LINE NEW PATLI TO PATLI)

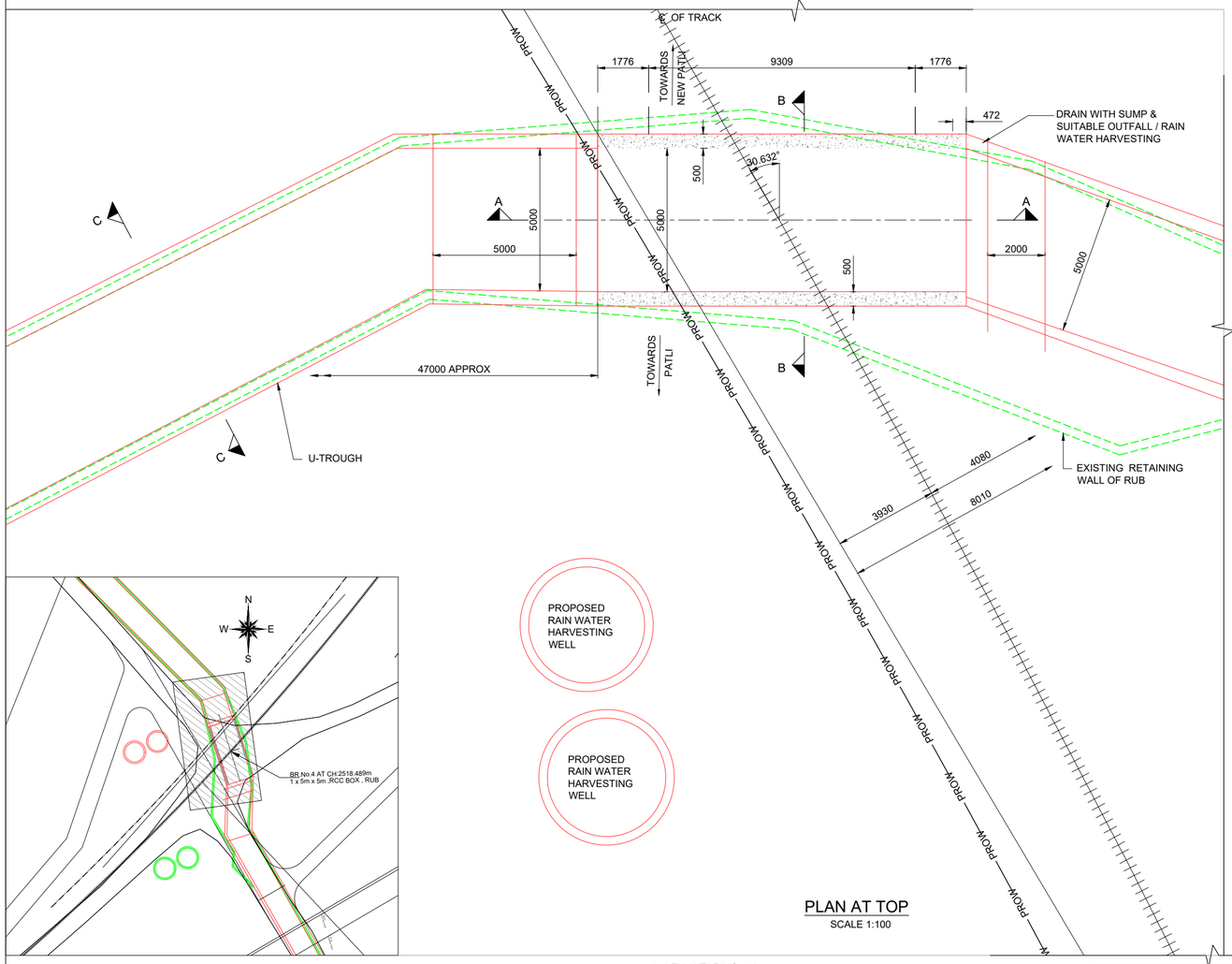
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD_03003_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



SECTIONAL ELEVATION AT A-A

SCALE 1:100

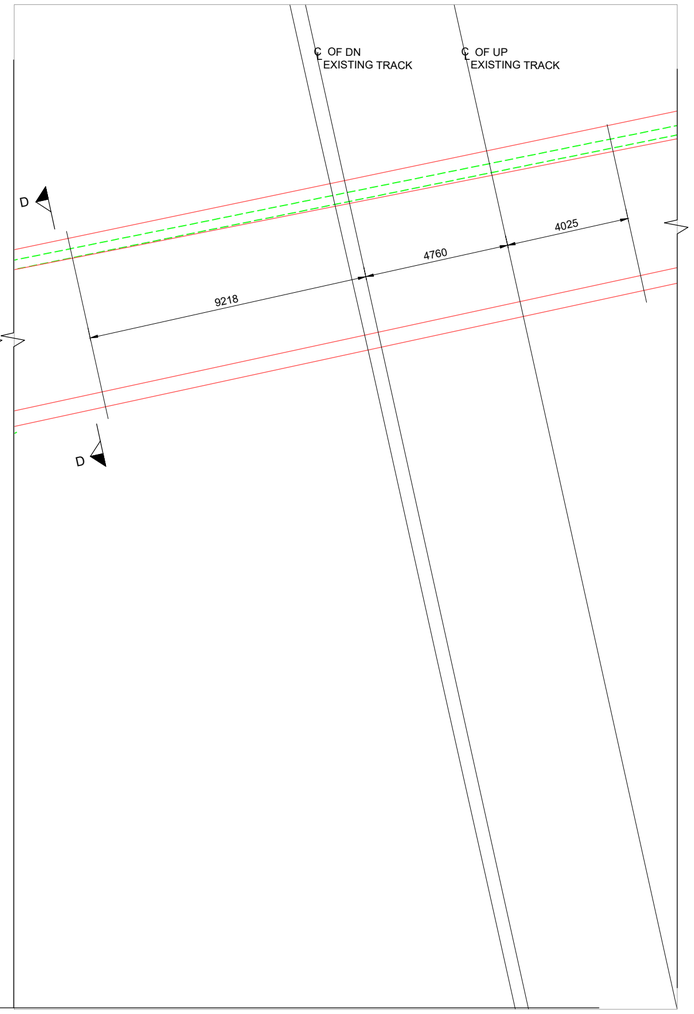


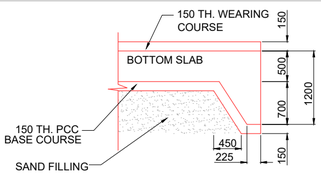
PLAN AT TOP

SCALE 1:100

KEY PLAN

SCALE 1:NTS





SHEAR KEY

SCALE 1:50

LEGEND	
PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
PRDL	PROPOSED ROAD LEVEL
ERL	EXISTING ROAD LEVEL
EGL	EXISTING GROUND LEVEL
———	PROPOSED
- - - -	DISMANTEL

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M.BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER, SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS-3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE(WC) =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.
15. SPEED BREAKER SHOULD BE PROVIDED ON EITHER APPROACH OF RUB AT A DISTANCE OF 20M FROM THE BRIDGE COVERING FULL WIDTH OF THE ROAD INCLUDE BERMS.
16. RETAINING WALL ALONG THE ROAD SHALL BE MIN 300 ABOVE GROUND LEVEL.NO WEEP HOLE SHALL BE PROVIDED IN RETAINING WALL.
17. DRAIN WITH SUMP & SUITABLE OUTFALL SHALL BE PROVIDED FOR PROPER DRAINAGE. HUMP SHALL BE PROVIDED AT BOTH ENDS OF THE RAMP.
18. SHED SHALL BE PROVIDED OVER THE RAMP.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

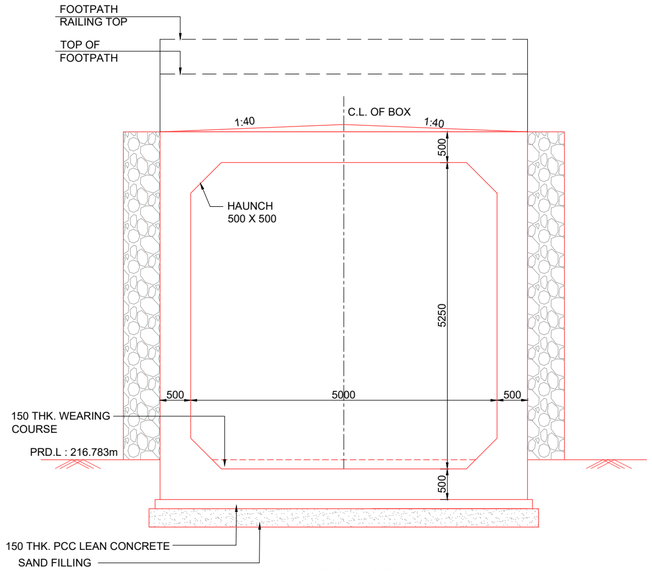
RITES THE INFRASTRUCTURE PEOPLE

SMEC

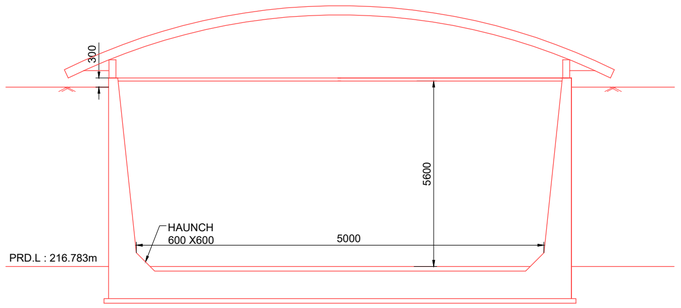
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO.4 - 1X5.0X5.25m RCC BOX AT CH. 2518.489m (CONNECTING LINE NEW PATLI TO PATLI)

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-03004_A1	1 OF 2

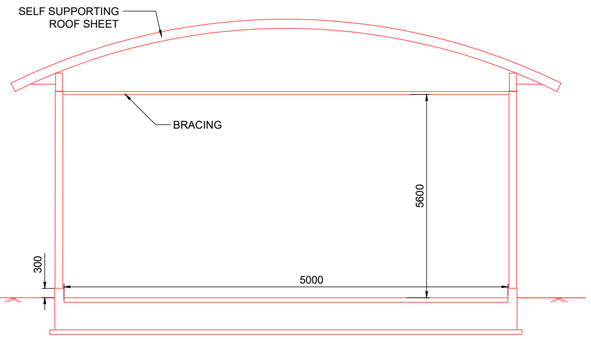
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	14-12-2022



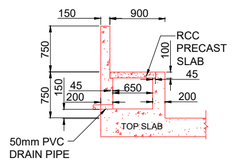
SECTION B-B
SCALE 1:50



SECTION D-D
NTS
COVER SHED ON APPROACH ROAD



SECTION C-C
NTS
COVER SHED ON APPROACH ROAD



DETAIL OF A
(SCALE-1:50)
(FOOTPATH)

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

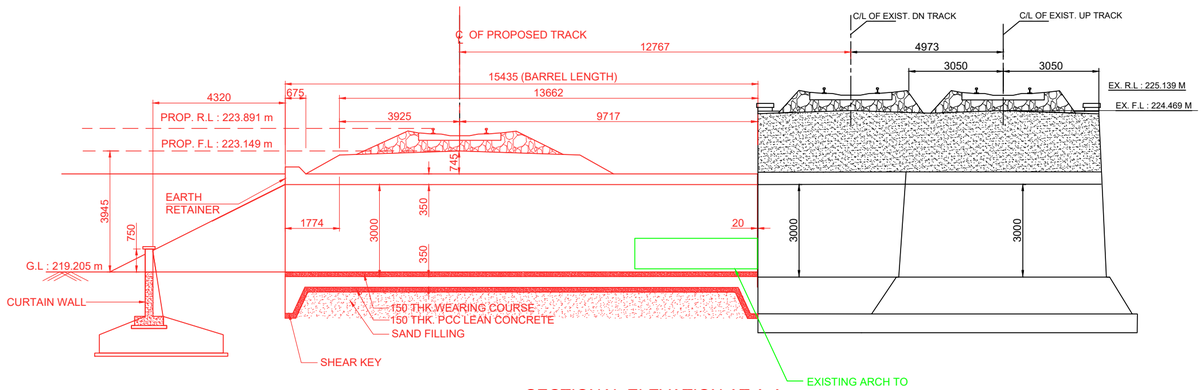
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

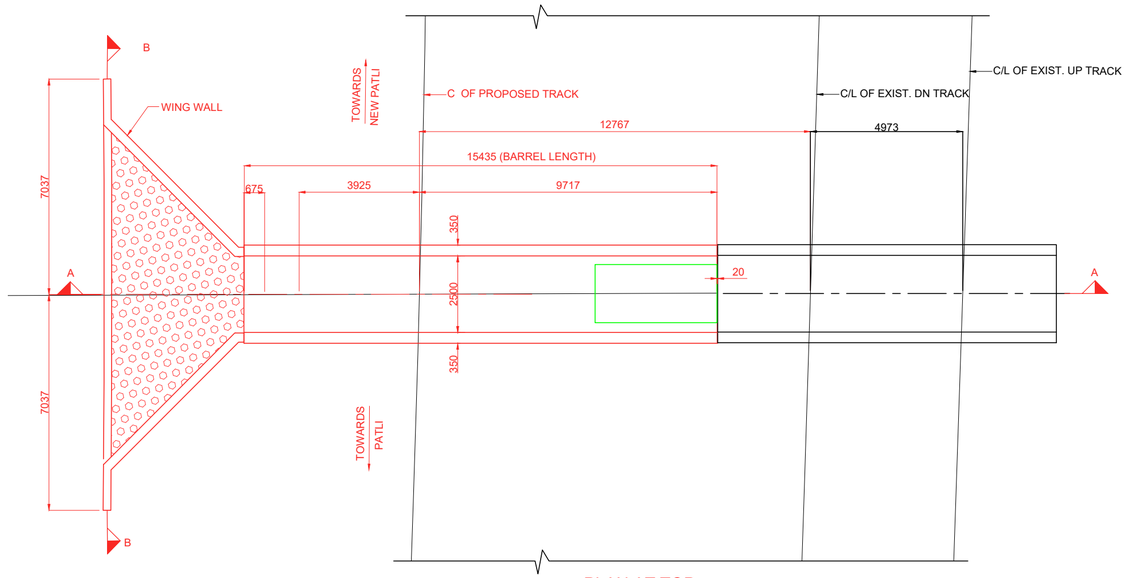
TITLE:-CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR ROAD UNDER BRIDGE NO.4 - 1X5.0X5.25m RCC BOX AT CH. 2518.489m (CONNECTING LINE NEW PATLI TO PATLI)

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-03004_A1	2 OF 2

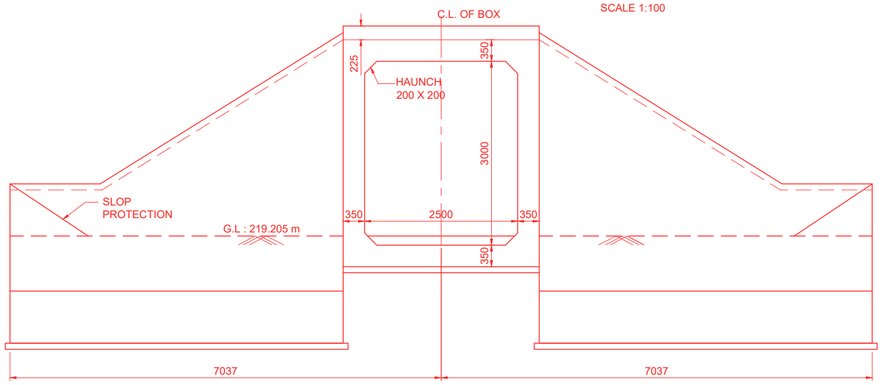
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	14-12-2022



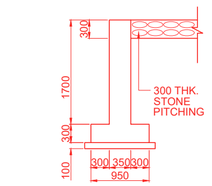
SECTIONAL ELEVATION AT A-A
SCALE 1:100



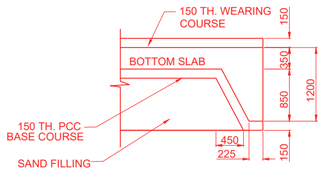
PLAN AT TOP
SCALE 1:100



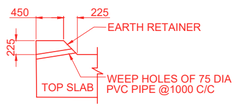
VIEW B-B
SCALE 1:50



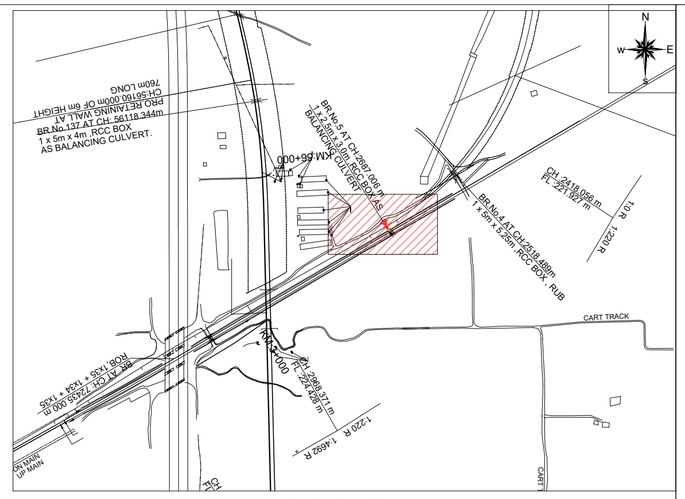
CURTAIN WALL DETAILS
SCALE 1:50



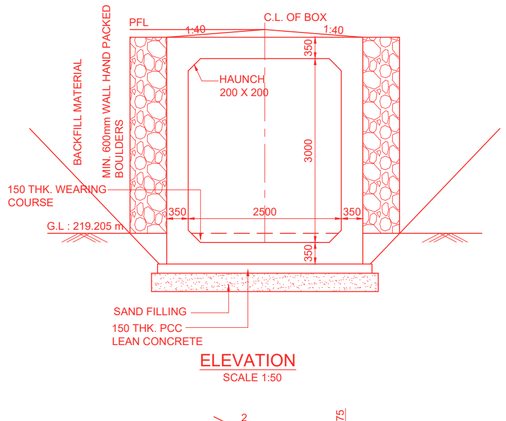
SHEAR KEY
SCALE 1:50



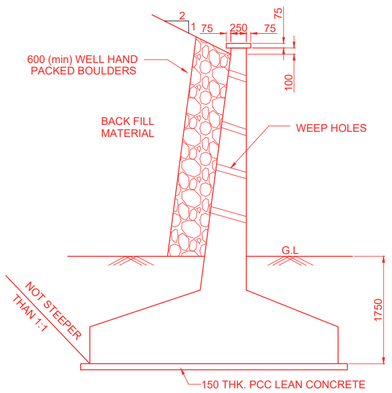
EARTH RETAINER
SCALE 1:50



KEY PLAN
SCALE 1:NTS



ELEVATION
SCALE 1:50



WING WALL (TO BE DESIGN AS PER SITE CONDITION)

TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
———	PROPOSED
———	DISMANTEL

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF NEW PATLI STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD,
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERTNO.5 - 1X2.5X3.0mRCC BOX AT CH. 2687.006 AND EXIST BOX. SIZE- 1X2.5X3.0 (CONNECTING LINE NEW PATLI TO PATLI)

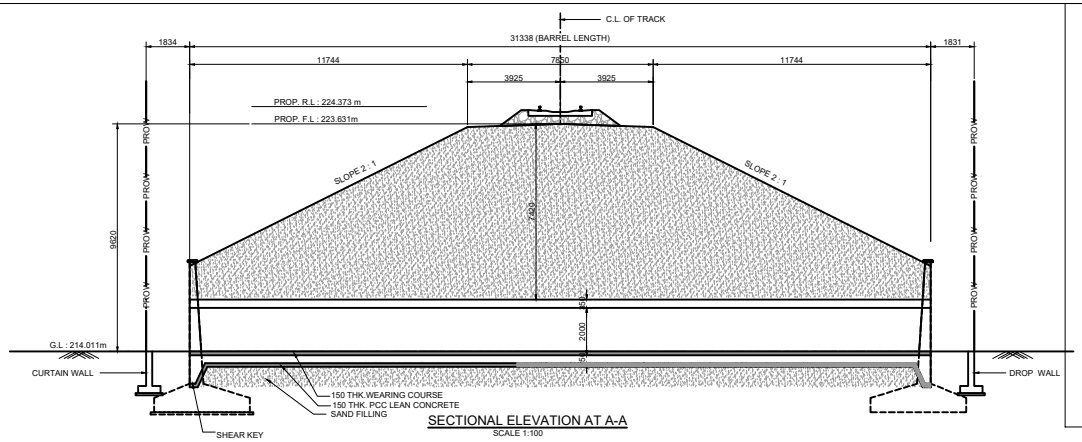
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD_03005_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

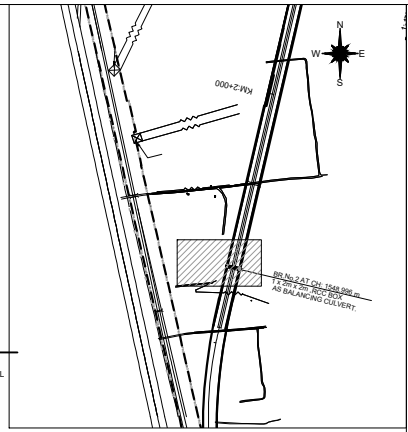
4 Minor Bridges

4.1.2 Connecting Line

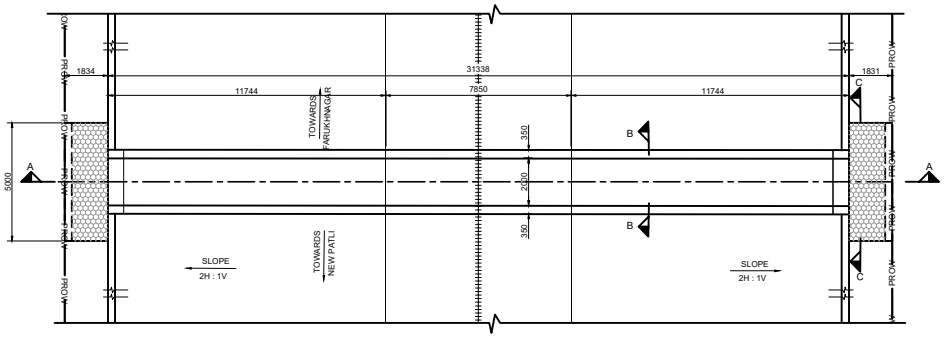
B. New Patli to Sultanpur



SECTIONAL ELEVATION AT A-A
SCALE 1:100



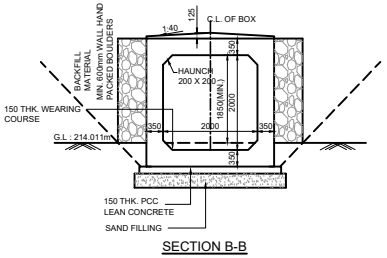
KEY PLAN
SCALE 1:NTS



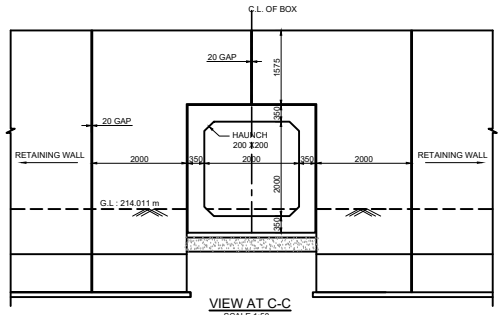
PLAN AT TOP
SCALE 1:100

LEGEND

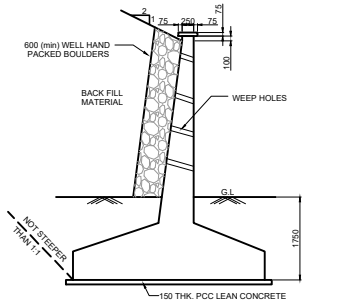
PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL



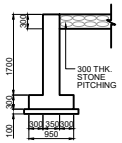
SECTION B-B
SCALE 1:50



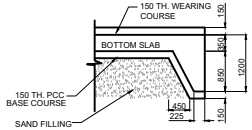
VIEW AT C-C
SCALE 1:50



TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



DROP / CURTAIN WALL DETAILS
SCALE 1:50



SHEAR KEY
SCALE 1:50

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSIONS SHALL NOT BE SCALED FROM THE DRAWING. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF NEW PATLI STATION BUILDING TAKEN AS 0.00 M. WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

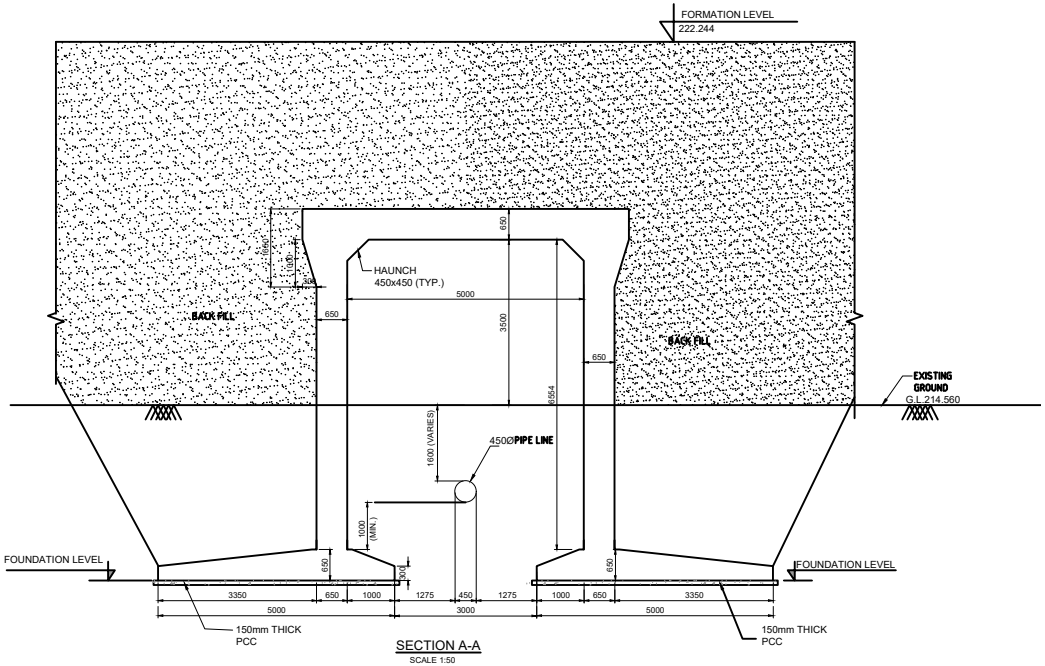
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

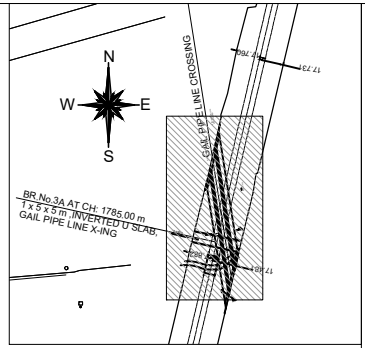
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO.2 - 1X2.0X2.0m RCC BOX AT CH.1548.996 (CONNECTING LINE NEW PATLI TO SULTANPUR)

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-04002_A1	1 OF 1

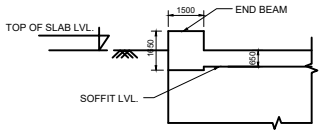
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



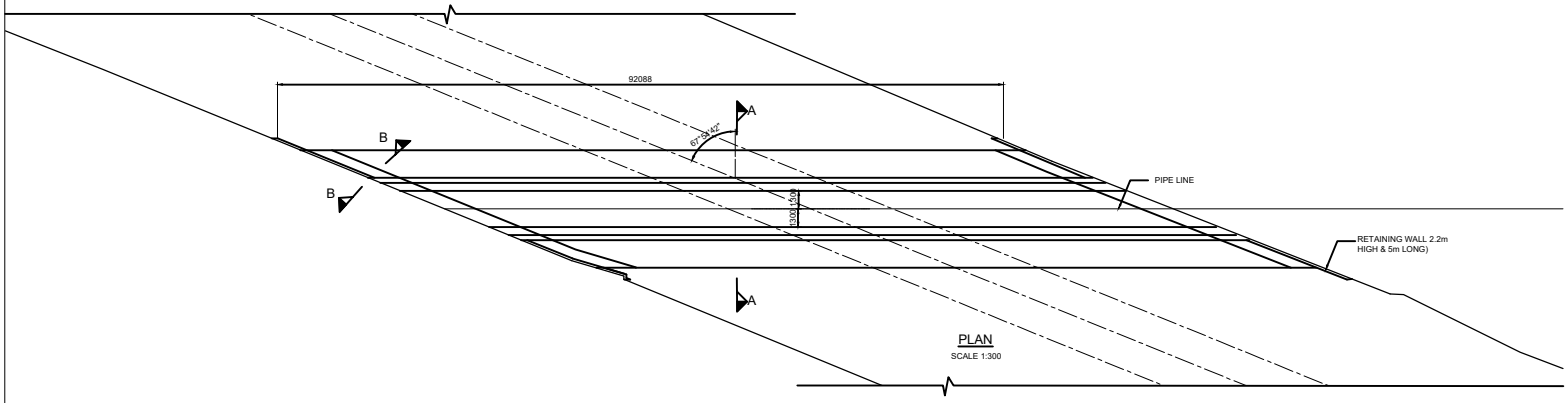
SECTION A-A
SCALE 1:50



KEY PLAN
SCALE 1:NTS



SECTION B-B
SCALE 1:50



PLAN
SCALE 1:300

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
3. BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING.
4. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
5. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL, BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
6. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
7. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
8. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
9. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
10. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BRIDGE AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF STRUCTURE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

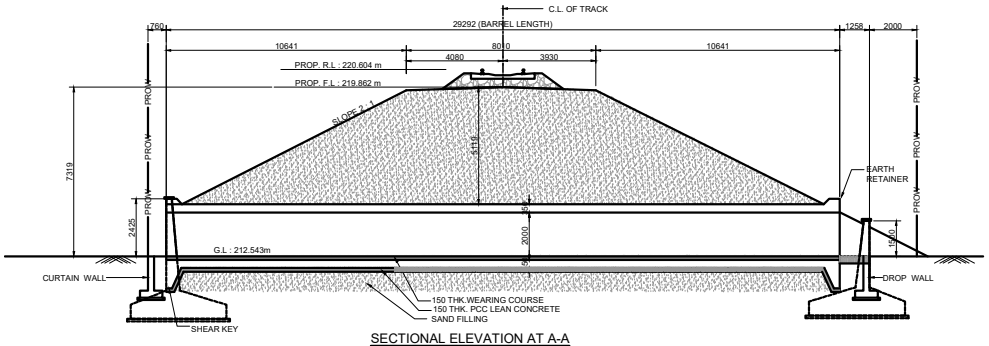
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

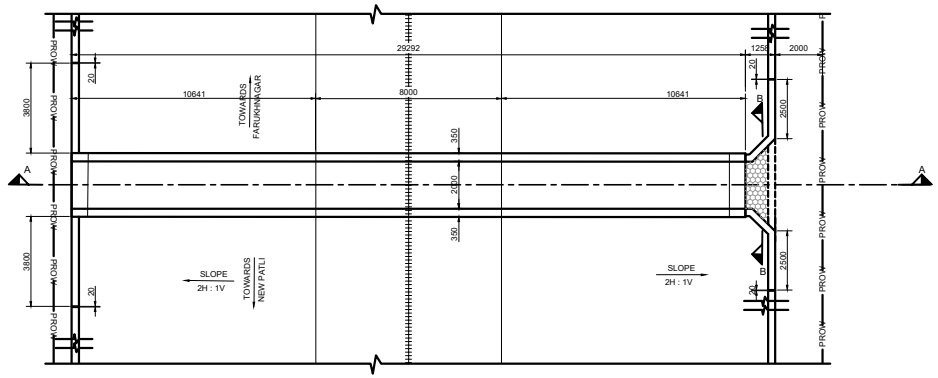
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BRIDGE NO.3A - 5 m CLEAR SPAN INVERTED U OVER GAIL PIPE LINE CROSSING AT CH. 1785m (CONNECTING LINE NEW PATLI TO SULTANPUR)

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD_03003A_A0	1 OF 1

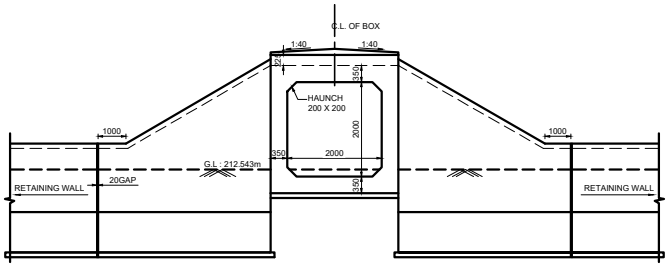
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



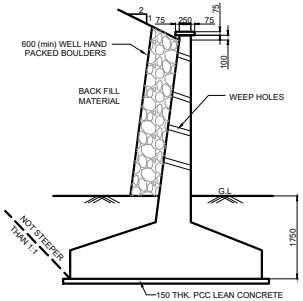
SECTIONAL ELEVATION AT A-A
SCALE 1:100



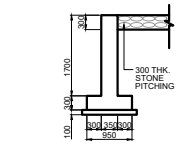
PLAN AT TOP
SCALE 1:100



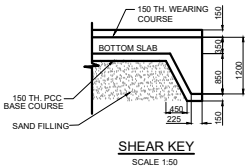
VIEW B-B
SCALE 1:50



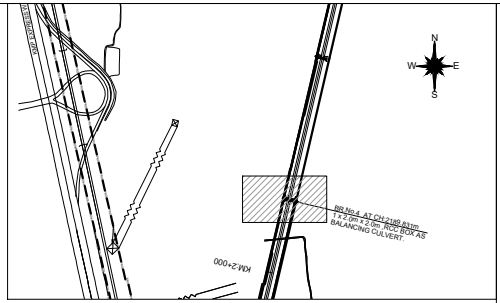
TYPICAL DETAIL OF RETURN WALL / WING WALL
SCALE 1:50



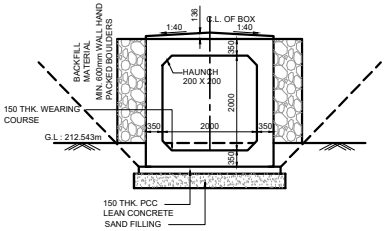
DROP / CURTAIN WALL DETAILS
SCALE 1:50



SHEAR KEY
SCALE 1:50



KEY PLAN
SCALE 1:NTS



ELEVATION
SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF PRITHALA STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT,HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
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8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB- STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

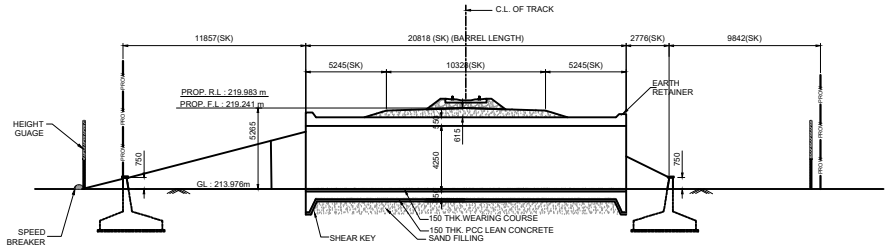
CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BALANCING CULVERT BRIDGE NO.4 - 1X2.0X2.0m RCC BOX AT CH. 2189.831m (CONNECTING LINE NEW PATLI TO SULTAANPUR)

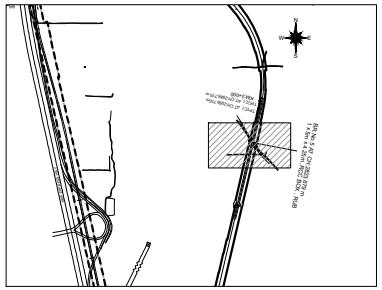
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-04004_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



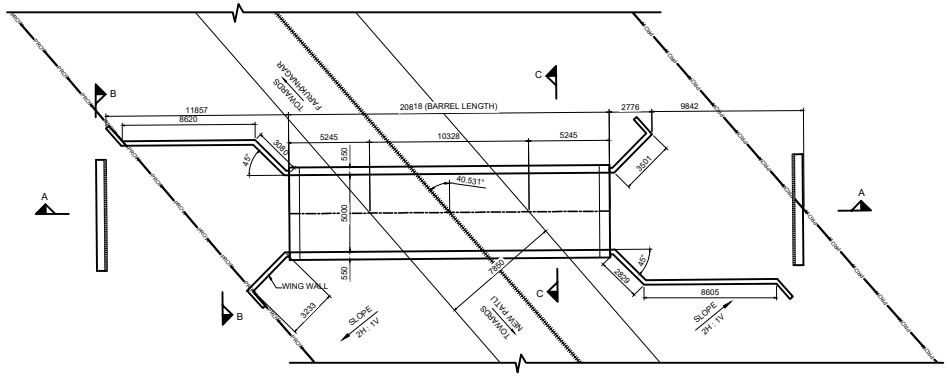
SECTIONAL ELEVATION AT A-A

SCALE 1:150



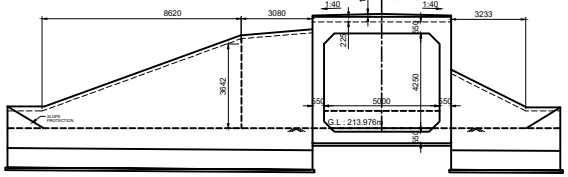
KEY PLAN

SCALE 1:NTS



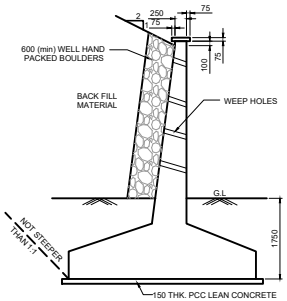
PLAN AT TOP

SCALE 1:150



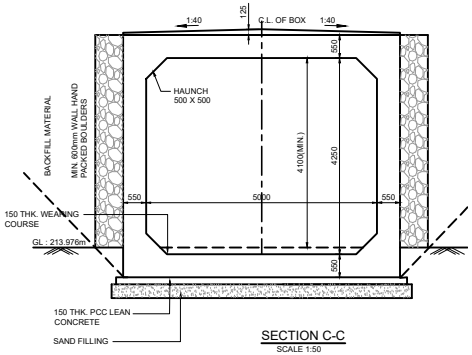
VIEW AT B-B

SCALE 1:100



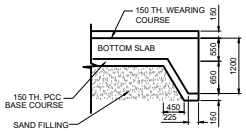
TYPICAL DETAIL OF RETURN WALL / WING WALL

SCALE 1:50



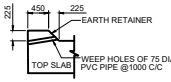
SECTION C-C

SCALE 1:50



SHEAR KEY

SCALE 1:50



EARTH RETAINER

SCALE 1:50

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. THE CHAINAGES SHOWN ARE RECKONED FROM C/L OF NEW PATLI STATION BUILDING TAKEN AS 0.00 M, WITH RESPECT TO UP MAIN LINE.
3. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
4. BOX BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.
5. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
6. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL, BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
7. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
8. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/ISSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
9. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
10. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
11. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
7. SEISMIC ZONE- IV
8. EXPOSURE CONDITION- MODERATE.
9. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
10. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
11. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM.CONFIRMING TO IS: 3117.
12. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
13. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC/WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
14. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. HEIGHT GAUGE SHALL BE PROVIDE AS PER RDSO STANDARD DRAWING NO. RDSO/M0001.

IMPORTANT NOTE:
TOP OF BOTTOM SLAB OF RCC BOX SHALL NOT BE KEPT ABOVE THE NATURAL GROUND LEVEL HOWEVER, ROAD LEVEL AND VERTICAL CLEARANCE ABOVE ROAD LEVEL SHALL BE MAINTAINED AS SHOWN IN THE DRAWING.OVERALL HEIGHT OF THE BOX MAY NEED MODIFICATION ACCORDINGLY.THE HEIGHT OF RCC BOX SHALL BE PROVIDED KEEPING ABOVE PROVISION IN VIEW.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

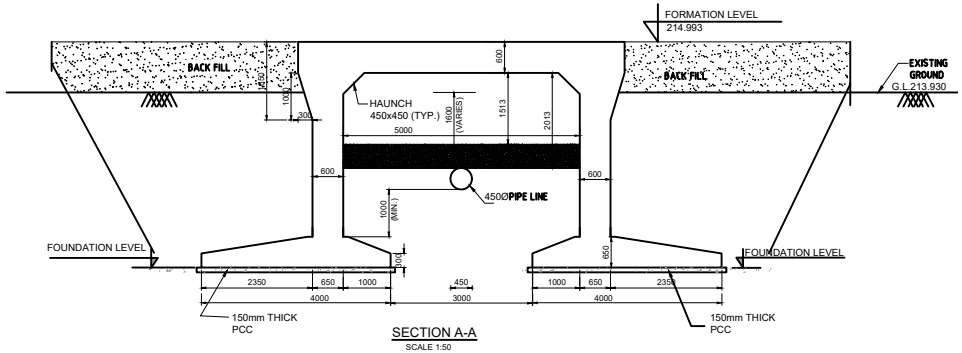
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

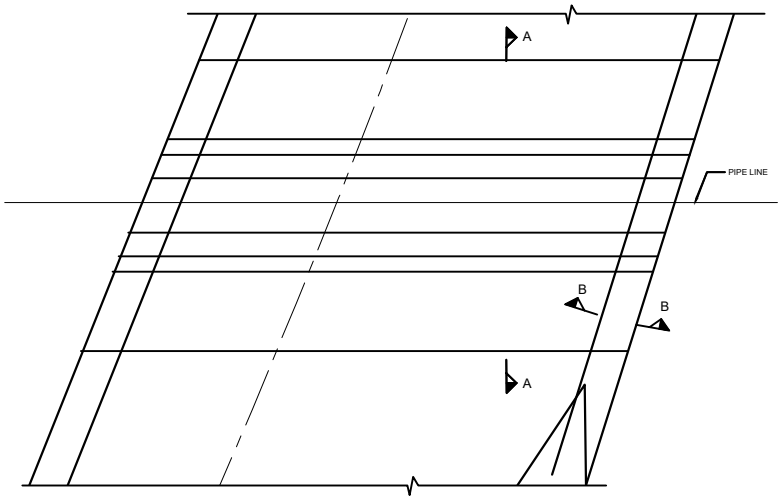
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR ROAD UNDER BRIDGE NO.5 - 1X5.0X4.25m RCC BOX AT CH. 2823.679 m (CONNECTING LINE NEW PATLI TO SULTANPUR)

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-04005_A1	1 OF 1

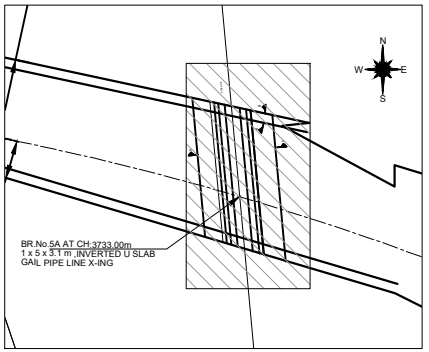
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



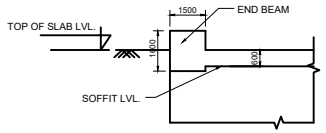
SECTION A-A
SCALE 1:50



PLAN
SCALE 1:100



KEY PLAN
SCALE 1:NTS



SECTION B-B
SCALE 1:50

NOTES :

A) GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. FOR RAIL LEVELS, FORMATION LEVEL, GRADES ETC. REFER L-SECTION.
3. BRIDGE IS TO BE DESIGNED FOR 32.5 T LOADING.
4. THE EXISTING DETAILS ARE AS PER SITE SURVEY AND SHALL BE VERIFIED BY THE CONCTRACTOR BEFORE EXECUTION.
5. ENGINEER IN CHARGE/ SITE ENGINEER SHOULD VERIFY THE RAIL LEVEL FORMATION LEVEL , BED LEVEL & TRACK CENTER AT SITE BEFORE COMMENCEMENT OF WORK.
6. SUITABLE BED SLOPE SHALL BE PROVIDED AND ADJUSTED AS PER SITE CONDITIONS
7. ENGINEER IN CHARGE/SITE ENGINEER SHALL ENSURE THE SAFETY OF TRACK/ROAD AT ALL THE TIME AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DAMAGE OF S&T CABLE /OFC DURING EXECUTION OF WORK CONCERNED DEPT. SUCH AS BSNL/AIRTEL/SSE/SIG/ADSTE ETC. SHALL BE INFORMED WELL IN ADVANCE BEFORE EXECUTION OF WORK.
8. THIS DRAWING IS THE PROPERTY OF HRIDC AND FOR EXCLUSIVE USE OF HORC.
9. DETAILED DESIGN DRAWING WILL BE PREPARED BASED ON THIS CONCEPTUAL APPROVED GAD.
10. THICKNESS OF STRUCTURAL MEMBERS ARE TENTATIVE AND WILL BE FINALISED AFTER DETAILED DESIGN.

B) TECHNICAL NOTES :

1. PROTECTION WORK ON SLOPES OF BANK UP TO 15M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
2. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
3. FOR PROPER DRAINAGE OF WATER SUITABLE SLOPE TO BE PROVIDED ON TOP OF BOX SLAB.
4. ALL CLEAN/ EXPANSION JOINTS SHALL BE FILLED WITH THERMOCOL.
5. PLACEMENT LEVEL OF BOX AS SHOWN IN THIS GAD IS INDICATIVE AND MAY BE SUITABLY LOWERED/ELEVATED BASED UPON THE REQUIREMENT OF CLEARANCE, DRAINAGE &NATURAL GROUND PROFILE.
6. DIMENSION OF THE BOX MAY BE SUITABLY MODIFIED AS PER SITE REQUIREMENT.HEIGHT OF BOX SHOWN INCLUDES MINIMUM REQUIRED CLEAR OPENING HEIGHT AND WEARING COARSE. OVERALL HEIGHT OF BOX OPENING MAY VARY AS PER SITE REQUIREMENT AND ACTUAL ROAD/GROUND PROFILE.
7. DESIGN CRITERIA SHALL BE BASED ON FOLLOWING IRS CODES
   (i) IRS BRIDGE RULE
   (ii) IRS CONCRETE BRIDGE CODE
   (iii) IRS BRIDGE SUB-STRUCTURE & FOUNDATION CODE
8. SEISMIC ZONE- IV
9. EXPOSURE CONDITION- MODERATE.
10. DURING CONSTRUCTION, IF REQUIRED, ROAD CLOSURE TO BE OBTAINED FROM CONCERNED ROAD/CIVIL AUTHORITIES. DIVERSION OF ROAD IF ANY, REQUIRED IS TO BE DONE BY CONTRACTOR AT HIS COST
11. THE BACK FILL MATERIAL SHALL BE CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE AND FOUNDATION CODE.
12. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 K.G/SQM. CONFIRMING TO IS: 3117.
13. REINFORCEMENT SHALL BE Fe 500D (TMT) CONFORMING TO IS 1786
14. FOR CONCRETE SPECIFICATION REFER IRS CONCRETE BRIDGE CODE.
    GRADE OF CONCRETE :
    (i) ALL RCC /WEARING COURSE =M:35/DETAILED DESIGN DRG.
    (ii) LEVELING COURSE/LEAN CONCRETE =M:20/DETAILED DESIGN DRG.
15. BEARING CAPACITY OF SOIL SHALL BE ENSURED AS PER DETAILED DESIGN REQUIREMENT. IF REQUIRED GROUND IMPROVEMENT MAY BE CARRIED OUT AND CONFIRMED THROUGH FIELD TESTING.
15. FOUNDATION LEVEL SHOWN IN DRAWING IS TENTATIVE. DETAILED DESIGN DRAWING SHALL BE FOLLOWED FOR FOUNDATION LEVEL DURING EXECUTION.
16. ADEQUATE SLOPE IN BOTTOM SLAB OF RCC BOX TOWARDS DIRECTION OF FLOW SHALL BE PROVIDED.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

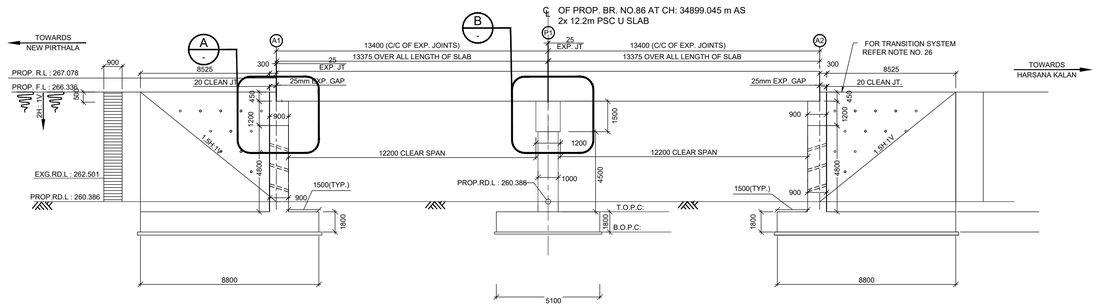
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR BRIDGE NO.5A - 5 m CLEAR SPAN INVERTED U OVER GAIL PIPE LINE CROSSING AT CH. 3733m (CONNECTING LINE NEW PATLI TO SULTANPUR)

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD_04005A_A0	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

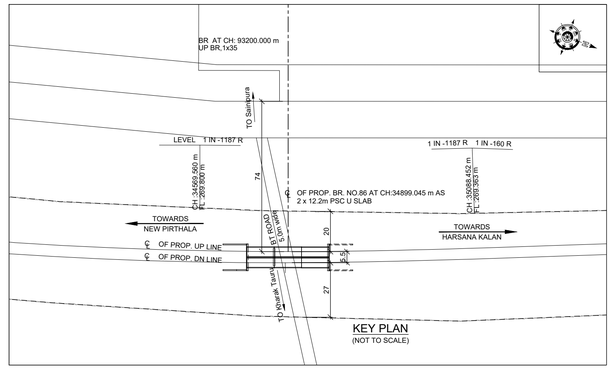
4.2 Major Bridges

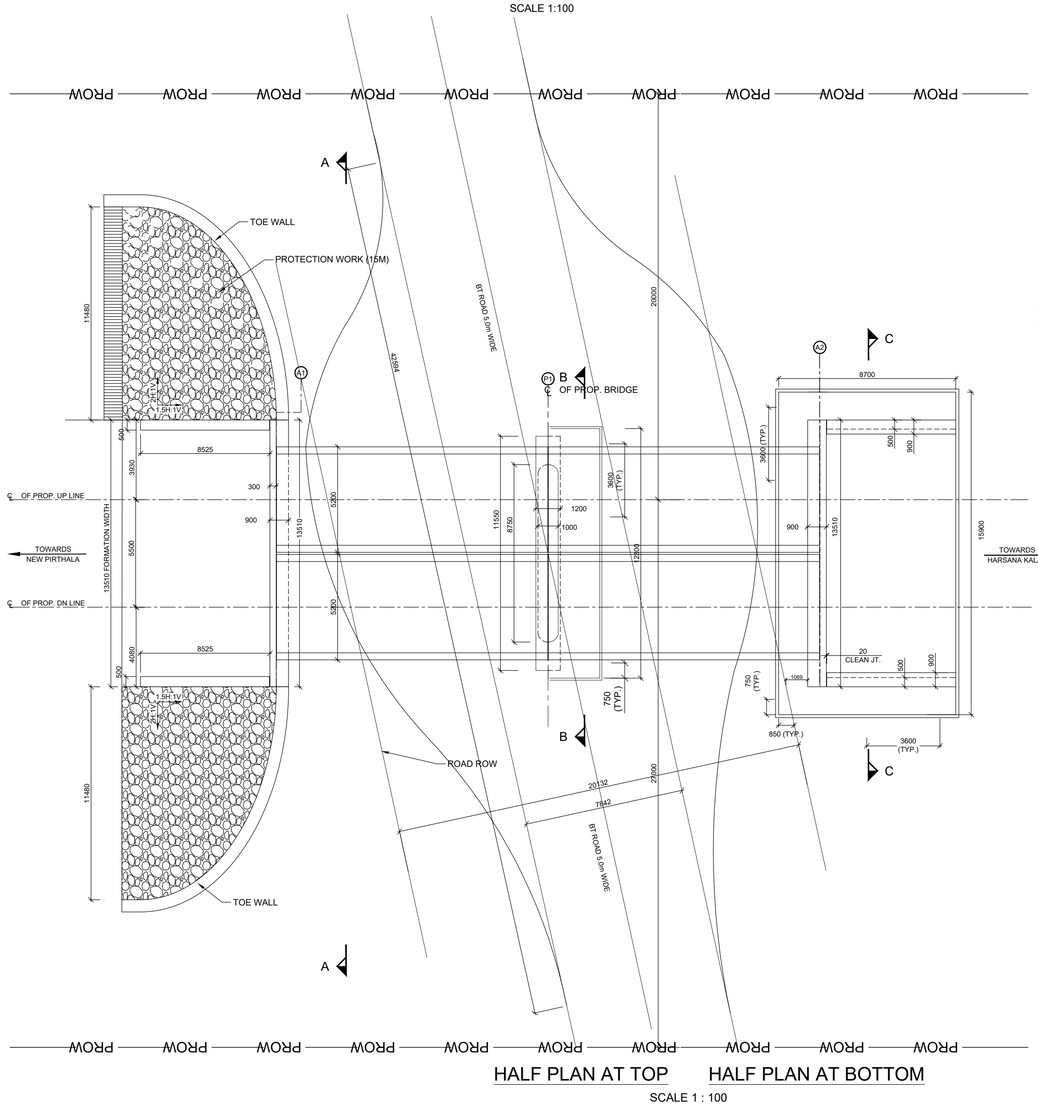
4.2.1 Main Line

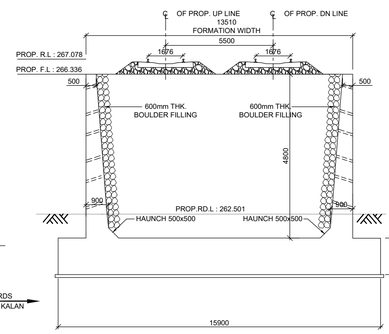


ELEVATION

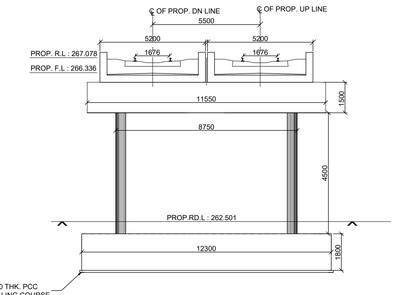
SCALE 1:100

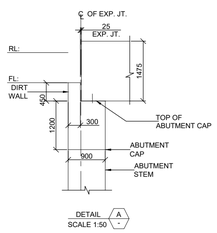






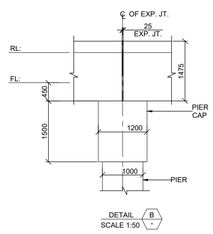
SECTION C-C
SCALE 1 : 100





DETAIL A
SCALE 1:50

SECTION B-B
SCALE 1 : 100



DETAIL B
SCALE 1:50

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER.
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) IS 2911 PART-1 SECTION-2.
   v) EXPOSURE CONDITION - MODERATE.
   vi) SEISMIC ZONE - III.
   vii) STANDARD OF LOADING : SUPER-STRUCTURE - 25T (RDSO STANDARD) & SUB-STRUCTURE - 32.5T - 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. SIZE & TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   ii) FOR FOUNDATION----------M35
   iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786-2008 SHALL BE USED AS REINFORCEMENT.
11. BED LEVEL,ROAD LEVEL, FORMATION LEVEL AND RAIL LEVEL AND ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. PROTECTION WORK ON SLOPES OF BANK UPTO 30M, BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURNWALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @1.464 KG/SQM.
18. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
19. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
20. THE SPECIFICATIONS FOR THE PSC U SLAB SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO 10281,10281/1 AND 10281/2.
21. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
22. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
23. BRIDGE DETAILS LIKE , DL, INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
24. THE DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
25. FOR TOE WALL DETAILS REFER SEPARATE SKETCH NO. GC-HRIDC-SK-GEN-014.
26. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

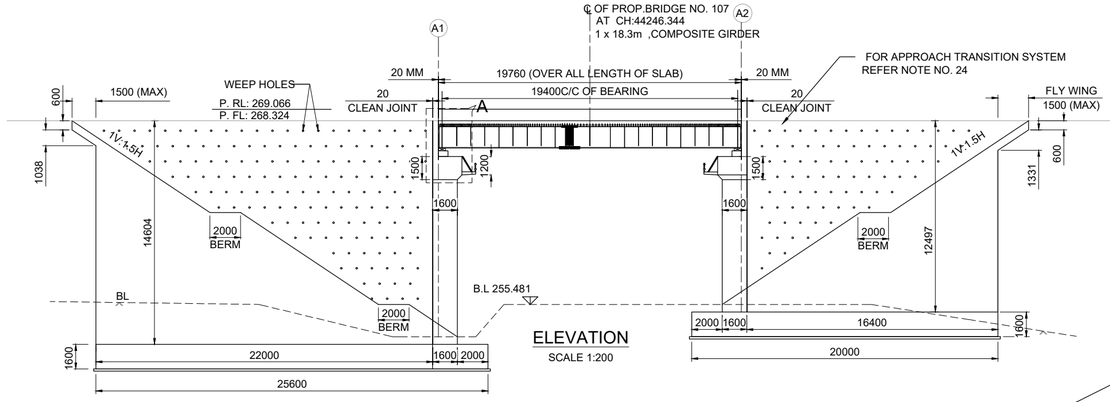
THE INFRASTRUCTURE PEOPLE

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

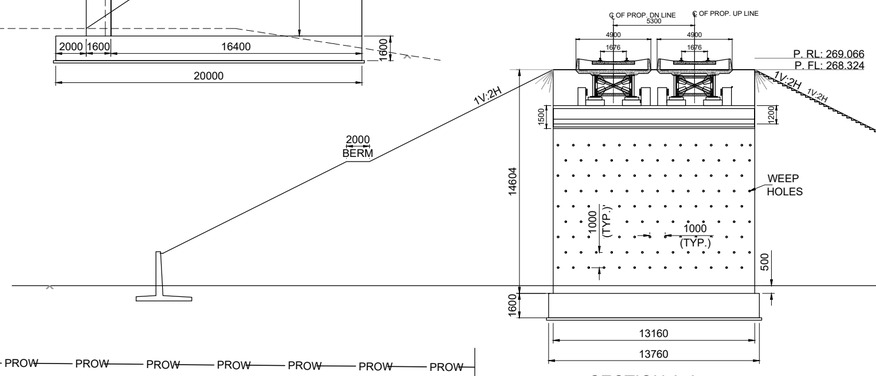
TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR MAJOR BRIDGE NO 86 AT CH: 34899.045m AS 2X12.2m PSC U SLAB

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01086_A1	1 OF 1

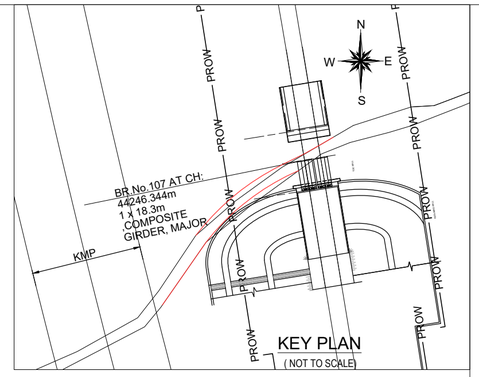
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



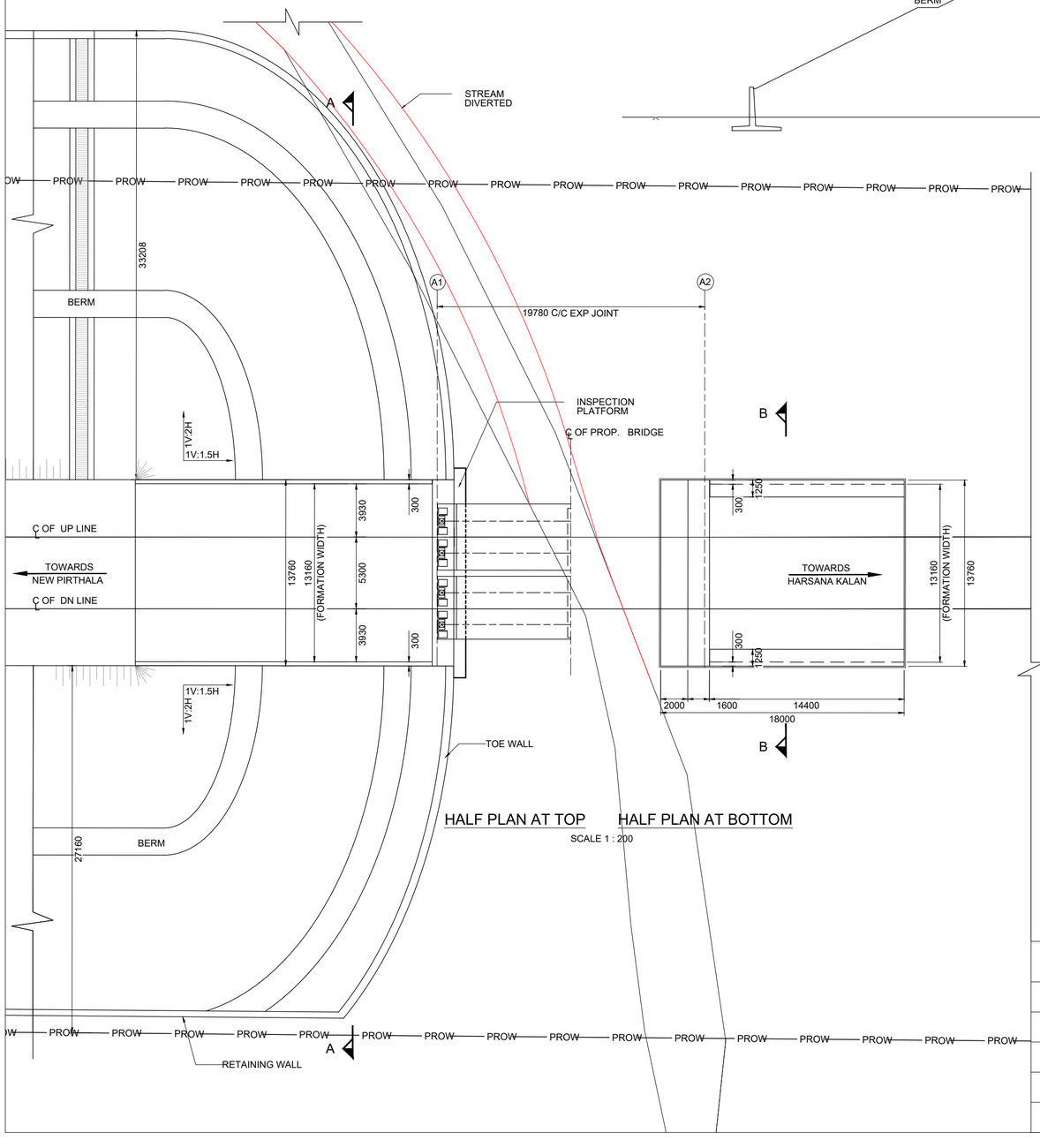
ELEVATION
SCALE 1:200



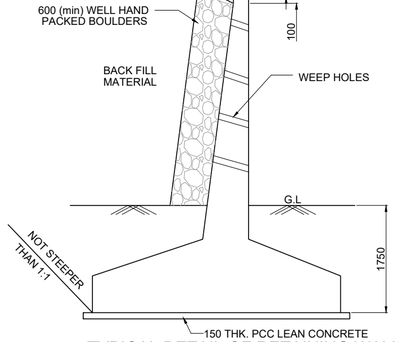
SECTION A-A
(SCALE 1:200)



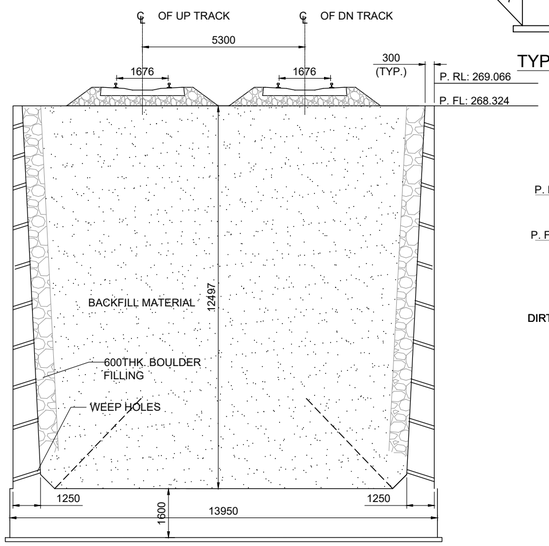
KEY PLAN
(NOT TO SCALE)



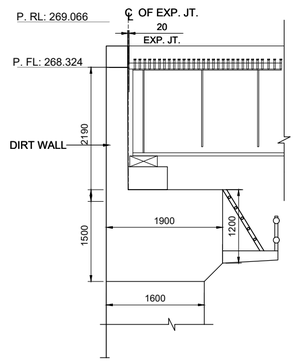
HALF PLAN AT TOP HALF PLAN AT BOTTOM
SCALE 1 : 200



TYPICAL DETAIL OF RETAINING WALL
SCALE 1:50



SECTION B-B
SCALE 1:100



DETAIL -A
SCALE 1:50

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) EXPOSURE CONDITION - MODERATE.
   v) SEISMIC ZONE - IV
   vi) STANDARD OF LOADING :- SUPER STRUCTURE-25T AND SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   ii) FOR FOUNDATION----------M35
   iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786-2008 SHALL BE USED AS REINFORCEMENT.
11. ROAD LEVEL & FORMATION LEVEL AND RAIL LEVEL SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. STONE PITCHING ON SLOPES OF BANK ON APPROACHES OF BRIDGE MAY BE PROVIDED AS DIRECTED BY ENGINEER.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL BEHIND RETURN WALL / WING WALL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
18. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
19. THE SPECIFICATIONS FOR THE PSC I GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO B-11753/R1 TO 11753/7R1
20. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
21. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
22. BRIDGE DETAILS LIKE , DL, INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
23. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
24. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.
25. PATHWAY ARRANGEMENT SHELL BE PROVIDED ON OUTER SIDES OF THE COMPOSITE GIRDER. PATHWAY SHELL BE PROVIDED AS PER RDSO DWG. NO.CBS-0046 (CG).

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

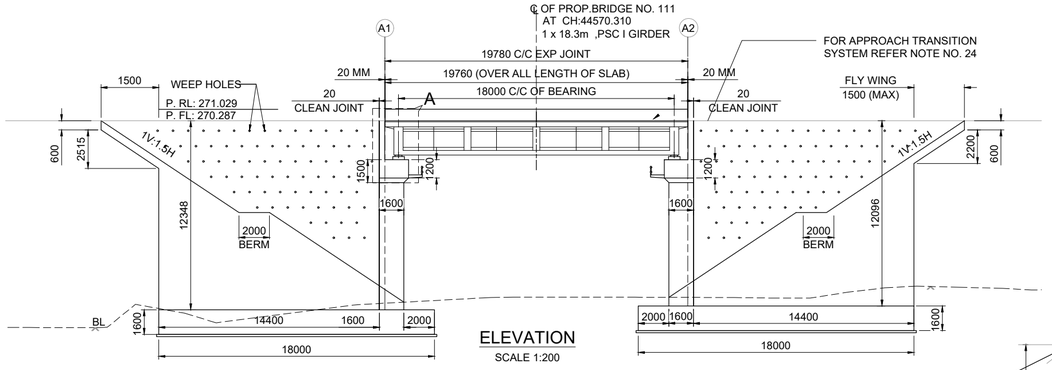
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE
SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR PROPOSED MAJOR BRIDGE NO.107 AT CH: 44246.344m 1 x 18.3 m COMPOSITE GIRDER

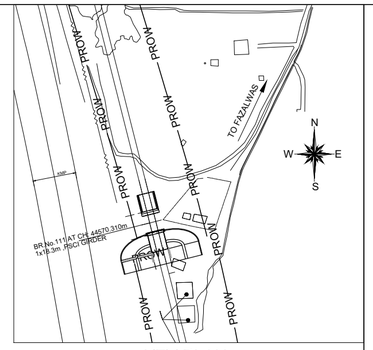
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRG-BRD-GAD-01107_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



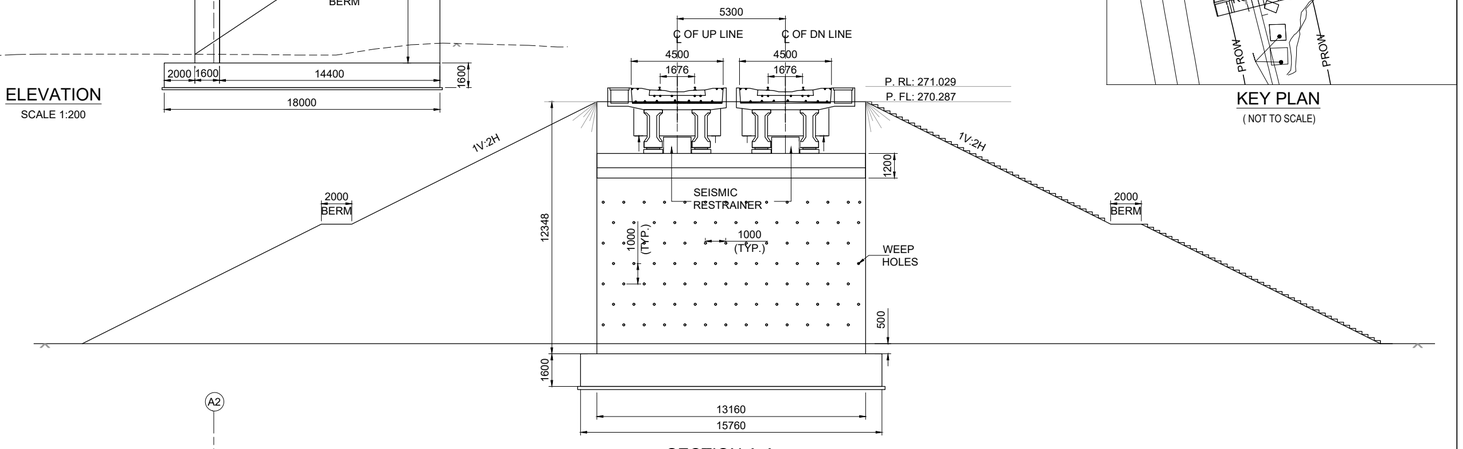
ELEVATION

SCALE 1:200



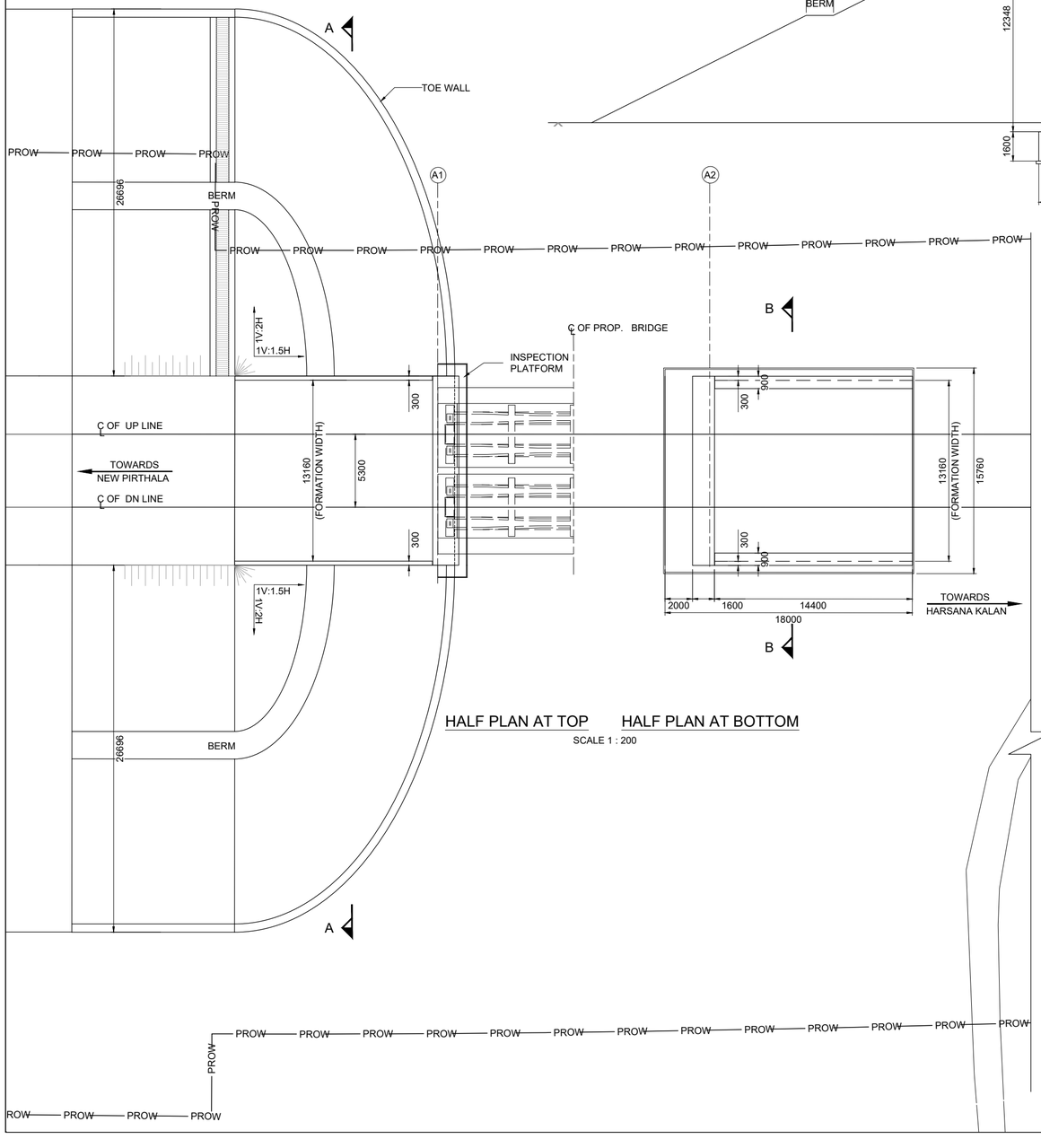
KEY PLAN

(NOT TO SCALE)



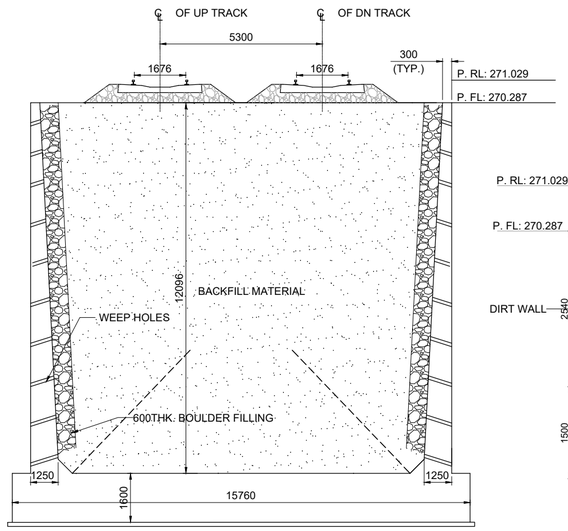
SECTION A-A

(SCALE 1:150)



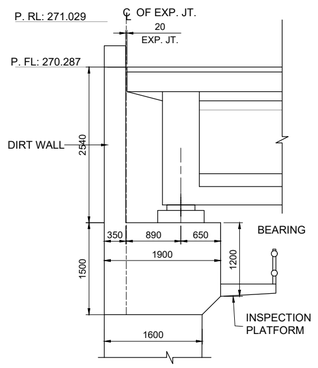
HALF PLAN AT TOP HALF PLAN AT BOTTOM

SCALE 1 : 200



SECTION B-B

SCALE 1:100



DETAIL -A

SCALE 1:50

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) IS 2911 PART-1 SECTION-2.
   v) EXPOSURE CONDITION - MODERATE.
   vi) SEISMIC ZONE - IV
   vii) STANDARD OF LOADING :- SUPER STRUCTURE-25T AND SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   ii) FOR FOUNDATION----------M35
   iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786-2008 SHALL BE USED AS REINFORCEMENT.
11. ROAD LEVEL & FORMATION LEVEL AND RAIL LEVEL SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. STONE PITCHING ON SLOPES OF BANK ON APPROACHES OF BRIDGE MAY BE PROVIDED AS DIRECTED BY ENGINEER.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
18. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
19. THE SPECIFICATIONS FOR THE PSC I GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO B-10273 TO 10273/4
20. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
21. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
22. BRIDGE DETAILS LIKE , DL, INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
23. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
24. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL
RL	ROAD LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

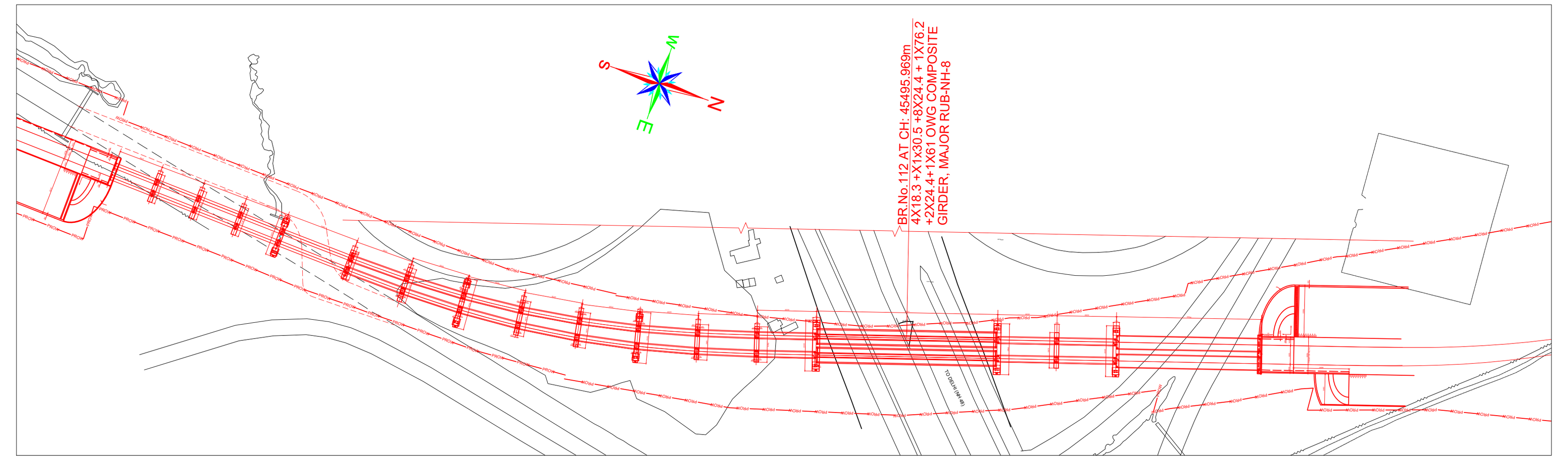
RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUALGENERAL ARRANGEMENT DRAWING FOR PROPOSED MAJOR RUB NO.111 AT CH: 44570.310 m AS 1 x 18.3 m PSC I GIRDER

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRG-BRD-GAD-01111_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	14-12-2022

ELEVATION



KEY PLAN

PLAN AT TOP

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) IS 2911 PART-1 SECTION-2.
   v) EXPOSURE CONDITION - MODERATE.
   vi) SEISMIC ZONE - IV
   vii) STANDARD OF LOADING :- SUPER STRUCTURE-32.5T (RDSO STANDARD OWG),SUPER STRUCTURE-25T (RDSO STANDARD COMPOSITE GIRDER (CG) & SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. SIZE AND TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL---------------M35
   ii) FOR FOUNDATION --M35
   iii) FOR LEVELING COURSE------------------------------------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786-2008 SHALL BE USED AS REINFORCEMENT.
11. BED LEVEL & ROAD LEVEL,FORMATION LEVEL AND RAIL LEVEL & ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 33°.
13. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BACK FILL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
15. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 KG/SQM.
16. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
17. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
18. THE SPECIFICATIONS FOR THE SUPERSTRUCTURE REFER18.3m COMPOSITE GIRDER RDSO/B-11753/R2 TO 11753/6/R1,24.4m COMPOSITE GIRDER RDSO/B-11751/1R2 TO 11751/8/, 30.5m COMPOSITE GIRDER RDSO/B-11754/1R1 TO 11754/7R1, 61m OPEN WEB GIRDER RDSO/B 17121 TO 17138 & 76.2m OPEN WEB GIRDER RDSO/B 17101 TO 17118.
19. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
20. FOR PILE FOUNDATION THE RELEVANT CODE FOR PILE FOUNDATION AND TESTING WILL BE FOLLOWED.
21. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
22. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
23. ARRANGEMENT FOR PATHWAY SHALL BE PROVIDED AS PER RDSO DWG. NO. CBS-0045(FOR OWG) & CBS-0046 (FOR CG).
24. TROLLEY REFUGE SHALL BE PROVIDED ON OPPOSITE SIDES OF PIERS AS PER IRSOD.
25. SEISMIC ARRESTOR SHALL BE PROVIDED ON THE PIER/ABUTMENT CAP.
26. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
27. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
28. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

CONSTRUCTION DEPTH

	PROP. LINE
1) RAIL	172 mm
2) RUBBER PAD	10 mm
3) PSC SLEEPER	210 mm
4) BALLAST	350 mm
TOTAL	742 mm

CONSTRUCTION DEPTH ON OPEN WEB GIRDER

1) RAIL (60kg)	172 mm
2) BEARING PAD	10 mm
3) GROOVED BEARING PLATE	19 mm
4) CHANNEL SLEEPER	150 mm
5) PACKING PLATE BELOW SLEEPER	6 mm
6) ELASTOMERIC PAD	25 mm
TOTAL	382 mm

LEGEND

R.L	RAIL LEVEL
F.L	FORMATION LEVEL
RD.L	ROAD LEVEL
T.O.P.C	TOP OF PILE CAP
B.O.P.C	BOTTOM OF PILE CAP
PROP.	PROPOSED
THK.	THICKNESS
EXP. JT.	EXPANSION JOINT
C.C	CEMENT CONCRETE
TYP.	TYPICAL
B.L	BED LEVEL

COLOR CODE LEGEND:

- – – – – - PROPOSED
- —— —— - DISMANTAL

TRACK DETAILS

PROP R.L	273.923m
PROP F.L	273.181m
VERTICAL ALIGNMENT	LEVEL
HORIZONTAL ALIGNMENT	STRAIGHT

DESCRIPTION OF PROPOSED BRIDGE

S.NO.	ITEM	
1	CHAINAGE (m)	45495.969
2	RAIL LEVEL (m)	273.923m
3	FORMATION LEVEL (m)	273.181m
4	SKEW ANGLE	----
5	CLEAR SPAN (m)	30.500, 76.2 &61
6	TYPE OF CROSSING	ROADS

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R. KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-1	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANTS FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

THE INFRASTRUCTURE PEOPLE

Member of the Surbana Jurong Group

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR PROP. MAJOR RUB NO.112, AT CH: 45495.969m

4X18.3(CG) +1X30.5(CG) +8X24.4 (CG)+1X76.2(OWG) +2X24.4(CG)+1X61(OWG)

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRG-BRD-GAD-01112_A1	1 OF 2

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	08-12-2022

NOTES:
1. FOR GENERAL NOTES REFER SHEET 1 OF 2.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
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CONSULTANT:
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RITES Limited in consortium with SMEC International Pty. Ltd.

THE INFRASTRUCTURE PEOPLE

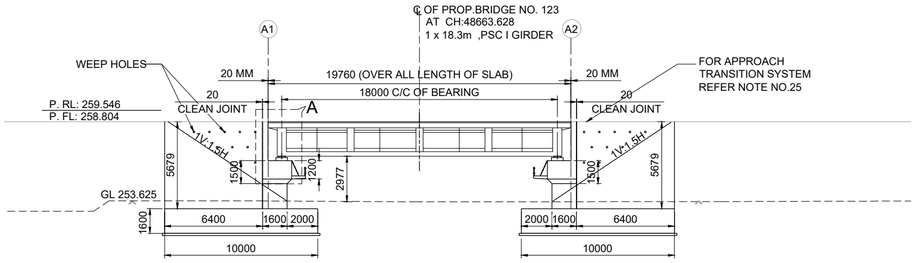
Member of the Surbana Jurong Group

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	[signature]	R.R. KUMAR GM/IP&P/HRIDC	[signature]
SUDHIR AGRAWAL DPD/CIVIL	[signature]	UMA.M.RAO DGM/C-1	[signature]
REETU PATIAL CDE/ CIVIL	[signature]		

TITLE CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR PROP. MAJOR RUB NO.112, AT CH: 45495.969m
4X18.3(CG) +1X30.5(CG) +8X24.4 (CG)+1X76.2(OWG) +2X24.4(CG)+1X61(OWG)

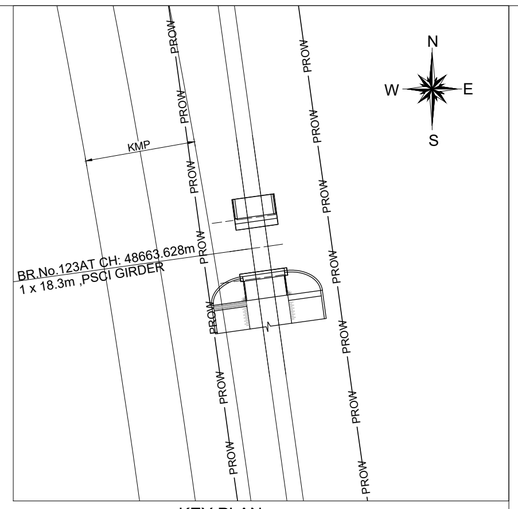
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRG-BRD-GAD-01112_A1	2 OF 2

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	08-12-2022



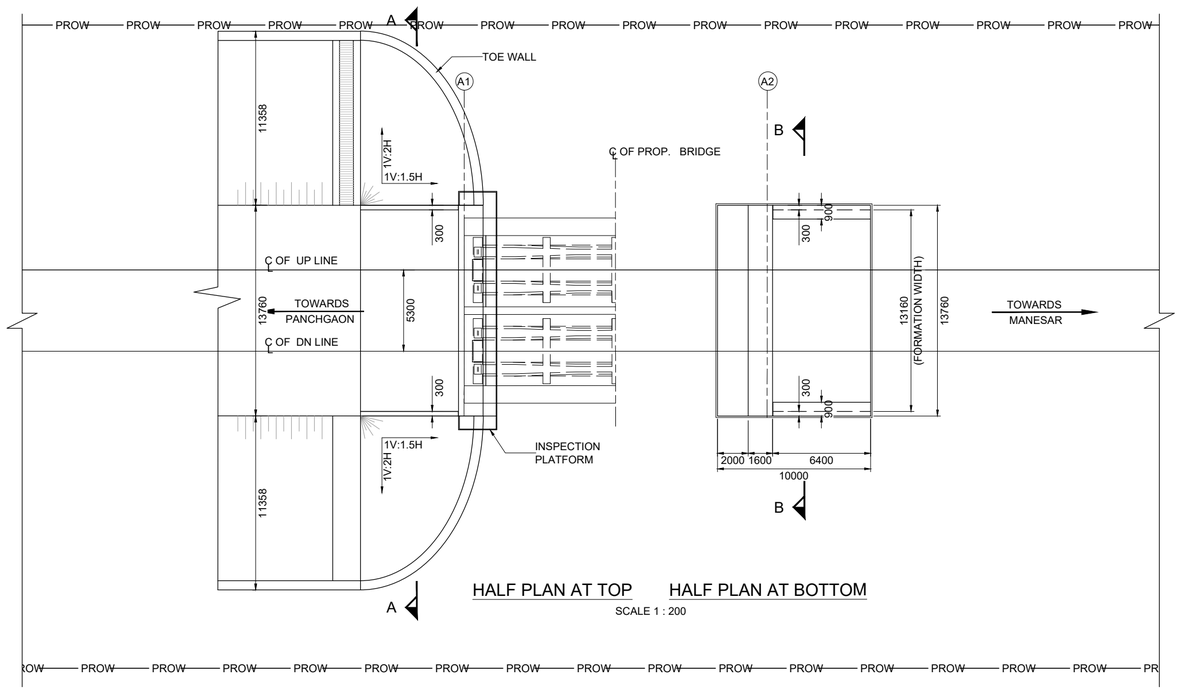
ELEVATION

SCALE 1:200



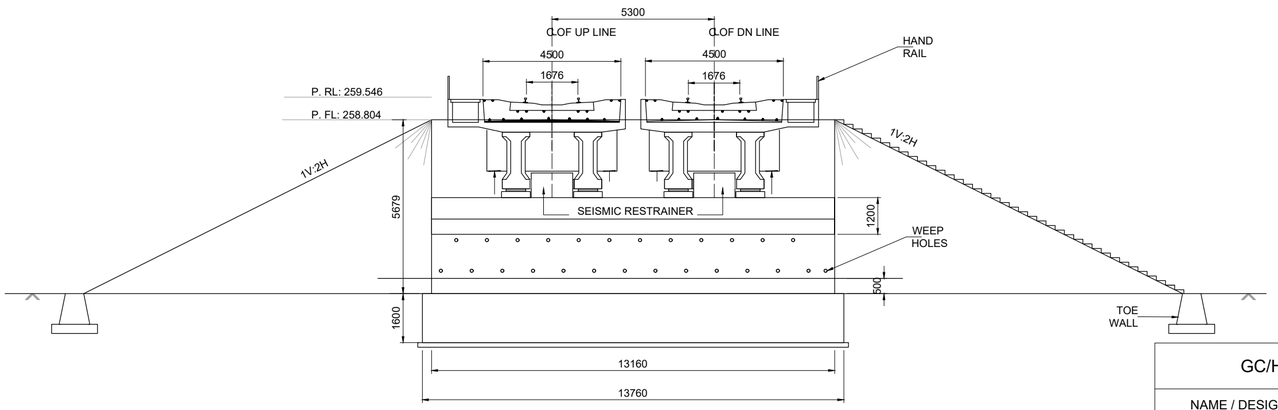
KEY PLAN

(NOT TO SCALE)



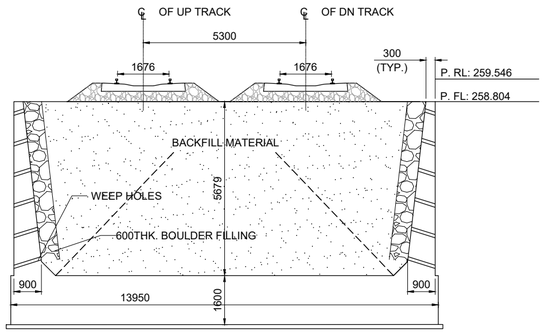
HALF PLAN AT TOP HALF PLAN AT BOTTOM

SCALE 1 : 200



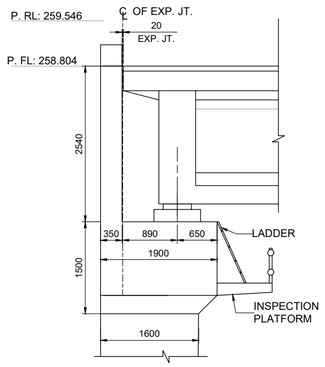
SECTION A-A

(SCALE 1:100)



SECTION B-B

SCALE 1:100



DETAIL -A

SCALE 1:50

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) EXPOSURE CONDITION - MODERATE.
   v) SEISMIC ZONE - IV
   vi) STANDARD OF LOADING :- SUPER STRUCTURE-25T AND SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   ii) FOR PILE & PILE CAP----------M35
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786-2008 SHALL BE USED AS REINFORCEMENT.
11. ROAD LEVEL & FORMATION LEVEL AND RAIL LEVEL SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL BEHIND RETURN WALL / WING WALL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
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17. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
18. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
19. THE SPECIFICATIONS FOR THE PSC I GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO B-10273 TO 10273/4
20. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
21. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
22. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
23. BRIDGE DETAILS LIKE , DL, INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
24. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
25. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

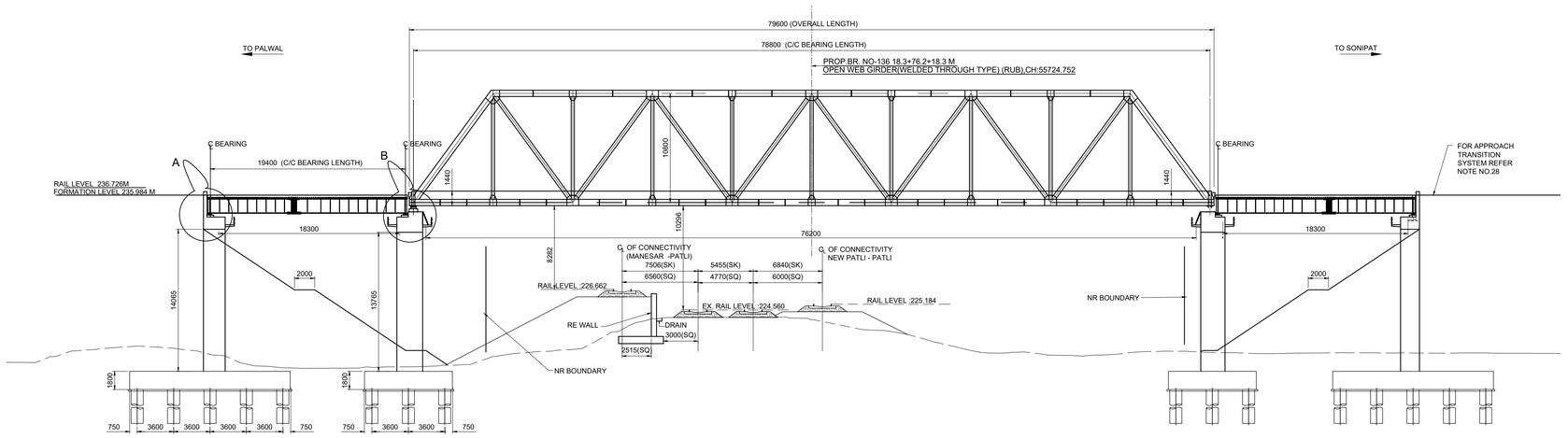
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

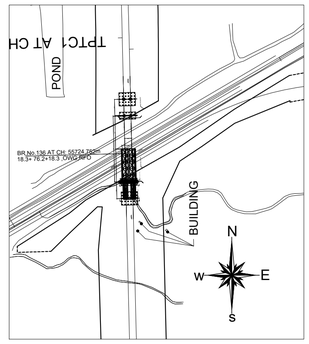
RITES THE INFRASTRUCTURE PEOPLE SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR PROPOSED VIADUCT BR NO.123 AT CH: 48663.628m AS 1 x 18.3 m PSC I GIRDER

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRG-BRD-GAD-01123_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



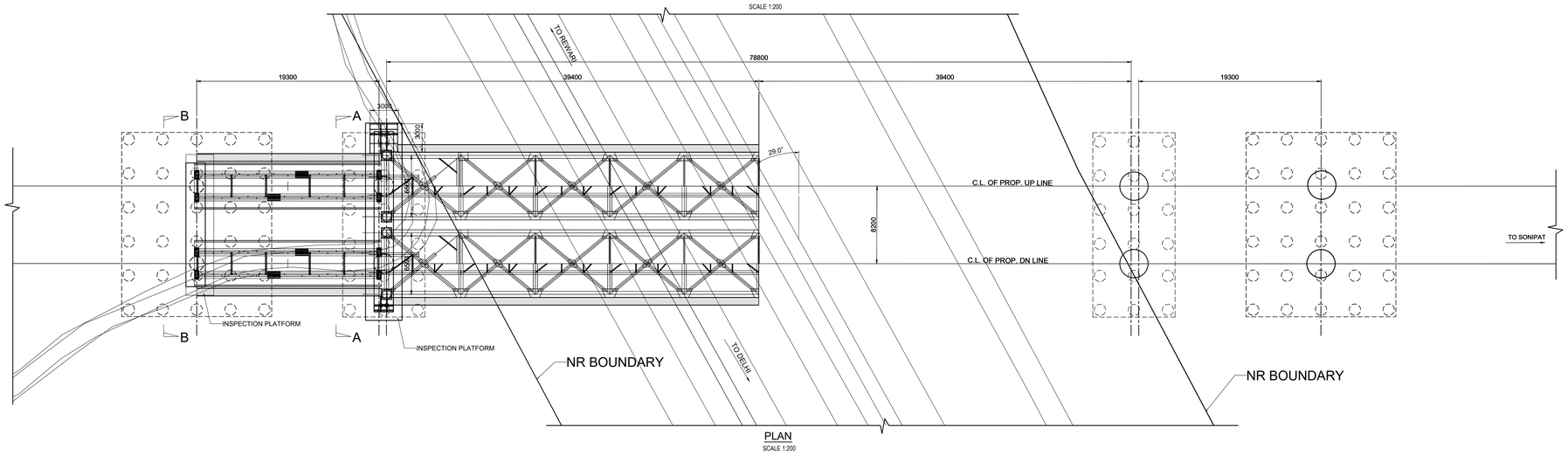


KEYPLAN
(NOT TO SCALE)

DATUM - 205.00					
FORMATION LEVEL	235.984	235.984	235.984	235.984	235.984
GROUND LEVEL	220.218	218.994	223.665	220.413	220.362
CHAINAGE	55666.052	55685.352	55724.752	55764.152	55783.452

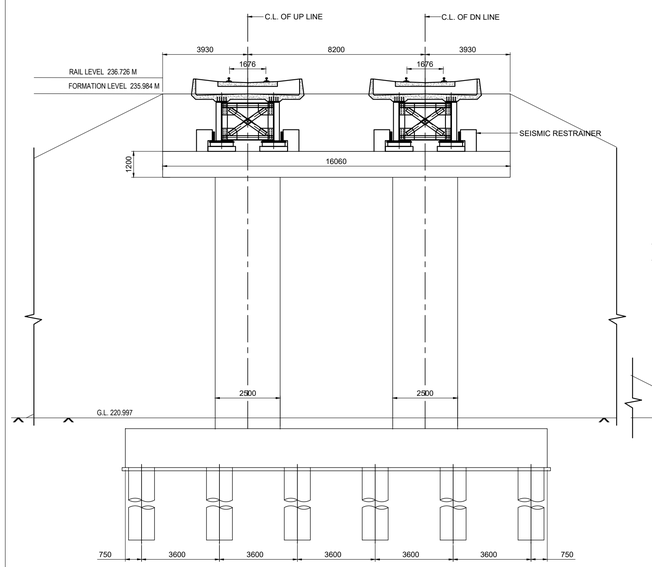
SECTIONAL ELEVATION

SCALE 1:200



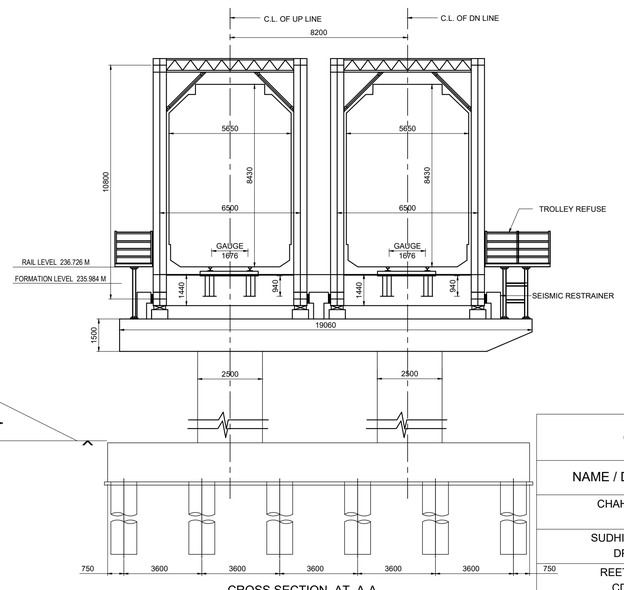
PLAN

SCALE 1:200



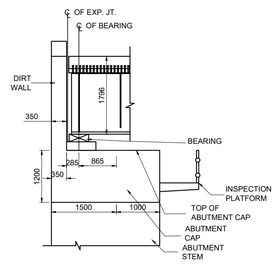
CROSS SECTION AT B-B

(SCALE 1:100)



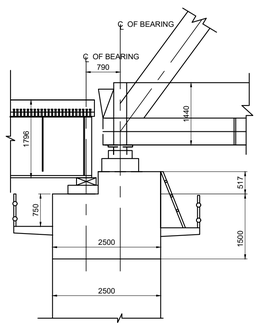
CROSS SECTION AT A-A

(SCALE 1:100)



DETAILS AT "A"

SCALE 1:50



DETAILS AT "B"

SCALE 1:50

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) IS 2911 PART-1 SECTION-2.
   v) EXPOSURE CONDITION - MODERATE.
   vi) SEISMIC ZONE - IV
   vii) STANDARD OF LOADING :- SUPER STRUCTURE-32.5T (RDSO STANDARD OWG),SUPER STRUCTURE-25T (RDSO STANDARD CG) & SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. TYPE OF FOUNDATION SHALL BE PILE FOUNDATION. NO.OF PILES & SIZE OF SUBSTRUCTURE SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   ii) FOR FOUNDATION ----------M35
   iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786-2008 SHALL BE USED AS REINFORCEMENT.
11. BED LEVEL & ROAD LEVEL,FORMATION LEVEL AND RAIL LEVEL & ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BACK FILL BEHIND RETURN WALL / WING WALL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 KG/SQM.
16. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
17. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
18. THE SPECIFICATIONS FOR THE OPEN WEB GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO B-17101 TO 17118 AND COMPOSITE GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO B-11753/1R1 TO 11753/7R1.
19. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
20. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
21. BRIDGE DETAILS LIKE , DL, INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
22. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
23. ARRANGEMENT FOR PATHWAY SHALL BE PROVIDED AS PER RDSO DWG. NO. CBS-0045(FOR OWG) & CBS-0046 (FOR CG).
24. TROLLEY REFUGE SHALL BE PROVIDED ON OPPOSITE SIDES OF EACH CENTRAL PIER.
25. SEISMIC ARRESTOR SHALL BE PROVIDED ON THE PIER/ABUTMENT CAP.
26. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
27. PROVISION FOR OHE MAST SHALL BE KEPT ON PIER CAP REQUIREMENT.
28. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	ChahateyRam	R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

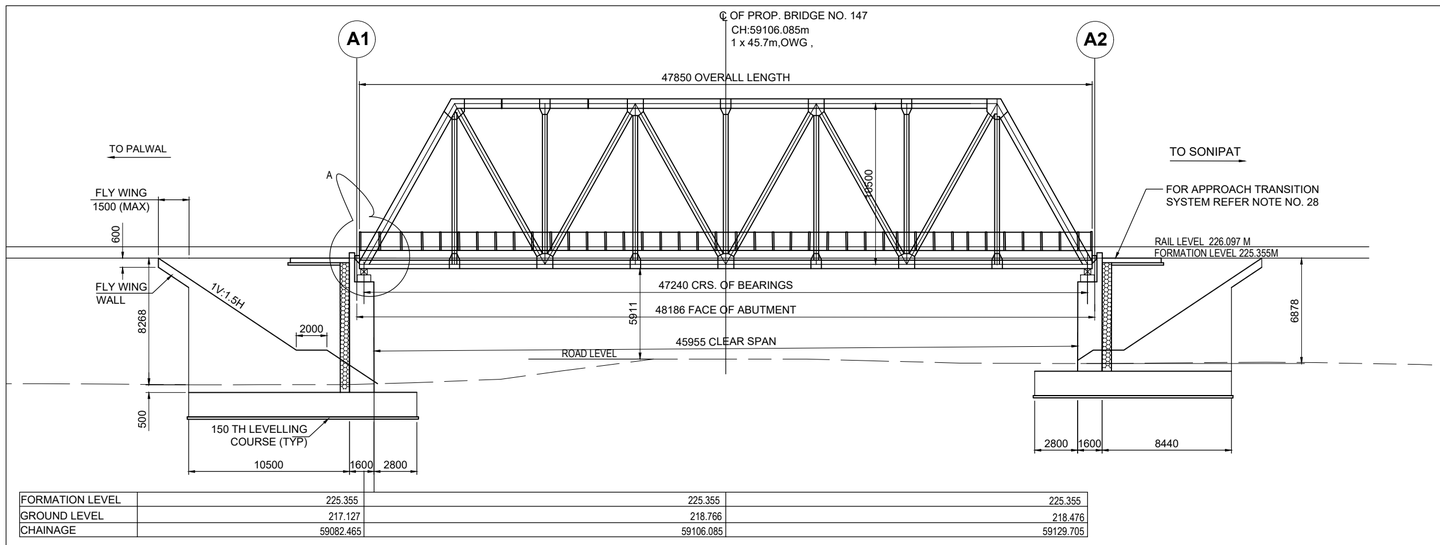
RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR PROPOSED MAJOR ROR BRIDGE NO.136, 18.3(CG)+76.2(OWG)+18.3 (CG) AT CH: 55724.752m

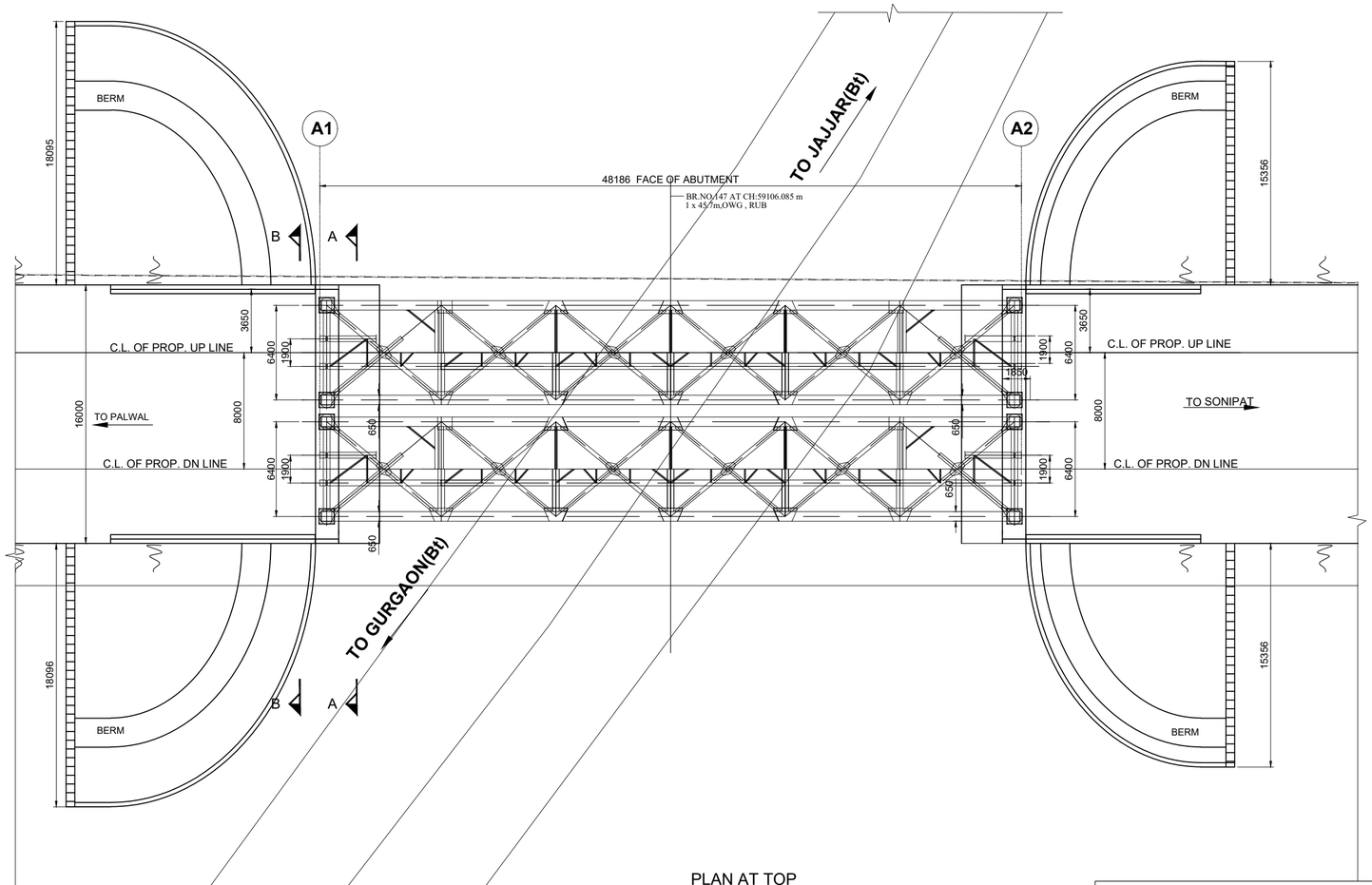
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01136_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

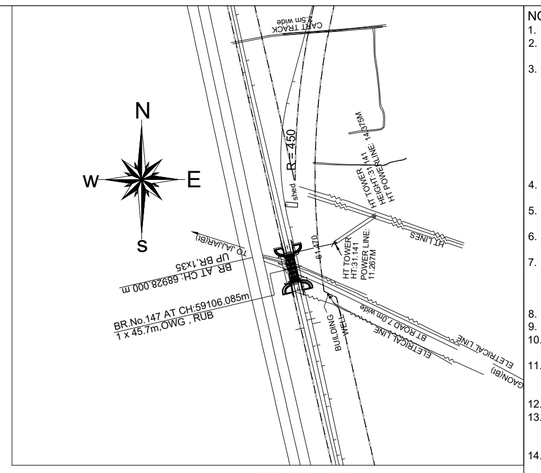


FORMATION LEVEL	225.355	225.355	225.355
GROUND LEVEL	217.127	218.766	218.476
CHAINAGE	59082.465	59106.085	59129.705

SECTIONAL ELEVATION
SCALE 1:200



PLAN AT TOP
SCALE 1:200



KEY PLAN
SCALE 1:NTS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   - i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   - ii) IRS CONCRETE BRIDGE CODE 2014.
   - iii) IRS BRIDGE RULES 2014.
   - iv) IS 2911 PART-1 SECTION-2.
   - v) EXPOSURE CONDITION - MODERATE.
   - vi) SEISMIC ZONE - IV
   - vii) STANDARD OF LOADING :- SUPER STRUCTURE-32.5T (RDSO STANDARD OWG), SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. SIZE AND TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   - i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   - ii) FOR FOUNDATION ----------M35
   - iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786- 2008 SHALL BE USED AS REINFORCEMENT.
11. BED LEVEL & ROAD LEVEL,FORMATION LEVEL AND RAIL LEVEL & ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 KG/SQM.
18. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
19. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
20. THE SPECIFICATIONS FOR THE OPEN WEB GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO/B-17081 TO 17098
21. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
22. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
23. BRIDGE DETAILS LIKE , DL, INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
24. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
25. ARRANGEMENT FOR PATHWAY SHALL BE PROVIDED AS PER RDSO DWG. NO. CBS-0045 (FOR OWG).
26. SEISMIC ARRESTOR SHALL BE PROVIDED ON THE PIER/ABUTMENT CAP.
27. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
28. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC

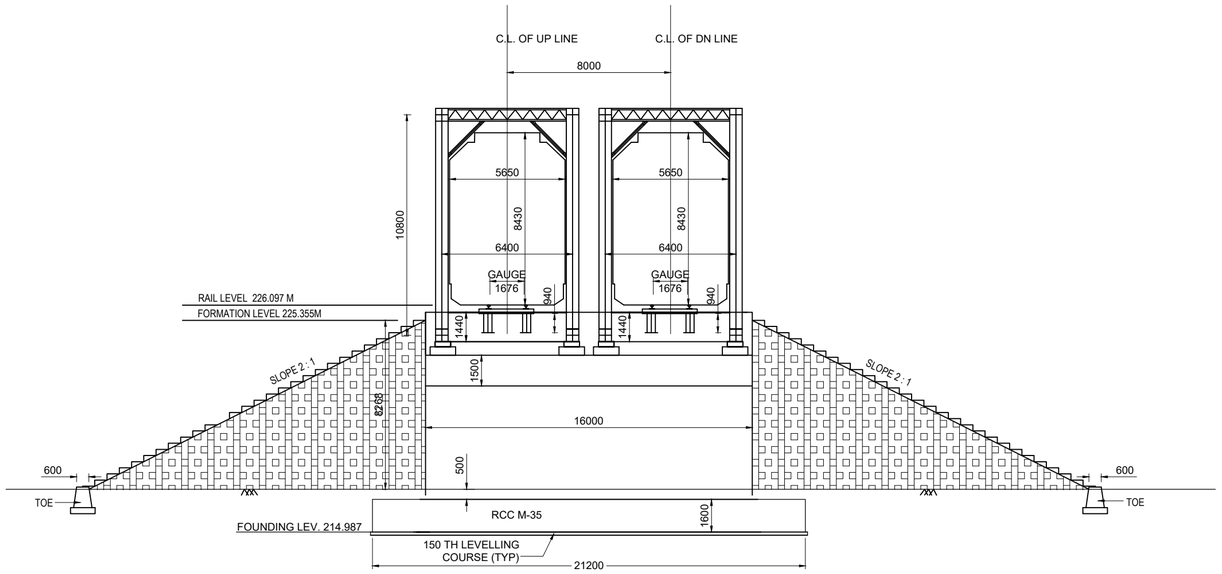
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR PROPOSED MAJOR RUB NO.147 AT CH:59106.085m 1 x 45.7m,OPEN WEB GIRDER

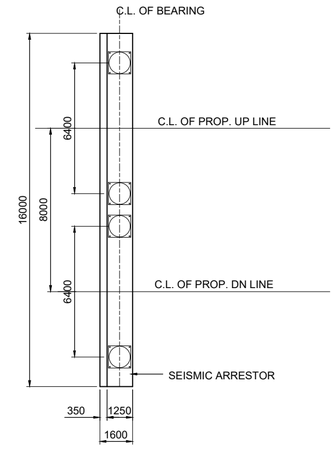
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01147_A1	1 OF 2

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	14-12-2022



CROSS SECTION AT A-A (ABUTMENT)

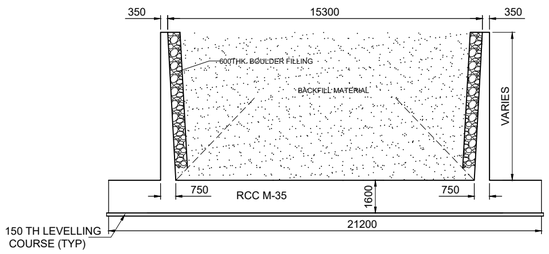
SCALE 1:150



TYPICAL DETAILS OF ABUTMENT CAP

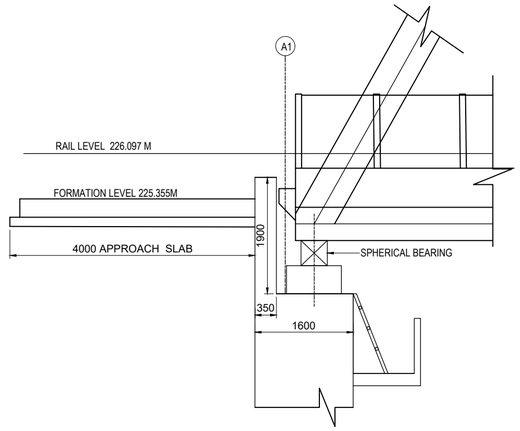
SCALE 1:150

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER.
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.



CROSS SECTION AT B-B

SCALE 1:150



DETAILS AT "A"

SCALE 1:50

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	ChahateyRam	R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

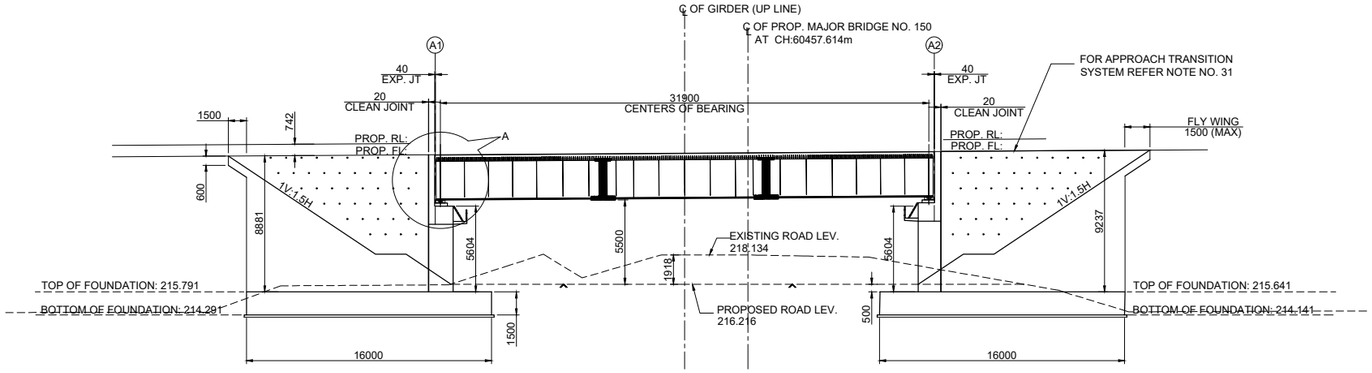
RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR PROPOSED MAJOR RUB NO.147 AT
59106.085 m 1 x 45.7m,OPEN WEB GIRDER

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01147_A1	2 OF 2

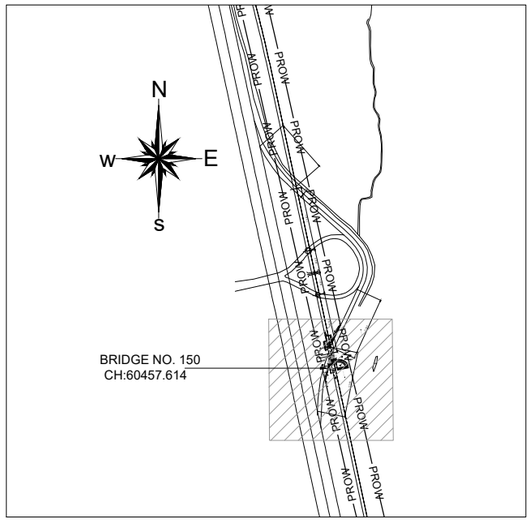
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



FORMATION LEVEL	224.666	224.796	224.872
GROUND LEVEL	216.224	217.991	216.862
CHAINAGE	60437.522	60457.614	60469.422

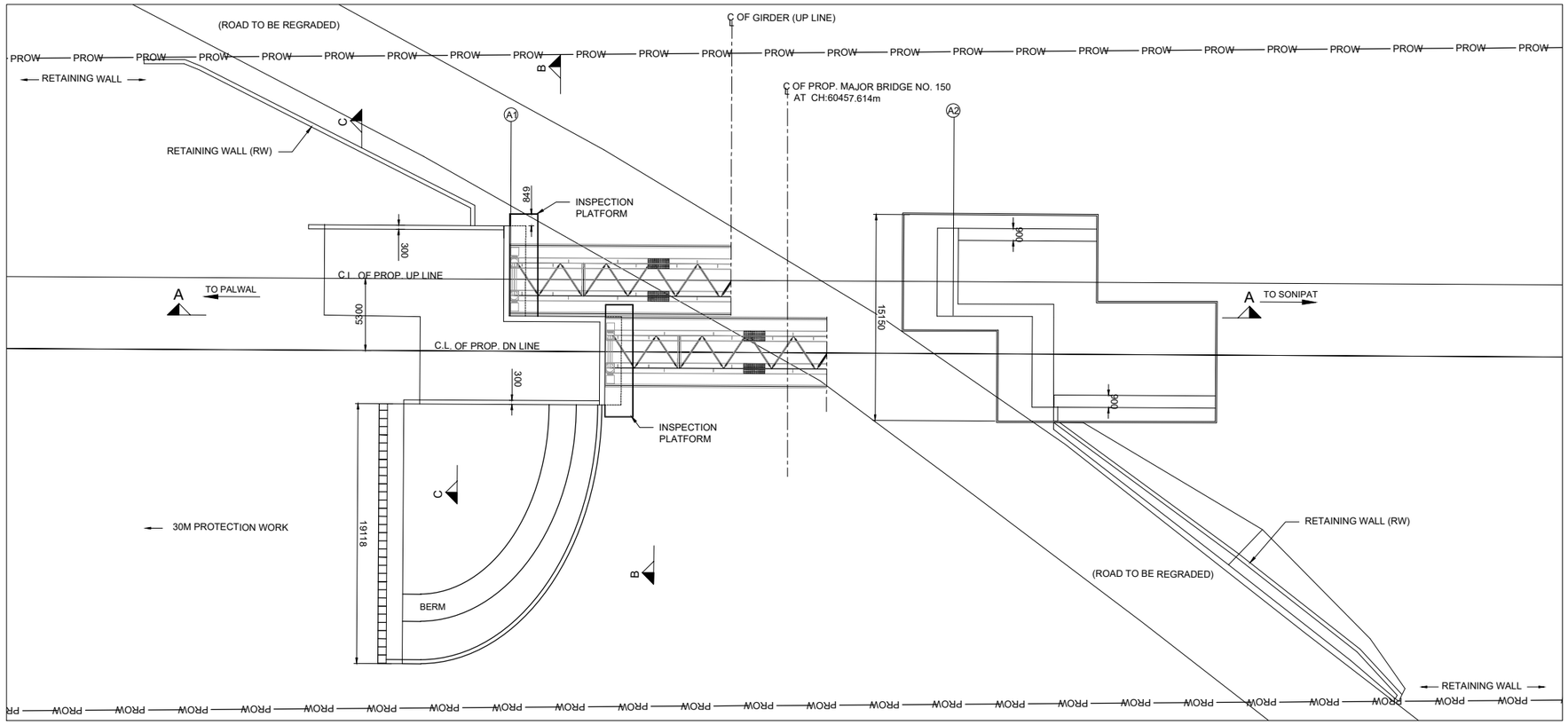
SECTIONAL ELEVATION

SCALE 1:200



KEY PLAN

SCALE 1:NTS



HALF PLAN AT TOP HALF PLAN AT BOTTOM

SCALE 1 : 200

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   - i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   - ii) IRS CONCRETE BRIDGE CODE 2014.
   - iii) IRS BRIDGE RULES 2014.
   - iv) IS 2911 PART-1 SECTION-2.
   - v) EXPOSURE CONDITION - MODERATE.
   - vi) SEISMIC ZONE - IV
   - vii) STANDARD OF LOADING :- SUPER STRUCTURE-25T, SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. SIZE AND TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   - i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   - ii) FOR FOUNDATION ----------M35
   - iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786- 2008 SHALL BE USED AS REINFORCEMENT.
11. BED LEVEL & ROAD LEVEL,FORMATION LEVEL AND RAIL LEVEL & ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN & WING WALL TO BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL OF RETURN & WING WALL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 KG/SQM.
18. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
19. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
20. THE SPECIFICATIONS FOR THE COMPOSITE GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO/B-11754/R2 TO 11754/6.
21. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
22. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
23. BRIDGE DETAILS LIKE , INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
24. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
25. ARRANGEMENT FOR PATHWAY SHALL BE PROVIDED AS PER RDSO DWG. NO. CBS-0046 (FOR CG).
26. SEISMIC ARRESTOR SHALL BE PROVIDED ON THE PIER/ABUTMENT CAP.
27. EXISTING ROAD SHALL BE FIRST DIVERTED TEMPORARILY TO THE EXSITING ROAD STANDARDS.
28. THEREAFTER EXISTING ROAD SHALL BE LOWERED AS SHOWN IN THE DRAWING. L-SECTION OF LOWERED ROAD SHALL BE GOT APPROVED FROM THE ENGINEER BEFORE START OF WORK.
29. PROTECTIVE BARRIERS FOR ABUTMENTS SHALL BE PROVIDED AS APPROVED BY THE ENGINEER.
30. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BRIDGE AFTER PROTECTION WORK.
31. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

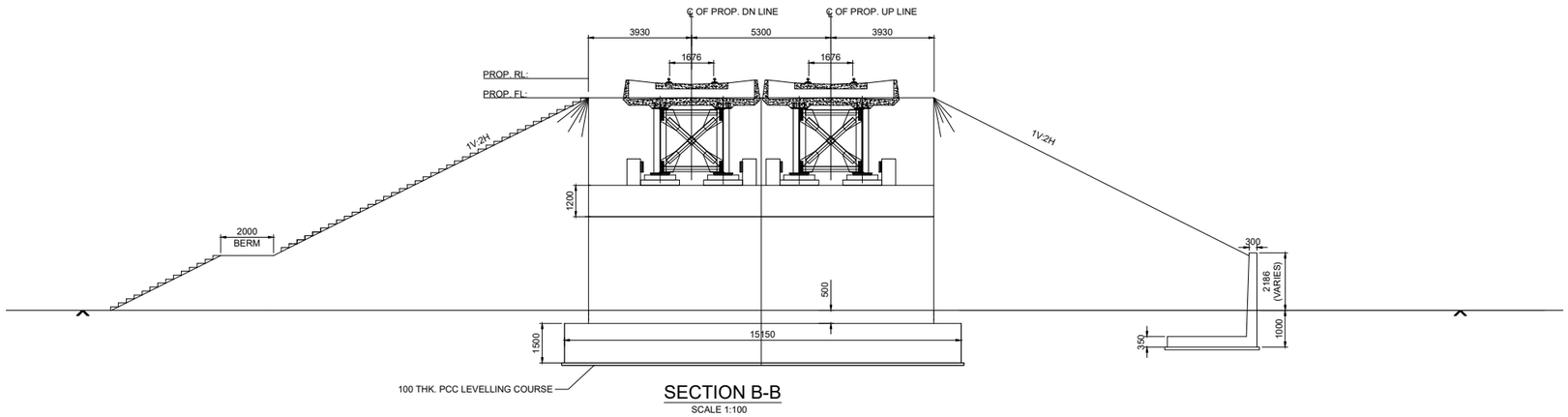
RITES THE INFRASTRUCTURE PEOPLE | SMEC

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

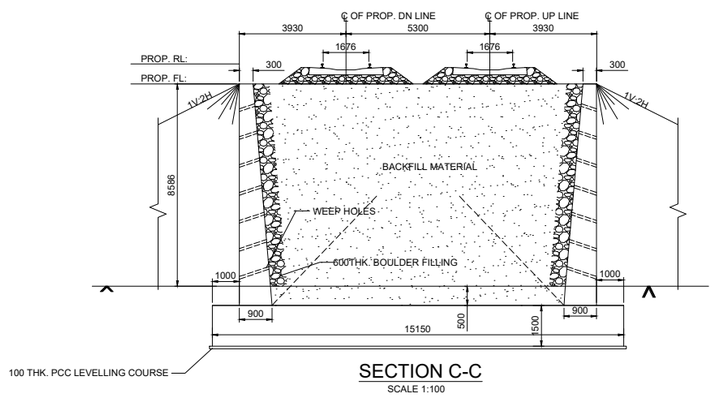
FOR PROPOSED MAJOR RUB NO.150,
1 x 30.5m COMPOSITE GIRDER AT CH: 60457.614m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01150_A1	1 OF 2

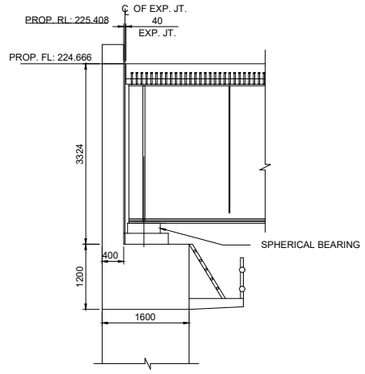
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



SECTION B-B
SCALE 1:100



SECTION C-C
SCALE 1:100



DETAIL- A
SCALE 1:50

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

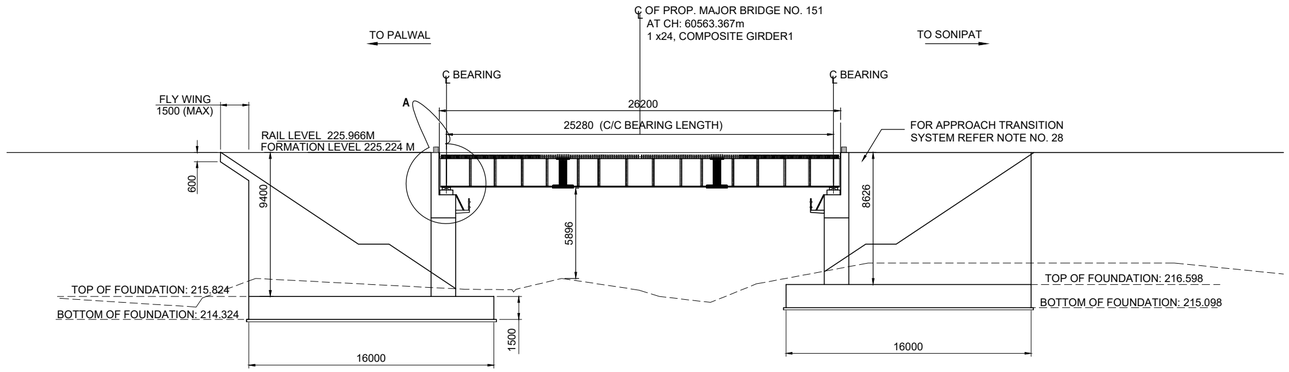
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR PROPOSED MAJOR RUB NO.150,
1 x 30.5m COMPOSITE GIRDER AT CH: 60457.614m

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01150_A1	2 OF 2

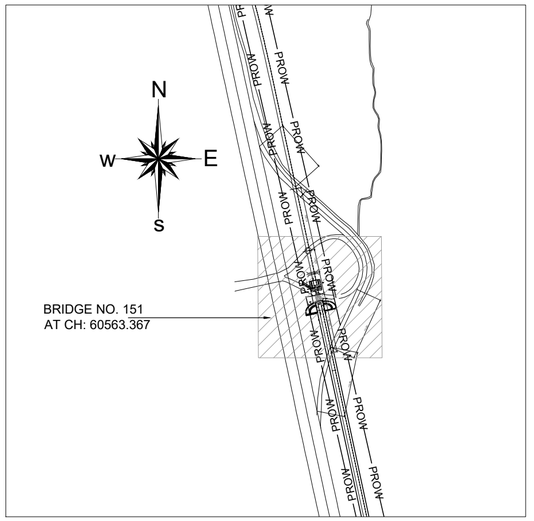
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



FORMATION LEVEL	225.224	225.224	225.224
GROUND LEVEL	216.358	216.223	217.583
CHAINAGE	60550.727	60563.367	60767.004

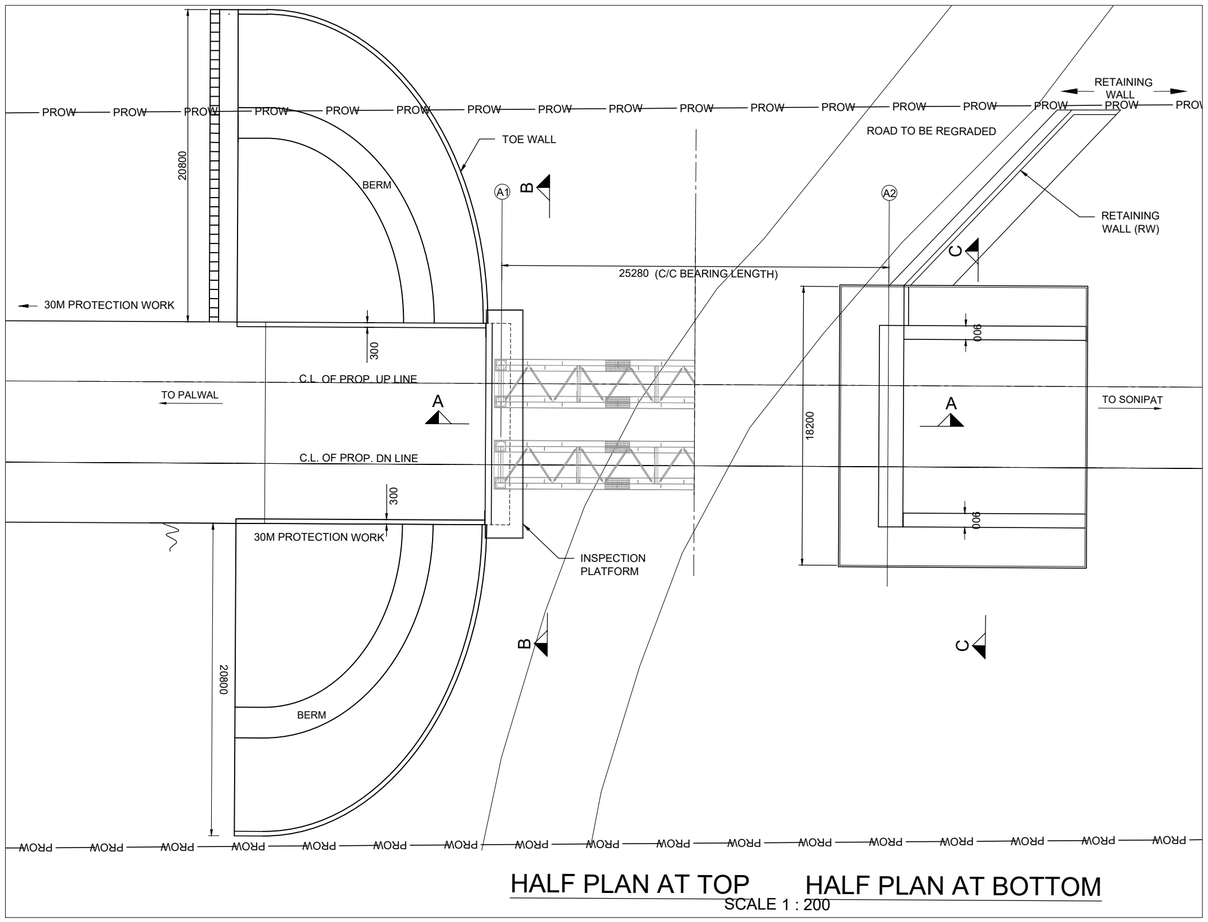
SECTIONAL ELEVATION

SCALE 1:200



KEY PLAN

SCALE 1:NTS



HALF PLAN AT TOP HALF PLAN AT BOTTOM

SCALE 1 : 200

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) IS 2911 PART-1 SECTION-2.
   v) EXPOSURE CONDITION - MODERATE.
   vi) SEISMIC ZONE - IV
   vii) STANDARD OF LOADING :- SUPER STRUCTURE-25T, SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. SIZE AND TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   ii) FOR FOUNDATION ----------M35
   iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786- 2008 SHALL BE USED AS REINFORCEMENT.
11. BED LEVEL & ROAD LEVEL,FORMATION LEVEL AND RAIL LEVEL & ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 KG/SQM.
18. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
19. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
20. THE SPECIFICATIONS FOR THE COMPOSITE GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO/B-11751/R1 TO 11751/8.
21. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
22. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
23. BRIDGE DETAILS LIKE , INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
24. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
25. PATHWAY SHALL BE PROVIDED ON OUTER SIDE OF CG. RDSO DWG. NO. CBS-0046 (FOR CG.) SHALL BE FOLLOWED FOR ARRANGEMENT OF PATHWAY.
26. SEISMIC ARRESTOR SHALL BE PROVIDED ON THE PIER/ABUTMENT CAP.
27. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY APPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
28. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR

RITES Limited in consortium with SMEC International Pty. Ltd.

THE INFRASTRUCTURE PEOPLE

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

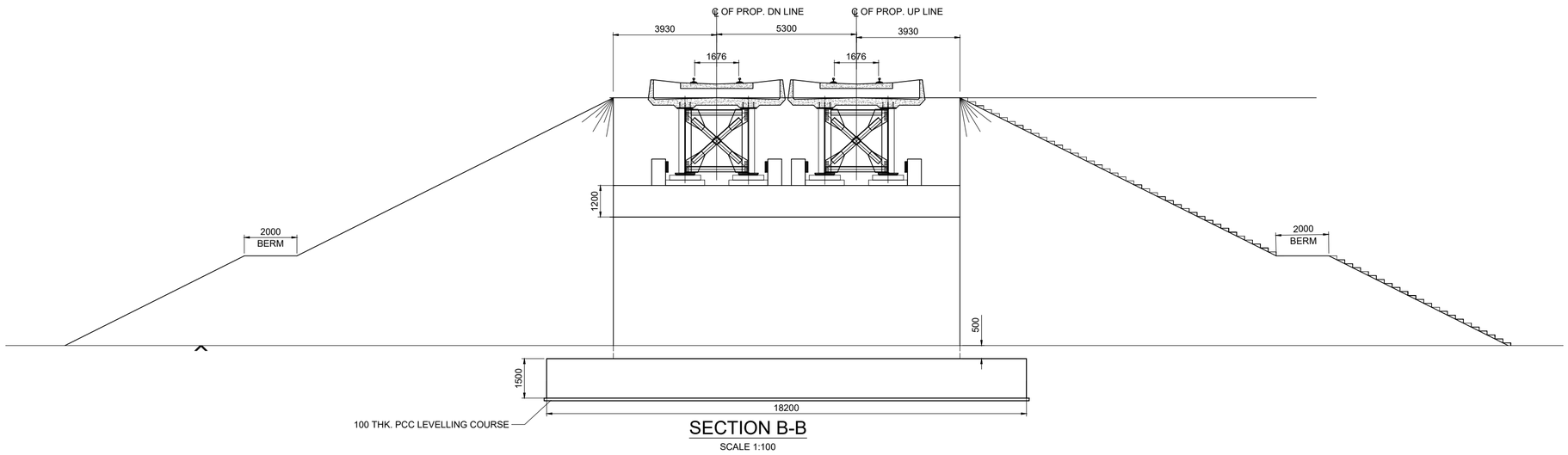
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING

FOR PROPOSED MAJOR RUB NO.151,
1 x 24.4m COMPOSITE GIRDER AT CH: 60563.367m

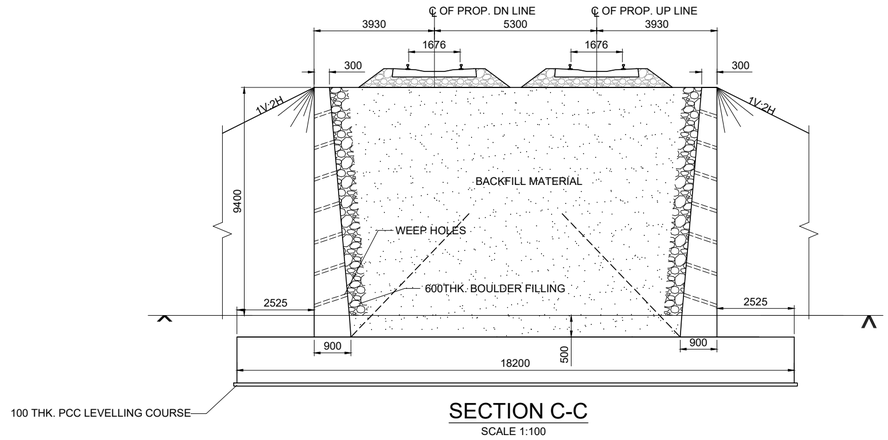
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01151_A1	1 OF 2

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

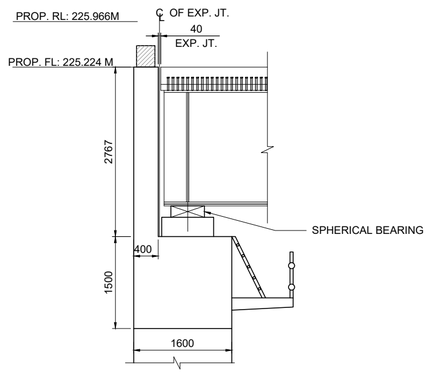
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED



SECTION B-B
SCALE 1:100



SECTION C-C
SCALE 1:100



DETAIL- A
SCALE 1:50

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

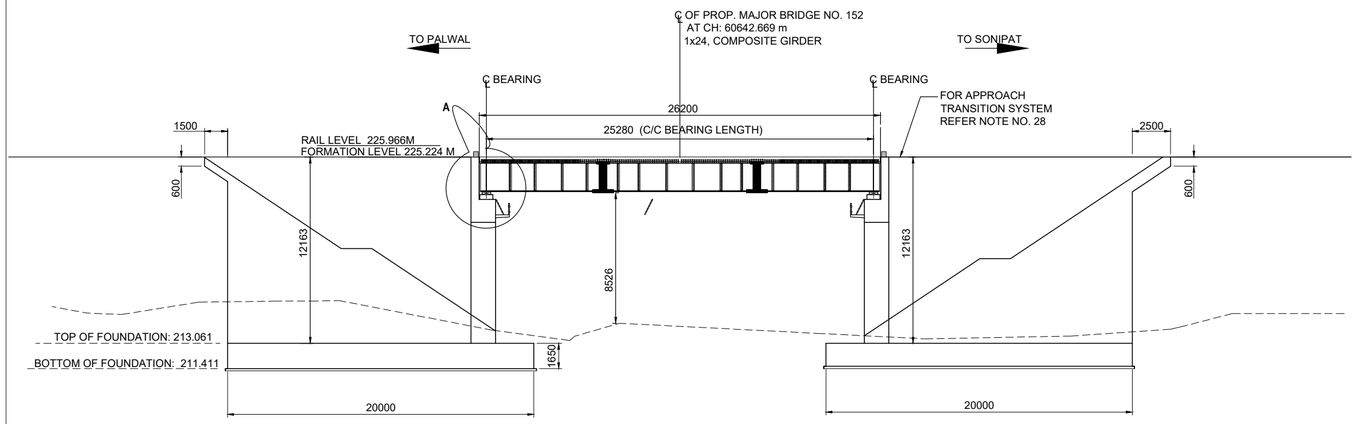
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR PROPOSED MAJOR RUB NO.151,
1 x 24.4m COMPOSITE GIRDER AT CH: 60563.367m

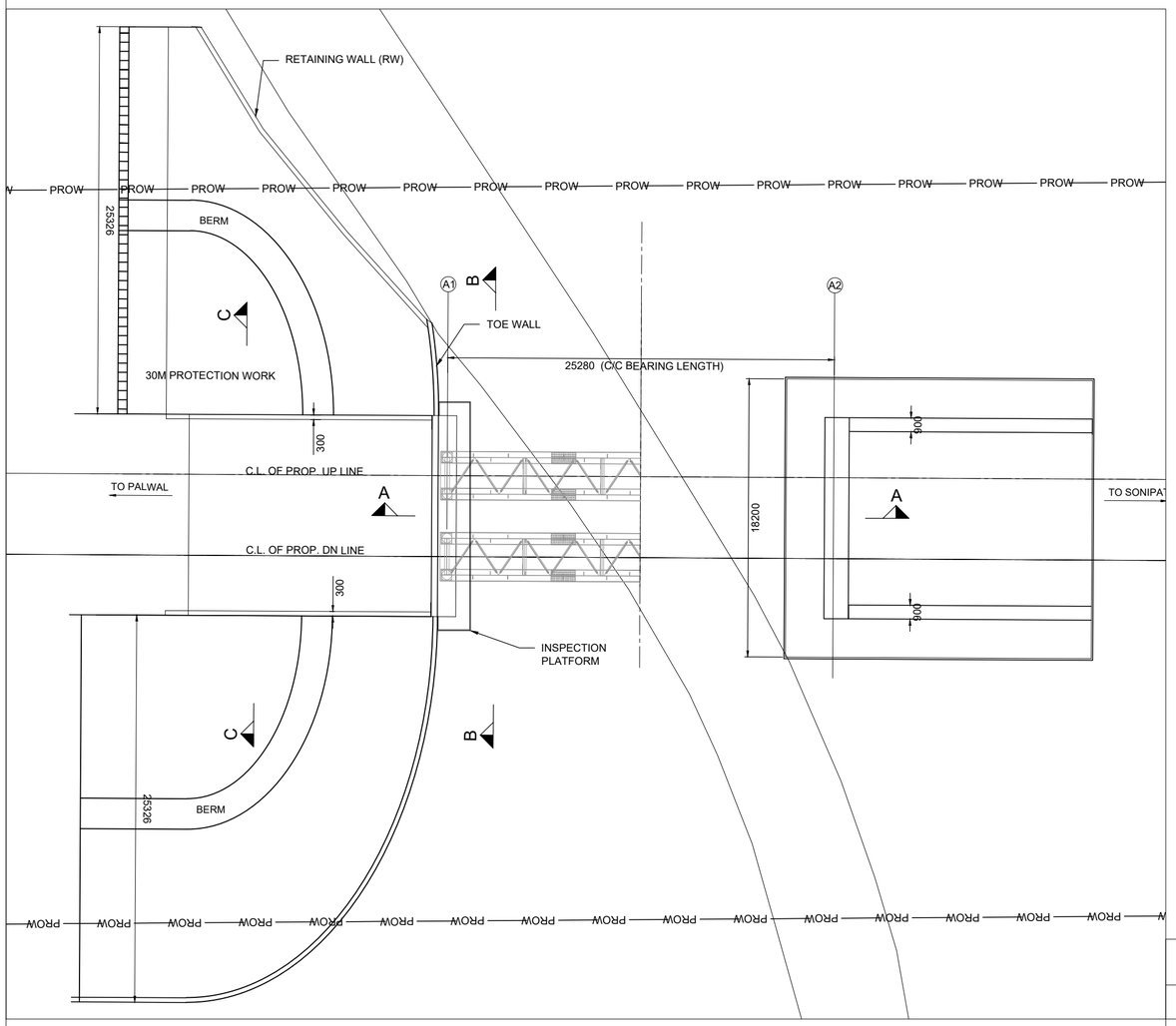
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01151_A1	2 OF 2

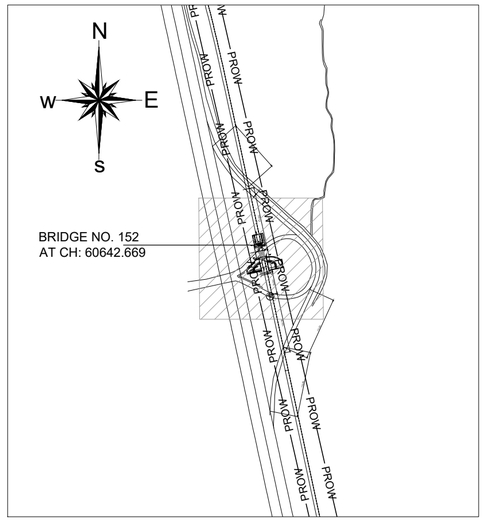
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



FORMATION LEVEL	225.224	225.224	225.224
GROUND LEVEL	213.996	214.178	213.528
CHAINAGE	60630.029	60642.669	60655.309

SECTIONAL ELEVATION
SCALE 1:200





KEY PLAN
SCALE - N.T.S

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) IS 2911 PART-1 SECTION-2.
   v) EXPOSURE CONDITION - MODERATE.
   vi) SEISMIC ZONE - IV
   vii) STANDARD OF LOADING :- SUPER STRUCTURE-25T, SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. SIZE AND TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   ii) FOR FOUNDATION ----------M35
   iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786- 2008 SHALL BE USED AS REINFORCEMENT.
11. BED LEVEL & ROAD LEVEL,FORMATION LEVEL AND RAIL LEVEL & ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 KG/SQM.
18. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
19. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
20. THE SPECIFICATIONS FOR THE COMPOSITE GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO/B-11751/R1 TO 11751/8.
21. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
22. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
23. BRIDGE DETAILS LIKE , INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
24. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
25. PATHWAY SHALL BE PROVIDED ON OUTER SIDE OF CG. RDSO DWG. NO. CBS-0046 (FOR CG.) SHALL BE FOLLOWED FOR ARRANGEMENT OF PATHWAY.
26. SEISMIC ARRESTOR SHALL BE PROVIDED ON THE PIER/ABUTMENT CAP.
27. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
28. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
THE INFRASTRUCTURE PEOPLE

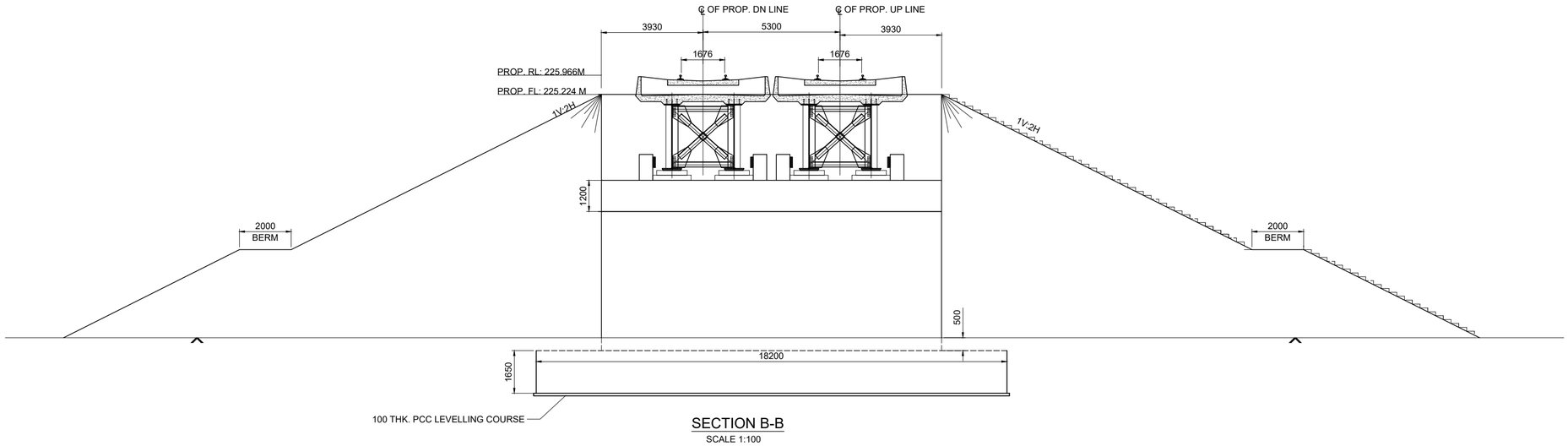
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR PROPOSED MAJOR RUB NO.152,
1 x 24.4m COMPOSITE GIRDER AT CH: 60642.669 m

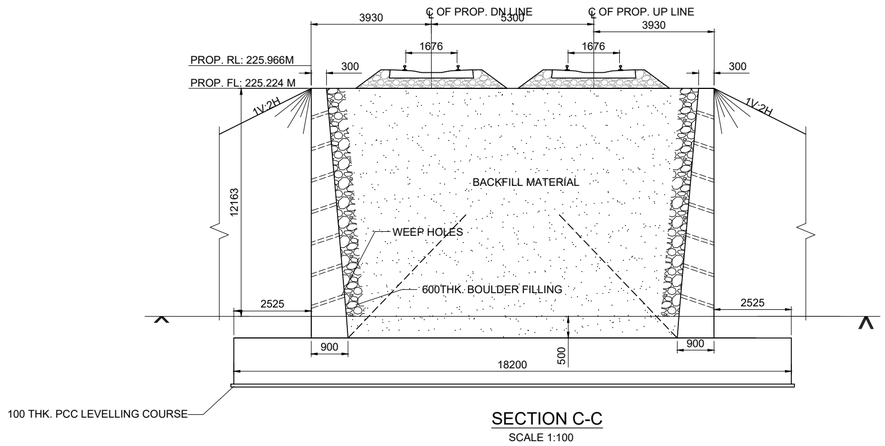
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01152_A1	1 OF 2

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

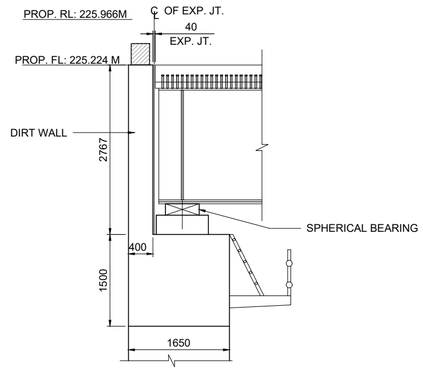
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED



SECTION B-B
SCALE 1:100



SECTION C-C
SCALE 1:100



DETAIL- A
SCALE 1:50

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD	ChahateyRam	R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

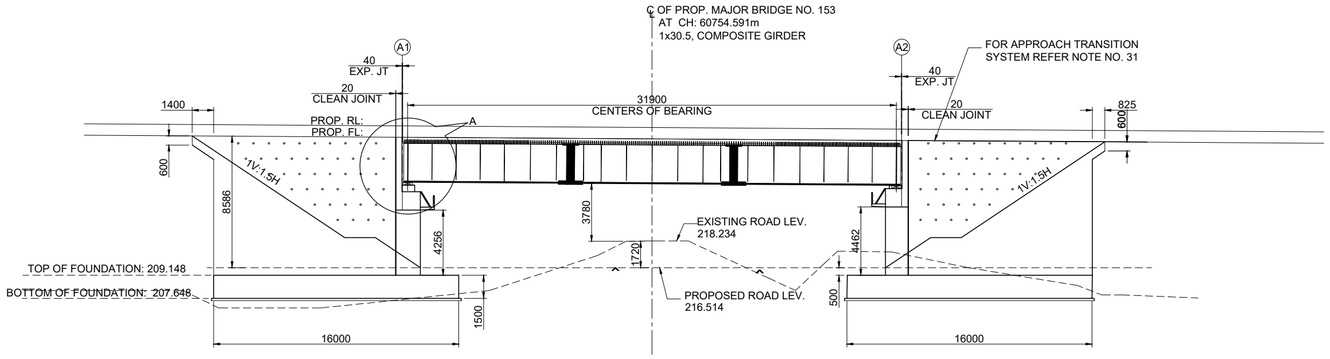
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

THE INFRASTRUCTURE PEOPLE

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR PROPOSED MAJOR RUB NO.152,
1 x 24.4m COMPOSITE GIRDER AT CH: 60642.669 m

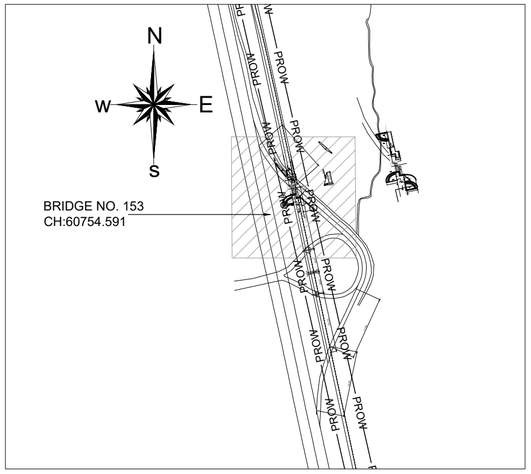
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01152_A1	2 OF 2

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

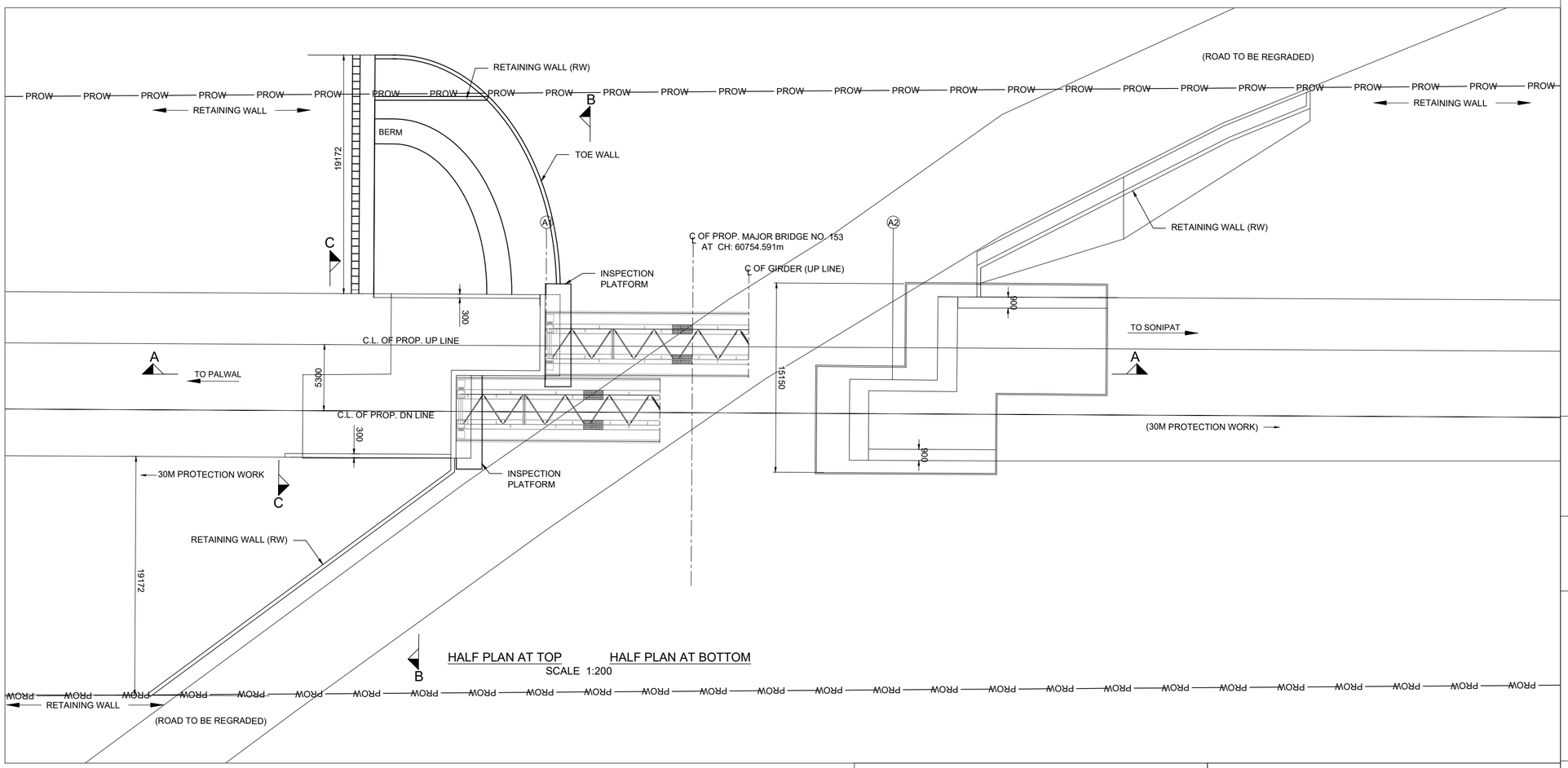


FORMATION LEVEL	224.898	224.898	224.898
GROUND LEVEL	214.948	218.234	215.865
CHAINAGE	60743.12	60754.591	60775.02

SECTIONAL ELEVATION
SCALE 1:200



KEY PLAN
SCALE - N.T.S



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) IS 2911 PART-1 SECTION-2.
   v) EXPOSURE CONDITION - MODERATE.
   vi) SEISMIC ZONE - IV
   vii) STANDARD OF LOADING :- SUPER STRUCTURE-25T, SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. SIZE AND TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   ii) FOR FOUNDATION ----------M35
   iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786- 2008 SHALL BE USED AS REINFORCEMENT.
11. BED LEVEL & ROAD LEVEL,FORMATION LEVEL AND RAIL LEVEL & ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 KG/SQM.
18. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
19. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
20. THE SPECIFICATIONS FOR THE COMPOSITE GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO/B-11754/R2 TO 11754/6.
21. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
22. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
23. BRIDGE DETAILS LIKE , INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
24. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
25. ARRANGEMENT FOR PATHWAY SHALL BE PROVIDED AS PER RDSO DWG. NO. CBS-0046 (FOR CG).
26. SEISMIC ARRESTOR SHALL BE PROVIDED ON THE PIER/ABUTMENT CAP.
27. EXISTING ROAD SHALL BE FIRST DIVERTED TEMPORARILY TO THE EXSITING ROAD STANDARDS.
28. THEREAFTER EXISTING ROAD SHALL BE LOWERED AS SHOWN IN THE DRAWING. L-SECTION OF LOWERED ROAD SHALL BE GOT APPROVED FROM THE ENGINEER BEFORE START OF WORK.
29. PROTECTIVE BARRIERS FOR ABUTMENTS SHALL BE PROVIDED AS APPROVED BY THE ENGINEER.
30. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
31. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC

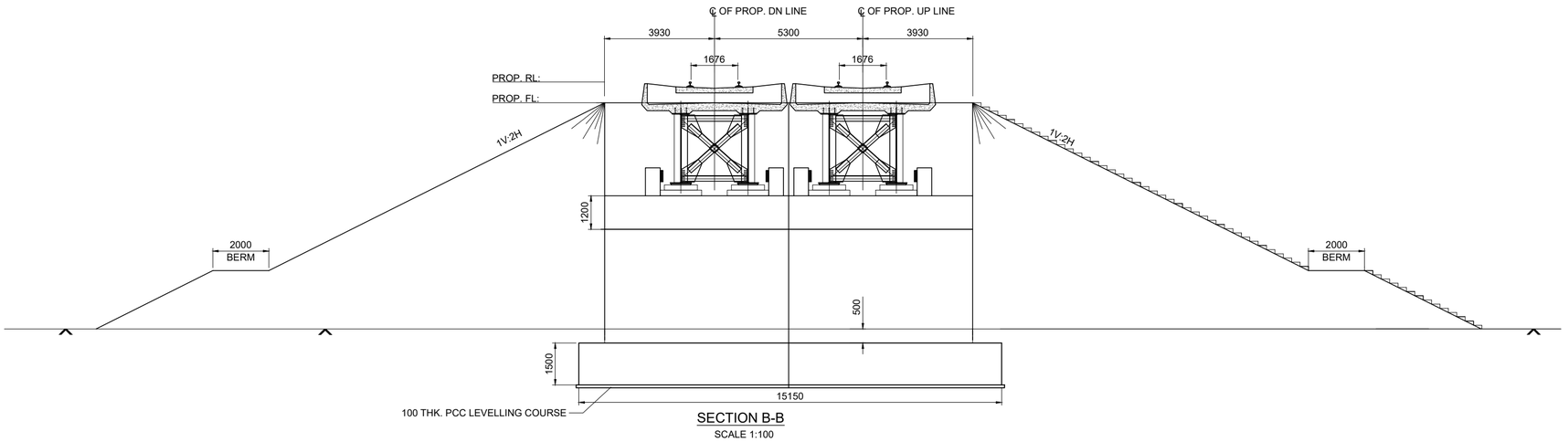
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR PROPOSED MAJOR RUB NO.153,
1 x 30.5 m COMPOSITE GIRDER AT 60754.591m

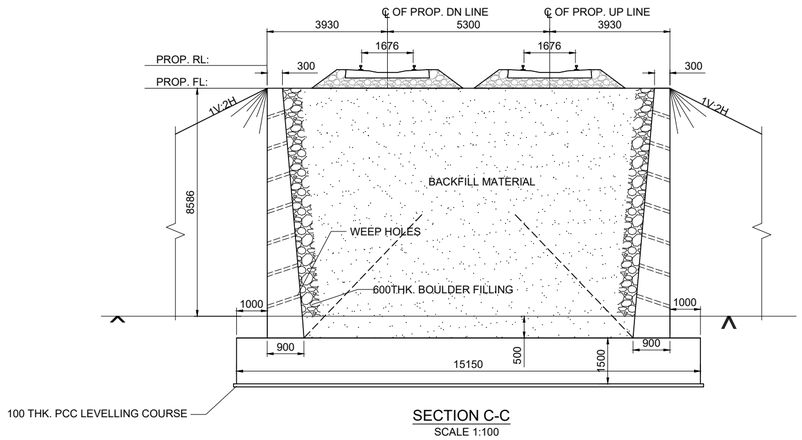
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01153_A1	1 OF 2

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

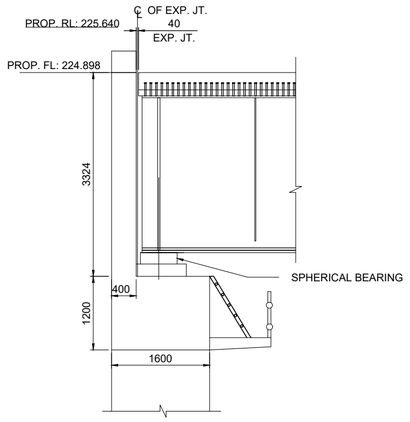
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED



SECTION B-B
SCALE 1:100



SECTION C-C
SCALE 1:100



DETAIL- A
SCALE 1:50

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

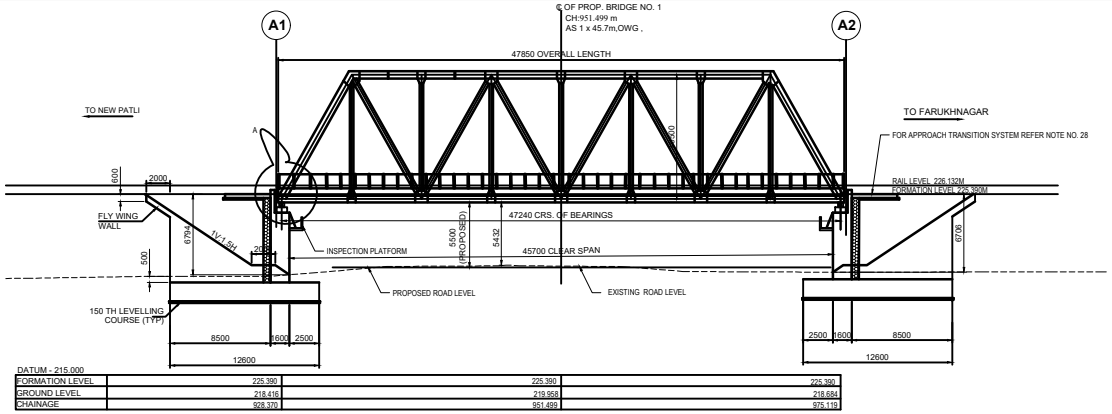
THE INFRASTRUCTURE PEOPLE

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING
FOR PROPOSED MAJOR RUB NO.153,
1 x 30.5 m COMPOSITE GIRDER AT 60754.591m

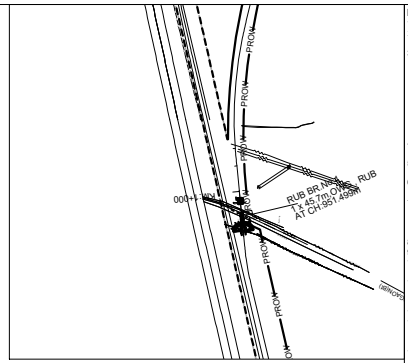
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-01153_A1	2 OF 2

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

4 Major Bridges
4.2.2 Connecting Line
A New Patli-Sultanpur

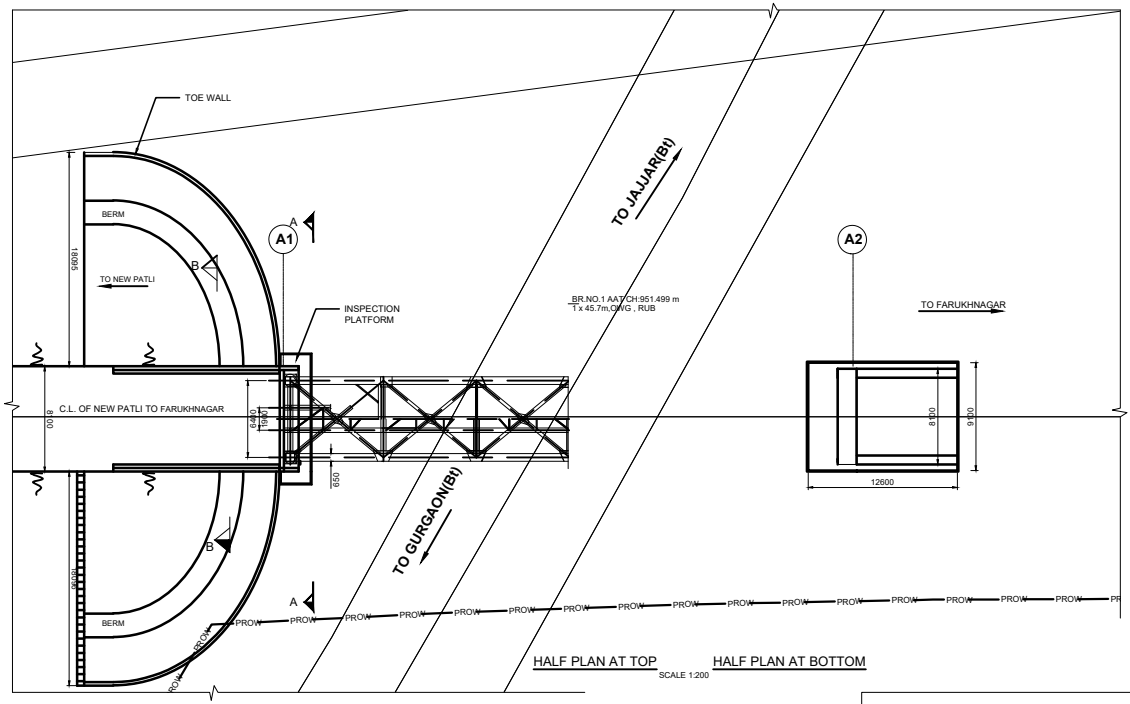


SECTIONAL ELEVATION
SCALE 1:200



KEY PLAN
SCALE 1:NTS

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) IS 2911 PART-1 SECTION-2.
   v) EXPOSURE CONDITION - MODERATE.
   vi) SEISMIC ZONE - IV
   vii) STANDARD OF LOADING :- SUPER STRUCTURE-32.5T (RDSO STANDARD OWG), SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. SIZE AND TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
   ii) FOR FOUNDATION ----------M35
   iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
9. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
10. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786- 2008 SHALL BE USED AS REINFORCEMENT.
11. BED LEVEL & ROAD LEVEL FORMATION LEVEL AND RAIL LEVEL & ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
12. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
13. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 KG/SQM.
18. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
19. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
20. THE SPECIFICATIONS FOR THE OPEN WEB GIRDER SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO/B-17081 TO 17098
21. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
22. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
23. BRIDGE DETAILS LIKE , DL, INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
24. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
25. ARRANGEMENT FOR PATHWAY SHALL BE PROVIDED AS PER RDSO DWG. NO. CBS-0045 (FOR OWG).
26. SEISMIC ARRESTOR SHALL BE PROVIDED ON THE PIER/ABUTMENT CAP.
27. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
28. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.



HALF PLAN AT TOP HALF PLAN AT BOTTOM
SCALE 1:200

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

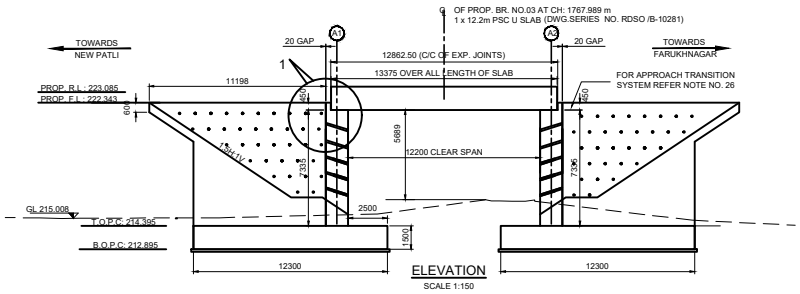
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

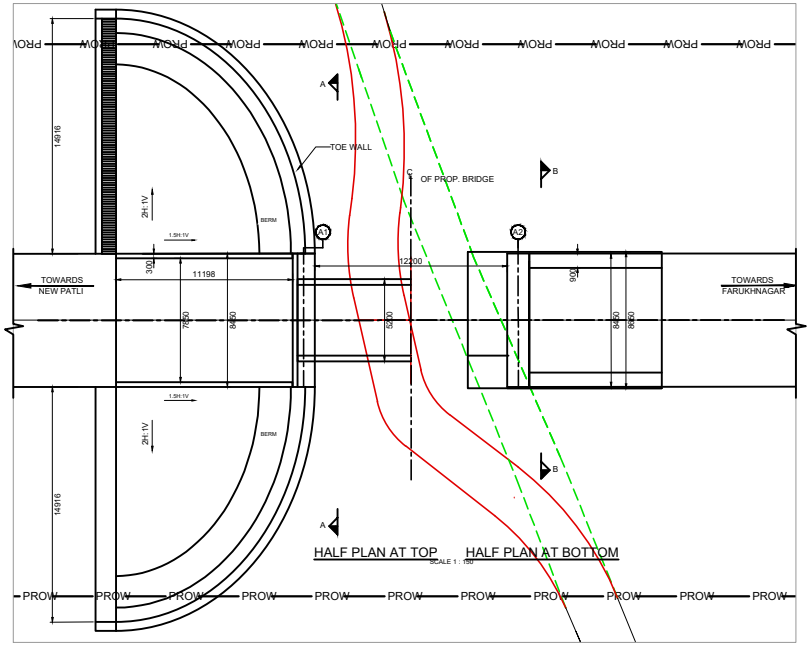
TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR PROPOSED MAJOR RUB NO. 1 AT CH:951.499 m 1 x 45.7m,OPEN WEB GIRDER(CONNECTING LINE NEW PATLI TO SULTANPUR)

DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-04001_A1	1 OF 1

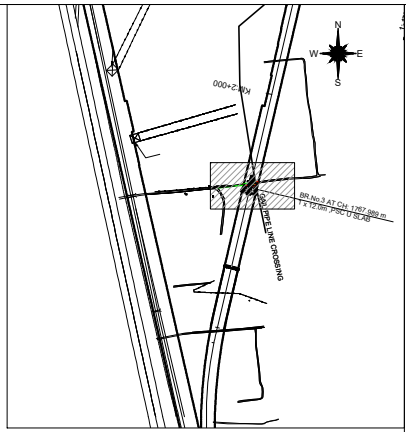
SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022



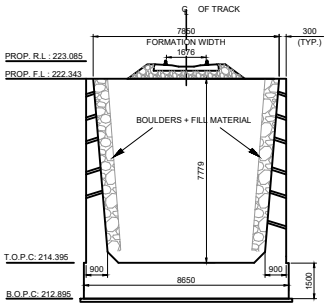
ELEVATION
SCALE 1:150



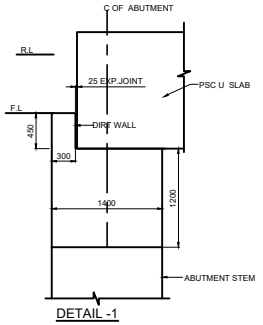
HALF PLAN AT TOP HALF PLAN AT BOTTOM
SCALE 1 : 150



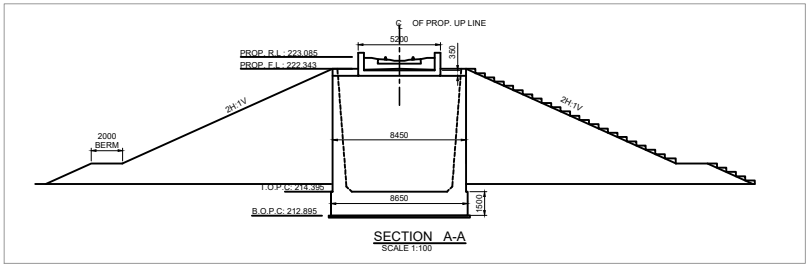
KEY PLAN
SCALE 1:NTS



SECTION B-B
SCALE 1:100



DETAIL -1
SCALE 1:30



SECTION A-A
SCALE 1:100

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METER
2. DIMENSIONS ARE NOT TO BE SCALED ONLY WRITTEN DIMENSIONS TO BE FOLLOWED
3. DESIGN CRITERIA
   i) IRS BRIDGE SUBSTRUCTURE AND FOUNDATION CODE 2013.
   ii) IRS CONCRETE BRIDGE CODE 2014.
   iii) IRS BRIDGE RULES 2014.
   iv) IS 2911 PART-1 SECTION-2.
   v) EXPOSURE CONDITION - MODERATE.
   vi) SEISMIC ZONE - IV
   vii) STANDARD OF LOADING :- SUPER STRUCTURE-25T (RDSO STANDARD) & SUB STRUCTURE-32.5T- 2008 LOADING.
4. THE STRUCTURAL DIMENSIONS AND SIZES ARE INDICATIVE AND THESE MAY VARY DURING DETAIL DESIGN.
5. SIZE & TYPE OF FOUNDATION SHOWN IS TENTATIVE AND MAY CHANGE DURING DETAILED DESIGN.
6. ALL RCC AND CC WORKS SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION LAID DOWN IN IRS CONCRETE BRIDGE CODE.
7. THE GRADE OF CONCRETE
   i) FOR ABUTMENT,DIRT & RETURN WALL----------M35
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   iii) FOR LEVELING COURSE----------M20
8. ALL CONCRETE WORK SHALL BE MECHANICALLY MIXED AND VIBRATED.
8. MIX DESIGN SHALL BE APPROVED BY ENGINEER - IN CHARGE.
9. HIGH YIELD STRENGTH DEFORMED BARS OF GRADE Fe-500D CONFORMING TO IS: 1786-2008 SHALL BE USED AS REINFORCEMENT.
10. BED LEVEL & ROAD LEVEL,FORMATION LEVEL AND RAIL LEVEL & ALIGNMENT SHALL BE VERIFIED BY THE ENGINEER AT SITE BEFORE EXECUTION OF WORK.
11. ANGLE OF INTERNAL FRICTION OF BACK FILL SHALL NOT BE LESS THAN 35.
12. PROTECTION WORK ON SLOPES OF BANK UP TO 30M,BOTH SIDES ON APPROACHES OF BRIDGE SHALL BE DONE AS PER SKETCH NO. GC-HRIDC-SK-GEN-015.
14. BOULDER FILLING & BOULDER PACKING BEHIND RETURN WALL / WING WALL SHALL BE DONE AS PER IRS FOUNDATION & SUBSTRUCTURE CODE CL.7.5.2.
15. BACK FILL SHALL BE AS PER CL.7.5 OF IRS BRIDGE SUBSTRUCTURE & FOUNDATION CODE 2013.
16. 75mm DIA WEEP HOLES TO BE PROVIDED @1000 C/C HORZ. AND 1000 MM C/C VERTICALLY ABOVE LOWEST WATER LEVEL IN RETURN WALL AS PER IRS SUB STRUCTURE CODE CLAUSE 7.6.
17. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.464 KG/SQM.
18. CURING SHALL BE DONE AS PER CLAUSE NO 8.4 OF IRS CONCRETE BRIDGE CODE.
19. SAFETY & PROTECTION OF THE PROPOSED WORK IS TO BE ENSURED BY THE CONTRACTOR AS PER PARA 826 OF IRPWM WITH UPDATED CORRECTION SLIPS OF 2011-12.
20. THE SPECIFICATIONS FOR THE PSC U SLAB SHALL BE IN ACCORDANCE WITH RDSO DRG.NO'S : RDSO 10281,10281/1 AND 10281/2.
21. CONCRETING SHALL BE DONE IN ACCORDANCE WITH IRS CONCRETE BRIDGE CODE WITH 20MM MAXIMUM SIZE AGGREGATE.
22. ALL DIMENSIONS AND LEVELS SHOULD BE VERIFIED AT SITE BEFORE EXECUTION.
23. BRIDGE DETAILS LIKE , DL, INSPECTION STEPS PAINTINGS ETC SHOULD BE FOLLOWED AS PER BRIDGE MANUAL, DURING CONSTRUCTION.
24. THIS DRAWING IS PROPERTY OF HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (HRIDC) AND EXCLUSIVE USE OF HRIDC.
25. INSPECTION STEPS SHALL BE PROVIDED AT DIAGONALLY OPPOSITE ENDS OF THE BOX AFTER PROTECTION WORK.
26. TRANSITION SYSTEM TO BE ADOPTED ON BRIDGE APPROACHES SHALL BE AS PER RDSO REPORT NO. GE:R-50(TRANSITION SYSTEM ON APPROACHES OF BRIDEGES). FOR DETAILS REFER SKETCH NO. GC-HRIDC-SK-GEN-019.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL
———	PROPOSED ROAD
- - - -	DISMANTEL ROAD

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

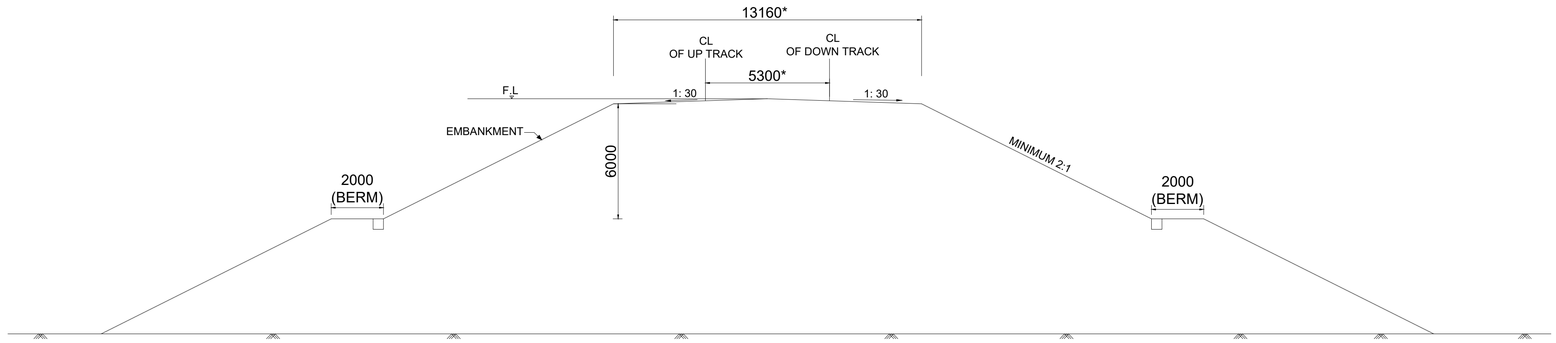
GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R.R KUMAR GM/IP&P/HRIDC	
SUDHIR AGRAWAL DPD/CIVIL		UMA.M.RAO DGM/C-W	
REETU PATIAL CDE/ CIVIL			

TITLE:- CONCEPTUAL GENERAL ARRANGEMENT DRAWING FOR PROPOSED MAJOR RUB NO. 3, 1 x 12.2m PSC U SLAB AT CH.1767.989 (CONNECTING LINE NEW PATLI TO SULTANPUR)

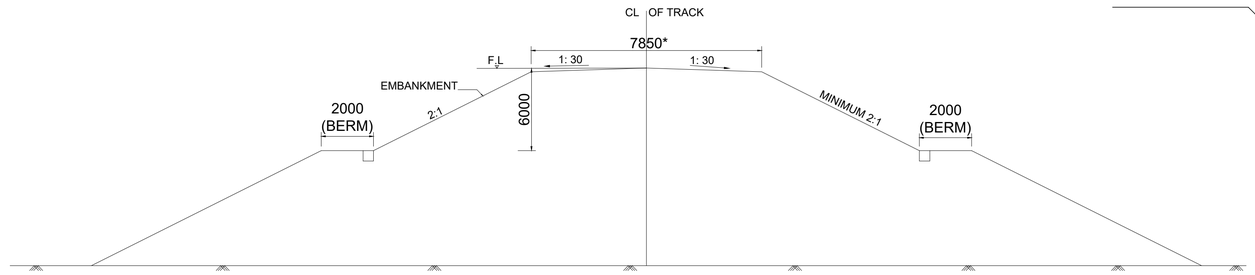
DRG. NO.	SHEET NO.
GC-HRIDC-C23-DRW-BRD-GAD-04003_A1	1 OF 1

SCALE :	ISSUE DATE	REVISED DATE
AS SHOWN	11-11-2022	16-12-2022

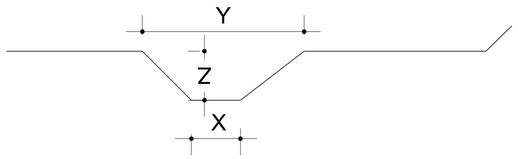
5 Miscellaneous Drawings (Conceptual Plan)



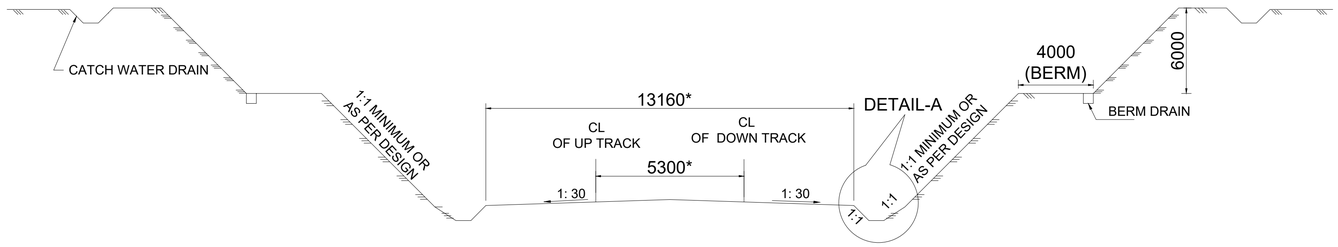
TYPICAL CROSS-SECTION OF EMBANKMENT
(FOR DOUBLE TRACK)



TYPICAL CROSS-SECTION OF EMBANKMENT
(FOR SINGLE TRACK)



DETAIL-A



TYPICAL CROSS-SECTION OF CUTTING
(FOR DOUBLE TRACK)

NOTES:
1. ALL DIMENSION ARE IN MM.
2. DEPTH OF BALLAST CUSHION SHOULD BE PROVIDED AS PER PARA 212(2) OF IRPWM.
3. CROSS SLOPE OF 1IN 30 SHALL BE PROVIDED.
4. MINIMUM FORMATION WIDTH OF 13160 MM SHALL BE ENSURED FOR NEW WORKS IN BOTH EMBANKMENT AND IN CUTTING (EXCLUDING SIDE DRAIN)
5. * FORMATION WIDTH SHALL BE INCREASED BASED ON CURVE & SUPER ELEVATION AS PER IRSOD.
6. X, Y, Z DIMENSIONS SHALL BE AS PER DESIGN.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

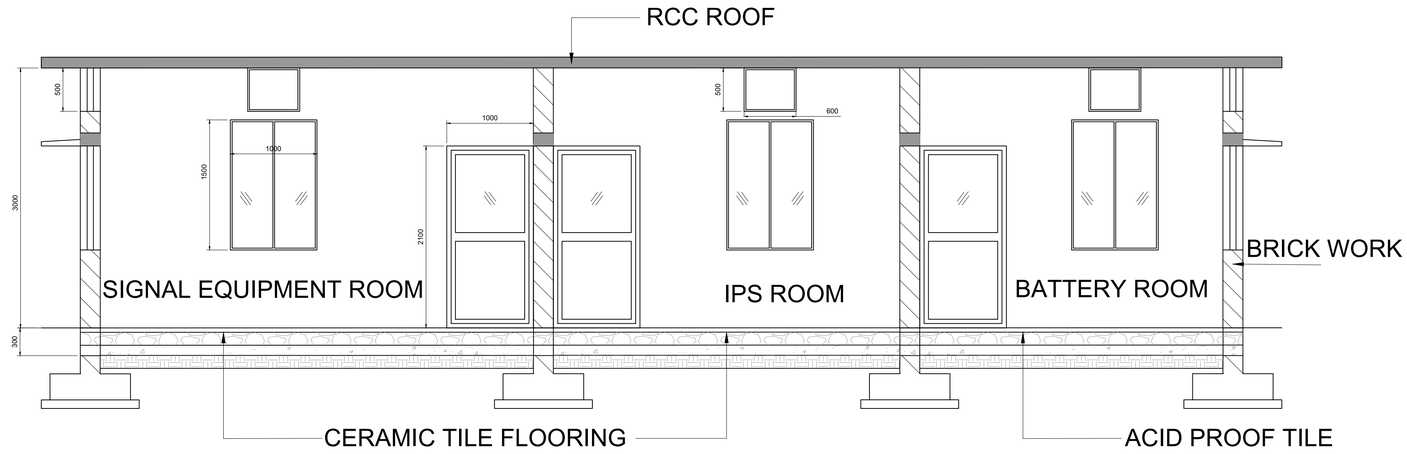
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:- CONCEPTUAL PLAN
TYPICAL EMBANKMENT/CUTTING PROFILE

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-001_A1	

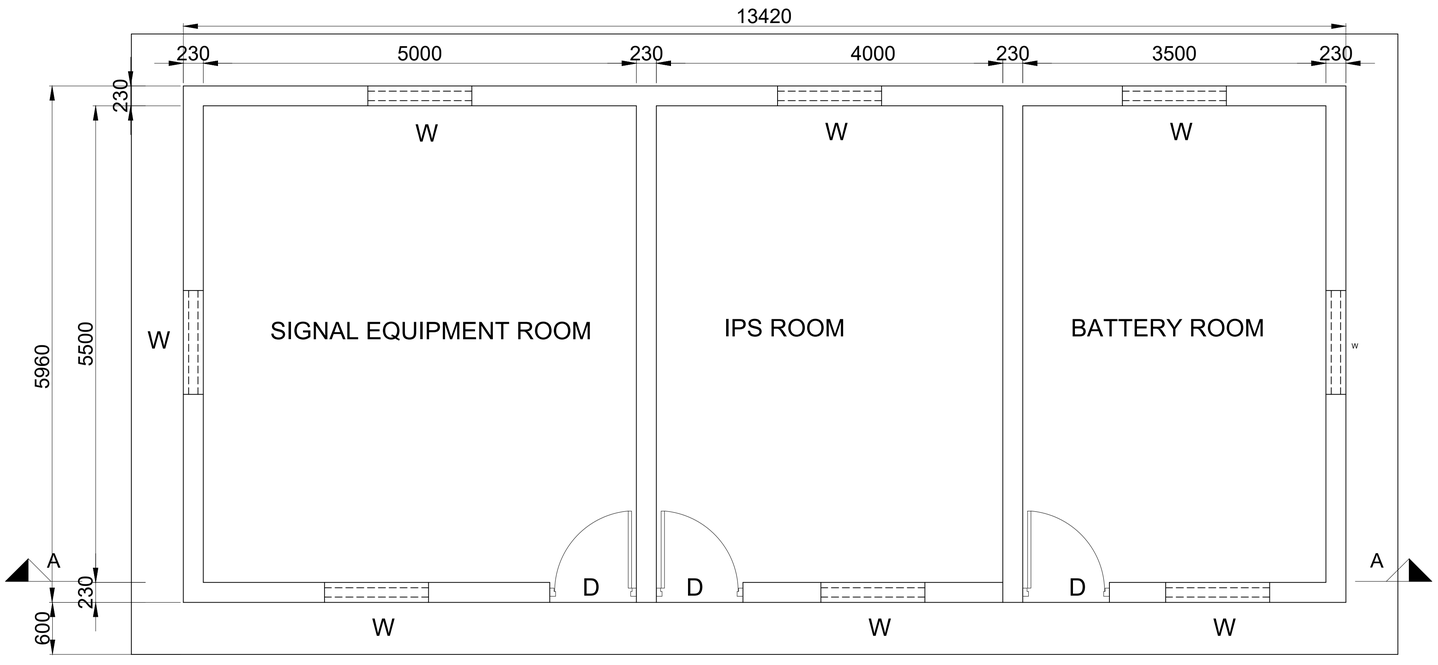
SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



SECTIONAL ELEVATION A-A

SCHEDULE

DOOR	2100x1000
WINDOW	1000x1500
VENTILATOR	600x500



PLAN

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. PLINTH LEVEL SHALL BE KEPT AT LEAST 300mm ABOVE THE GROUND LEVEL.
3. DPC SHALL BE PROVIDED ABOVE PLINTH LEVEL.
4. FOUNDATION SHALL BE DESIGNED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
5. DOOR & WINDOW FRAMES SHALL BE OF STEEL.
6. DOOR SHUTTERS SHALL BE 35mm THICK FLUSH DOORS.
7. WINDOWS AND VENTILATORS SHALL BE AS PER RELEVANT IS CODES.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

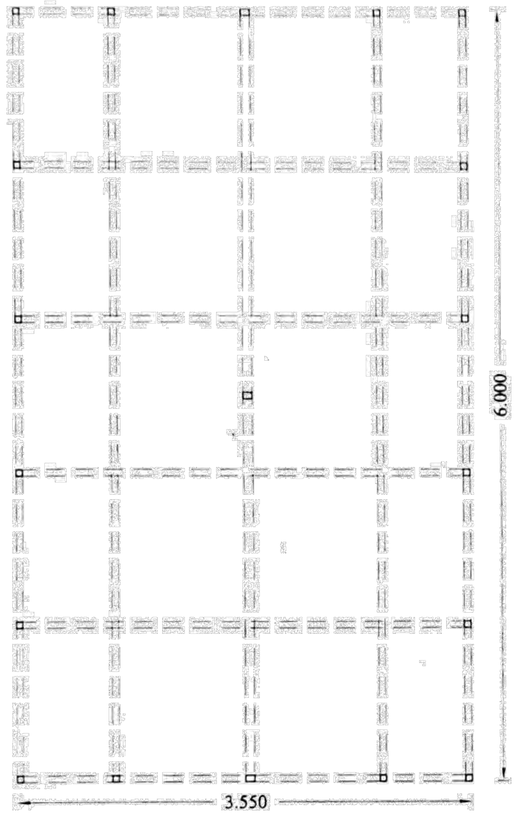
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

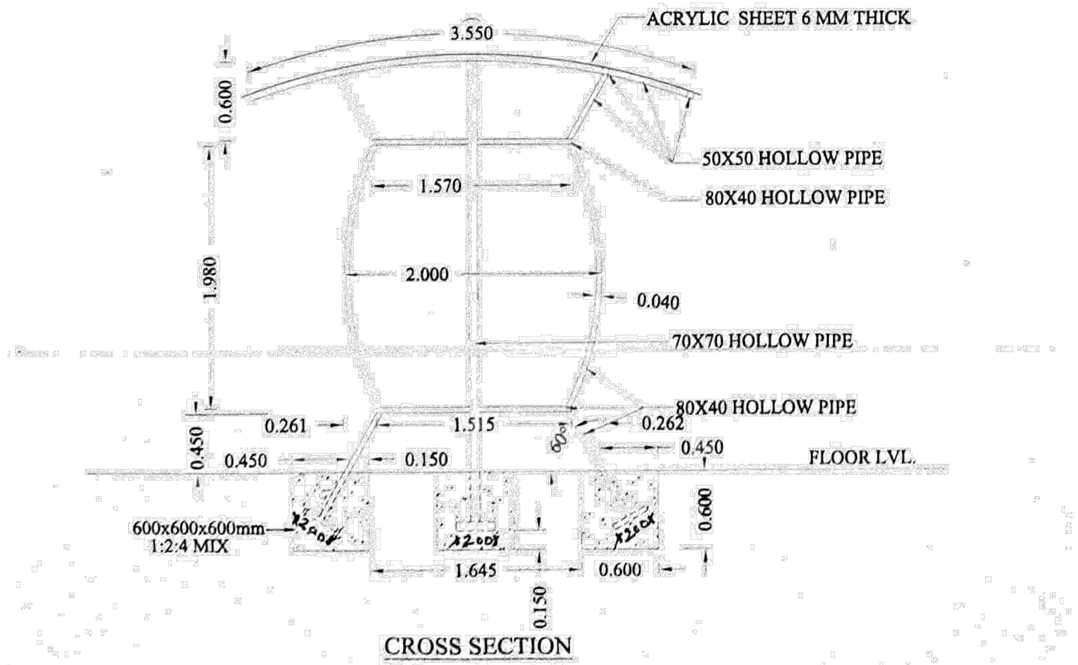
TITLE:- CONCEPTUAL PLAN
S & T HUT

DRG. NO. GC-HRIDC-SK-GEN-002_A1 | SHEET NO. 1 OF 1

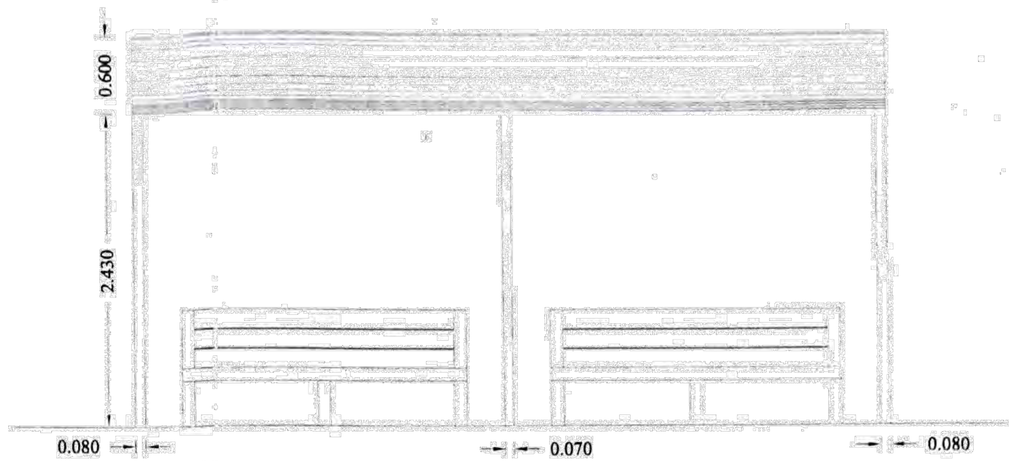
SCALE : AS SHOWN | ISSUE DATE 28.12.2022



PLAN



CROSS SECTION



FRONT VIEW

Note:-

1- All dimensions are in meter unless otherwise mentioned in the drawing.
2- 6mm thick Multi-wall Translucent Polycarbonate sheet both side UV Protected and in curved shape including Aluminum top and bottom profile with EPDM gasket,their fixing with S.S. Pipe purlins self tapping screw etc. on structure roof of shelter
3- This sketch is only for architectural purpose. Hollow Circular/ square/ rectangular sections of S.S. shall be used. Size mentioned in the drawing are tentative and shall be as per detailed design.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

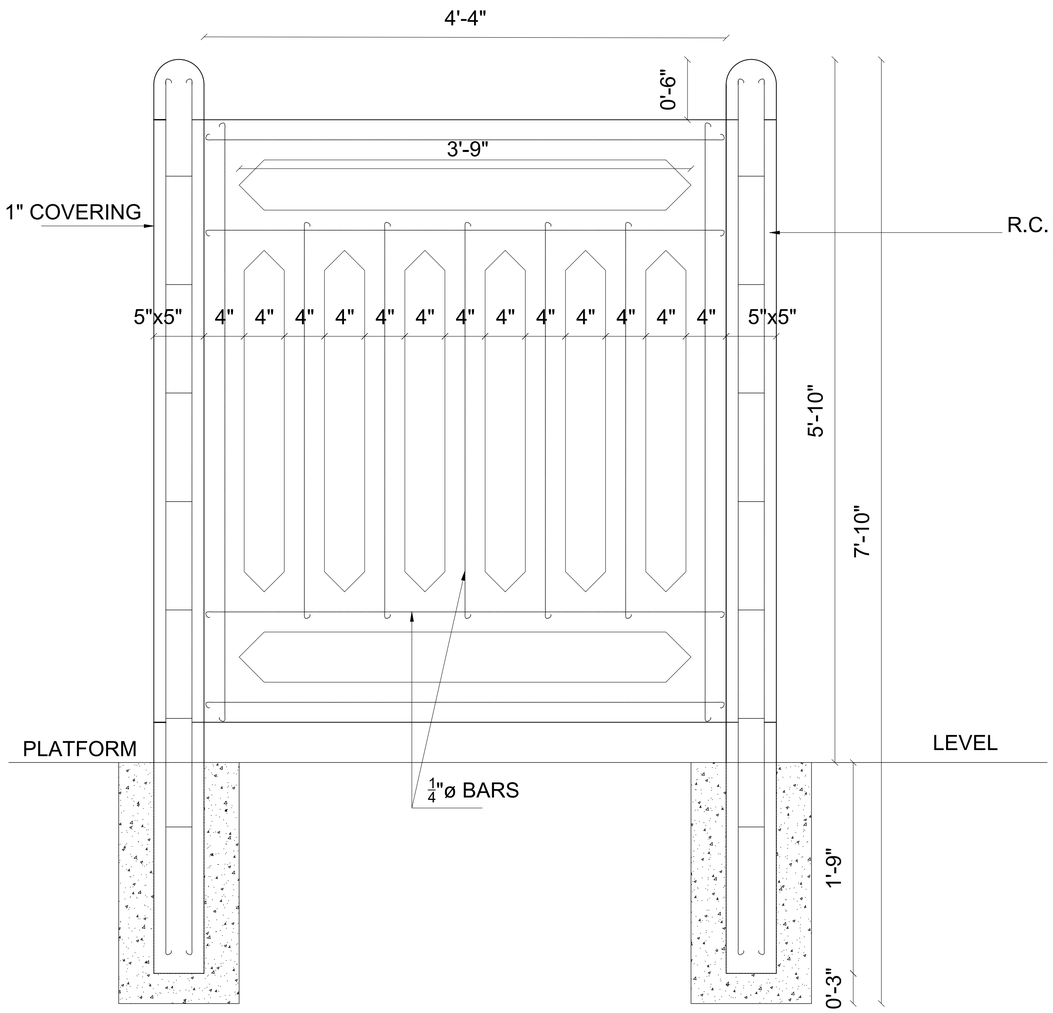
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

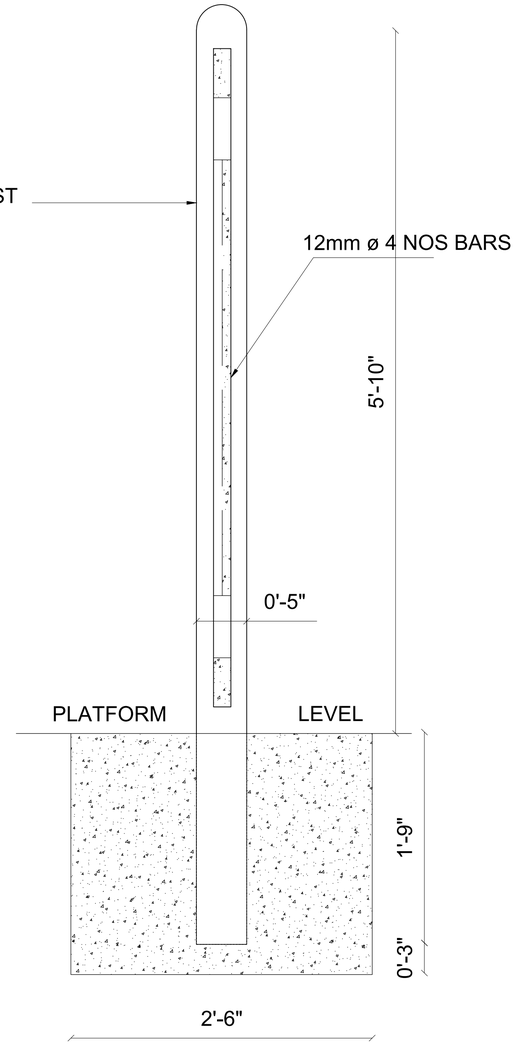
TITLE:- CONCEPTUAL PLAN
MINI PLATFORM SHELTER

DRG. NO. GC-HRIDC-SK-GEN-003_A1
SHEET NO. 1 OF 1

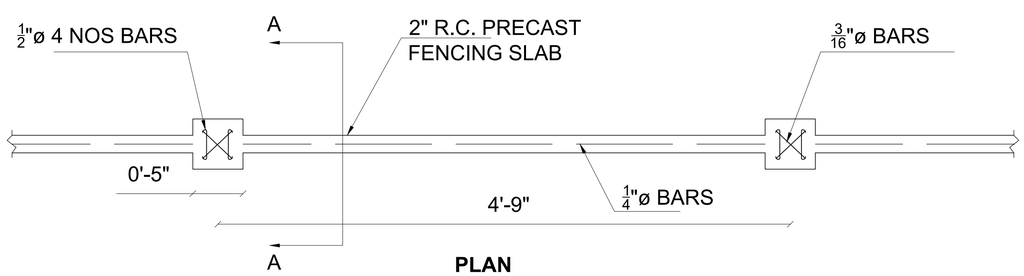
SCALE : AS SHOWN
ISSUE DATE 28.12.2022



ELEVATION



SECTION AT A-A



PLAN

NOTES:
1. ALL DIMENSION ARE IN INCHES UNLESS OR OTHERWISE MENTIONED.
2. NO DIMENSION SHALL BE SCALED FROM THE DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

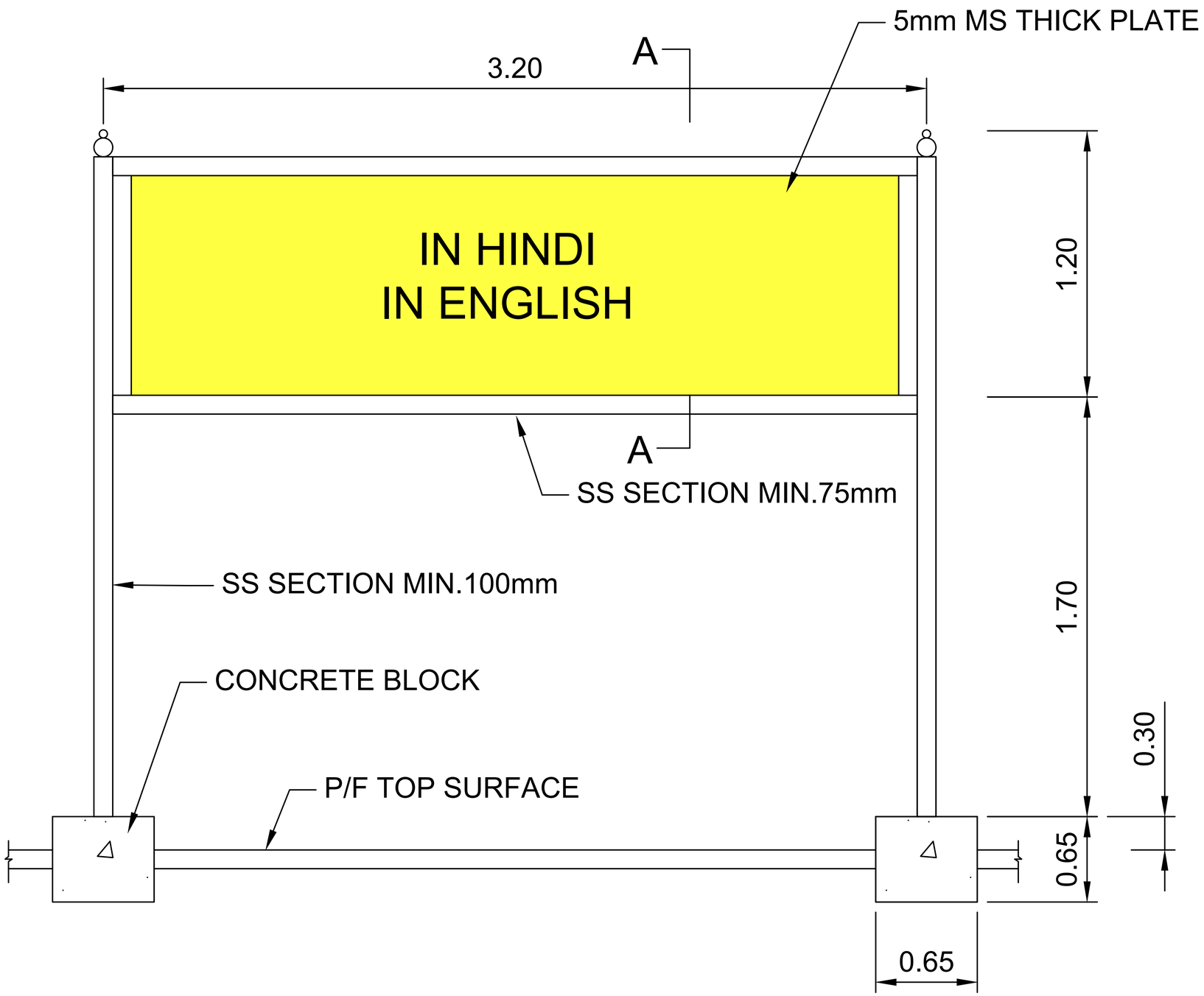
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:- CONCEPTUAL PLAN
R.C. PRE-CAST FENCING FOR END PLATFORM

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-004	1 OF 1

SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



Notes:

1. THE PRINCIPAL NAME BOARDS PAINTED ON BOTH FACES SHOULD BE FIXED AT BOTH THE ENDS OF THE PLATFORM AND GENERALLY ORIENTED AT RIGHT ANGLE TO THE TRACK.
2. THE ACTUAL ANGEL AT WHICH THE NAME BOARD ARE FACED SHOULD BE DETERMINED BY THE SITE CONDITIONS ENSURING THE CRITERIA THAT THE NAME BOARDS ARE CLEARLY VISIBLE FROM APPROACHING TRAINS.
3. BOARD TO BE PAINTED YELLOW WITH BLACK LETTERS.
4. THE STATION NAME SHALL BE EXHIBITED IN THE FOLLOWING ORDER: REGIONAL LANGUAGE, HINDI AND ENGLISH.
5. HEIGHT OF LETTERS SHALL BE 300 MM, THICKNESS IN PROPORTIONS TO THE STYLE OF THE SCRIPT.
6. THE LOWER EDGE OF THE PRINCIPAL BOARD SHOULD BE 2M ABOVE THE PLATFORM.
7. THE PAINTING WORK SHALL BE COMMENCE ONLY AFTER THE SATISFACTORY SURFACE PREPARATION INSPECTED AND APPROVED BY THE ENGINEER.
8. 2 COATS OF APPROVED BRAND YELLOW PAINT SHALL BE APPLIED OVER THE ONE COAT OF PRIMER.
9. THE APPLIED COAT OF PAINT SHALL BE UNIFORM AND FREE FROM BRUSH MARKS, SACK MARKS, BLEMISHES ETC.
10. SS SECTION SIZE TO BE ADOPTED SHALL BE BASED UPON DETAILED DESIGN. SIZE SHALL NOT BE LESS THAN THAT MENTION DRAWING (CIRCULAR /SQUARE/RECTANGLE).

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

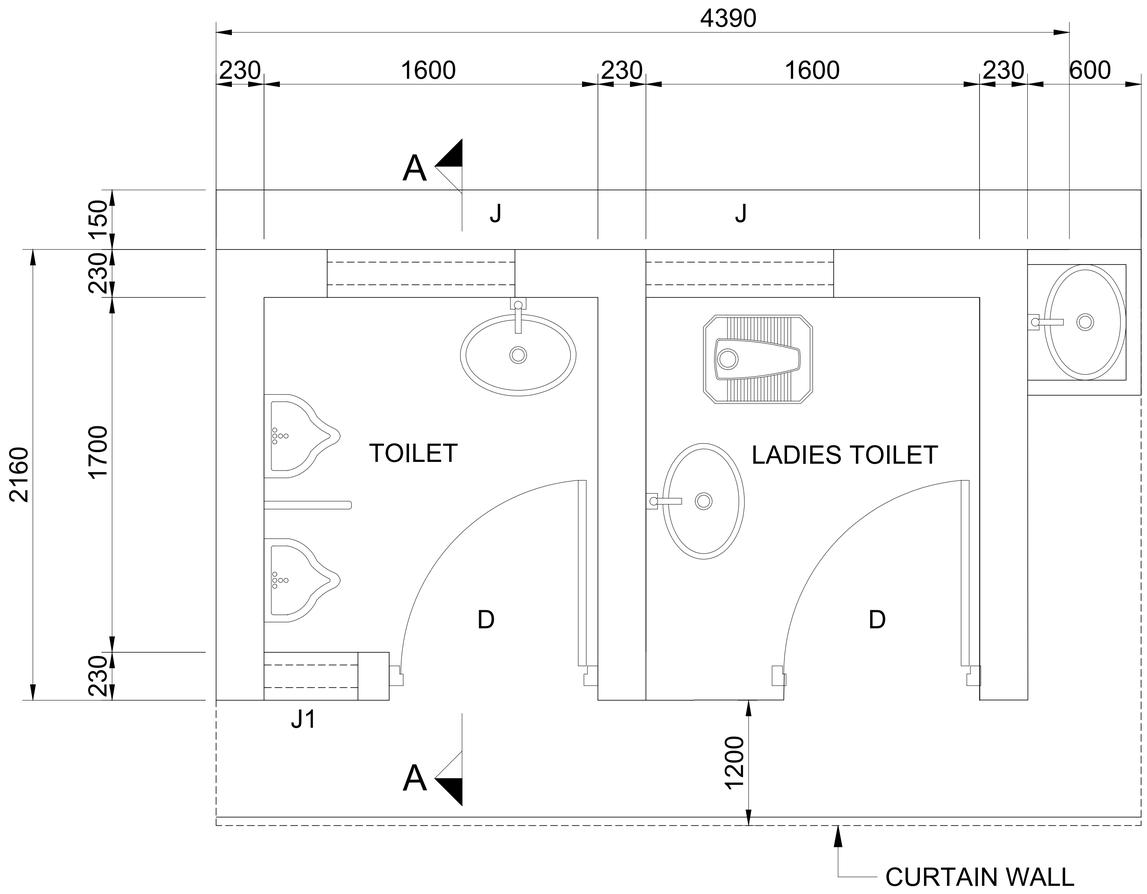
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

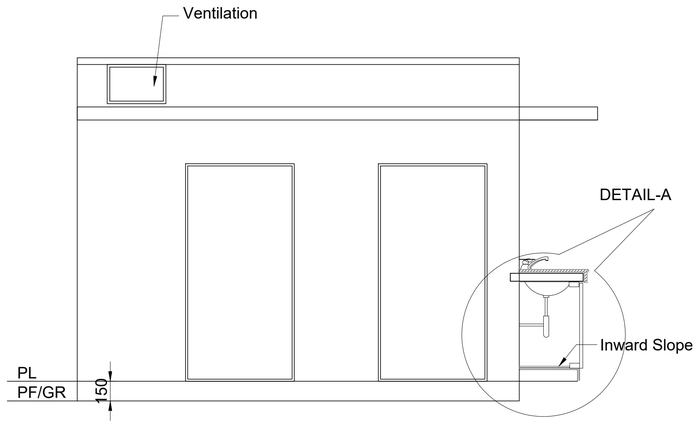
TITLE:- CONCEPTUAL PLAN
STATION NAME BOARD

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-005_A1	

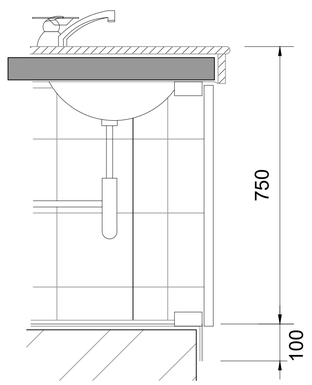
SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



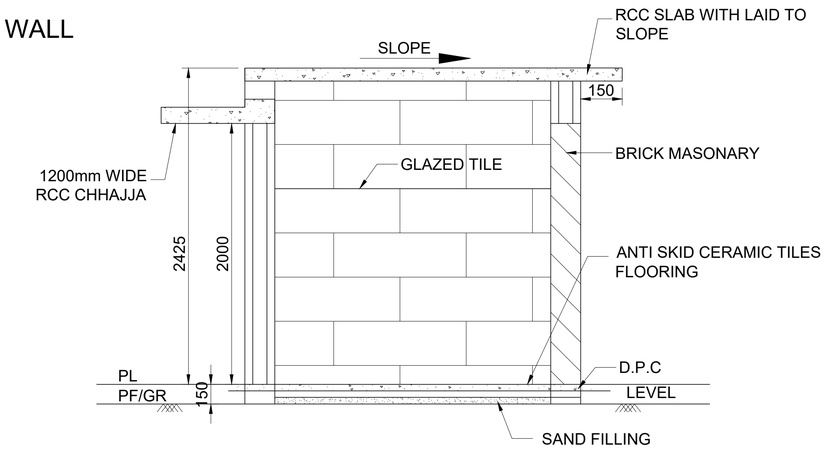
PLAN



FRONT ELEVATION



DETAIL 'A'



SECTION A-A

SCHEDULE OF JOINERY

REF.		SIZE
D	PVC DOOR	900x2000
J	RCC JALI (RAIN PROOF TYPE)	900x600
J1	RCC JALI (RAIN PROOF TYPE)	450x300

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. FLOORING WITH ANTISKID CERAMIC TILES TO BE PROVIDED.
3. INSIDE WALLS SHALL BE PROVIDED WITH GLAZED TILES OF APPROVED QUALITY UPTO CEILING.
4. WHITE GLAZED FLAT BACK LIPPED/ FRONT URINAL 430X260X350MM SIZE WITH PVC AUTOMATIC FLUSHING CISTERN.
5. VITREOUS CHINA SQUATTING TYPE URINAL OF SIZE 450X350X100MM TO CONFORM IS 771-1963 WITH AUTOMATIC FLUSHING CISTERN.
6. WASH BASIN OF SIZE 630MM X 450MM WITH CP BRASS PILLAR TAP OUTSIDE THE TOILET AND 550MM X 400MM WITH CP BRASS PILLAR TAP SHALL BE PROVIDED INSIDE THE TOILETS.
7. PLUMBING TO BE CONCEALED.
8. OVERHEAD TANK OF SUITABLE CAPACITY SHALL BE PROVIDED TO ENSURE UNINTERRUPTED WATER SUPPLY.
9. DRAINAGE IS TO BE CONNECTED TO SOAK PIT OF SUITABLE CAPACITY.
10. EFFLUENT TO BE DISCHARGE IN DRAINAGE SYSTEM (REFER SEPARATE DRAINAGE PLAN FOR DRAINAGE SYSTEM).

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

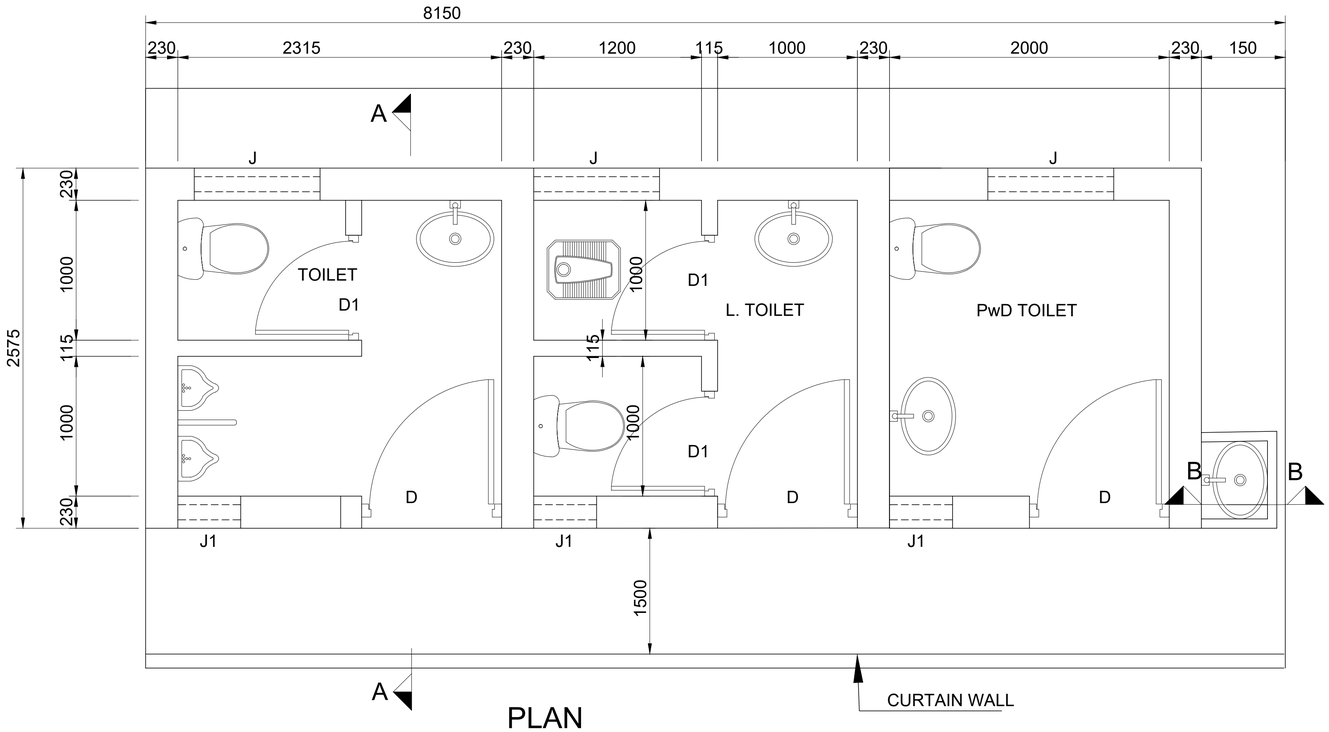
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE
SMEC Member of the Surbana Jurong Group

TITLE:- CONCEPTUAL PLAN
PROPOSED TOILET BLOCK ON ISLAND PLATFORMS

DRG. NO. GC-HRIDC-SK-GEN-006_A1
SHEET NO. 1 OF 1

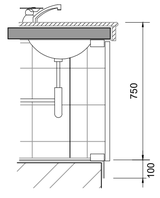
SCALE : AS SHOWN
ISSUE DATE 28.12.2022



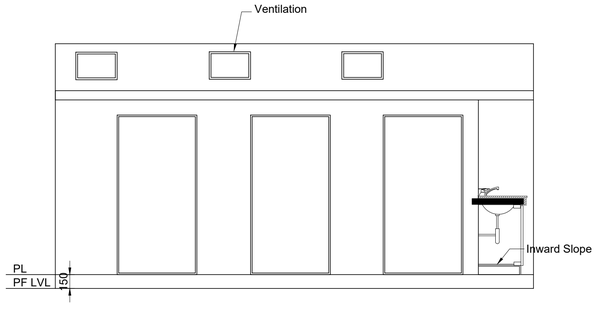
PLAN

NOTES :

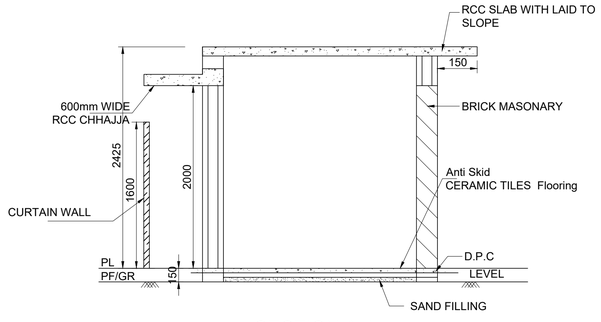
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. FLOORING WITH ANTISKID CERAMIC TILES TO BE PROVIDED.
3. INSIDE WALLS SHALL BE PROVIDED WITH GLAZED TILES OF APPROVED QUALITY UPTO CEILING.
4. WHITE GLAZED FLAT BACK LIPPED/ FRONT URINAL 430X260X350MM SIZE WITH PVC AUTOMATIC FLUSHING CISTERN.
5. VITREOUS CHINA SQUATTING TYPE URINAL OF SIZE 450X350X100MM TO CONFORM IS 771-1963 WITH AUTOMATIC FLUSHING CISTERN.
6. WASH BASIN OF SIZE 630MM X 450MM WITH CP BRASS PILLAR TAP OUTSIDE THE TOILET AND 550MM X 400MM WITH CP BRASS PILLAR TAP SHALL BE PROVIDED INSIDE THE TOILETS.
7. PLUMBING TO BE CONCEALED.
8. OVERHEAD TANK OF SUITABLE CAPACITY SHALL BE PROVIDED TO ENSURE UNINTERRUPTED WATER SUPPLY.
9. DRAINAGE IS TO BE CONNECTED TO SOAK PIT OF SUITABLE CAPACITY.
10. EFFLUENT TO BE DISCHARGE IN DRAINAGE SYSTEM (REFER SEPARATE DRAINAGE PLAN FOR DRAINAGE SYSTEM).



SECTION B-B



FRONT ELEVATION



SECTION A-A

SCHEDULE OF JOINERY

REF.		SIZE
D	PVC DOOR	900x2000
J	RCC JALI (RAIN PROOF TYPE)	900x600
J1	RCC JALI (RAIN PROOF TYPE)	450x300

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

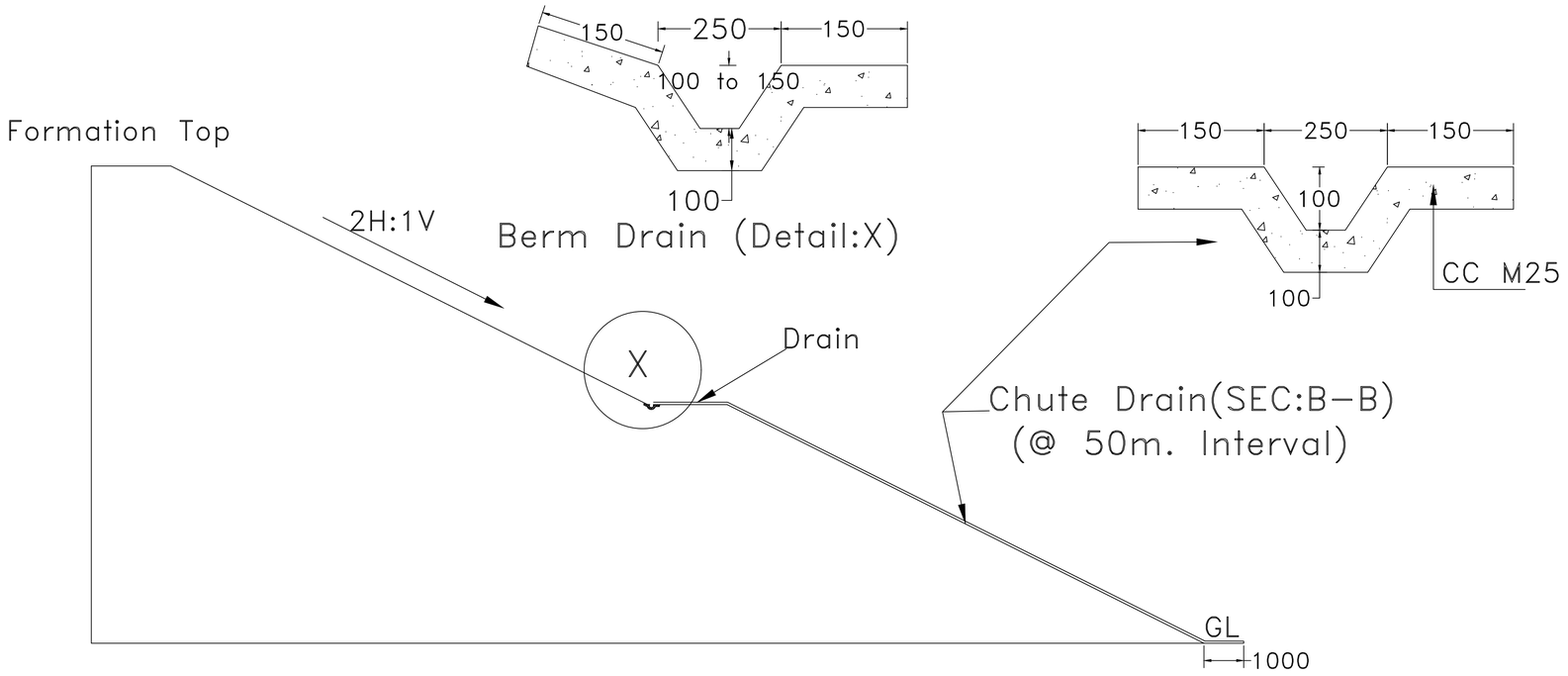
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

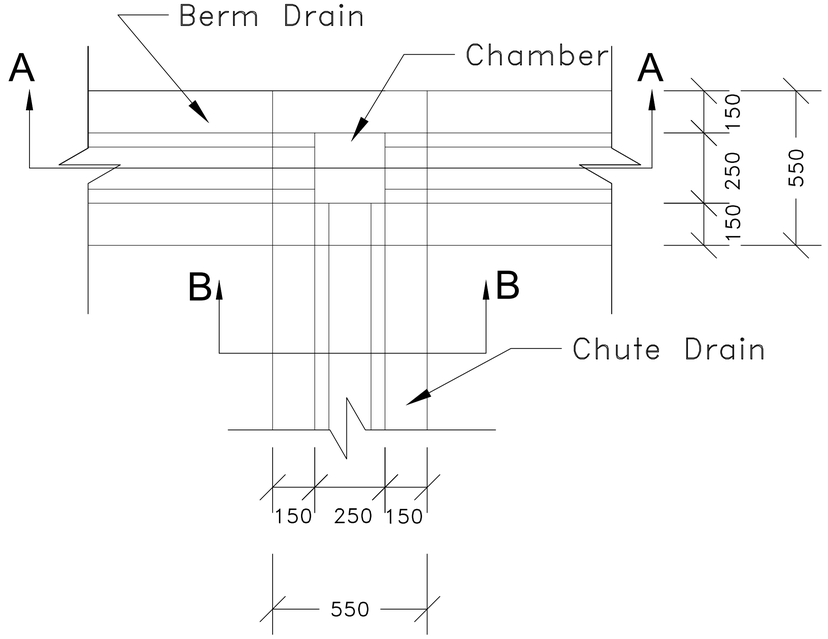
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

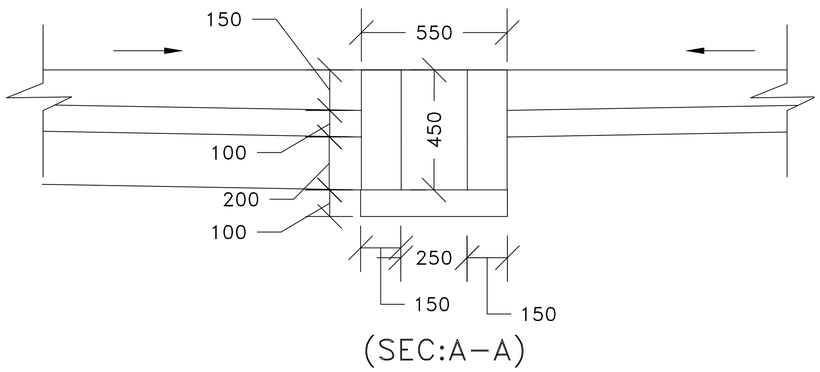
TITLE:- CONCEPTUAL PLAN
PROPOSED TOILET BLOCK ON END PLATFORMS

DRG. NO. GC-HRIDC-SK-GEN-007_A1 | SHEET NO. 1 OF1

SCALE : AS SHOWN | ISSUE DATE 28.12.2022







NOTES:-

1. ALL DIMESION ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. NO DIMENSION SHALL BE SCALED FROM DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

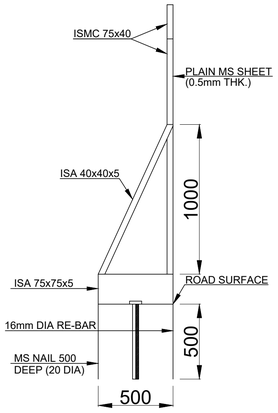
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

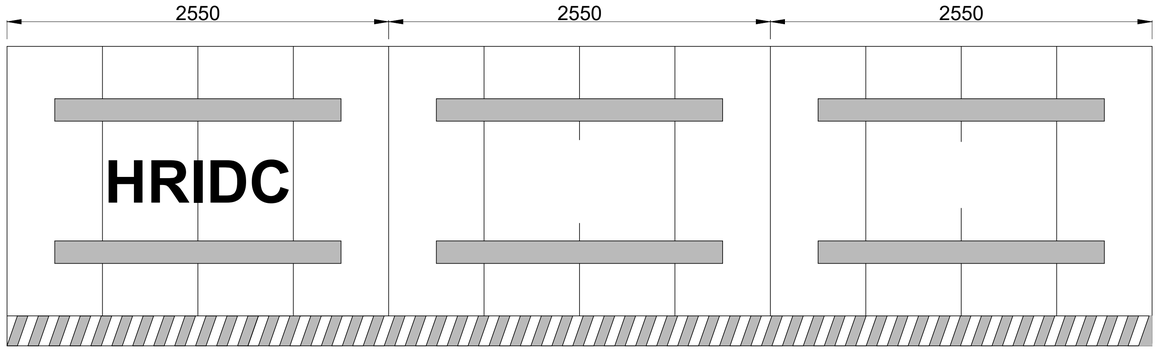
TITLE:- CONCEPTUAL PLAN
DRAINS FOR EMBANKMENT

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-008_A1	1 OF 1

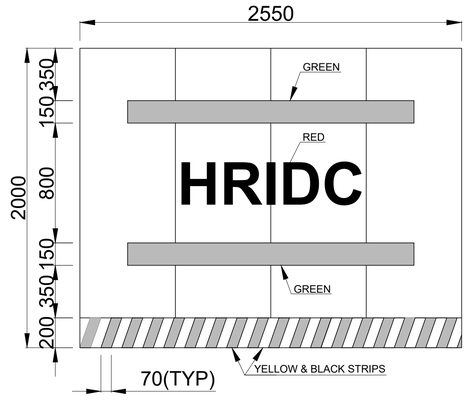
SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



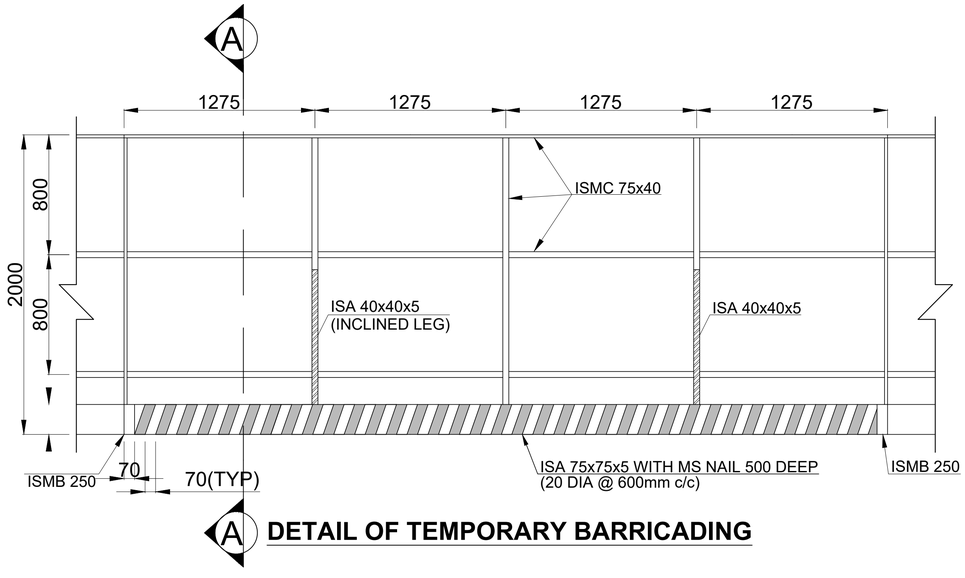
SECTION A-A



ELEVATION OF ONE UNIT OF TEMPORARY BARRICADING



ELEVATION OF ONE SET OF TEMPORARY BARRICADING



DETAIL OF TEMPORARY BARRICADING

NOTES:

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETERS, UNLESS OTHERWISE MENTIONED.
2. THIS BARRICADING SHALL BE USED AT LOCATION OF ROAD AND PEDESTRIAN TRAFFIC.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

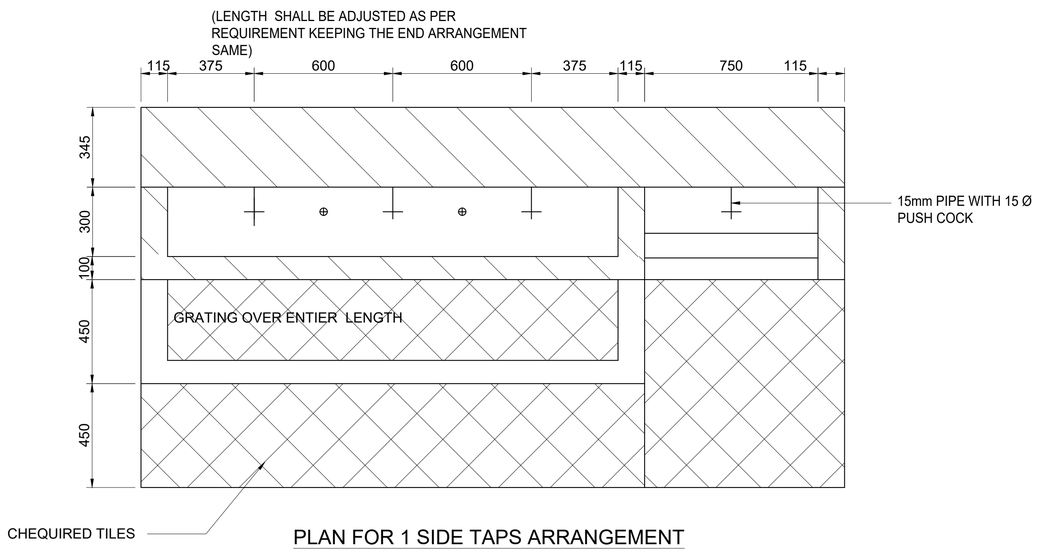
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

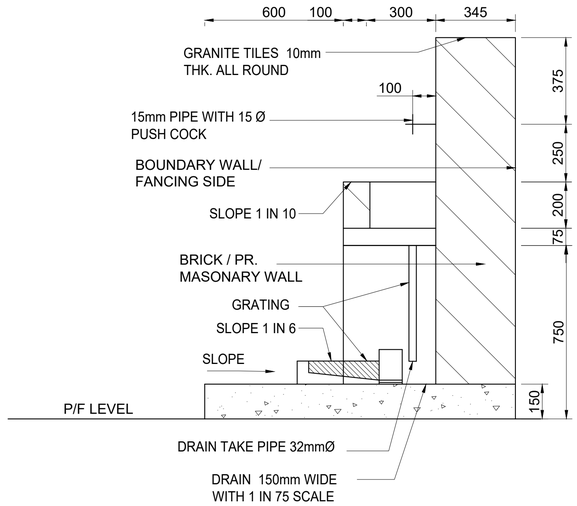
TITLE:- CONCEPTUAL PLAN
STEEL BARRICADE

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-009	

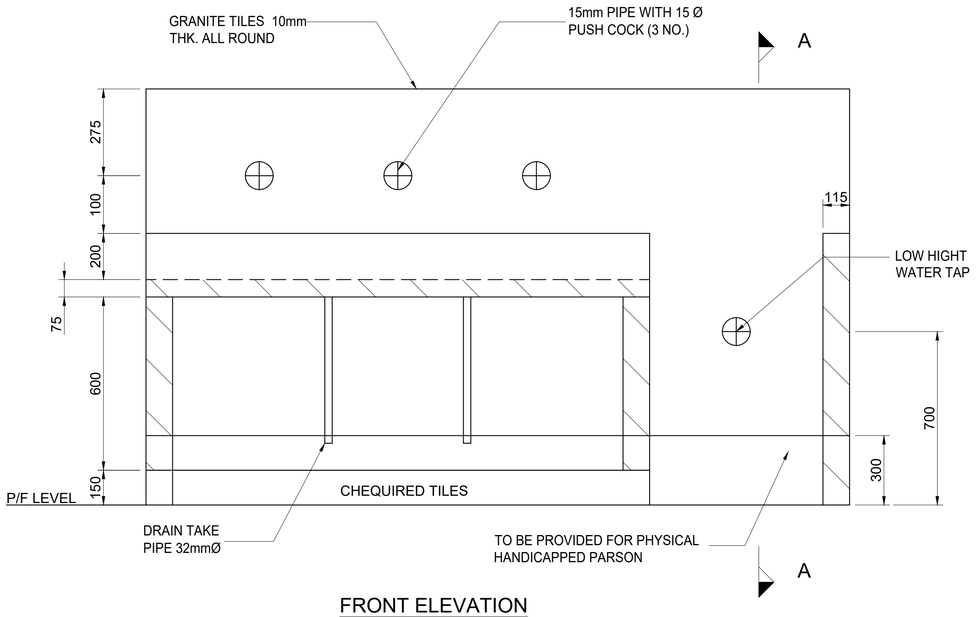
SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



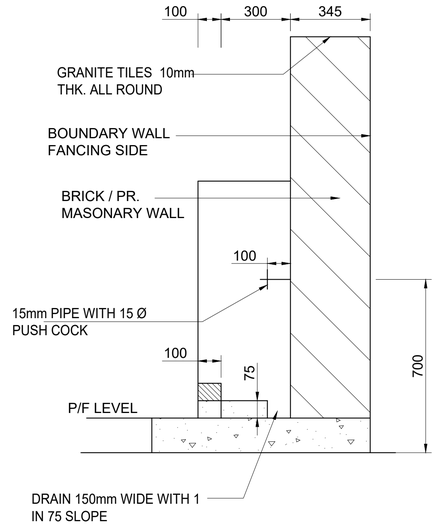
PLAN FOR 1 SIDE TAPS ARRANGEMENT



SECTION FOR ONE SIDE TAPS



FRONT ELEVATION



SECTION AT A-A

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETER
2. LENGTH SHALL BE ADJUSTED AS PER REQUIREMENT KEEPING THE END ARRANGEMENT SAME.
3. ALL EXPOSED SURFACES SHALL BE PROVIDE WITH GRANITE CLADDING.
4. CP BRASS TAPS WITH ANTI-SABOTAGE FITTINGS.
5. LOW HEIGHT WATER TAP TO BE PROVIDED FOR PHYSICALLY HANDICAPPED PERSONS.
6. ALL DIMENSIONS ARE TENTATIVE AND MAY VARY AS PER THE REQUIREMENT.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

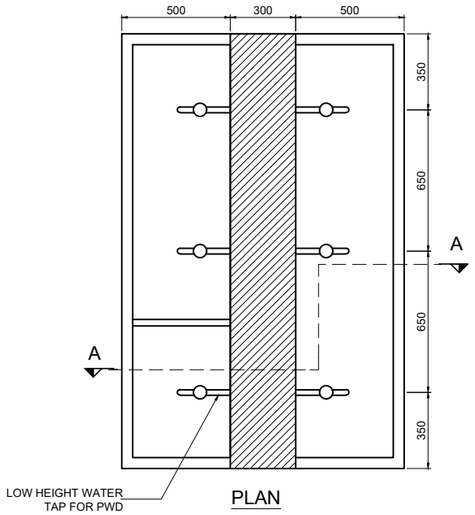
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

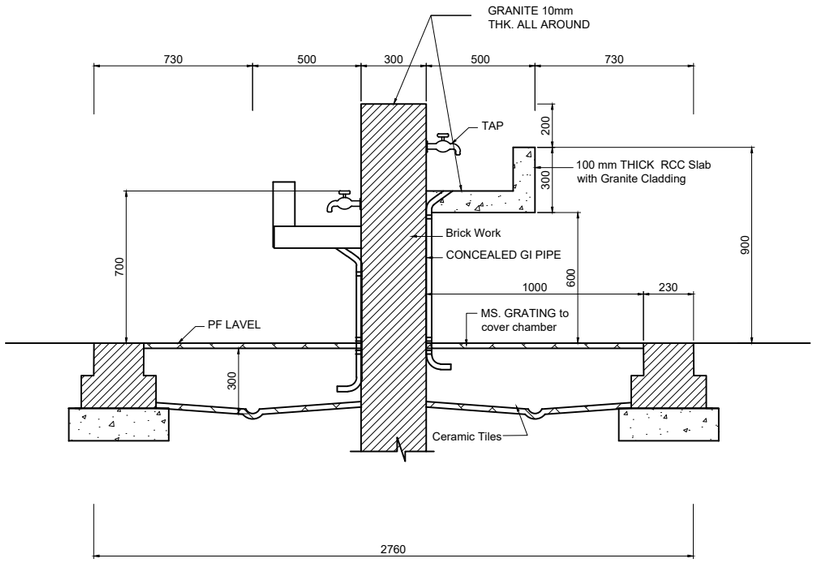
TITLE:- CONCEPTUAL PLAN
WATER BOOTH WITH ONE SIDE TAPS ARRANGEMENT (END PLATFORM)

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-010_A1	1 OF 1

SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



PLAN



SECTION A-A

NOTES :

1. ALL DIMENSIONS ARE IN MM .
2. ALL EXPOSED SURFACE SHALL BE OF GRANITE CLADDING
3. CP BRASS TAPS WITH ANTY SABOTAGE FITTINGS.
4. SEPARATE DRAINAGE PLAN SHALL BE REFERRED FOR EFFLUENT DISCHARGE etc.
5. ALL DIMENSIONS ARE TENTATIVE AND MAY VARY AS PER THE REQUIREMENT.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

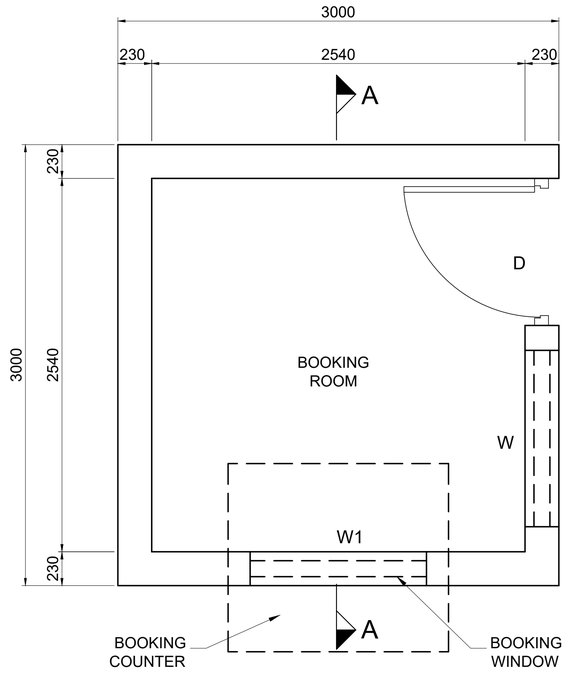
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

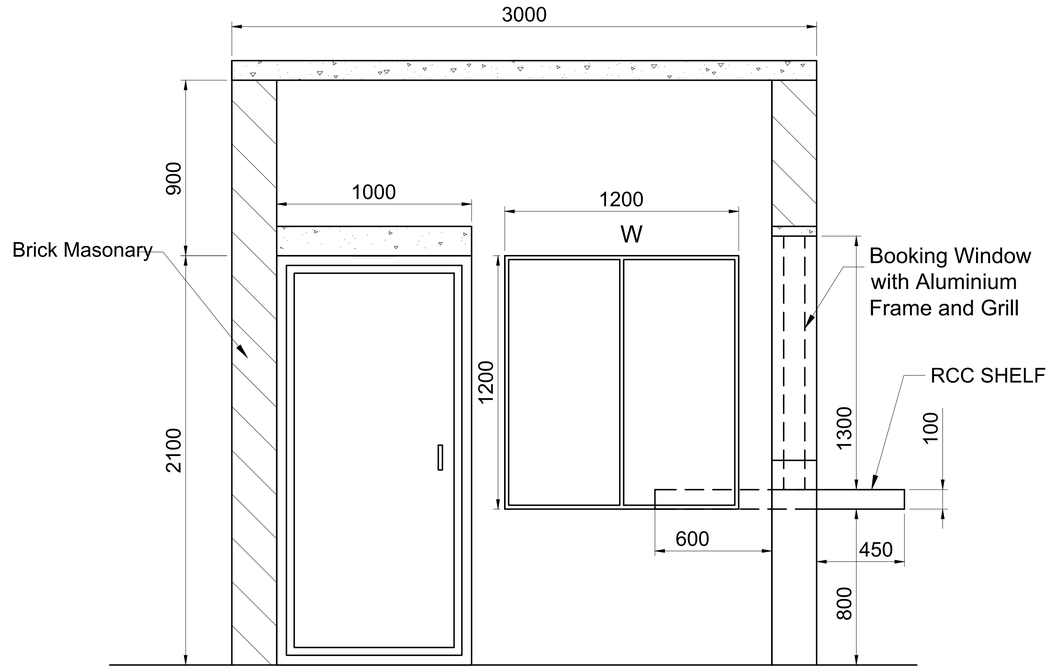
TITLE:- CONCEPTUAL PLAN
WATER BOOTH WITH BOTH SIDE TAPS ARRANGEMENT (ISLAND PLATFORM)

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-011_A1	

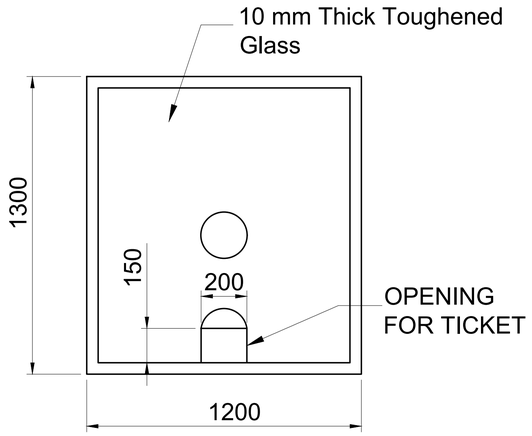
SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



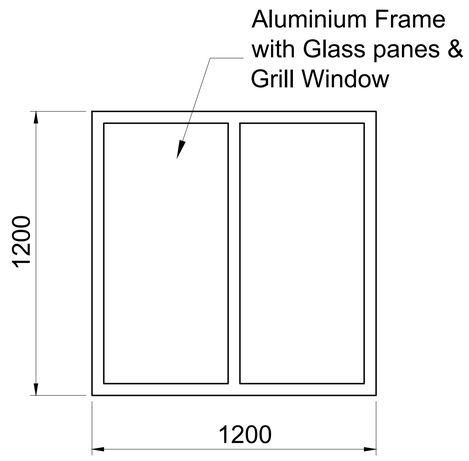
PLAN
(SCALE 1:50)



SECTION A-A
(SCALE 1:50)



DETAIL OF WINDOW (W1)
(SCALE 1:50)



DETAIL OF WINDOW (W)
(SCALE 1:50)

NOTES :

1. ALL DIMENSIONS ARE IN MILIMETERS.
2. DEEPTH OF FOUNDATION TO BE DECIDED AS PER SITE CONDITION.
3. RCC SHELF WITH GRANITE TOP TO BE PROVIDED FOR BOOKING COUNTER.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

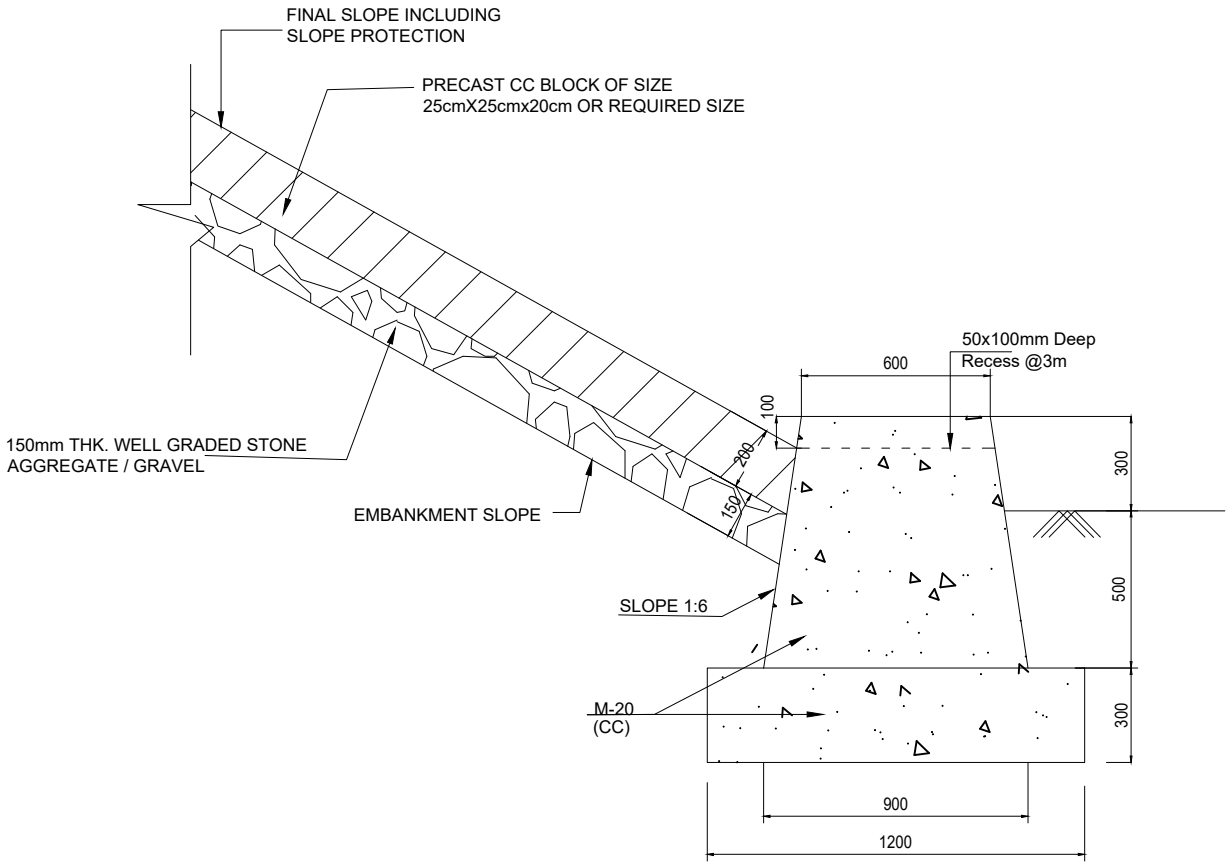
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:- CONCEPTUAL PLAN
TICKET COUNTER FOR
NEW PATLI STATION

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-013	

SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



TOE WALL

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRE UNLESS OTHERWISE MENTIONED.
2. M-20 GRADE CONCRETE SHALL BE USED FOR TOE WALL.
3. 25MM EXPANSION GAP SHALL BE PROVIDED AT 30m (MAX.) OF LENGTH OF WALL.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

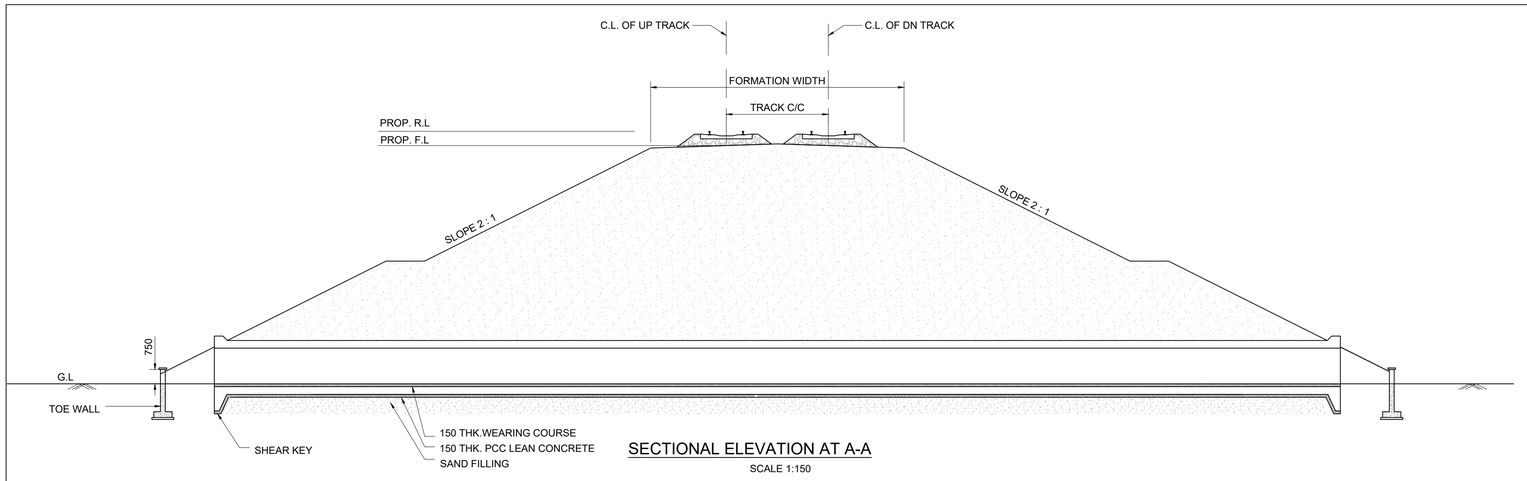
TITLE:- CONCEPTUAL PLAN
CC TOE WALL

DRG. NO. GC-HRIDC-SK-GEN-014_A1

SHEET NO. 1 OF 1

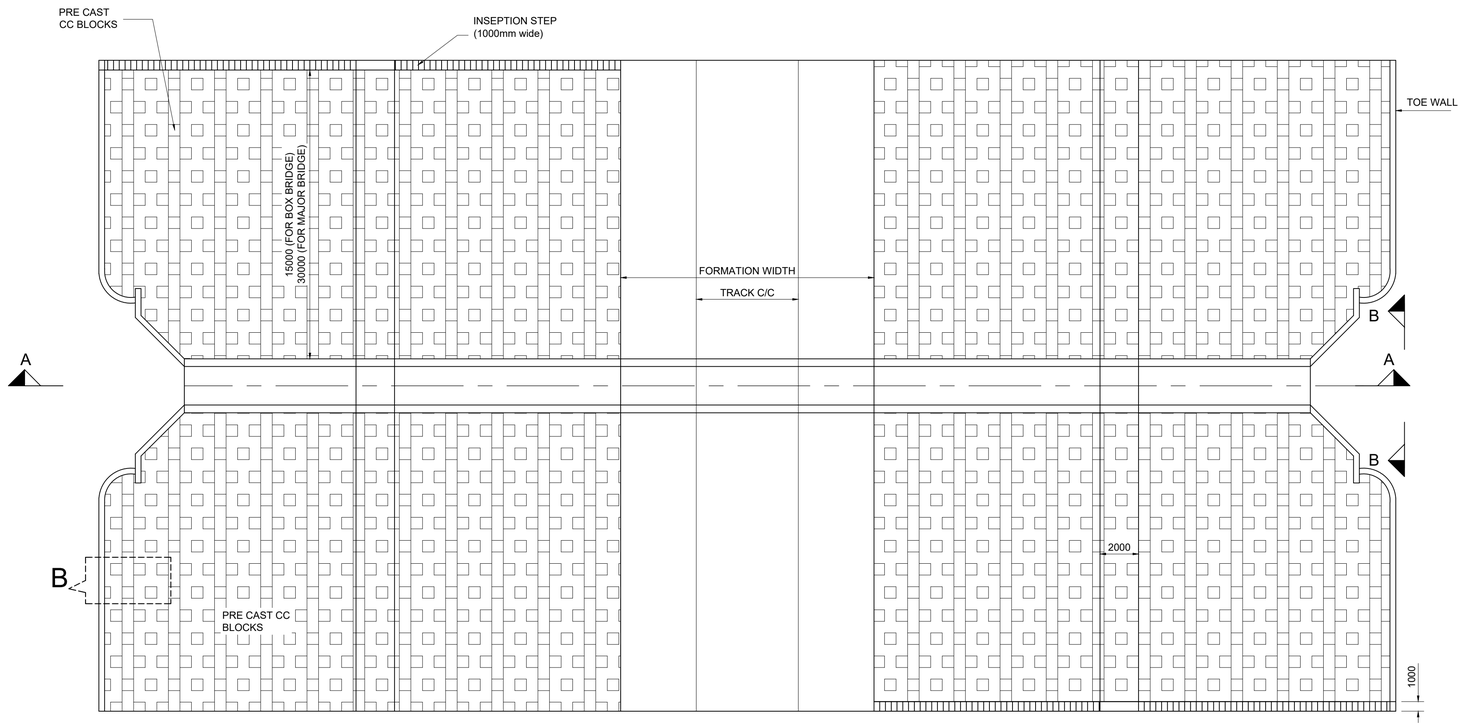
SCALE : AS SHOWN

ISSUE DATE 28.12.2022



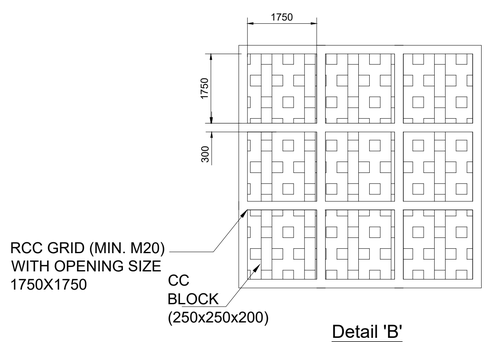
SECTIONAL ELEVATION AT A-A

SCALE 1:150



PLAN AT TOP

SCALE 1:150



Detail 'B'

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE MENTIONED.
2. PROTECTION WORK WITH PRECAST CC BLOCK ON BOTH SIDES OF BRIDGES SHALL BE DONE FOR 15m LENGTH AND 30m LENGTH FOR MINOR BRIDGES & MAJOR BRIDGES RESPECTIVELY.
3. THIS DRAWING IS VALID FOR SINGLE/MULTIPLE NO. OF TRACKS. TRACKS SHOWN IN DRAWING ARE SYMBOLIC PRESENTATION ONLY.

LEGEND

PRL	PROPOSED RAIL LEVEL
PFL	PROPOSED FORMATION LEVEL
HFL	HEIGHEST FLOOD LEVEL
GL	GROUND LEVEL

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR

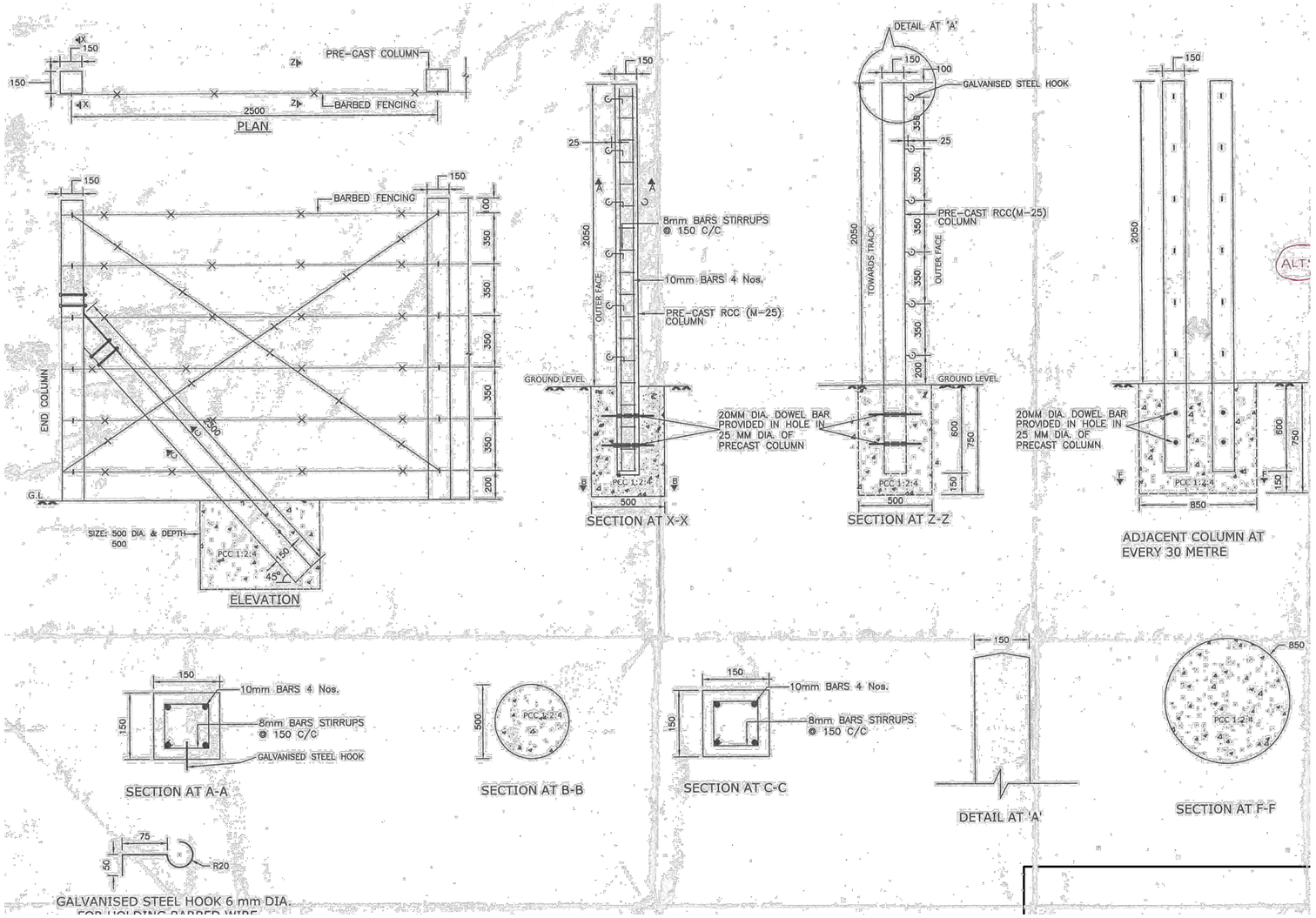
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:- CONCEPTUAL PLAN
TYPICAL DETAILS OF PROTECTION WORK

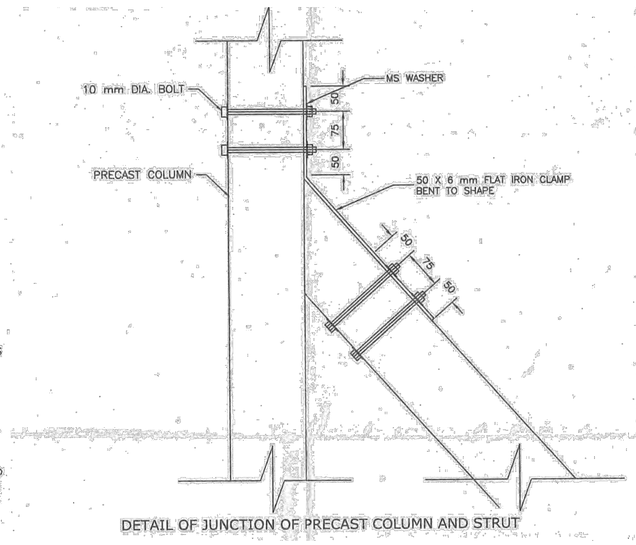
DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-015_A1	

SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



NOTES:

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.
2. BARBED FENCING SHALL BE MADE OF G.I. BARBED WIRES CONFIRMING TO IS: 278. THE WEIGHT OF G.I. BARBED WIRE SHALL BE AS PER SOR.
3. THE G.I BARBED WIRES SHALL BE FIXED TO THE COLUMNS WITH HOOKS MADE OF 6 mm DIA. GALVANIZED STEEL. ANOTHER END OF GALVANIZED STEEL HOOK SHALL BE PLACED BEHIND STIRRUPS AND TIED WITH STIRRUPS AS PER DRAWING TO PROVIDE STRENGTH.
4. FOR ERECTION OF WIRE FENCING, RECOMMENDATIONS GIVEN IN IS:4996-1984 SHALL BE FOLLOWED. FENCING WIRE SHALL BE TIED TO GALVANISED STEEL HOOKS WITH SHORT PIECE OF LIGHT WIRE.
5. M-25 GRADE CONCRETE SHALL BE USED IN PRECAST COLUMN/ STRUT. COLUMN/ STRUT SHALL BE CAST AT CENTRALIZED DEPOT UNDER CONTROLLED CONDITION AS PER IS :456-2000.
6. TMT BARS OF GRADE FE 415/ 500 OF SPECIFIED DIA. SHALL BE USED. TMT BAR SHALL BE CONFIRMING TO IS:1786 (LATEST).
7. ZONAL RAILWAY MAY PAINT THEIR INITIALS (SUCH AS NR, SER etc.) ON COLUMN AND STRUT.
8. STRUT OR BRACE SHALL BE FIXED WITH END RCC COLUMN BY SUITABLE ARRANGEMENT AS DETAILED IN DRAWING. 50 X 6 mm MS FLAT SHALL BE USED TO CONNECT STRUT/BRACE TO RCC COLUMN. 10 mm DIA. MS BOLT BLACK HEXAGONAL HEAD ROUND NECK WITH HEXAGONAL NUTS AND TWO WASHER SHALL BE USED. AFTER TIGHTING NUT, END OF BOLT SHALL BE HAMMERED TO MAKE ANTITHEFT.
9. SUPPORTING STRUT SHALL BE PROVIDED AT FIRST / END COLUMN OR CHANGE OF DIRECTION.
10. 1:20 SLOPE SHALL BE PROVIDED ON TOP OF COLUMN AT THE TIME OF CASTING.
11. AT EVERY 30 METRE TWO COLUMN SHALL BE GROUTED SIDE BY SIDE.
12. IN UNDULATING AREA, COLUMN SHALL BE PLACED ACCORDINGLY SO THAT BARBED WIRE ARE ALIGNED HORIZONTAL. VERTICALITY OF COLUMN SHALL BE CHECKED DURING ERECTION.
13. FOUNDATION SHALL BE DUG USING AUGAR/ MECHANICAL BORING EARTH SHALL BE RAMMED PROPERLY AND 50 MM SAND SHALL BE PLACED BEFORE FOUNDATION CASTING. FOUNDATION SHALL BE CURED PROPERLY.
14. THIS CATLE FENCE SHALL BE PROVIDED AT RAILWAY BOUNDARY.
15. IS:456(LATEST) SHALL BE FOLLOWED IN ALL R.C.C & P.C.C WORKS.



Notes:

1. THIS DRAWING IS BASED ON RDSO DRAWING NO. RDSO/WKS/2019/2.
2. GRADE OF CONCRETE M25.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

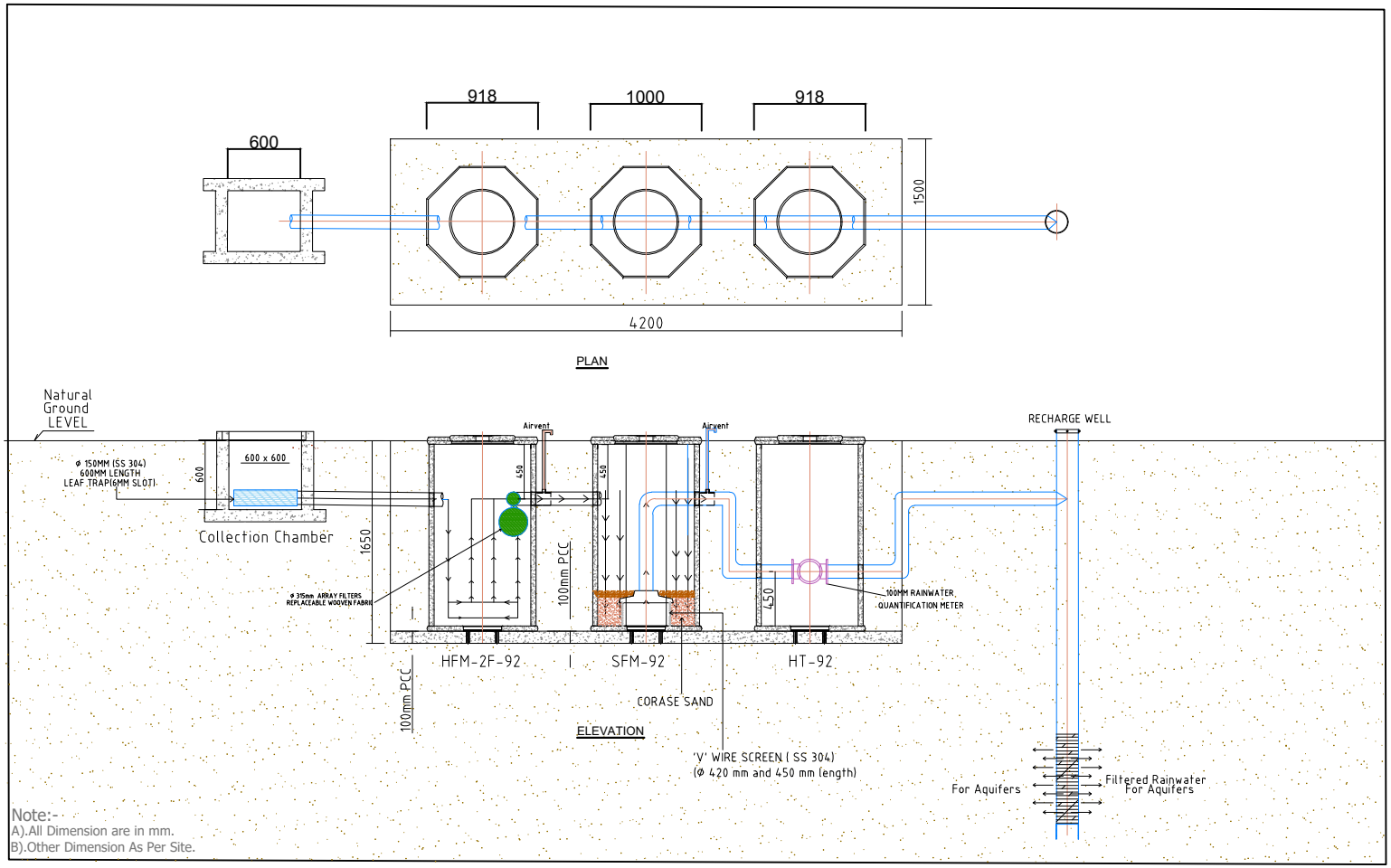
TITLE:- CONCEPTUAL PLAN
BARBED WIRE FENCING

DRG. NO. GC-HRIDC-SK-GEN-016_A1

SHEET NO. 1 OF 1

SCALE : AS SHOWN

ISSUE DATE 28.12.2022



Note:-
A).All Dimension are in mm.
B).Other Dimension As Per Site.

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT STATED.

2. DO NOT SCALE THE DRAWING FOLLOW ONLY WRITTEN DIMENSIONS.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Sarbana Jurong Group

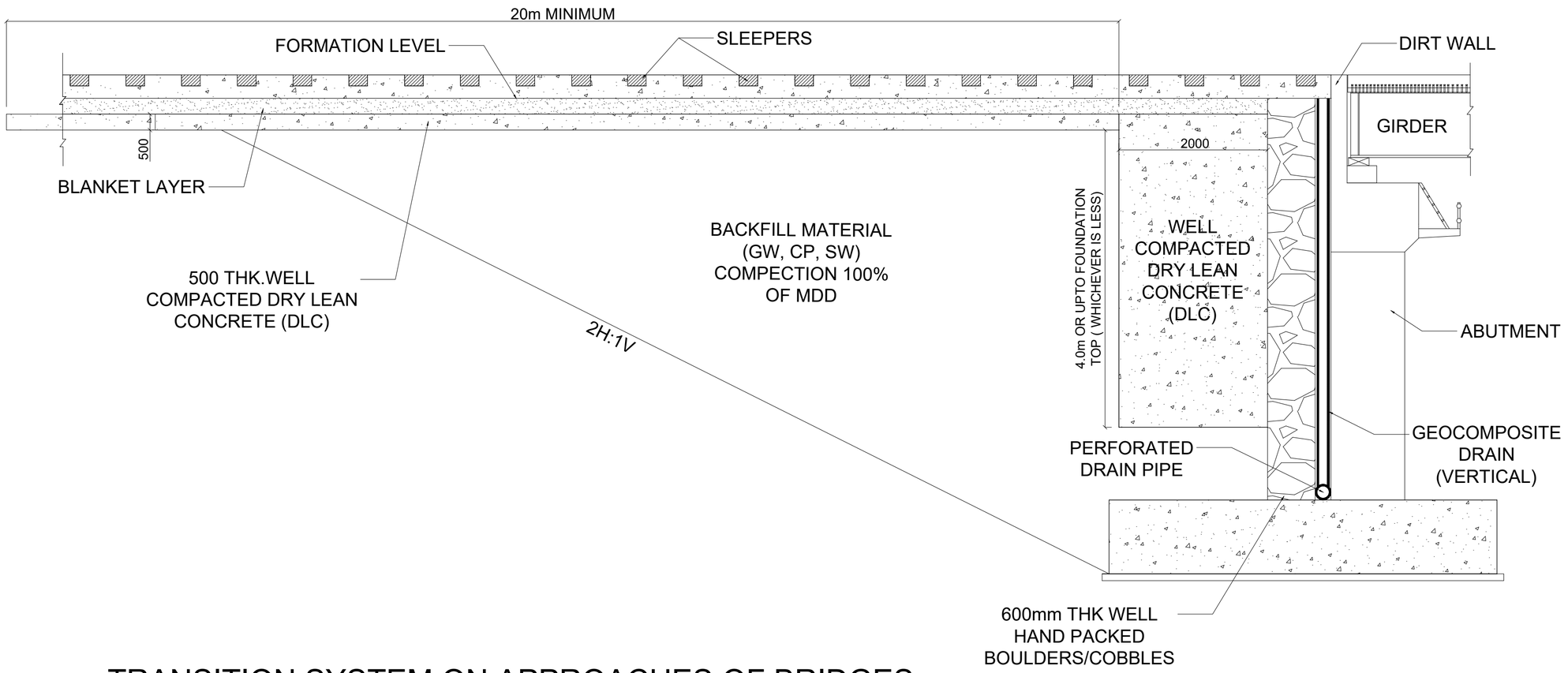
TITLE:- CONCEPTUAL PLAN
RAIN-WATER HARVESTING

DRG. NO. GC-HRIDC-SK-GEN-018

SHEET NO.

SCALE : AS SHOWN

ISSUE DATE 28.12.2022



TRANSITION SYSTEM ON APPROACHES OF BRIDGES

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT STATED.
2. DO NOT SCALE THE DRAWING FOLLOW ONLY WRITTEN.
3. THIS DRAWING IS PREPARED BASED UPON REFER RDSO REPORT NO. GE:R-50 DATED JULY-2021 FOR DETAILS THIS REPORT SHALL BE FOLLOWED.
4. GEOCOMPOSITE DRAINS TO BE USED BEHIND BRIDGE ABUTMENT SHALL BE AS PER RDSO/2018/GE:IRS-006, MARCH-2019 AND COMPREHENSIVE GUIDELINE AND SPECIFICATIONS FOR RAILWAY FORMATION.
5. PROVISION IN RETURN WALL SHALL BE KEPT TO TAKE OUT THE DISCHARGE FROM PERFORATED DRAIN PIPE.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

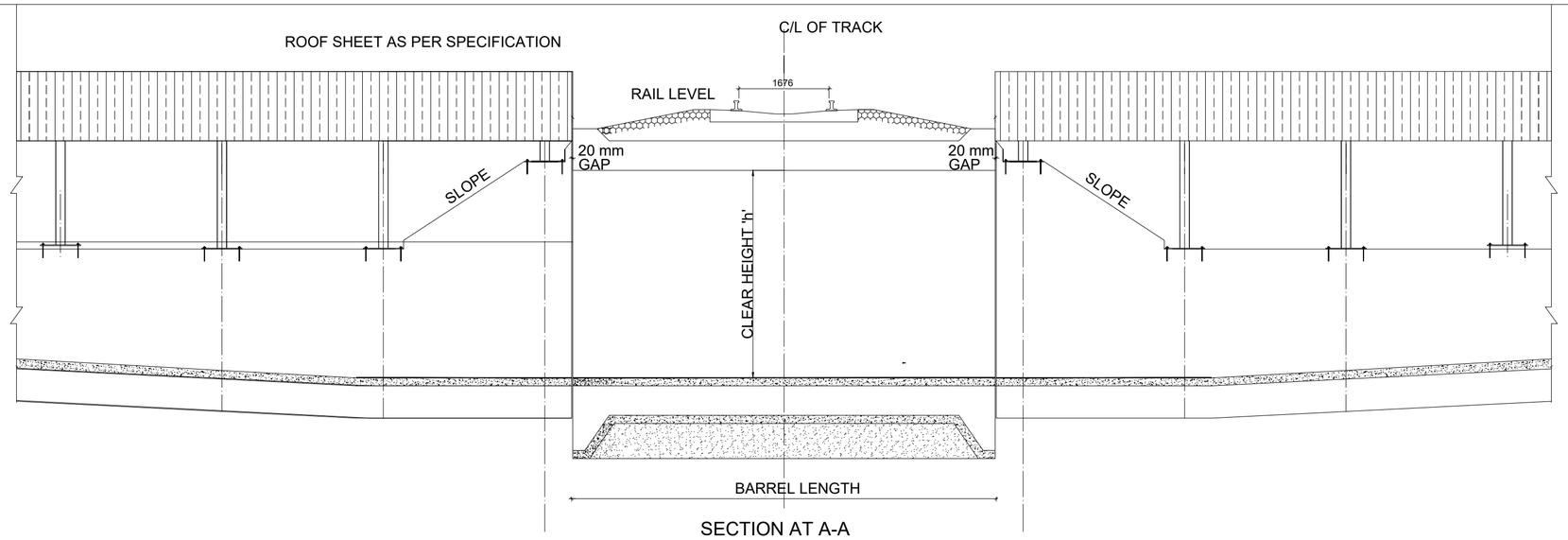
THE INFRASTRUCTURE PEOPLE

Member of the Surbana Jurong Group

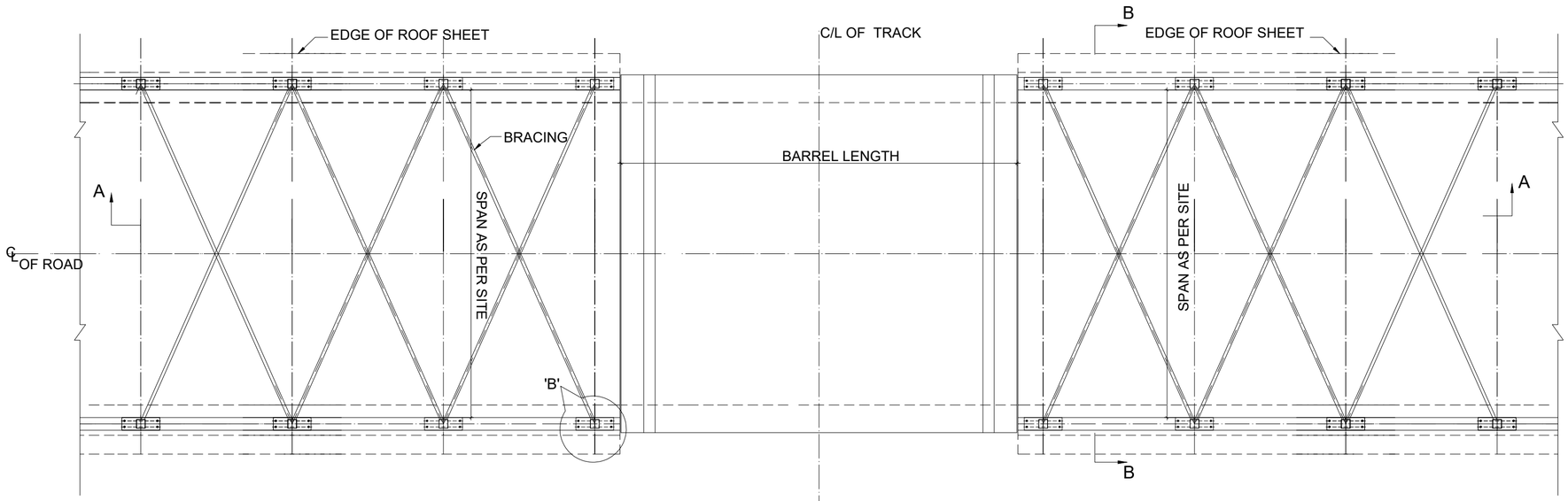
TITLE:-
CONCEPTUAL PLAN FOR
TRANSITION SYSTEM OF BRIDGE APPROACHES

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-019	1 OF 1

SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



SECTION AT A-A



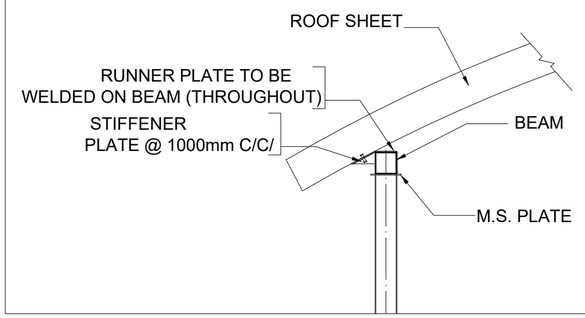
PLAN

NOTES :

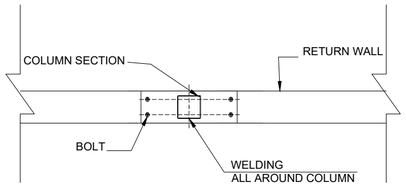
1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT STATED OTHERWISE.
2. DO NOT SCALE THE DRAWING FOLLOW ONLY WRITTEN DIMENSIONS.
3. VERIFY ALL SCHEDULE OF DIMENSION BEFORE EXECUTION OF WORK AT SITE. ENGINEER IN CHARGE SHOULD ENSURE THE SAFETY OF TRACK/EXISTING STRUCTURES BEFORE EXECUTION OF WORK.
4. STRUCTURAL STEEL SHALL CONFORM TO IS : 2062.
5. ALL WELD SHALL BE ALL AROUND CONTINUOUS UNLESS OTHERWISE MENTIONED.
6. SIZE AND SPACING OF STRUCTURAL MEMBERS SHALL BE FINALIZED AFTER DETAILED DESIGN.
7. RDSO REPORT NO. RDSO/WKS/2015/3 SHALL BE FOLLOWED FOR SELF-SUPPORTING ROOFING SYSTEM DETAILS, ITS INSTALLATION AND MATERIAL SPECIFICATION.
8. ROOF COVERING SHALL BE OF HIGH QUALITY, HIGH GRADE, PRE COATED GALVALUME SHEET OF MINIMUM THICKNESS 0.9mm.
9. PROFLEX ROOFING SYSTEM SHALL BE ADOPTED FOR SELF-SUPPORTING ROOFING.
10. ROOFING PANELS SHALL BE MECHANICALLY SEAMED (INTERLOCK) AND FREE FROM NOTES, NUT, BOLTS OVERLAPS AND SEALANTS.
13. AFTER ERECTION OF ROOFING, IT SHALL BE BOLTED WITH THE SUPPORTING STRUCTURE BY SELF-SPLITTING SCREWS.

RUNNER PLATE
TO BE WELDED ON BEAM
(THROUGHOUT)

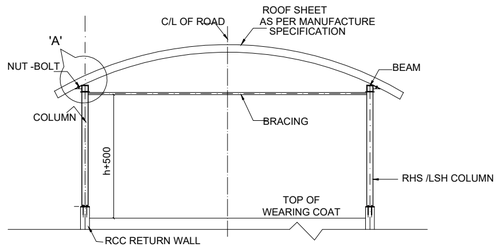
STIFFENER PLATE
@ 1000mm C/C/



DETAIL AT 'A'
NOT TO SCALE



DETAIL AT 'B'
NOT TO SCALE



SECTION AT B-B
DETAILS OF COVER SHED (COVER ON APPROACH ROAD)

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

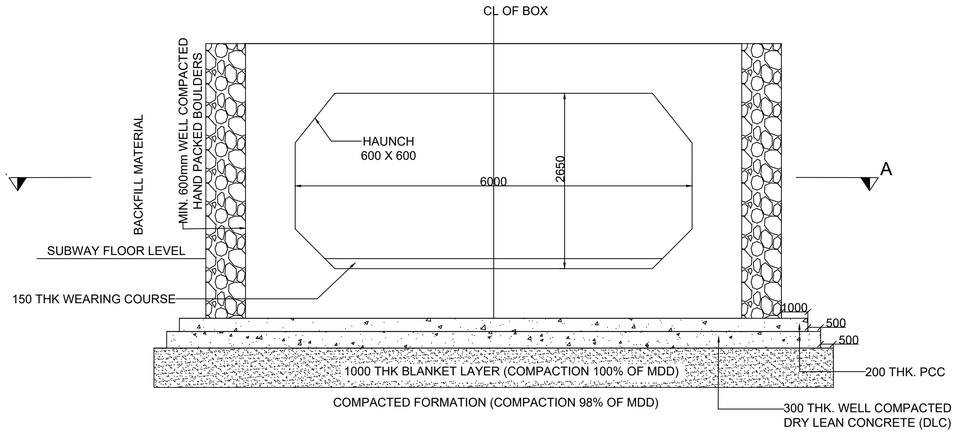
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

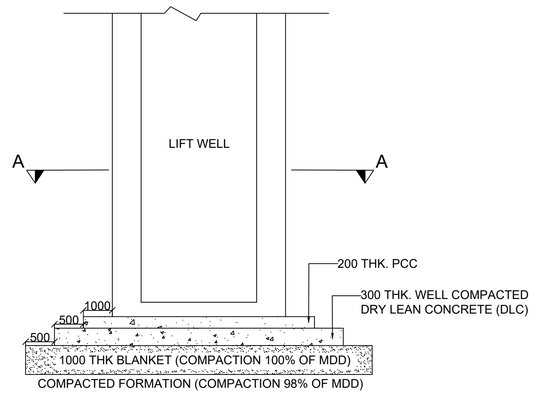
TITLE:- CONCEPTUAL PLAN FOR SELF SUPPORTING ROOF COVERING SHED

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-020	1 OF 1

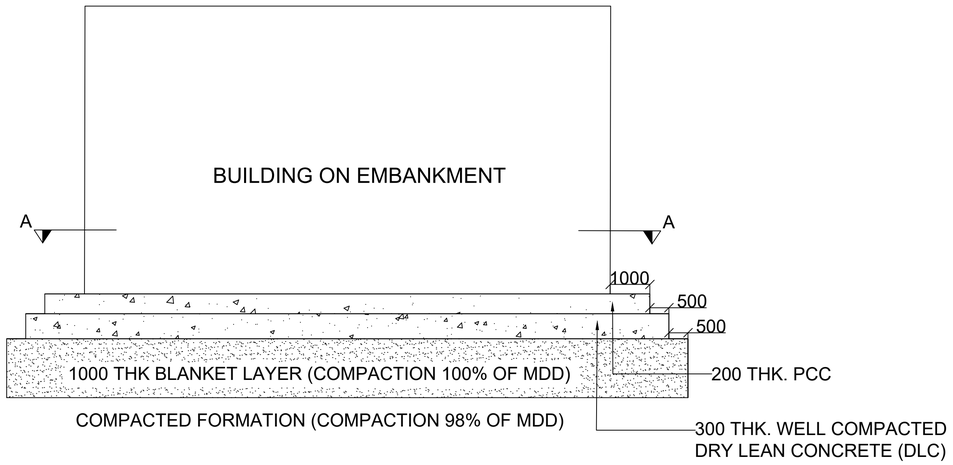
SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



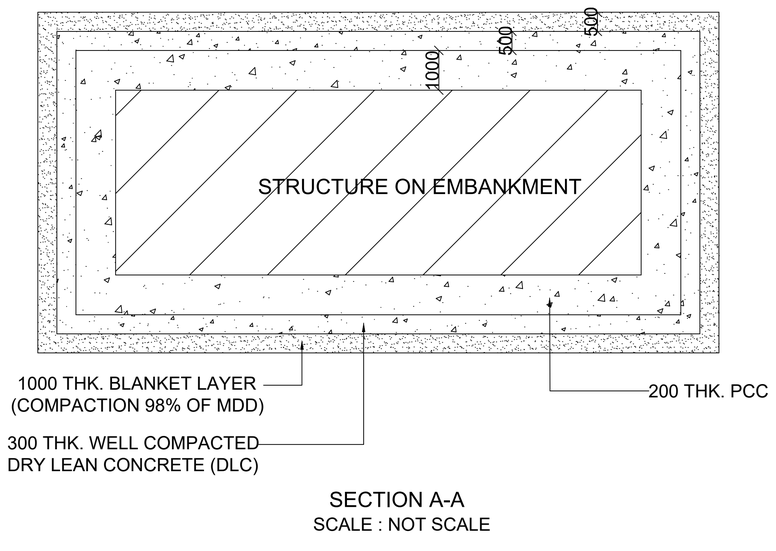
FORMATION DETAIL BELOW SUBWAY BOX



FORMATION DETAIL BELOW LIFT WELL



FORMATION DETAIL BUILDING



SECTION A-A
SCALE : NOT SCALE

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT STATED.
2. DO NOT SCALE THE DRAWING FOLLOW ONLY WRITTEN DIMENSIONS.
3. FOR BLANKET LAYER DETAILS FOLLOW RDSO SPECIFICATION NO.: RDSO82020/GR:IRS-004 (COMPREHENSIVE GUIDELINE AND SPECIFICATION FOR RAILWAY FORMATION).

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

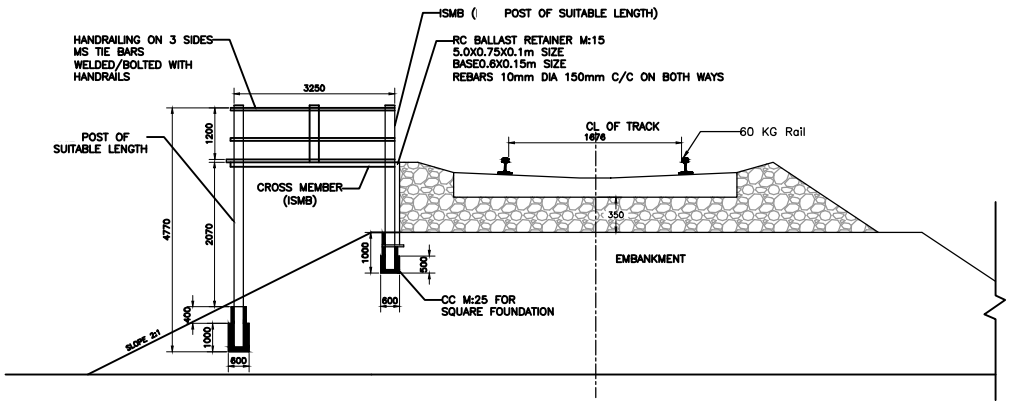
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

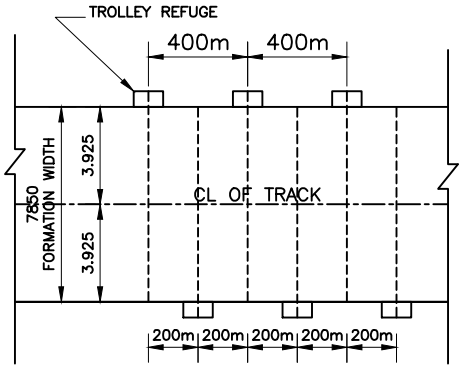
TITLE:- CONCEPTUAL PLAN FOR FORMATION DETAIL BELOW OF SUBWAY,LIFT WELL AND BUILDING

DRG. NO. GC-HRIDC-SK-GEN-021
SHEET NO. 1 OF 1

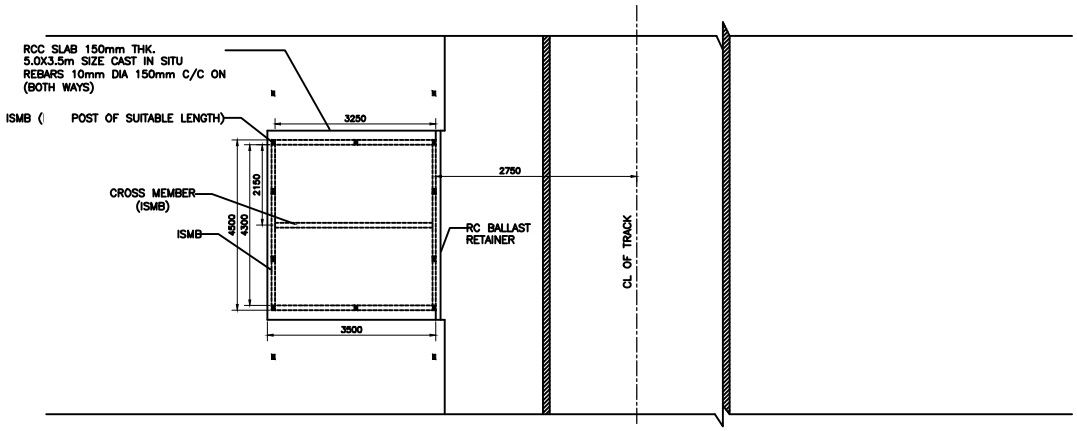
SCALE : AS SHOWN
ISSUE DATE 28.12.2022



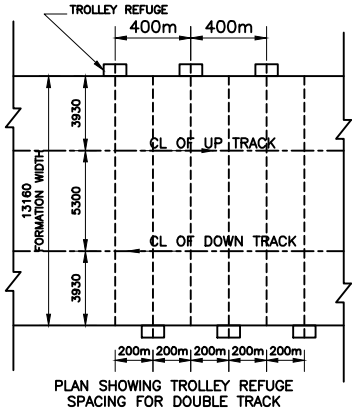
SECTIONAL ELEVATION



PLAN SHOWING TROLLEY REFUGE
SPACING FOR SINGLE TRACK



PLAN



PLAN SHOWING TROLLEY REFUGE
SPACING FOR DOUBLE TRACK

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT STATED.

2. DO NOT SCALE THE DRAWING FOLLOW ONLY WRITTEN DIMENSIONS.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Sarbana Jurong Group

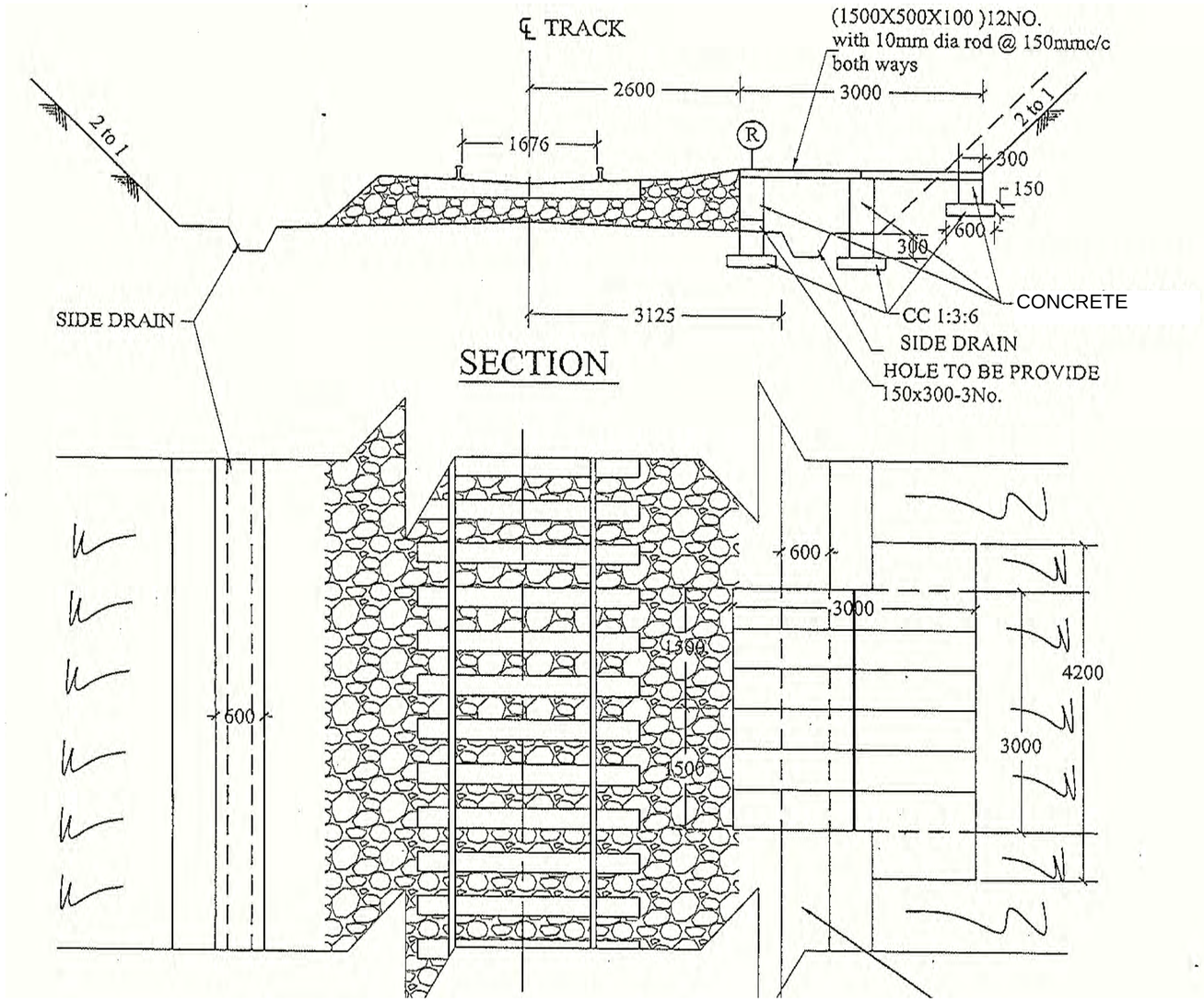
TITLE:- CONCEPTUAL PLAN FOR TROLLEY REFUGE IN EMBANKMENT

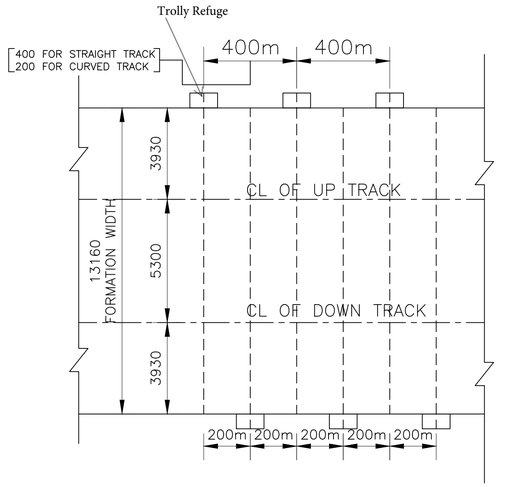
DRG. NO. GC-HRIDC-SK-GEN-022

SHEET NO. 1 OF 1

SCALE : AS SHOWN

ISSUE DATE 28.12.2022





PLAN SHOWING TROLLEY REFUGE
SPACING FOR DOUBLE TRACK

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT STATED.
2. DO NOT SCALE THE DRAWING FOLLOW ONLY WRITTEN DIMENSIONS.
3. RCC PRECAST SLAB M35 (1500X500X100)

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

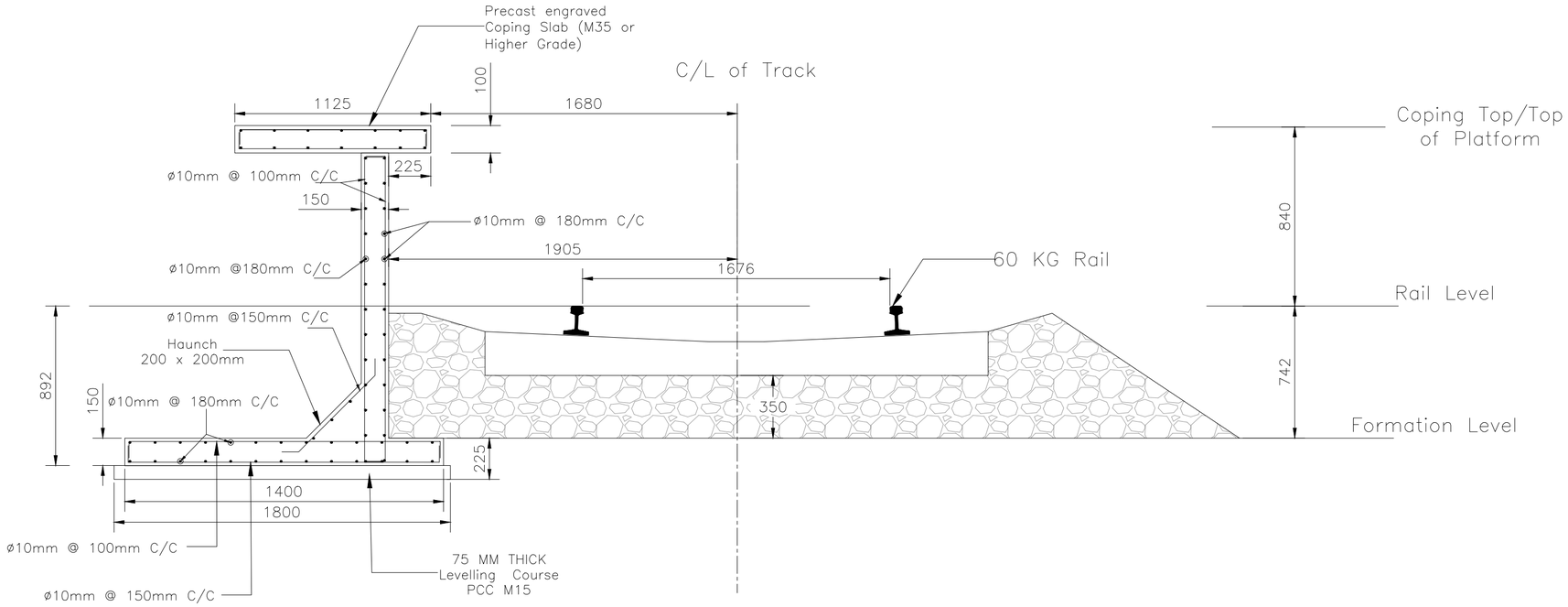
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:-
CONCEPTUAL PLAN FOR
TROLLEY REFUGE IN CUTTING

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-023	1 OF 1

SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



SECTION FOR PLATFORM WALL

NOTES:

1. ALL DIMENSION ARE IN MILLIMETERS EXPECT LEVELS WHICH ARE IN METERS. NO DIMENSION SHALL BE SCALED FROM DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. 25MM CLEAR COVER SHALL BE PROVIDED TO ALL TYPES OF OUTERMOST REINFORCEMENT.
3. #INDICATES HIGH YIELD STRENGTH STEEL Fe-500 D(TMT) CONFORMING TO I.S. 2008.
4. ANCHORAGE SHALL BE 50 X DIA OF BARS & NOT MORE THAN 50% BARS SHALL BE LAPPED AT ONE SECTION. THE DISTANCE BETWEEN TWO LAPS SHALL BE MORE THAN 1.5 TIMES THE LAP LENGTH.
5. 50mm DIA. PVC PIPE AS WEEP HOLES ARE TO BE PROVIDED IN PLATFORM/TOE WALL @1000mm C/C HORIZONTALLY AND VERTICALLY STAGGERED. MINIMUM 50mm DISTANCE BETWEEN PIPE FACE & ALL STEEL MUST BE MAINTAINED.
6. THE BACK FILL IS TO BE PROVIDED CONFORMING TO CLAUSE 7.5 OF IRS SUB-STRUCTURE CODE. COMPACTION OF BACKFILL SHALL BE DONE AFTER COMPACTING THE SOIL GIVING PASSIVE PRESSURE FROM TRACK SIDE.
7. CONCRETE GRADE OF PLATFORM WALL SHALL BE M:35.
8. IT SHALL BE DESIGNED FOR SEISMIC ZONE IV.
9. COPING SLAB IS NOT MONOLITHICALLY CAST WITH WALL. IT SHALL BE PRESENT ON PLATFORM WALL TOP USING 1:3 CEMENT-SAND MORTAR COPING SHALL BE KEPT AFTER THE COMPACTION OF BACKFILL.
10. SIZE & REINFORCEMENT SHOWN IN DRAWING IS TENTATIVE AND DETAILED DESIGN SHALL TAKE CARE OF THE REQUIREMENT OF SEISMIC ZONE IV.
11. 25MM EXPANSION GAP SHALL BE PROVIDED AFTER EVERY 25m LENGTH.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

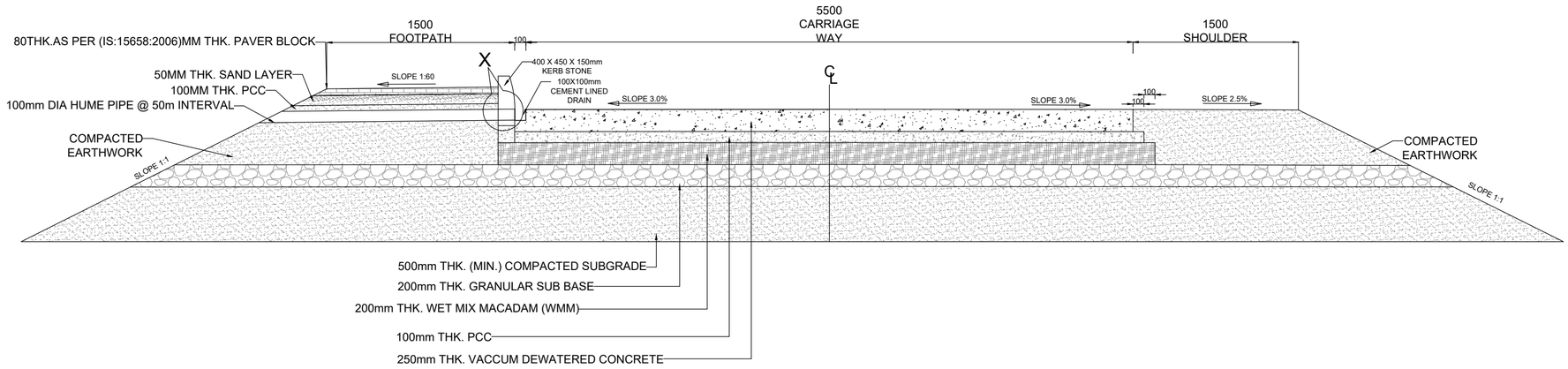
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

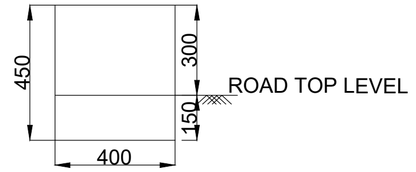
TITLE:- CONCEPTUAL SKETCH FOR RCC PLATFORM WALL

DRG. NO. GC-HRIDC-SK-GEN-024 | SHEET NO. 1 OF 1

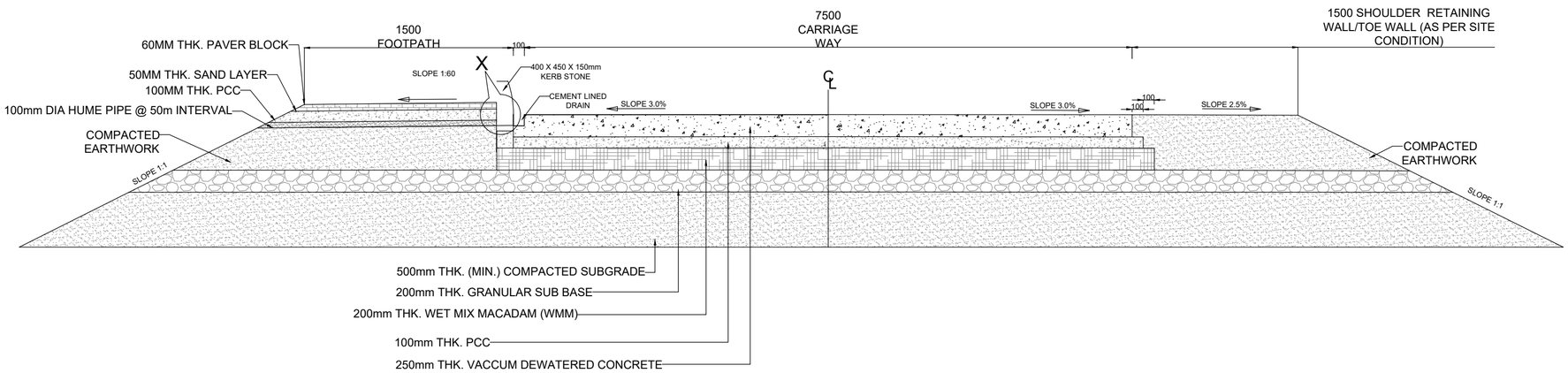
SCALE : AS SHOWN | ISSUE DATE 28.12.2022



TYPICAL CROSS-SECTION OF SINGLE LANE ROAD



DETAIL OF X



TYPICAL CROSS-SECTION OF DOUBLE LANE ROAD

NOTES:
1. ALL DIMENSION ARE IN MILLIMETERS EXPECT LEVELS WHICH ARE IN METERS. NO DIMENSION SHALL BE SCALED FROM DRAWING ONLY WRITTEN DIMENSION ARE TO BE FOLLOWED.
2. ROAD SHALL BE CONSTRUCTED AS PER MORTH STANDARDS.
3. LAYING OF PAVE BLOCK SHALL BE AS PER IRC PROVISION.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

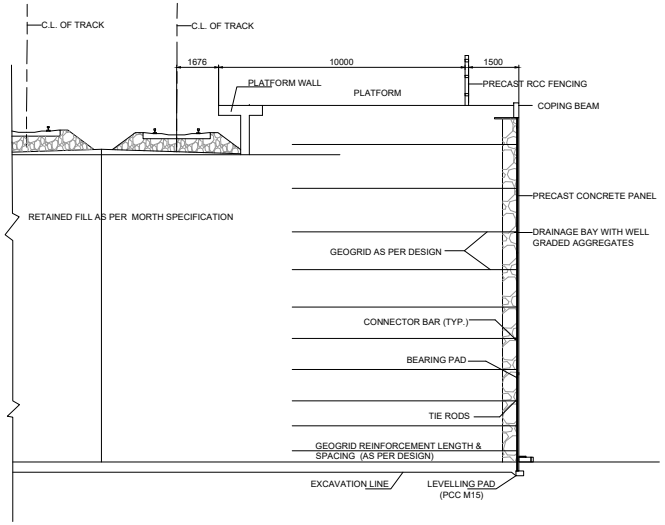
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

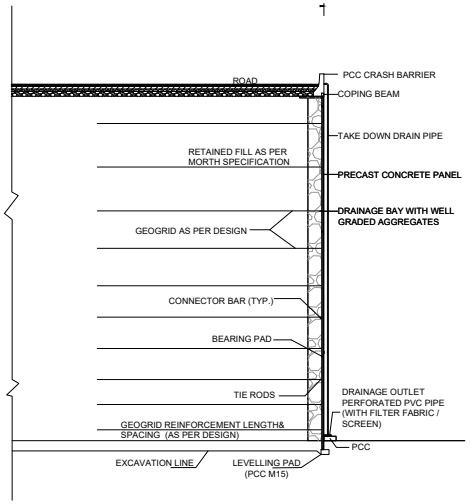
TITLE:- CONCEPTUAL SKETCH FOR SINGLE & DOUBLE LANE ROAD

DRG. NO. GC-HRIDC-SK-GEN-025 | SHEET NO. 1 OF 1

SCALE : AS SHOWN | ISSUE DATE 28.12.2022



TYPICAL CROSS SECTION OF REINFORCED EARTH WALL WITH GEOGRID REINFORCEMENT AND PRECAST PANEL FACING FOR RAIL PLATFROM



TYPICAL CROSS SECTION OF REINFORCED EARTH WALL WITH GEOGRID REINFORCEMENT AND PRECAST PANEL FACING FOR ROAD

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT STATED OTHERWISE.
2. DO NOT SCALE THE DRAWING FOLLOW ONLY WRITTEN DIMENSIONS.
3. DESIGNS, DETAILING OF RE WALL SHALL BE AS PER MORTH SPECIFICATION.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Sarbana Jurcng Group

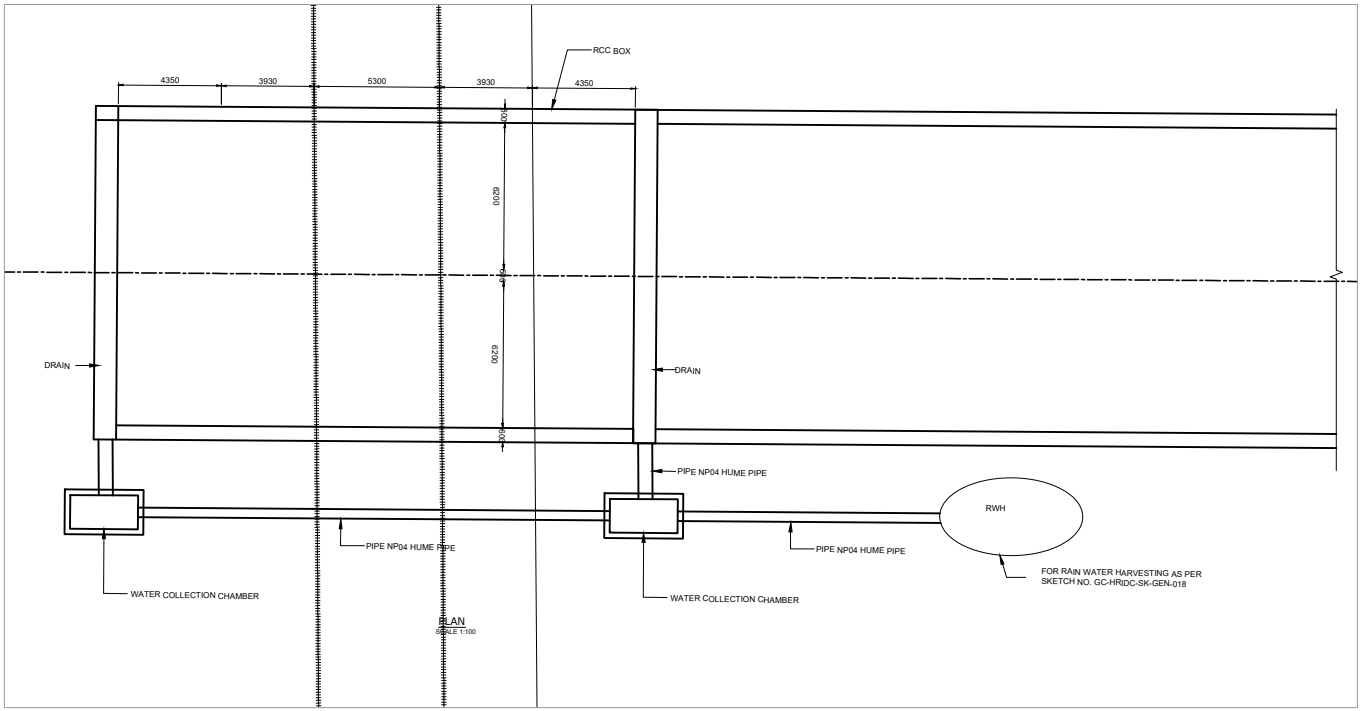
TITLE:- CONCEPTUAL SKETCH FOR REINFORCED EARTH WALL WITH GEOGRID REINFORCEMENT

DRG. NO. GC-HRIDC-SK-GEN-026

SHEET NO. 1 OF 1

SCALE : AS SHOWN

ISSUE DATE 28.12.2022



PLAN
SCALE 1:100

NOTES :
1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT LEVELS WHICH ARE IN METER, UNLESS OTHERWISE MENTIONED.
2. * SIZE OF SUMP SHALL BE AS PER DESIGN DISCHARGE.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Sarbana Jurong Group

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

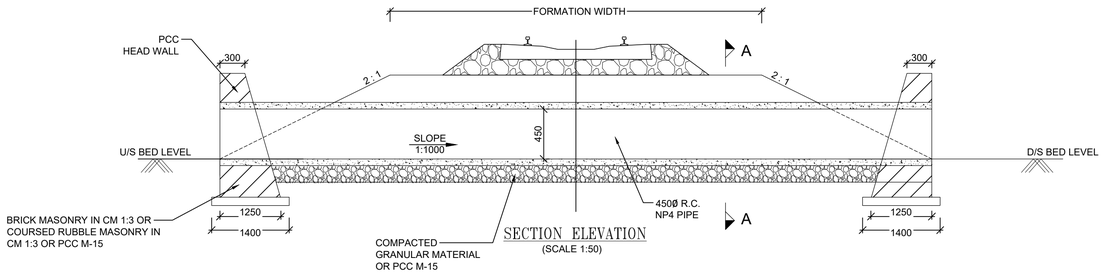
TITLE:- Conceptual Plan for sump

DRG. NO. GC-HRIDC-SK-GEN-027

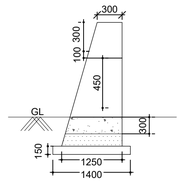
SHEET NO. 1 OF 1

SCALE : AS SHOWN

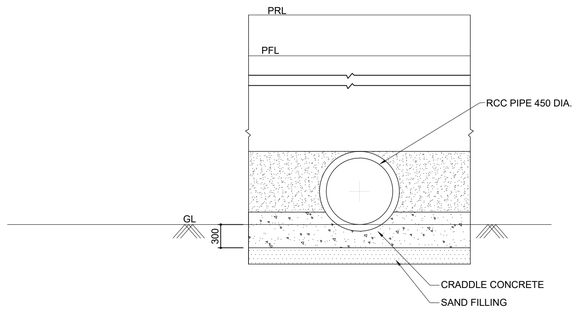
ISSUE DATE 28.12.2022



SECTION ELEVATION
(SCALE 1:50)



DETAIL OF HEAD WALL



SECTION A-A

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT STATED.
2. DO NOT SCALE THE DRAWING FOLLOW ONLY WRITTEN DIMENSIONS.
3. LOOSE/UNSUITABLE SOIL BELOW CULVERTS IS REPLACED WITH SUITABLE GRANULAR MATERIAL.
4. LONGITUDINAL SLOPE OF PIPE SHALL BE MIN. 1 IN 1000.
5. BEDDING CONDITION BELOW NP-04 PIPE SHALL BE AS PER IS:458.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

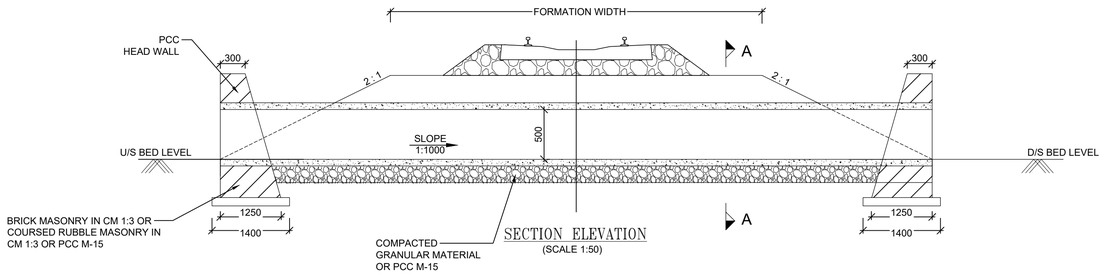
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

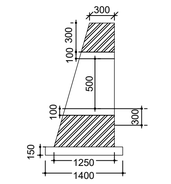
TITLE:- CONCEPTUAL SKETCH FOR NP4 PIPE OF 450mm DIA

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-028	1 OF 1

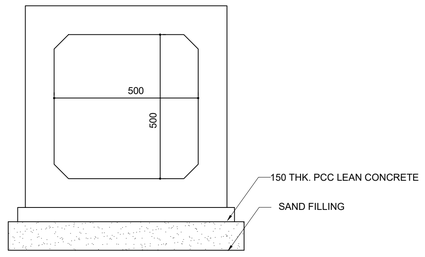
SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



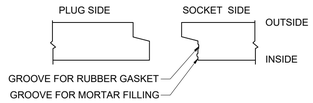
SECTION ELEVATION
(SCALE 1:50)



DETAIL OF HEAD WALL



SECTION B-B



PLUG &SOCKET JOINTS
SEALING MATERIAL RUBBER GASKET
FLANG BOLT CONNECTION

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT STATED.
2. DO NOT SCALE THE DRAWING FOLLOW ONLY WRITTEN DIMENSIONS.
3. LOOSE/UNSUITABLE SOIL BELOW CULVERTS IS REPLACED WITH SUITABLE GRANULAR MATERIAL.
4. STRUCTURE IS TO BE DESIGNED FOR 32.5 T LOADING AS APPLICABLE.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
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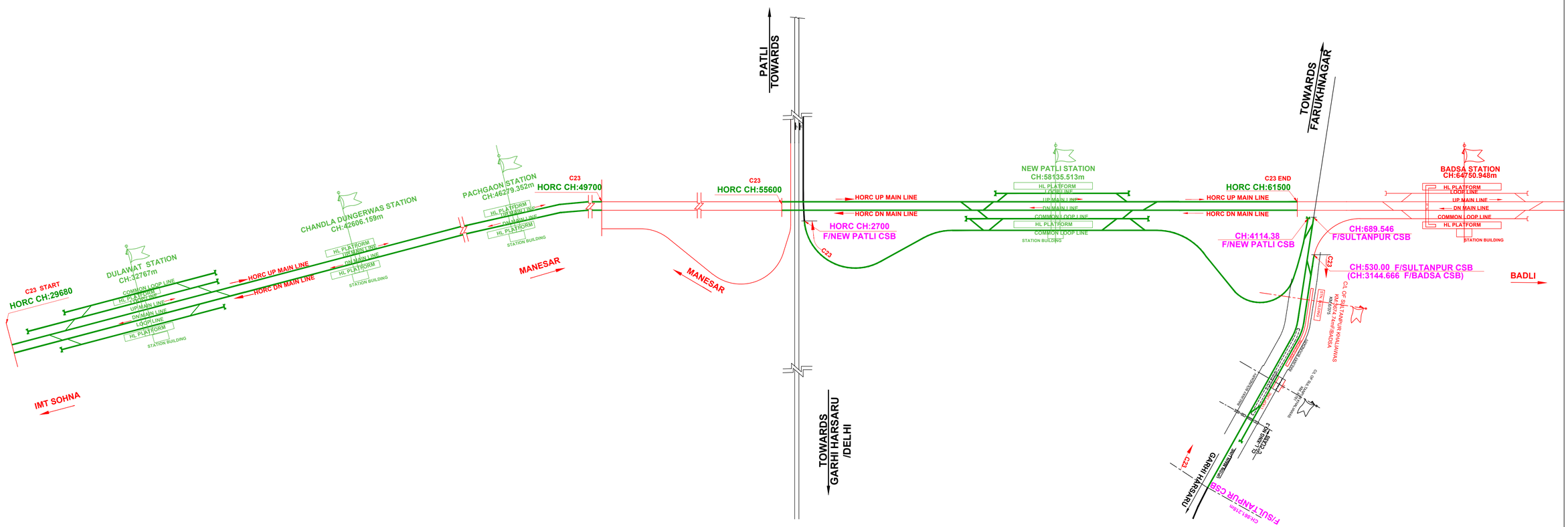
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:-
CONCEPTUAL SKETCH FOR PRECAST
RCC BOX 500 X 500 MM SIZE

DRG. NO.	SHEET NO.
GC-HRIDC-SK-GEN-029	1 OF 1

SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



LEGEND	
WORKS TO BE DONE BY C23 PACKAGE CONTRACTOR	
WORKS TO BE DONE BY OTHER PACKAGE CONTRACTOR	

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:

HARYANA ORBITAL RAIL CORRIDOR

CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:

GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

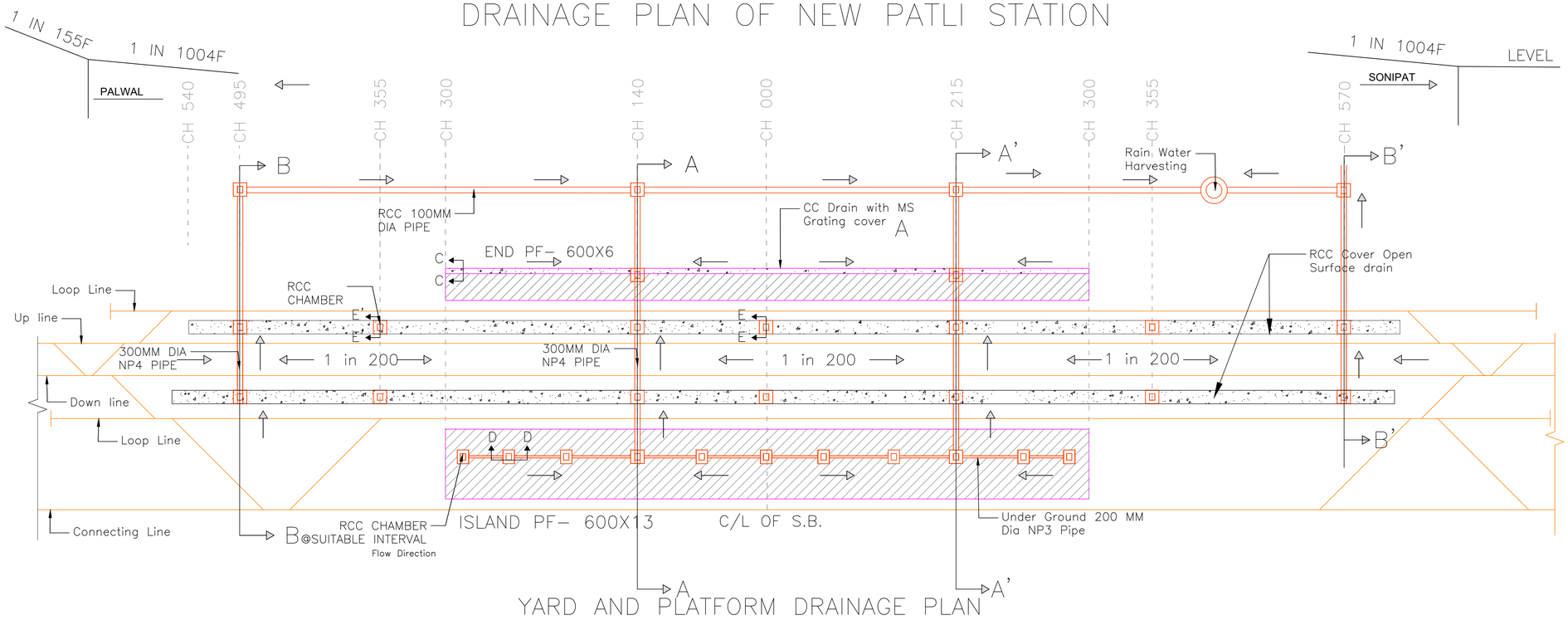
TITLE:-

JURISDICTIONAL SKETCH FOR CIVIL WORKS C-23 PACKAGE

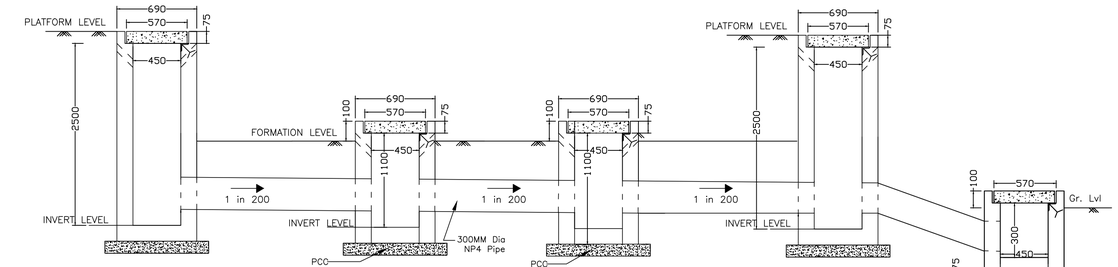
DRG. NO.	SHEET NO.
GC-HRIDC-C23-SK-CIVIL-001_A1	

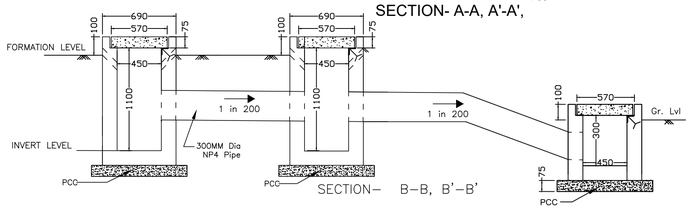
SCALE :	ISSUE DATE
AS SHOWN	28.12.2022

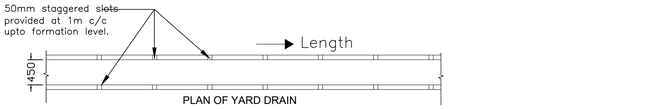
DRAINAGE PLAN OF NEW PATLI STATION

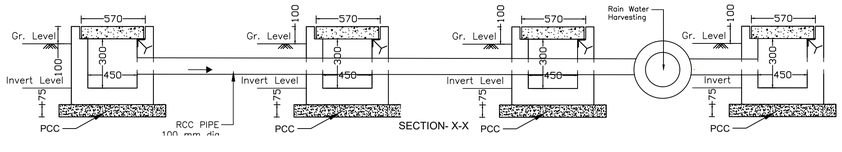


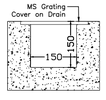
YARD AND PLATFORM DRAINAGE PLAN

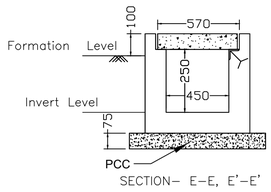


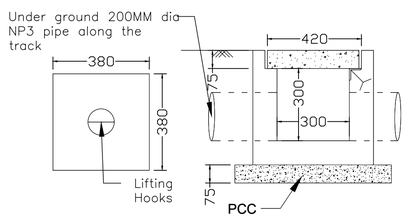


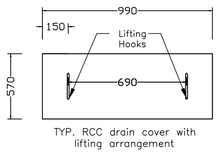












CHAINAGE	0	-140	215
FRL	0	139	-214
DRAIN SLOPE	LEVEL	1 IN 200	1 IN 200
FIX DEPTH	-250	-250	-250
DEPTH DUE TO SLOPE	0	-700	-1075
TOTAL DEPTH	-250.000	-1089.442	-1110.857

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

Legend

- RCC YARD DRAIN WITH COVER
- PLATFORM AREA
- PF DRAIN WITH MS GRATING
- RCC CHAMBER

Note:–
1. All dimension are in mm unless otherwise specified.
2. Precast RCC Cover to be provided as per drawing.
3. Drain to be provided with adequate slope to ensure self Cleansing Velocity.
4. Drain to be made of RCC With Min. Grade of M25.

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

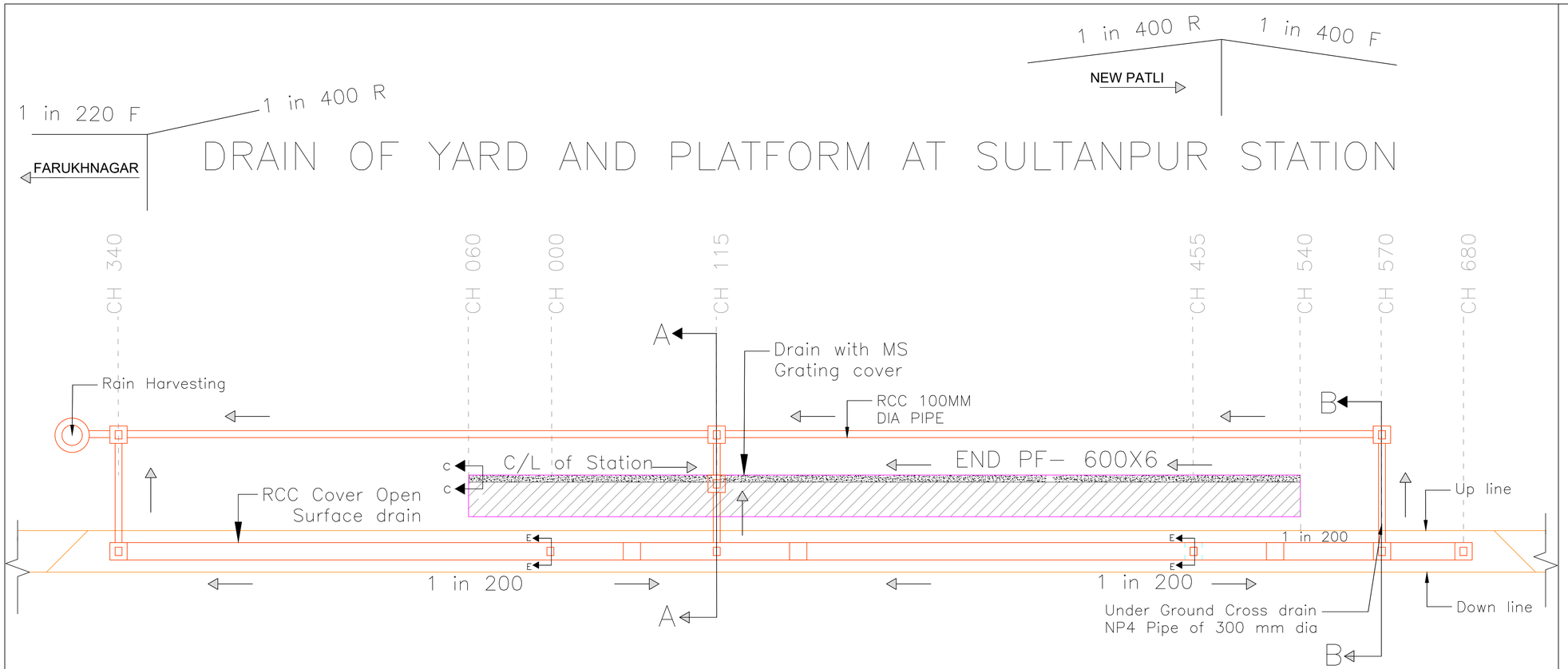
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

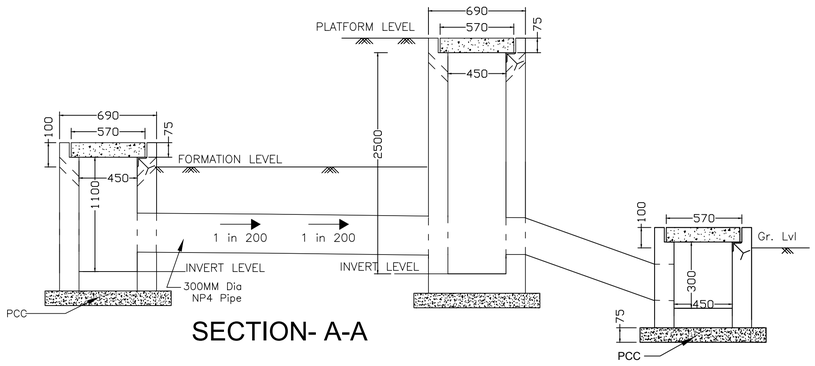
TITLE:- CONCEPTUAL PLAN DRAINAGE ARRANGEMENT (NEW PATLI)

DRG. NO. GC-HRIDC-C23-SK-CIVIL-002_A1 | SHEET NO.

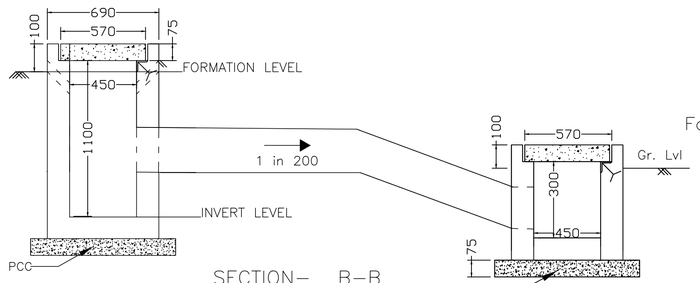
SCALE : AS SHOWN | ISSUE DATE 28.12.2022

DRAIN OF YARD AND PLATFORM AT SULTANPUR STATION

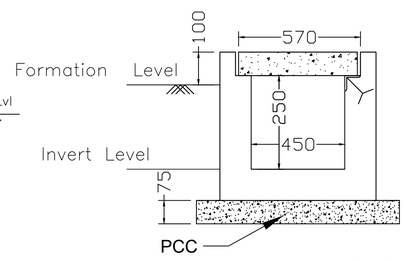




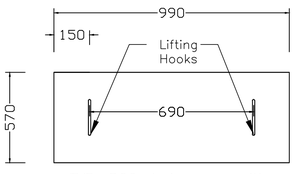
SECTION- A-A



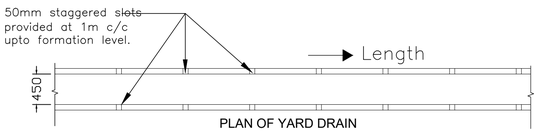
SECTION– B–B



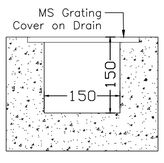
SECTION– E–E, E'–E'



TYP. RCC drain cover with lifting arrangement



PLAN OF YARD DRAIN



SECTION C–C

CHAINAGE	0	-340	115
FRL	0	-850	-288
DRAIN SLOPE	LEVEL	1 IN 200	1 IN 200
FIX DEPTH	-250	-250	-250
DEPTH DUE TO SLOPE	0	-1700	-575
TOTAL DEPTH	-250.000	-1100.000	-1112.500

Legend

- RCC YARD DRAIN WITH COVER
- PLATFORM AREA
- PF DRAIN WITH MS GRATING
- RCC CHAMBER

Note:–
1. All dimension are in mm unless otherwise specified.
2. Precast RCC Cover to be provided as per drawing.
3. Drain to be provided with adequate slope to ensure self Cleansing Velocity.
4. Drain to be made of RCC With Min. Grade of M25.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

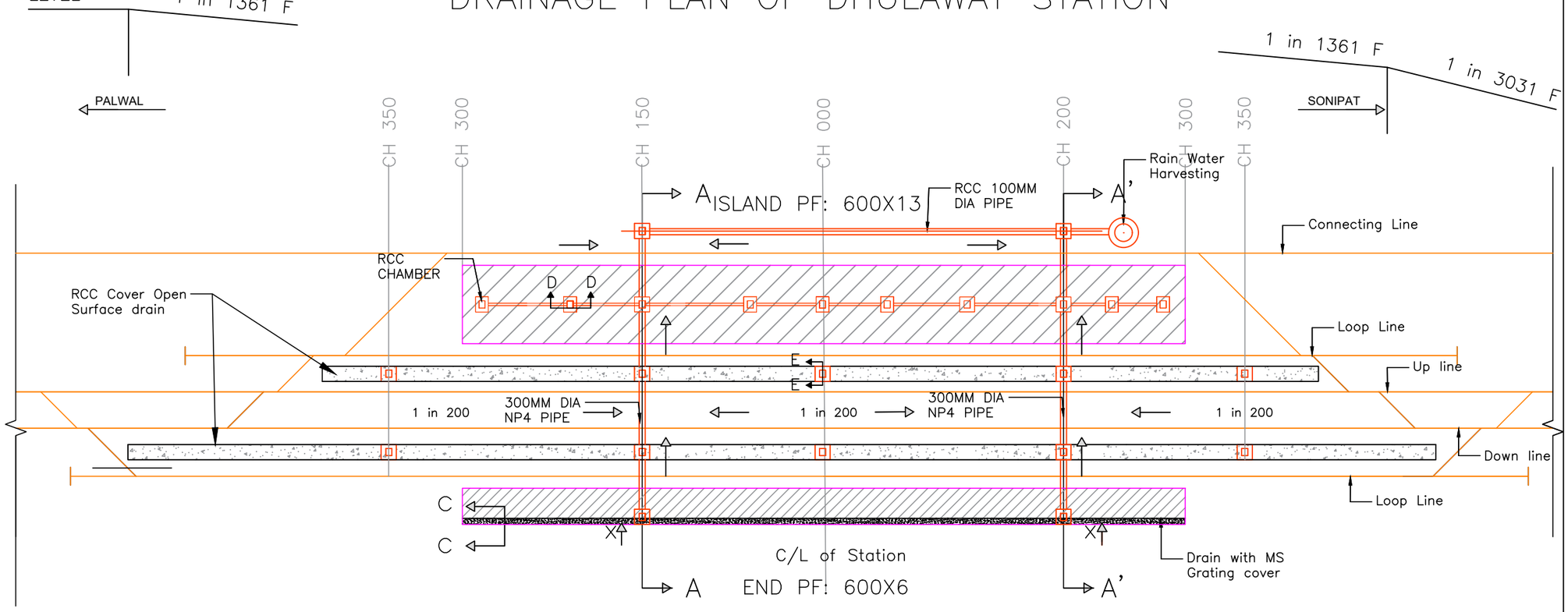
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

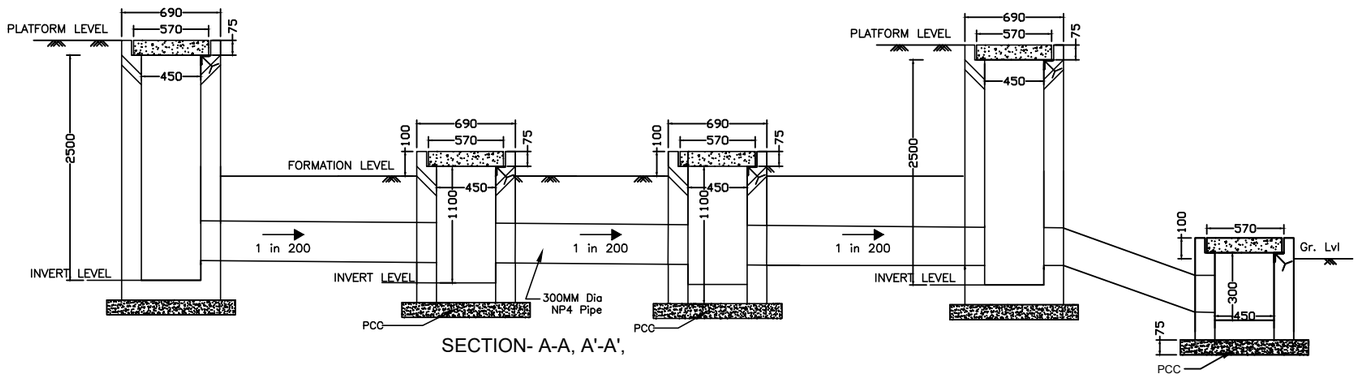
TITLE:- CONCEPTUAL PLAN DRAINAGE ARRANGEMENT (SULTANPUR)

DRG. NO. GC-HRIDC-C23-SK-CIVIL-003_A1 | SHEET NO.

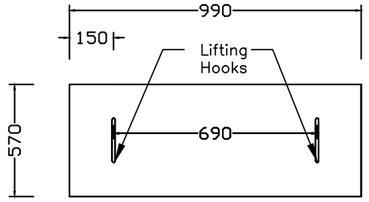
SCALE : AS SHOWN | ISSUE DATE 28.12.2022

DRAINAGE PLAN OF DHULAWAT STATION

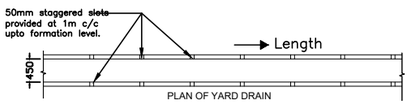


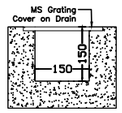


SECTION- A-A, A'-A',



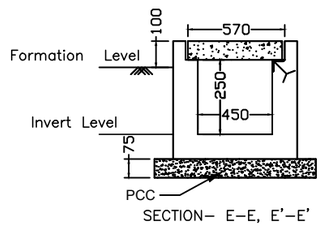
TYP. RCC drain cover with lifting arrangement



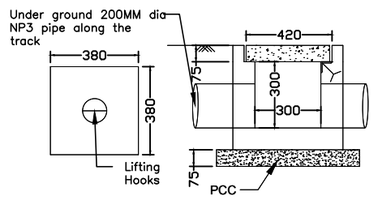


SECTION C–C

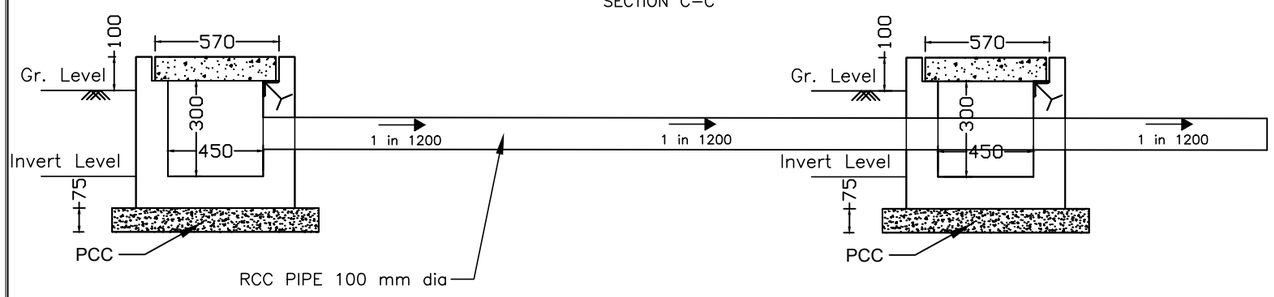
CHAINAGE	0	-150	200
FRL	0	110	-147
DRAIN SLOPE	LEVEL	1 IN200	1 IN 200
FIX DEPTH	-250	-250	-250
DEPTH DUE TO SLOPE	0	-750	-1000
TOTAL DEPTH	-250.000	-1110.196	-1103.073



SECTION– E–E, E'–E'



SECTION- D-D



SECTION- X-X

Note:–
1. All dimension are in mm unless otherwise specified.
2. Precast RCC Cover to be provided as per drawing.
3. Drain to be provided with adequate slope to ensure Cleansing Velocity.
4. Drain to be made of RCC With Min. Grade of M25.

Legend

	RCC YARD DRAIN WITH COVER
	PLATFORM AREA
	PF DRAIN WITH MS GRATING
	RCC CHAMBER

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE
SMEC Member of the Surbana Jurong Group

TITLE:- CONCEPTUAL PLAN DRAINAGE ARRANGEMENT (DHULWAT)

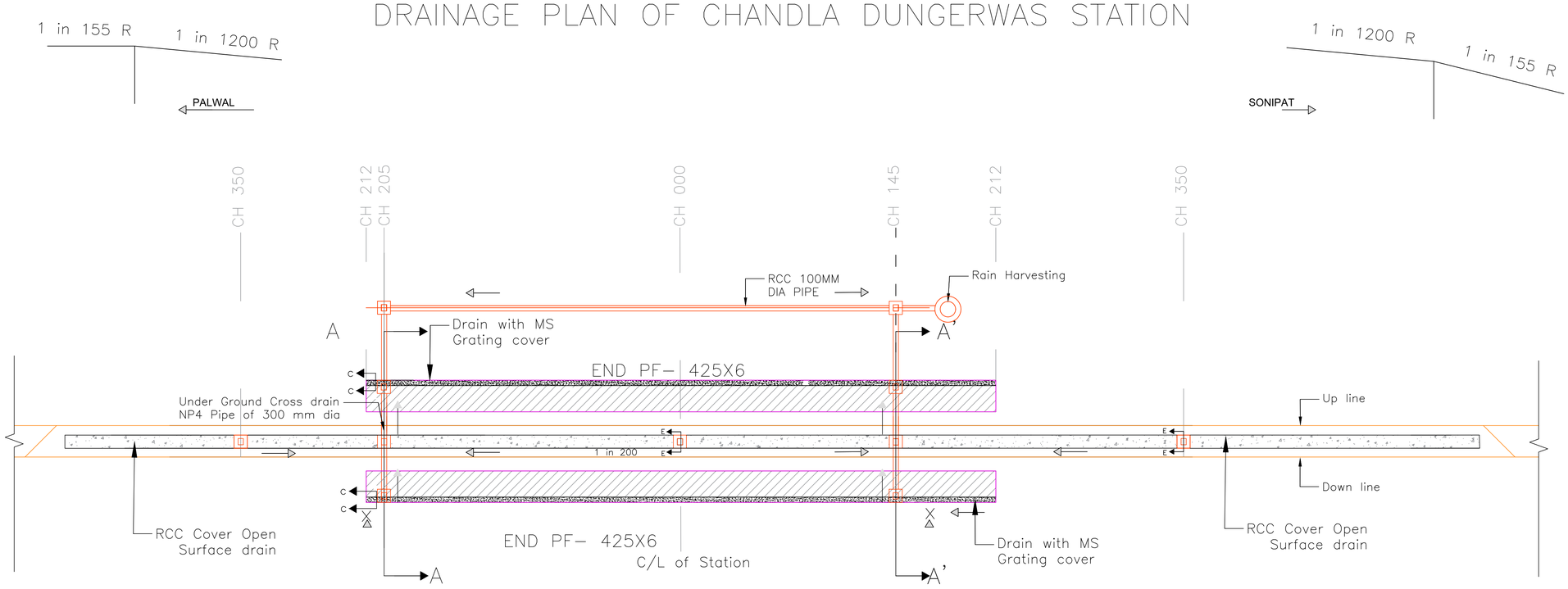
DRG. NO. GC-HRIDC-C23-SK-CIVIL-004_A1

SHEET NO.

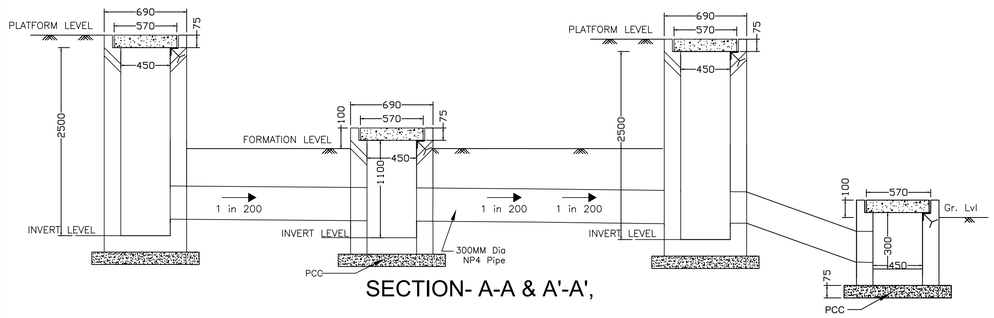
SCALE : AS SHOWN

ISSUE DATE 28.12.2022

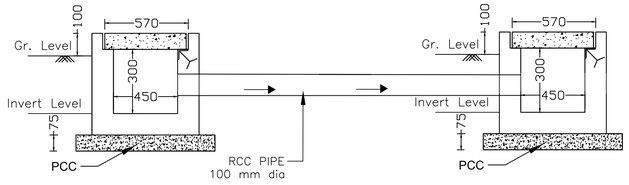
DRAINAGE PLAN OF CHANDLA DUNGERWAS STATION



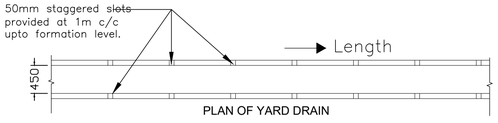
YARD AND PLATFORM DRAINAGE PLAN

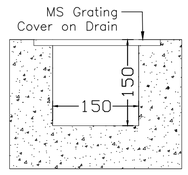


SECTION- A-A & A'-A',

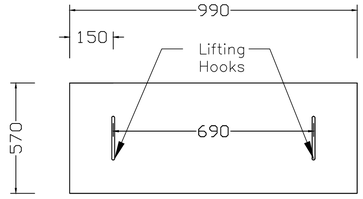


SECTION- X-X

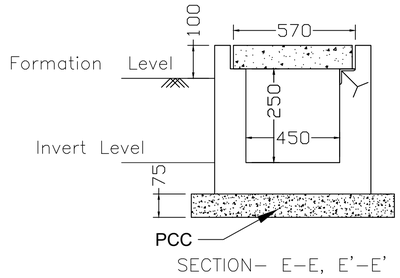




SECTION C–C



TYP. RCC drain cover with lifting arrangement



SECTION– E–E, E'–E'

CHAINAGE	0	-205	145
FRL	0	-171	121
DRAIN SLOPE	LEVEL	1 IN 200	FALL 1 IN 200
FIX DEPTH	-250	-250	-250
DEPTH DUE TO SLOPE	0	-1025	-725
TOTAL DEPTH	-250.000	-1104.167	-1095.833

Legend

	RCC YARD DRAIN WITH COVER
	PLATFORM AREA
	PF DRAIN WITH MS GRATING
	RCC CHAMBER

Note:–
1. All dimension are in mm unless otherwise specified.
2. Precast RCC Cover to be provided as per drawing.
3. Drain to be provided with adequate slope to ensure self Cleansing Velocity.
4. Drain to be made of RCC With Min. Grade of M25.

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

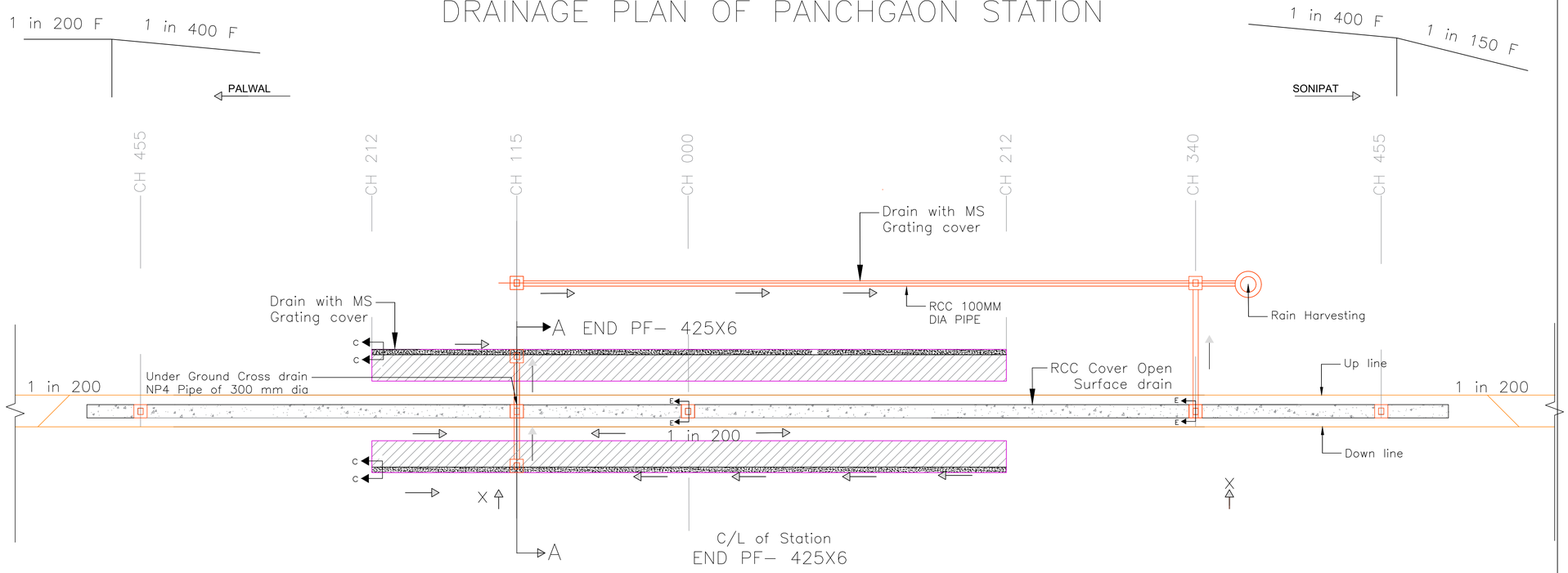
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

TITLE:- CONCEPTUAL PLAN DRAINAGE ARRANGEMENT (CHANDLA DUNGERWAS)

DRG. NO. GC-HRIDC-C23-SK-CIVIL-005_A1 | SHEET NO.

SCALE : AS SHOWN | ISSUE DATE 28.12.2022

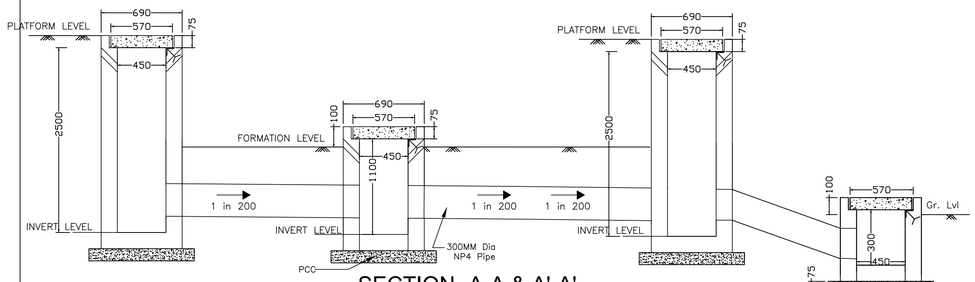
DRAINAGE PLAN OF PANCHGAON STATION



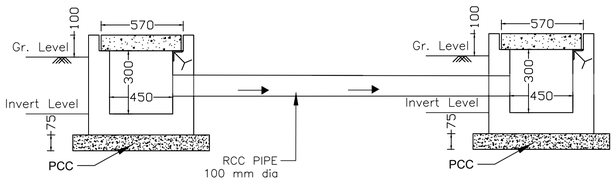
YARD AND PLATFORM DRAINAGE PLAN

Legend	
	RCC YARD DRAIN WITH COVER
	PLATFORM AREA
	PF DRAIN WITH MS GRATING
	RCC CHAMBER

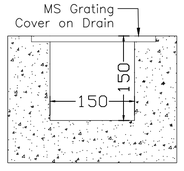
Note:–
1. All dimension are in mm unless otherwise specified.
2. Precast RCC Cover to be provided as per drawing.
3. Drain to be provided with adequate slope to ensure self Cleansing Velocity.
4. Drain to be made of RCC With Min. Grade of M25.



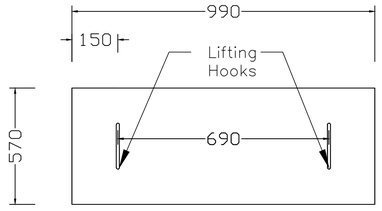
SECTION- A-A & A'-A',



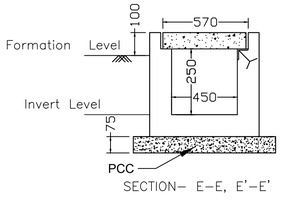
SECTION- X-X



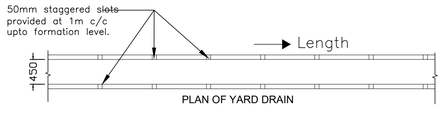
SECTION C–C



TYP. RCC drain cover with lifting arrangement



SECTION– E–E, E'–E'



PLAN OF YARD DRAIN

CHAINAGE	0	-115	340
FRL	0	288	-850
DRAIN SLOPE	LEVEL	1 IN 200	FALL 1 IN 200
FIX DEPTH	-250	-250	-250
DEPTH DUE TO SLOPE	0	-575	-1700
TOTAL DEPTH	-250.000	-1112.500	-1100.000

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

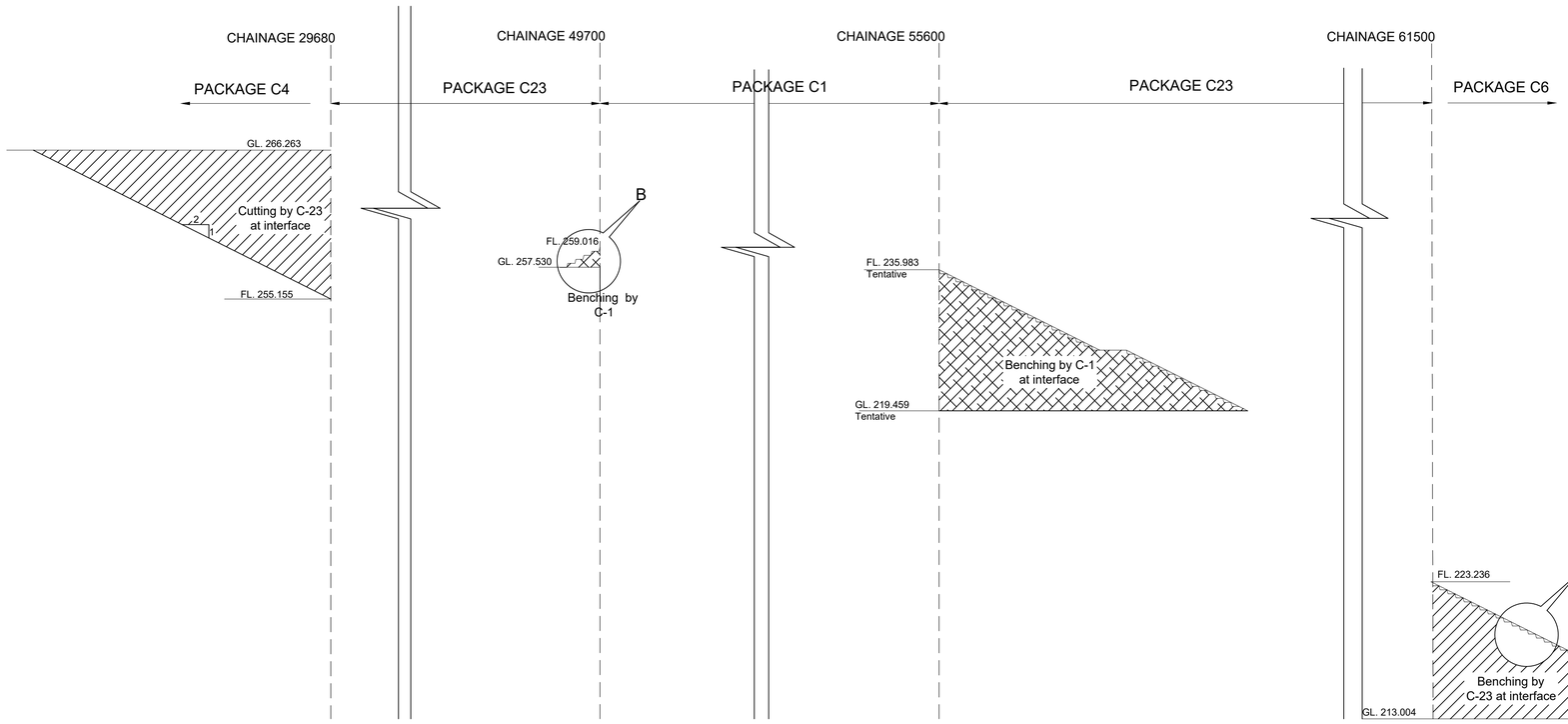
PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

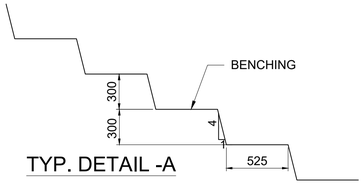
CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

CONSULTANT:
GENERAL CONSULTANT FOR HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.
RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

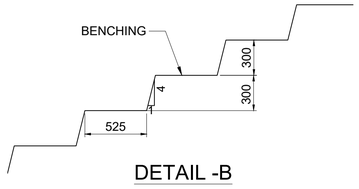
TITLE:-
CONCEPTUAL PLAN DRAINAGE ARRANGEMENT (PANCHGOAN)

DRG. NO.	GC-HRIDC-C23-SK-CIVIL-006_A1	SHEET NO.
SCALE : AS SHOWN		ISSUE DATE 28.12.2022





TYP. DETAIL -A



DETAIL -B

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. FOR OTHER DETAILS REFER RDSO SPECIFICATION NO. RDSO/2020/GE:IRS-004 SEPTEMBER 2020 "COMPREHENSIVE GUIDELINES AND SPECIFICATIONS FOR RAILWAY FORMATION".
3. DETAILS OF HATCHED AS BELOW-
   - AREA IS IN THE SCOPE OF C23
   - AREA IS NOT IN THE SCOPE OF C23

GC/HORC		HRIDC	
NAME / DESIGNATION	SIGN	NAME / DESIGNATION	SIGN
CHAHATEY RAM PD		R. R. KUMAR GM/ IP&P	
SUDHIR AGRAWAL DPD/CIVIL		RAJU SOLANKI DGM/C-SOUTH	
REETU PATIAL CDE/ CIVIL			

PROJECT:
HARYANA ORBITAL RAIL CORRIDOR
CONNECTING PALWAL TO SONIPAT BYPASSING DELHI AREA BY LINKING ASAOTI-PATLI-SULTANPUR-ASAUDAH BY NEW ELECTRIFIED BG DOUBLE LINE

CLIENT:
HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED.

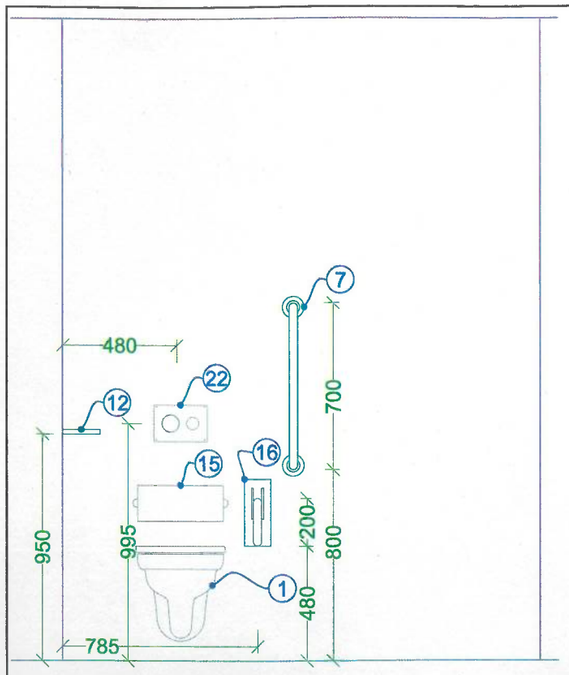
CONSULTANT:
GENERAL CONSULTANT FOR
HARYANA ORBITAL RAIL CORRIDOR
RITES Limited in consortium with SMEC International Pty. Ltd.

RITES THE INFRASTRUCTURE PEOPLE | SMEC Member of the Surbana Jurong Group

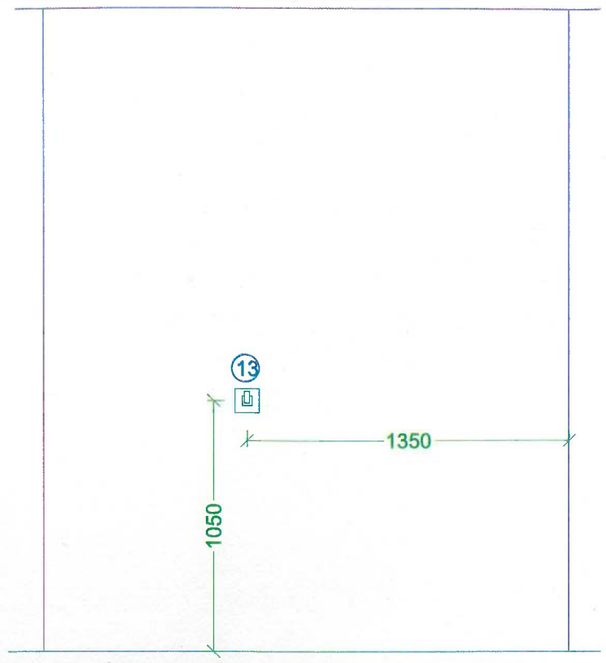
TITLE:- CONCEPTUAL PLAN BANK/CUTTING BENCHING AT INTERFACE LOCATION

DRG. NO.	SHEET NO.
GC-HRIDC-C23-SK-CIVIL-009_A1	

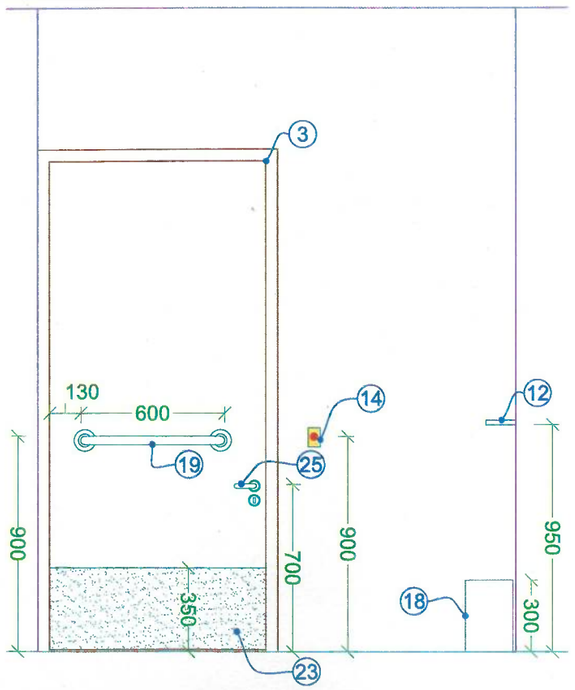
SCALE :	ISSUE DATE
AS SHOWN	28.12.2022



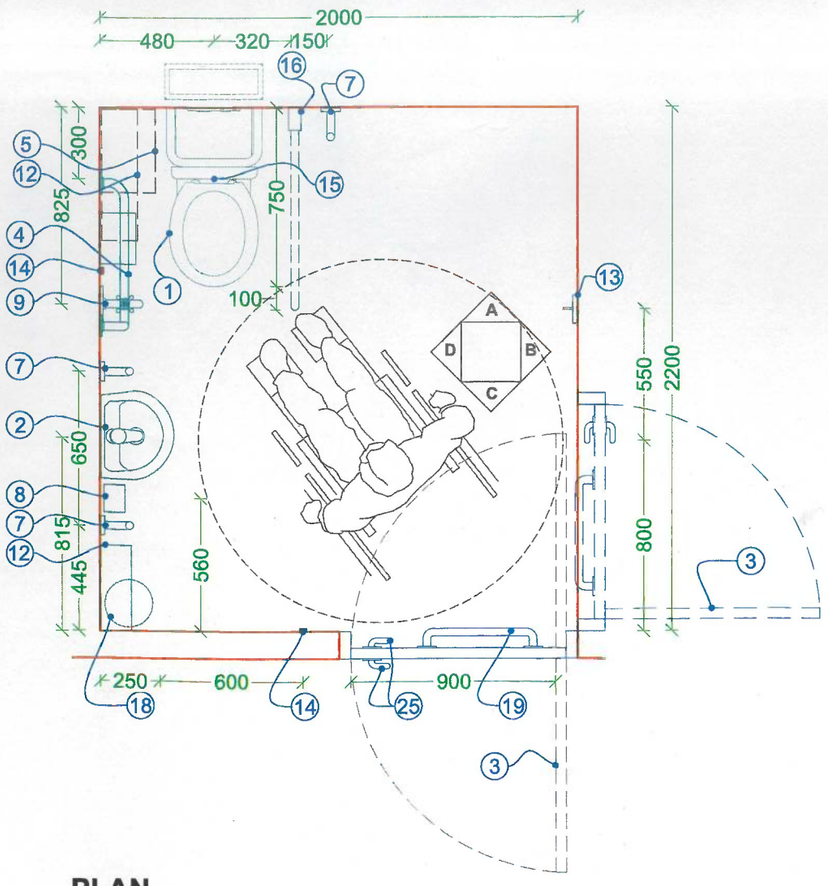
ELEVATION 'A'



ELEVATION 'B'



ELEVATION 'C'

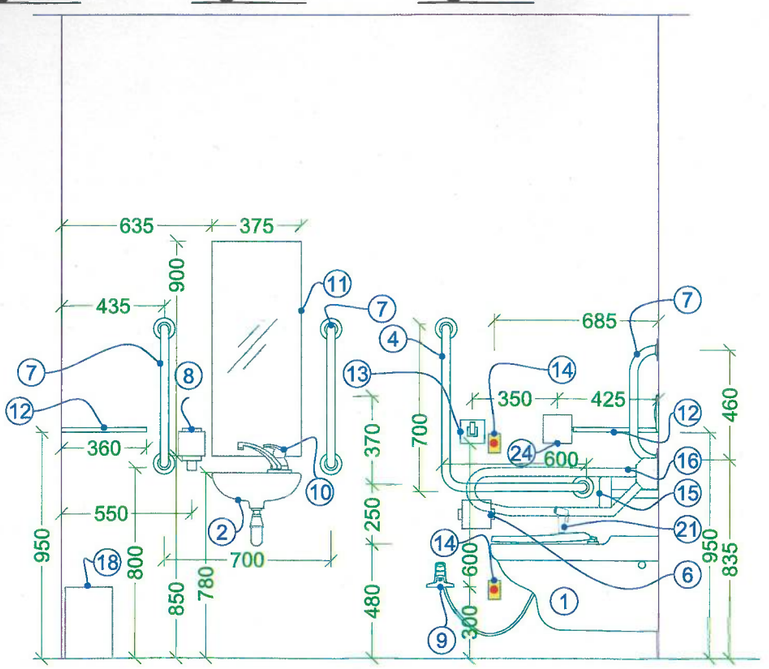


PLAN

Figure 1

Figure 2

Figure 3



ELEVATION 'D'

N.R.H.Q.E. PLAN NO.	: HQ/20/11-2021
TYPE PLAN NO.	: O-104/2021
CANCEL TYPE PLAN NO.	: .....

NOTE:-

1. DO NOT SCALE THIS DRAWING.
2. THIS DRAWING IS TO BE READ WITH ALL RELATED INFORMATION.
3. ALL DIMENSIONS TO BE VERIFIED ON SITE BY MAIN CONTRACTOR BEFORE THE COMMENCEMENT OF ANY DRAWING OR WORK WHATSOEVER.
4. ALL DIMENSIONS ARE IN MILLIMETER UNLESS SHOWN OTHERWISE.
5. ALL GRAB RAIL SHOULD BE PROPERLY FIXED TO HANDLE THE MINIMUM LOAD OF 45 kg (100 lbs).
6. ANTI-SKID OR SLIP RESISTANT TILES SHOULD BE USED ON FLOORING.
7. MIRROR SHOULD BE TILTED AT AN ANGLE OF 30° FOR BETTER VISIBILITY OF WHEELCHAIR USER.
8. VENTILATOR (600mm x 600mm) TO BE PROVIDED ACCORDING TO SITE OPENING.
9. ACCESSIBLE TOILET SHOULD HAVE THE INTERNATIONAL SYMBOL OF ACCESSIBILITY (WITH BRAILLE SIGNAGE) DISPLAYED OUTSIDE FOR WHEELCHAIR ACCESS (Figure 1).
10. THERE SHOULD BE ADEQUATE COLOUR & TONAL CONTRAST BETWEEN THE FIXTURES, WALLS & FLOORING. THIS IS TO ENABLE EASY RECOGNITION BY PERSONS WITH VISUAL IMPAIRMENTS.
11. **TOILET LEVEL SHOULD BE KEPT SAME AS LEVEL OF PLATFORM SO AS TO AVOID REQUIREMENT OF RAMP.**
12. **THIS DRAWING IS BASED ON RAILWAY BOARD'S LETTER NO. 2019/Stn.Dev.-I/03/06/Policy/PwDs dated 12.02.2020.**

LEGENDS:-

ITEM NO.	PARTICULARS/ DESCRIPTION OF ITEM
1	WALL HUNG COMMODE
2	WASH BASIN
3	DOUBLE SWING DOOR POSITIONS
4	STAINLESS STEEL WALL MOUNTED L-SHAPE GRAB RAIL
5	STAINLESS STEEL SANITARY NAPKIN DISPOSAL
6	STAINLESS STEEL TISSUE HOLDER
7	STAINLESS STEEL VERTICAL GRAB RAIL
8	SOAP DISPENSER
9	TWO WAY BIB COCK
10	LEVER HANDLE TAP (Figure 2)
11	MIRROR
12	STAINLESS STEEL SHELF
13	SINGLE POST CLOTH HOOK
14	ALARM SWITCH
15	BACK REST (Figure 3)
16	STAINLESS STEEL DROP DOWN RAIL
17	SANITARY DISPOSAL UNIT
18	STAINLESS STEEL DISPOSAL BIN
19	STAINLESS STEEL PULL RAIL
20	ALARM RESET BUTTON
21	HAND JET SPRAY
22	FULL & HALF FLUSH BUTTON
23	KICK PLATE
24	ALARM RESET BUTTON
25	D-LEVER HANDLE

MONA SRIVASTAVA (CE/STN. DEV.)	22/11/21
K.K. SHARMA (DY.CE/STN. DEV.)	22/11/21
MOHD. SHARIF (PREPARED BY: SSE/ARCH.)	10 Nov'2021

NORTHERN RAILWAY

TYPE PLAN

POWDER TOILET FOR DIVYANGS

CASE NO. SD/TP/2021	CANCEL PLAN NO. : NIL
SCALE : 1:25@A3	SHEET NO.: 01 OF 01
N.R.H.Q.E. PLAN NO. :	HQ/20/11-2021

Tender No. HORC/HRIDC/C-23/2022
Attachment 12
to
Corrigendum No. 2

Part 2, Section VII-8: Tender Drawings and Documents

Section VII-8B: Documents

Geotechnical Investigation Report

Additional Geotechnical Investigation Report for Six Nos. of Boreholes

Major Bridge

Old Ch. 42+256 (New Ch: 45+497)

(BH-P1, BH-P7, BH-P9, BH-P10, BH-P11 and BH-P12)

Geotechnical Investigation Report

Major Bridge
Old Ch. 42+256 (New Ch: 45+497)

SR NO. : 544_21-22

CONDUCTING GEOTECHNICAL INVESTIGATION, PREPARATION OF GEOTECHNICAL REPORT FOR DESIGNING OF BRIDGES AND FOR EMBANKMENT IN CONNECTION WITH CONSTRUCTION OF HARYANA ORBITAL RAIL CORRIDOR (HORC) PROJECT FROM PALWAL TO HARSANA KALAN INCLUDING CONNECTIVITY TO EXISTING IR NETWORK IN THE STATE OF HARYANA

CLIENT

M/S. HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LTD. (HRIDCL)

PROGRAMME

NOVEMBER - 2022

SR. No.	Report No.	Revision No.	Date
544_21-22	CEGTH/HRIDCL/SR-544/2022-23/1188_(06 BHs)	00	02.12.2022

CEGTH
CEG TEST HOUSE
AND RESEARCH CENTRE PVT LTD

B-11(G), Malviya Industrial Area, Jaipur-302017
Tel. : 91-141-4046599, Fax : 91-141-2751806
E-mail : info@cegtesthouse.com., www.cegtesthouse.com

CEGTH/HRIDCL/SR-544/2022-23/1188 Date:- 02.12.2022

To,

Haryana Rail Infrastructure Development Corporation Ltd. (HRIDCL)
SCO No.-17-19, 3rd & 4th Floor,
Sector - 17-A,
Chandigarh - 160017
Tele:- 0172-2715644
Email: hridc2017@gmail.com

Subject :- Geotechnical investigation work for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan in the state of Haryana.

Dear Sir,

We are pleased to submit this report of the subject work based on 06 boreholes carried out at Old Ch. 42+256 (New Ch: 45+497) for Major Bridge for the proposed project site.

The accompanying report presents results of various field tests and laboratory tests conducted on selected soil samples and their interpretation.

Should there be any clarifications regarding the contents please contact us at your most convenient time.

We value the opportunity to participate in this project and look forward a pleasant association on future projects.

Very truly yours,
CEG Test House & Research Centre Pvt. Ltd.

Prepared By:-

Nehal Jain
General Manager - Geotechnical
Authorized Signatory

Dr. Sarvesh Chandra
Technical Advisor (Geotechnical Expert)
Former Professor, IIT Kanpur

Ankur Mudgal
Sr. Manager

SR. No.	Report Ref. No.	Revision No.	Date
544_21-22	CEGTH/HRIDCL/SR-544/2022-23/1188_(06 BHs)	00	02.12.2022

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CHAPTER 1 GENERAL

1.0 INTRODUCTION:

The work of conducting "**Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana"** was awarded to "**CEG Test House & Research Centre Pvt. Ltd., Jaipur" by M/S.** "**Haryana Rail Infrastructure Development Corporation Ltd. (HRIDCL)"** as per work order no. HRIDC/ HORC/ GT/ CEG/ 237/ 2021/ 577-M dated 29th July 2021.

Field work including drilling of boreholes, conducting field tests such as Electrical Resistivity Test, & Plate Load Test and sample collection was carried out in the presence of representative of Client. Laboratory tests were conducted on selected soil samples to determine the design parameters, confirming to relevant IS specifications and the guidelines received from time to time from representative of Client.

This report includes the details of Methodology of Investigation, collection of samples of soil, field test results, laboratory test results, analysis of results and recommendations for proposed structure carried out at Old Ch. 42+256 (New Ch: 45+497) based on soil sample collected from the locations of 06 boreholes.

2.0 SITE LOCATION & GENERAL GEOLOGICAL HISTORY:

The details of the site & test locations for the proposed project are shown in location plan attached vide **Appendix A-1**. The site of proposed project is located from Palwal to Harsana Kalan (Sonipat) in the State of Haryana falls in seismic zone – IV (Zone factor=0.24) of India.

Soil of the Haryana Sub-Region have been classified and described under the following major soil types as shown below:-

- Typic Ustochrepts : Soil of old alluvial plains
- Typic Ustipsamments : Soil of Aravali plains
- Typic Ustifluvents : Soil of recent alluvial plains and flood plains
- Typic Torripsamments : Soil of Aeofluvial plains
- Rocky Outcrops : Aravali rocky hills

The district wise details of soil characteristics are described below:-

Panipat: The soils are well drained, Sandy loam to clay loam/silty clay loam in plains and loam to clay loam/ silty/ loose clay loam in relic channels/depressions/basins.

Sonipat: The district comprises of recent flood plains, young meander plains, old meander plains and old alluvial plains. Recent flood plains occur along the Yamuna River and clearly show fluvial features. The soils are loamy sand to sandy loam on the surface and sandy loam to clay loam in the sub surface.

Rohtak: The district mainly comprises of old alluvial plains. The soils are loamy sand to sandy loam on the surface and sandy loam to clay loam in the sub surface. Old meander plains are almost flat with loamy sand to silty clay loam soils. Oldest among all the land forms are old alluvial plains, which cover major areas in the district. These soils are sand to loamy sand/sandy loam (surface) to silt loam/silty clay loam (sub-surface).

Jhajjar: The district mainly comprises of old alluvial plains and some parts of the district also have soil belonging to Aravali plains.

Rewari: The soils of the district fall under Entisols and Inceptisols orders. The surface soil texture varies from sand to fine loamy sand.

Gurgaon: The district comprises of sand dunes, sandy plains, alluvial plains, salt affected areas,

low lands, lakes, hills and pediments. The soil varies from sand to loamy sand in sand dunes and sandy plain areas, sandy loam to clay loam / silty clay loam in alluvial plains, calcareous, loamy sand to loam in salt affected plains, silty loam to loam in low lands and calcareous, loamy sand to loam in hills.

Mewat: The soils of the area are generally sandy loam to loam. In parts of the low-lying areas, they are clayey and saline. The upper hills are mostly barren.

Faridabad and Palwal: The district comprises of recent Yamuna flood plains, low lying plains, depressions, sand dunes and hills. The texture of the soil is sand to loamy sand in recent Yamuna flood plains, sandy loam in plains, sandy loam to clay loam in alluvial plains, sandy loam to loam

(surface), clay loam/silty clay (sub-surface) in low lying plains and depressions.

3.0 SCOPE OF WORK:

The stipulated scope of work involved carrying out the following operations:-

a) Mobilisation of necessary plant equipment, men and materials for the complete Geotechnical investigation work as per specifications, drawings and instructions of the Engineer and to complete the same within the stipulated time schedule and demobilisation after completion of field work.

b) Shifting of Equipments from one structure location to another including Ereaction, installation of rigs at site and dismantling of the same after completion of field work. Shifting of setup for each borehole location and associated preparation for borehole under water

c) Making 150 mm nominal diameter boreholes at various locations in all types of soils except hard rock and large boulders using suitable approved method of boring including chiselling, cleaning, providing casing pipe as required; performing Standard Penetration Test at every 3.0m interval and at change of strata; collection of water samples and disturbed soil samples, observation such as ground water, etc., collection of undisturbed soil samples at every 3.0 m interval and at change of strata; transportation of all the collected samples to the laboratory and back filling of boreholes on completion of the same, complete as per specification and instructions of the Engineer, for depths below natural ground level.

d) Conducting Electrical resistivity tests at various locations all complete as per specification and directions of the Engineer.

e) Conducting plate load test at various locations, all complete as per specification and directions of the Engineer.

f) Drilling of Nx size boreholes (75mm dia.) in all types of hard rock, collection of core samples, maintaining continuous record of core recovery/ RQD, keeping the cores in wooden core boxes, transporting to laboratory, backfilling on completion of the same, all complete as per specification and instructions of the EIC.

g) Conducting various laboratory tests on soil samples at an approved laboratory including preparation of soil samples to determine the following properties of soil, all complete as per specification.

<u>On soil Samples</u>

- Dry density test
- Bulk Density and Moisture Content.
- Sieve Analysis
- Hydrometer Analysis
- Liquid Limit and Plastic Limit
- Specific gravity
- Shrinkage Limit
- Free Swell Index
- Direct Shear Test
- Triaxial Shear Test
- One Dimensional consolidation test
- Chemical Analysis of soil samples (pH, chloride, Sulphate)

h) Conducting laboratory tests on rock samples including preparation of the samples to determine the following properties, all complete as per specification

On Rock Samples

- Moisture content, porosity & Density
- Specific gravity
- Hardness
- Unconfined compression test
- Point load strength index
- Modulus of Elasticity and Poission's Ratio
- Abrasion Test

i) Conducting chemical tests on water samples to determine the Sulphate, chloride and pH value all complete as per specification.

j) Submitting draft report in soft copy including all field records and laboratory test results, graphs, etc., all complete as per specifications.

k) Submitting final report in three hard copies in after the approval of the draft report including all field records and laboratory test results, graphs, etc., all complete as per specifications.

4.0 FIELD INVESTIGATION IN SOIL STRATA:

The investigation was planned to obtain the subsurface stratification in the proposed project site and collect soil / rock core samples for laboratory testing to determine the engineering properties such as shear strength, along with basic engineering classification of the subsurface stratum.

For geotechnical investigation work, required equipements along with rotary drilling rigs and manpower were mobilized at site to carry out various field activities as per the scope of work. These were shifted from one test location to another location during execution of field work and were demobilized on satisfactory completion of field work.

For conducting the field investigations the following practices were followed at site:

- The locations of 06 boreholes carried out at Old Ch. 42+256 (New Ch: 45+497) were marked at site at specified locations. These locations are shown in **Appendix A-1** attached subsequently.

The details of various boreholes along with their coordinates are provided herein below:

Table 1.1: Details of Borehole Locations

S. No.	Chainage Old (km)	Chainage New (km)	Structure	BH.No.	Depth of Water Table below EGL (m)	Depth of Borehole below EGL (m)	Co-ordinates (m)		(+) R.L. (m)
							E	N	
1.	42+256	45+497	MJB	BH-P1	NE*	35.00	685810.000	3133716.000	261.500
2.				BH-P7		35.00	685841.000	3133807.000	263.750
3.				BH-P9		35.00	685867.000	3133938.000	262.750
4.				BH-P10		35.00	685863.000	3133950.000	263.228
5.				BH-P11		35.00	685832.000	3133970.000	264.855
6.				BH-P12		35.00	685794.000	3133961.000	264.325

NE*:-Not Encountered

- In soil, boreholes of 150mm dia. were drilled as per the standard procedure laid in IS: 1892.
- Borehole was properly cleaned before taking any sample in soil.
- Casing was used as per the prevailing soil conditions, to stabilize the borehole.
- Standard Penetration Tests were conducted in bore holes at regular intervals or at every change of strata as per Technical specification.
- Undisturbed were collected wherevery feasible as per the requirements and at specified depths. The same has been discussed in detail in soil characteristics sheets attached with the report.
- Water table was not met in the boreholes.

The detailed procedure adopted for conducting various field tests is given here in below:

(i) Standard Penetration Test:

The Standard Penetration Test was conducted in boreholes as per IS 2131. The test was carried out using the standard split spoon sampler to measure the number of blows 'N'.

Standard split spoon sampler was attached to an 'A' rod. It was driven from borehole bottom to a distance of 45 cm using a standard hammer of 63.5 kg falling freely from a height of 75 cm to the required depth. While driving, the number of blows required to penetrate every 15 cm are recorded. The total number of blows required for the last 30 cm is taken as 'N' value at that particular depth of the borehole. Wherever the total penetration was less than 45cm, the no. of blows & the depth penetrated is recorded in the respective borelog.

SPT 'N' values were correlated with relative density of non-cohesive stratum and with consistency of cohesive stratum as given below:-

Table 1.2: Soil compactness as per SPT N values (cl. 9.7, table 9.3 & 9.4, page 330_text book of V.N.S. Murthy)

Correlation for Clay / Plastic silt		Correlation for Sand / Non-Plastic silt	
Consistency	**SPT "N" Value**	**Compactness**	**SPT "N" Value**
Very Soft	0 - 2	Very Loose	0 - 4
Soft	2 - 4	Loose	4 - 10
Medium	4 - 8	Medium	10 - 30
Stiff	8 - 15	Dense	30 - 50
Very Stiff	15 - 30	Very Dense	> 50
Hard	> 30		

The field SPT N values obtained were further corrected as per the guidelines given in IS: 2131 as follows:

(a) For overburden: - The N value for cohesionless soil is corrected with the help of fig. 1 given in IS-2131.

(b) Due to dilatancy :- Wherever N values observed below water table in fine sand, silty sand or silt was greater than 15, then corrected N values were corrected as under:

$$N' = 15 + \tfrac{1}{2}(N-15)$$

(ii) Undisturbed Sampling (Soil) in boreholes:

Undisturbed samples were collected using MS tubes of suitable diameter and length with Area ratio as per clause 4.1.1 (c) of IS: 1892 (latest) fitted to an adopter with ball and socket arrangement. Before taking any sample, sampling tube was properly greased. Immediately after taking on undisturbed sample in a tube, the adopter head was removed along with the disturbed material. The visible ends of the sample were trimmed off any wet disturbed soil. The ends were coated alternately with four layers of just molten wax. More molten wax was added to give a total thickness of min. 25 mm. The samples were carefully labeled and transported to the laboratory for testing. Undisturbed samples wherever slipped during lifting were duly marked in the field logs as well as in the soil profile.

5.0 LABORATORY TESTS ON SOIL SAMPLES:

The following laboratory tests were conducted on selected soil samples:

Table 1.3: Description of Tests

Description of Test	Reference	Undisturbed (UDS) Soil Samples	Disturbed (DS/SPT) Soil Samples
Grain Size Analysis / Hydrometer	IS: 2720 (Part - 4)	√	-
Natural Moisture Content / Bulk / Dry density	IS : 2720 (Part – 2)	√	-

Description of Test	Reference	Undisturbed (UDS) Soil Samples	Disturbed (DS/SPT) Soil Samples
Atterberg Limits • Liquid Limit • Plastic Limit	 IS: 2720 (Part - 5) IS: 2720 (Part - 5)	 √ √	 √ √
Specific Gravity	IS : 2720 (Part – 3)	√	-
Direct Shear Test	IS : 2720 (Part – 13)	√	-
Triaxial compressive shear test	IS : 2720 (Part – 11 & 12)	√	-
Chemical Analysis of Soil Samples	IS : 2720 (Part – 26, 27)	√	-

Note:- The detailed procedure adopted for conducting various laboratory tests is described in the following paragraphs:

5.1.1 Dry density and Bulk density

For determination of bulk density and dry density, a sample of known volume 'V' was extracted from the undisturbed sampling tube and it's bulk weight 'W' was noted down.Moisture content 'Wn' was determined by oven drying method.

The bulk density and dry density were determined by following equation-

Bulk density (γ_b) = W/V

Dry density (γ_d) = γ_b/ (1+Wn)

5.1.2 Natural water content

For this test, the soil sample of known quantity (Wm) was taken in a container.The container with soil sample was placed into an oven for drying at 105-110°c temperature for 16-24 hours. After drying, the dry sample was again weighted to determine the dry weight of sample (Wd).

The natural water content was computed by the following equation-

Wn = (Wm-Wd)*100/Wd

5.1.3 Grain Size Analysis (IS: 2720- Part-4)

Wet sieve analysis:

For determination of particle sizes finer than 75 micron, wet sieve analysis test was conducted. For this test, oven dried sample of known quantity was taken in a container and soaked with dispersing agent. The soaked soil sample was washed thoroughly over 75 micron IS sieve until the water passing sieve was substantially clean.

Fraction retained on 75 micron IS sieve was carefully collected in a container without any loss in material and placed into oven for drying.

Dry sieve analysis:

For this test, the oven dried soil sample after wet sieving was sieved through the set of IS sieves 20 mm, 10 mm, 4.75 mm, 2.0 mm, 1.0 m , 425 micron , 300 micron, 150 micron and 75micron. The amounts of soil retained on each sieve were noted down. The % retained, cumulative % retained and % passing were computed accordingly. Wherever the soil sample % passing 75 micron sieve was significant, Hydrometer method was used to find the percentage of silt and clay fraction.

Grain size analysis for the fraction passing 75 micron IS Sieve (Hydrometer method)

Calibration of Hydrometer

Hydrometer was calibrated to determine a relationship (an equation) between the effective depth H_R and corresponding hydrometer reading R_h (obtained during test).

50 to 100 gm of soil sample passing through 75 micron IS Sieve was taken. It was mixed with 100 ml of sodium hexametaphesphate solution and the mixture was warmed for about 10 minutes. It was then transferred to the cup of the mechanical mixer and the soil suspension was stirred for 15 minutes. The soil suspension was transferred into 1000 ml measuring cylinder and distilled water was added to make 1000ml solution. This solution was mixed vigorously. The measuring cylinder was then allowed to stand and the stopwatch was started. Hydrometer was immersed in the solution and reading were taken after half, one, two and four minutes. The hydrometer was then removed slowly and kept in distilled water at the same temperature as the soil suspension. Readings were taken after the periods of 8, 15 and 30 minutes, and one, two and four hours. Hydrometer was removed, rinsed and placed in the distilled water after each reading. After 4 hours reading was taken once or twice within 24 hours. Finally a reading was taken at the end of 24 hours. The temperature of the suspension was observed and recorded.

Calculations

Diameter of the particles (D):

$$D = \sqrt{\frac{30\mu}{980(G-1)}} \times \sqrt{\frac{H_R}{t}} = M\sqrt{\frac{H_R}{t}}$$

Where,

D = diameter of particle in suspension, in mm;

μ = co-efficient of viscosity of water at the temperature of the suspension at the time of taking the hydrometer reading, in poise;

G = specific gravity of the soil fraction used in the sedimentations analysis;

H_R = effective depth corresponding to R_n, in cm.

t = time elapsed between the beginning of sedimentation and taking of hydrometer reading in minutes

$M = \sqrt{\frac{30\mu}{980(G-1)}}$ = a constant factor for given values of μ and G at the temperature of the suspension.

Percentage finer than diameter D:

The percentage by mass (w) of particles smaller than corresponding equivalent particle diameters (D) was calculated from the formula:

$$w = \frac{100G_s}{W_b(G_s - 1)} \times R_h$$

Where

w = percentage finer

G_s = specific gravity of soil particle

W_b = weight of soil

R_h = Hydrometer reading

5.1.4 Specific Gravity (IS: 2720-Part-3 Sec-1)

The specific gravity of soil sample was determined by density bottle method. For this test 5-10g oven dried and cooled soil sample was taken in 50ml capacity density bottle and its weight was noted down as W_2 .The soil was covered with distilled water and left for sufficient period for suitable soaking. The entrapped air was removed by vacuum. The bottle with soil was filled fully with water and its weight was noted down (W_3). The mass of empty bottle and bottle filled with distilled water were noted down as W_1 and W_4 respectively.

The Specific Gravity was determined by using following equation :

$G=W_2-W_1/[(W_2-W_1)-(W_3-W_4)]$

5.1.5 Liquid Limit (IS: 2720- Part-5)

By Cone Penetrometer Method

The 'Cone Penetrometer Apparatus' is a variant of the fall-cone and consists of a cone with a smooth polished surface and angle of 30° ± 1/2°. The weight of the cone, together with its associated shaft is 80g ± 0.5g. A support assembly with an automatic cone release mechanism and cone height adjustment mechanism used to hold the cone vertically. The angle and weight of the cone were calibrated at regular intervals, and the sharpness of the cone tip was checked daily.

Distilled water was added and thoroughly mixed with the soil sample to produce a homogeneous paste. The paste was then placed in a cup with a diameter of at least 55mm and a depth of at least 40mm. The surface of the soil was smoothed off level and parallel to the base. The support assembly was used to position the tip of the cone so that it was just touching the top surface of the soil, and the automatic tripping mechanism was released. The cone was allowed to penetrate into the soil for a period of 5 (± 1) s, then the cone was locked off to stop further movement and the penetration was recorded. The cup was refilled and the test was repeated. The two recorded penetrations need to be within 0.5mm of each other, otherwise a third test is performed. when the three test vary by more than 1mm the test was repeated.

Further tests were conducted, at varying water contents, in order to produce a series of cone penetrations (usually 4) in the range 15mm to 25mm. The resulting cone penetrations were plotted verses the water content of the test specimens. The Liquid Limit (W_L) was read off the graph, being the water content at which the line of best fit through the test points crosses 20mm penetration.

5.1.6 Plastic Limit (IS: 2720-Part-5)

For this test, soil sample was prepared in the same way as for liquid limit test. A ball of soil sample weighed about 5 gm was formed. The ball was rolled between the fingers of one hand and the glass plate with pressure sufficient to reduce the mass into a thread of about 3 mm in 5 to 10 complete forward and back movements. When a diameter of 3 mm was reached, soil was again remolded into a ball. The process of rolling and remolding was repeated until the thread started just crumbing at a diameter of 3 mm. The crumbled thread was immediately transferred to an airtight container for determination of its moisture content by oven drying method.

This water content has been termed as plastic limit. (W_P)

5.1.7 Plasticity Index (IS: 2720-Part-5)

The plasticity index Ip was given by

$I_p = W_L - W_P$ (in percent)

5.1.8 Direct Shear Test (IS:2720-Part-13):

For this test shear box test apparatus was used. The prepared specimen from remolded/undisturbed sample was placed carefully in the box. The plain grid was kept on top of the specimen with its directions at right angles to the direction of shear. The upper porous stone was placed on the grid and loading pad on the stone. The box with specimen was gently placed in the container (water jacket). The specimen was submerged with water. The container was mounted with the shear box and the specimen inside, on the shearing machine. The upper part of the box was so adjusted that it

touchéd the proving ring. The jack was brought forward to bear up against the box container. The proving ring dial gauge was set to read zero.

The steel ball was placed in the recess of the loading pad. The loading yoke was set in contact with the steel ball on the loading pad. Vertical displacement dial gauge to read zero in contact with the top of the yoke. The normal load was applied and any change in thickness of specimen was recorded. Shear displacement dial gauge was also set to read zero. The locking screw was now removed and two parts of the shear box were separated by advancing the spacing screws.

The specimen was sheared at constant rate of strain. The readings of the proving ring dial gauge were noted down every 15 seconds for the first one-minute and then every 30 seconds thereafter. The reading of change in the thickness dial gauge and shear displacement dial gauge were also recorded at the same time interval. The test was continued until the specimen fails. The specimen was assumed to fail when the proving ring dial gauge started receding or at shear displacement of approximately 15% of the length took place.

The soil was removed from the box and test was repeated on the identical specimen under increased normal load.

The rate of strain for conducting Direct Shear Test is kept as 0.25 mm/min as per codal/literature provision based on strata.

5.1.9 Triaxial Shear Test_UUT (IS: 2720-Part-11)

For this test, Triaxial Shear Test apparatus was used. The plain disc was placed on the pedestal of the triaxial cell. The specimen was placed centrally on the disc. A correct size rubber membrane was fitted inside the stretcher with ends of membrane folded over those of the stretcher. Vacuum was applied to stretch the membrane to the inside surface of the stretcher which was carefully slipped around the specimen kept on the pedestal. The vacuum on the membrane was released. Its bottom part was rolled down into the pedestal. plain disc was placed on the top of the specimen and then loading pad was placed. The top part of membrane was rolled on to the loading pad. Then the stretcher was removed and ends were sealed with ‘O’ rings. With the properly sealed specimen placed centrally on the pedestal, the cell was assembled, keeping the loading piston initially clear of the loading pad of the specimen, the assembly was placed in the loading frame.

For unconsolidated undrained test, the bottom drainage value (BDV) and top drainage value (TDV) of cell, was closed and air release valve (ARV) was opened. The cell was filled with water through the cell water value CWV. ARV was closed when water begins to escape through it. The cell pressure was raised to the desired value and kept constant till the end of the test.

When the cell pressure was applied, the load piston rises upward, the loading machine was operated at the anticipated rate to bring the load piston slightly above the loading pad of the specimen and the load measuring dial gauge on proving ring was set to zero.

The piston was brought just in contact with loading pad by hand operation of the machine. The

axial compression dial gauge was mounted and set to read zero.

The axial loading was started at 1.25 mm/min rate of strain. Simultaneous readings on the load and compression dial gauges were noted down. The test was continued until a recession of the axial load is observed or 20% of strain.

After failure, the specimen was unloaded by reversing the loading machine, cell pressure was reduced and cell water was drained out through BRV. The cell was dismantled and the specimen was taken out, rubber membrane was removed and weight of the failed sample and its water content was determined. The test was repeated on two more identical specimens with increasing cell pressure.

The rate of strain for conducting UUT is kept as 1.25 mm/min as per codal/literature provision based on strata.

5.1.10 Chemical Testing

Chemical Testing was generally performed in accordance with IS: 2720, but the different parts of method as described below:

a) Total Sulphate Content Of Soil

Samples were tested according to IS 2720 (Part 27). The dried soil was extracted with a 10% solution of hydrochloric acid. The extract was adjusted to slightly alkaline pH with ammonia, and then barium chloride solution was added to precipitate the sulphate. The barium sulphate precipitate was collected by filtration, and it was washed, dried and weighed. The mass of barium sulphate recovered was used to calculate the sulphate content of the original soil.

b) pH Value

Samples were tested according to IS: 2720 (Part 26). The soil sample (30 ± 0.1g) was extracted with 75 ml of distilled water and the pH of the resulting suspension was measured with a calibrated (by means of Standard buffer solution) pH meter.

c) Chloride Content

For the water soluble content, soil samples were extracted with a volume of water equal to twice the mass of the soil. The extract was filtered and acidified with a small amount of nitric acid. Standardized silver nitrate solution was then added to precipitate the chloride as its silver salt. The amount of precipitated silver remaining in solution was then determined by titration.

An acid-soluble version of the test was also available, with the initial extraction being with nitric acid instead of water.

CHAPTER 2 ANALYSIS OF TEST RESULTS AND INTERPRETATION

6.0 STRATIFICATION

From the study of the borehole carried out at Old Ch. 42+256 (New Ch: 45+497), it is revealed that:-

At location of O.C. 42+256 N.C. 45+497:-

The sub strata mainly consist of silty Clay of low plasticity (CL)/Sandy Silt (ML-CL)/Silty sand (SM).

6.1 GROUND WATER TABLE DEPTH

The Ground Water Table was not met in the boreholes as given in Table 1.1. Actual site was located under the shallow water body of around 1 m depth so boreholes were drilled 30 to 40 m away from the actual site location. For the analysis purpose, submerged soil condition has been considered.

6.2 RESULTS OF CHEMICAL ANALYSIS

Results of chemical analysis of soil samples (as per **Appendix – B2**) indicates that the soil sample falls under Class I for sulphates and chlorides concentration (As per IS 456-2000 and CIRIA Sp. Publication No. 31). The results are summarized here in below :-

Summary of chemical analysis of soil samples

Chemical Property	Findings (Min. to Max.)	Remarks (Required limits as per IS 456-2000)
pH	8.24 to 8.36	> 6.0
Sulphite as SO_3^{2-} (%)	0.0018 (%) to 0.0021 (%)	< 0.2% (Class I)
Chlorides as Cl^- (%)	0.0057 (%) to 0.0064 (%)	No limit specified in IS 456. However, a limit of 0.10% specified for class I in CIRIA Sp. Publication No. 31)

Note :- All the chemical contents are within permissible limit hence no special precautions are required.

6.3 COMPUTATION OF LIQUEFACTION POTENTIAL

Liquefaction is the sudden loss of shear strength of the sub soil strata due to earthquake-induced vibration under saturated conditions.

Assessment of liquefaction potential of foundation strata is made by simplified approach proposed as per IS: 1893 (Part-1)-2016, from the SPT data and peak ground acceleration likely to occur at

the site. In this method, cyclic shear stress likely to be induced in the foundation strata by Design Basis Earthquake (DBE) is first evaluated.

Next threshold cyclic shear stress, which is good enough to cause liquefaction, is determined from SPT data and the empirical relations. Finally, comparison of these two stresses is used in the estimation of liquefaction susceptibility of the foundation strata.

Unsaturated soils are not subjected to liquefaction because vibratory forces from earthquakes do not cause any increase in pore water pressure in such soils.

The area of site from Palwal to Harsana Kalan (Sonipat) in the State of Haryana falls in seismic zone – IV of India as per IS: 1893. Further as per the provisions of IS: 1893 in soil deposits consisting of submerged loose sands & soils falling under classification of SP with standard penetration N value less than 15, the shaking caused by earthquake ground motion may cause liquefaction or excessive total and differential settlements.

For the analysis of liquefaction potential, following constant parameters are considered:

EQ Zone	IV
Earthquake Magnitude (Mw)	7.0
Peak Horizontal Ground Acceleration (amax /g)	0.24

For the analysis of liquefaction potential, the water table is considered at groud level. The strata in the boreholes are likely to liquefy tabulated below:-

Table 2.1: Liquefaction Analysis

S. No.	Chainage Old (km)	Chainage New (km)	Structure	BH.No.	Depth of Water Table below EGL (m)	Liquefiable Depth (m)
1.	42+256	45+497	MJB	BH-P1	Not Encountered	8.50
2.				BH-P7	Not Encountered	4.00
3.				BH-P9	Not Encountered	8.50
4.				BH-P10	Not Encountered	7.00
5.				BH-P11	Not Encountered	7.00
6.				BH-P12	Not Encountered	4.00

6.4 INTERPRETATION OF LAB TEST RESULTS

Grain Size Analysis

1. **Clay content:** It generally varies from 6 to 11%.
2. **Silt content:** It generally varies from 22 to 61%.
3. **Sand content:** It generally varies from 23 to 84%.
4. **Gravel content:** It generally varies from 1 to 11%.

Atterberg's Limit

5. **Liquid limit:** The test results of liquid limit of the soil samples reveal that it generally varies from 26 to 28% in ML-CL type of soil, 32 to 32% in CL type of soil.
6. **Plastic Limit*:*** The plastic limit of the soil sample varies from 21 to 22% in ML-CL type of soil, 20 to 23% in CL type of soil. However ML-CL type of soil is considered as non-plastic.
7. **Plasticity index*:*** The plasticity index of the soil samples generally varies from 5 to 7% in ML-CL type of soil, 9 to 11% in CL type of soil whereas ML-CL and SM/ SM-SC/ SC type of soil are non-plastic.

Natural moisture content & Bulk density

The bulk density of soil samples generally varies from 1.81gm/cc to 1.97gm/cc whereas natural moisture content varies from 9.0% to 29.4%.

Direct shear tests:

Direct shear test under drained condition have been conducted in sandy silty (ML-CL) / sandy stratum (SM/ SM-SC/ SC) type of soil.

For Sandy strata (SM/ SM-SC/ SC), the value of angle of internal friction varies from 25^{o} to 32^{o}, whereas cohesion varies from 0.00 kg/cm^2 to 0.11 kg/cm^2.

For Silty strata (ML-CL), the value of angle of internal friction varies from 22^{o} to 27^{o}, whereas cohesion varies from 0.18 kg/cm^2 to 0.21 kg/cm^2.

Triaxial shear tests:

Triaxial shear test under undrained condition have been conducted in silty clay (CL) type of soil.

For silty clay (CL) strata, the value of angle of internal friction varies from 4^{o} to 5^{o}, whereas cohesion varies from 1.41kg/cm^2 to 2.24kg/cm^2.

CHAPTER 3 TYPE AND DEPTH OF FOUNDATION WITH ANALYSIS

7.0 TYPE & DEPTH OF FOUNDATION:

Based on the nature & strength characteristics of the substrata and requirement of the project, the following type of foundation have been analyzed as given below:

Table 3.1 : Shallow Foundation

Type of foundation	Depth of Foundation below E.G.L. (m)	Size of Foundation (m x m)
Shallow Foundation	2.0, 3.0, 4.0	7.2 x 7.2

Table 3.2 : Pile Foundation

Type of foundation	Length of Pile below E.G.L. (m)	Dia. of Pile (m)
Normal Bored Cast in-situ RCC Pile	20.0, 22.0, 24.0, 26.0, 28.0 & 30.0	1.0 & 1.2

The details of foundation analysis are given in the subsequent paragraph.

7.1 ANALYSIS OF SHALLOW FOUNDATION

7.1.1 From Shear Failure Criteria

Net Safe Bearing capacity from Shear Failure consideration has been computed in accordance with IS: 6403-1981, which is based on, modified Terzaghi's classical approach. The weighted average of shear strength parameters for various strata upto depth equal to 0.5*B*Tan (45+Ø/2) (where B = Width of the Foundation, Ø = Angle of internal friction) is used in the analysis. A factor of safety of 2.5 to estimate the net safe bearing capacity from ultimate net bearing capacity.

For soils, containing both coarse grained (gravels & sands) and fine grained (clays), c and Φ are used to determine the soil strength. In case of predominantly fine grained soils, c and Φ are determined by the Triaxial Compression test as per IS: 2720 pt XI. For predominantly coarse grained soils, c and Φ are determined by Direct Shear test as per IS: 2720 pt XIII. These c and Φ values were used for determining the SBC of soil as per shear failure criteria.

The ultimate net bearing capacity in case of general shear failure is given by following expression,

$q_d = c\,N_c\,s_c\,d_c\,i_c + q\,(N_q-1)\,s_q\,d_q\,i_q + (1/2)\,B\,\gamma\,N_\gamma\,s_\gamma\,d_\gamma\,i_\gamma\,W'$

The ultimate net bearing capacity in case of local shear failure is given by following expression,

$q'_d = (2/3)\,c\,N'_c\,s_c\,d_c\,i_c + q\,(N'_q-1)\,s_q\,d_q\,i_q + (1/2)\,B\,\gamma\,N'_\gamma\,s_\gamma\,d_\gamma\,i_\gamma\,W'$

Where,

$d_c = 1 + 0.2\,(D_f/B)*SQRT(N_\phi)$

$d_q = d_\gamma = 1$ for $\phi < 10^o$

$d_q = d_\gamma = 1 + 0.1\,(D_f/B)*SQRT(N_\phi)$ for $\phi > 10^o$

$N_\phi = \tan^2(\pi/4 + \phi/2)$

ϕ' for local shear failure = $\tan^{-1}(0.67 \tan\phi)$

7.1.2 From Settlement Failure Criteria

Allowable Bearing Pressure from Settlement Failure consideration has been computed in accordance with IS: 8009 (Part-I). The magnitude of settlement, when foundation loads are applied, depends upon the compressibility of the underlying strata and rigidity of the substructure.

The total permissible settlement in cohesion-less soil is estimated using SPT value as per IS: 8009 (Part-I). While using this approach, the N value was corrected, wherever applicable, below the footing base to at least 1.5B below the base to account for the effects of energy ratio, adopted bearing pressure, dilation for submerged silty fine sands / fine sands as well as that due to the overburden pressure.

Further for settlement Calculation in cohesive soil the following equation has been used.

$S_t = \Delta P\ M_v\ H$

Where,

M_v = Coefficient of volume compressibility, cm^2/kg

ΔP = Pressure increment, kg/cm^2

H = Thickness of layers

Note: - Value of Coefficient of volume compressibility (Mv) has been calculated by using the following co-relation [Ref. Stroud and Butler, 1975] :-

Coefficient of Volume Compressibility derived from SPT N-Value (after Stroud and Butler, 1975)

Plasticity Index (%)	Conversion Factor (f_2)	m_v (10^{-3} kPa^{-1}) based on N-Value: $m_v = 1/(f_2N)$				
		N=10	N=20	N=30	N=40	N=50
10	800	0.12	0.06	0.04	0.03	0.02
20	525	0.19	0.09	0.06	0.05	0.04
30	475	0.21	0.10	0.07	0.05	0.04
40	450	0.22	0.11	0.07	0.06	0.04

$Mv = 1/(f_2 N_{corr.})$

Where f_2 = factor based on $N_{corr.}$ Value & plasticity index of soil

$N_{corr.}$ = corrected SPT 'N' value

For analysis of shallow foundation the total permissible settlement has been considered as 25mm, & 50mm as per IS 1904.

Zone of influence below foundation has been considered up to 1.5 times the width of the foundation.

For the determination of the SBC from settlement criteria, the corrected SPT N values within the influence zone are given in the table below.

NOTE:-

- Lower of the two values obtained from settlement and shear criteria is used in arriving at allowable bearing capacity of the soil.
- Structural foundations are designed based on the minimum of Safe Bearing Capacity obtained from Shear Failure Criteria and Allowable Bearing Pressure corresponding to the permissible settlement. The permissible Settlement that can be allowed for the foundation depends on the strata at the location and type of foundation (whether Isolated or Raft).

  Settlement occurs with the application of loads on foundations. It has two components, Immediate Settlement and Long Term Settlement. The immediate settlement takes place immediately as the loading is imposed on the structure and long term settlement arises due to the consolidation of the sub-soil with time under the load. Hence, the total settlement allowed for a foundation is the sum of the immediate and consolidation settlement that is expected to occur. The cohesionless strata (predominantly sandy) is primarily subjected to immediate settlement and cohesive strata (clayey) undergoes settlement in long time with the compression of the strata due to consolidation. Settlement of the foundation is determined from the relation provided in Indian standards (IS: 8009 (part-1) &/or various literatures (Bowles, BM Das, etc.).

  From the Geotechnical investigation conducted on our site along with subsequent laboratory tests on soil samples, it is observed that predominantly the strata is silty with sand (SM/SC/SM-SC/ML-CL i.e. predominantly cohesionless) with the presence of small patches of silty clay of low plasticity (CL). Since the Settlement that takes place in cohesionless strata is mostly immediate, it takes place immediately after the imposing of load, initially during construction with the application of Dead Load and further during Live Load. The live load usually is many times lesser than the dead load, and correspondingly the post construction settlement is very less for live loads. As an example, if dead load is three times that of live load, then the settlement corresponding to live load (i.e. the post construction settlement) will be one-third of the settlement due to dead load which is comparatively lesser than 25mm for permissible settlement of 50mm.

  According to the IS 1904, the permissible settlement for concrete structure having raft foundation is allowed upto 75mm, and the permissible settlement is 25mm post construction as per IRS code (Code of Practice for The Design of Sub-Structures and Foundations of Bridges). As discussed above, the settlement post construction is directly proportional to the allowable settlement. Therefore, given the importance of structure to be constructed and considering mostly cohesionless strata encountered at site, it is recommended that the maximum permissible settlement shall be

restricted to 50mm for the design purpose on conservative side so that the post construction settlement can be constraint to lesser than 25mm.

As per IS- 8009 part 1 clause 9.2.2.1, If the clay layer is sandwitched between cohesionless soil layers, the immediate settlement is zero. Hence, even though the immediate settlement has been calculated during analysis, however it is ignored in the calculation of total settlement.

The sample calculations for computation of allowable bearing capacity of sub-strata for shallow foundation vide **Appendix – C-2.**

7.2 ANALYSIS OF PILE FOUNDATION

(A) DEEP FOUNDATION

The safe Load Carrying Capacity of normal bored cast in-situ RCC pile is determined in compression, uplift and lateral as per IS: 2911 (Part-1/sec-2) – 2010. The axial capacity of a pile depends upon the soil skin friction along the shaft and end bearing at it's tip.

Thus Axial load = Skin Friction + End-bearing

a) For piles in granular soils (using the static formula)

$$\mathbf{Q_u = (0.5*D*\gamma*N_\gamma + P_D*N_q)*A_p + (\Sigma K_i*P_{Di}*\tan\delta_i)*A_{si}}$$

Where,

Q_u = Ultimate load capacity of pile in KN

D = dia. of pile shaft in m

γ = effective unit weight of the soil at pile tip in kN/m^3

N_γ & N_q = bearing capacity factors depending upon the angle of internal friction Φ at pile tip (N_γ from IS 6403 for general shear failure case & N_q from Fig. 1, IS 2911)

P_D = effective overburden pressure at pile tip in kN/m^2 limited to 15-17 times diameter of pile (as per the Phi value at end bearing)

Σ = Summation for layers (1 to n) in which pile is installed and which contribute to (+ve) skin friction

K_i = coefficient of earth pressure applicable for the i^{th} layer

P_{Di} = effective overburden pressure for the i^{th} layer in kN/m^2 limited to 15-17 times diameter of pile (as per the Phi value at end bearing)

δ_i = angle of wall friction between pile and soil for i^{th} layer, and

A_{si} = surface area of pile shaft in the i^{th} layer in m^2

b) For piles in cohesive soils (using the static formula)

$$\mathbf{Q_u = cp*Nc*A_p + \Sigma\alpha_i*c_i*A_{si}}$$

Where,

Q_u = Ultimate load capacity of pile in KN

A_p = cross-sectional area of pile tip in m^2

N_c = bearing capacity factor (= 9)

Σ = Summation for layers (1 to n) in which pile is installed and which contribute to (+ve) skin friction

α_i = adhesion factor for the i^{th} layer depending on the consistency of soil

c_i = average cohesion for i^{th} layer in kN/m^2

A_{si} = surface area for pile shaft in the i^{th} layer in m^2

c) For computation of safe load carrying capacity of pile in lateral, the following equation has been used:

i. Fixed Head Condition

$$Q = (12 * E * I * Y) / (L_1 + L_f)^3$$

ii. Free Head Condition

$$Q = (3 * E * I * Y) / (L_1 + L_f)^3$$

Where,

Q = Lateral Load (in kg)

Y = Permissible lateral deflection taken as 5mm

E = Modulus of Elasticity of concrete

I = Moment of Inertia of the pile cross-section

L_1 = Length of pile above cut-off level

L_f = Length of fixity

The effective length of the pile has been considered below the cut-off level taken as 2.0m below the EGL. Normal Bored cast in-situ RCC piles having stem diameter equal to 100cm & 120cm and of effective length varying from 16.0m to 28.0m were selected.

For the analysis of the pile foundations the soil parameters used for computation of safe load carrying capacity of pile is tabulated below:-

Table 3.3 : Design Soil Parameter

Chainage Old (km)	Chainage New (km)	BH.No.	Layer depth below EGL (m)		Thickness of strata (m)	Strata description	SPT 'N'		Bulk Density (gm/cc)	Cohesion (C) (kg/cm2)	Angle of internal Friction (Φ) (°)
			From	To			Observed	Corrected			
42+256	45+497	BH-P1	0.00	4.00	4.00	Sandy Silt	10	13	1.72	0.13	25
			4.00	7.00	3.00	Sandy Silt	13	16	1.75	0.15	25
			7.00	10.00	3.00	Silty Clay	21	21	1.87	0.77	6

Chainage Old (km)	Chainage New (km)	BH.No.	Layer depth below EGL (m)		Thickness of strata (m)	Strata description	SPT 'N'		Bulk Density (gm/cc)	Cohesion (C) (kg/cm2)	Angle of internal Friction (Φ) (°)
			From	To			Observed	Corrected			
42+256	45+497	BH-P1	10.00	13.00	3.00	Silty Clay	37	37	1.93	1.38	6
			13.00	23.50	10.50	Silty Clay	62	62	1.97	1.71	5
			23.50	28.50	5.00	Sandy Silt	75	38	1.88	0.19	25
			28.50	35.00	6.00	Silty Sand	85	39	1.81	0.00	31
		BH-P7	0.00	5.50	5.50	Silty Clay	16	16	1.80	0.61	5
			5.50	8.50	3.00	Silty Clay	20	20	1.85	0.71	6
			8.50	11.50	3.00	Silty Clay	26	26	1.89	0.99	5
			11.50	14.50	3.00	Silty Clay	22	22	1.86	0.99	5
			14.50	21.00	6.50	Silty Clay	57	57	1.95	1.21	5
			21.00	35.00	13.00	Silty Clay	65	65	2.05	1.98	5
		BH-P9	0.00	4.00	4.00	Sandy Silt	8	10	1.69	0.13	25
			4.00	7.00	3.00	Sandy Silt	11	13	1.72	0.14	26
			7.00	10.00	3.00	Sandy Silt	21	21	1.77	0.15	26
			10.00	13.00	3.00	Sandy Silt	28	24	1.79	0.17	27
			13.00	22.00	9.00	Silty Clay	40	40	1.94	1.51	5
			22.00	35.00	12.50	Silty Clay	74	74	1.97	2.10	5
		BH-P10	0.00	5.50	5.50	Sandy Silt	10	13	1.80	0.44	5
			5.50	8.50	3.00	Silty Clay	24	24	1.82	0.91	6
			8.50	14.50	6.00	Silty Clay	39	39	1.87	1.10	6
			14.50	16.00	1.50	Silty Clay	-	-	1.97	1.19	7
			16.00	20.50	4.50	Sandy Silt	70	47	1.88	0.15	25
			20.50	22.00	1.50	Sandy Silt	-	-	1.90	0.19	26
			22.00	35.00	12.00	Silty Clay	74	74	2.02	2.31	6
		BH-P11	0.00	2.50	2.50	Sandy Silt	-	-	1.68	0.00	31
			2.50	7.00	4.50	Silty Clay	19	19	1.84	0.78	5
			7.00	13.00	6.00	Silty Clay	27	27	1.86	1.02	6
			13.00	14.50	1.50	Silty Clay	-	-	1.89	1.04	6
			14.50	22.00	7.50	Sandy Silt	48	33	1.84	0.16	26
			22.00	25.50	3.50	Sandy Silt	46	25	1.85	0.18	27
			25.50	31.00	5.50	Silty Clay	66	66	2.01	2.68	6
			31.00	35.00	3.50	Silty Clay	74	74	2.02	2.68	6
		BH-P12	0.00	5.50	5.50	Silty Clay	19	19	1.85	0.95	5
			5.50	11.50	6.00	Silty Clay	29	29	1.92	1.14	5
			11.50	14.50	3.00	Silty Clay	24	24	1.89	0.98	6
			14.50	35.00	19.50	Silty Clay	42	42	1.96	1.25	5

Design parameter have been obtain from the laboratory test results however various depth where the shear parameter seems on the lower side with respect to SPT 'N' values those shear parameter

have been judicially improved based on the SPT 'N' for the analysis purpose.

The sample calculation for computation of safe load carrying capacity of normal bored cast-in-situ RCC pile in compression & uplift are attached vide **Appendix C-3.**

The sample calculation for computation of safe load carrying capacity of normal bored cast-in-situ RCC pile in lateral are attached vide **Appendix C-4.**

CHAPTER 4 FOUNDATION RECOMMENDATIONS

8.0 FOUNDATION RECOMMENDATIONS

- Based on the nature & strength characteristics of the substrata and requirement of the project, shallow foundation and normal bored cast in-situ RCC pile foundation have been analyzed.
- Based on the method of analysis & design parameters given under Para 7.1 above, the recommended net allowable bearing capacity values are given in Table 4.1 to 4.4.

Table 4.1: Recommended Net Allowable Bearing Capacity for shallow foundation for allowable settlement 25mm

Chainage Old (km)	Chainage New (km)	BH. No.	Foundation Size (m x m)	Depth of foundation below EGL (m)	Net Safe Bearing Capacity from Shear Failure (t/m^2)	Net Allowable Bearing Pressure from settlement failure (t/m^2)	Recommended Net Allowable Bearing Capacity (t/m^2)
42+256	45+497	BH-P1	7.2 x 7.2	2.0	16.5	7.8	NR
			7.2 x 7.2	3.0	18.7	9.3	NR
			7.2 x 7.2	4.0	21.1	11.5	NR
		BH-P7	7.2 x 7.2	2.0	18.1	8.7	NR
			7.2 x 7.2	3.0	18.8	9.4	NR
			7.2 x 7.2	4.0	19.4	10.6	NR
		BH-P9	7.2 x 7.2	2.0	13.3	4.7	NR
			7.2 x 7.2	3.0	15.2	5.1	NR
			7.2 x 7.2	4.0	17.1	5.2	NR
		BH-P10	7.2 x 7.2	2.0	21.4	14.1	NR
			7.2 x 7.2	3.0	22.2	18.7	NR
			7.2 x 7.2	4.0	23.0	19.8	NR
		BH-P11	7.2 x 7.2	2.0	18.9	11.6	NR
			7.2 x 7.2	3.0	19.6	14.5	NR
			7.2 x 7.2	4.0	20.3	15.4	NR
		BH-P12	7.2 x 7.2	2.0	32.6	14.3	NR
			7.2 x 7.2	3.0	33.7	15.1	NR
			7.2 x 7.2	4.0	34.8	15.9	NR

* The maximum value of recommended net allowable bearing capacity shall be restricted to 30 t/m^2.

Table 4.2: Recommended Net Allowable Bearing Capacity for shallow foundation for allowable settlement 50mm

Chainage Old (km)	Chainage New (km)	BH. No.	Foundation Size (m x m)	Depth of foundation below EGL (m)	Net Safe Bearing Capacity from Shear Failure (t/m^2)	Net Allowable Bearing Pressure from settlement failure (t/m^2)	Recommended Net Allowable Bearing Capacity (t/m^2)
42+256	45+497	BH-P1	7.2 x 7.2	2.0	16.5	15.6	NR
			7.2 x 7.2	3.0	18.7	18.5	NR
			7.2 x 7.2	4.0	21.1	23.0	NR
		BH-P7	7.2 x 7.2	2.0	18.1	17.3	NR
			7.2 x 7.2	3.0	18.8	18.9	NR
			7.2 x 7.2	4.0	19.4	21.2	NR
		BH-P9	7.2 x 7.2	2.0	13.3	9.3	NR
			7.2 x 7.2	3.0	15.2	10.1	NR
			7.2 x 7.2	4.0	17.1	10.4	NR
		BH-P10	7.2 x 7.2	2.0	21.4	28.1	NR
			7.2 x 7.2	3.0	22.2	37.4	NR
			7.2 x 7.2	4.0	23.0	39.5	NR
		BH-P11	7.2 x 7.2	2.0	18.9	23.2	NR
			7.2 x 7.2	3.0	19.6	29.0	NR
			7.2 x 7.2	4.0	20.3	30.7	NR
		BH-P12	7.2 x 7.2	2.0	32.6	28.6	NR
			7.2 x 7.2	3.0	33.7	30.2	NR
			7.2 x 7.2	4.0	34.8	31.9	NR

Table 4.3: Recommended Net Allowable Bearing Capacity for shallow foundation for allowable settlement 25mm (Replaced or Compacted Soil)

Chainage Old (km)	Chainage New (km)	BH. No.	Foundation Size (m x m)	Depth of foundation below EGL (m)	Net Safe Bearing Capacity from Shear Failure (t/m^2)	Net Allowable Bearing Pressure from settlement failure (t/m^2)	*Recommended Net Allowable Bearing Capacity (t/m^2)
42+256	45+497	BH-P7	7.2 x 7.2	2.0	25.4	16.2	16.2
			7.2 x 7.2	3.0	27.2	19.3	19.3
			7.2 x 7.2	4.0	29.1	23.6	23.6
		BH-P12	7.2 x 7.2	2.0	41.3	13.5	13.5
			7.2 x 7.2	3.0	43.8	15.2	15.2
			7.2 x 7.2	4.0	46.3	17.2	17.2

Table 4.4: Recommended Net Allowable Bearing Capacity for shallow foundation for allowable settlement 50mm (Replaced or Compacted Soil)

Chainage Old (km)	Chainage New (km)	BH. No.	Foundation Size (m x m)	Depth of foundation below EGL (m)	Net Safe Bearing Capacity from Shear Failure (t/m^2)	Net Allowable Bearing Pressure from settlement failure (t/m^2)	*Recommended Net Allowable Bearing Capacity (t/m^2)
42+256	45+497	BH-P7	7.2 x 7.2	2.0	25.4	32.4	25.4
			7.2 x 7.2	3.0	27.2	38.6	27.2
			7.2 x 7.2	4.0	29.1	47.2	29.1
		BH-P12	7.2 x 7.2	2.0	41.3	27.1	27.1
			7.2 x 7.2	3.0	43.8	30.4	30.4
			7.2 x 7.2	4.0	46.3	34.4	34.4

Note:- Table 4.1& 4.2 Show that most of the boreholes are liquefiable up to certain depth. Therefore before laying the open foundation it is recommended to replace & compact the soil up to liquefaction depth, Replaced/ Compacted SBC are presented in Table 4.3 & 4.4. However, the stara liquefied more than 4m depth from EGL are not recommended for SBC.

Note:-

- The maximum value of recommended net allowable bearing capacity shall be restricted to 30 t/m^2.
- As per the Morth guidelines the gradation of fill soil shall be as per following limits. The effective angle of friction not less than 30º. The gradation of fill soil shall be as per following limits.

Sieve Size	Percentage Passing
75 mm	100%
425 micron	0-60%
75 micron	less than 15 %
PI	≤6

1. *The density of backfill soil should be more than 95% of proctor density. The replaced /compacted soil should be lay down layer wise for each 300mm.*
2. *The design parameters considered for replaced/compacted Soil for calculating the SBC from shear criteria are as follows;*

C=0, Phi = 32 degree, Sp. Gravity= 2.63 Moisture content= 8%, bulk density= 1.84 g/cc, N = 25.

- Based on the method of analysis given under Para 7.2 above, The values of Safe Load Carrying Capacity of piles in compression, uplift and lateral under static conditions have been tabulated below:-

Table 4.3: Safe Load Carrying Capacity of normal bored cast in-situ RCC Pile in Soil

Chainage Old (km)	Chainage New (km)	BH. No.	Diameter of Pile (m)	Length of piles below cut-off (m)	Cut-off level below EGL (m)	Safe load carrying capacity of single pile (T)		
						In compression	In uplift	In Lateral
								Fixed Head
42+256	45+497	BH-P1	1.0	20.0	2.0	139.0	117.0	5.3
				22.0		154.0	133.0	
				24.0		174.0	153.0	
				26.0		193.0	174.0	
				28.0		212.0	193.0	
				30.0		285.0	213.0	
			1.2	20.0		194.0	151.0	8.3
				22.0		214.0	174.0	
				24.0		241.0	202.0	
				26.0		268.0	231.0	
				28.0		296.0	259.0	
				30.0		422.0	288.0	
		BH-P7	1.0	20.0	2.0	162.0	140.0	12.9
				22.0		200.0	158.0	
				24.0		215.0	175.0	
				26.0		231.0	192.0	
				28.0		247.0	209.0	
				30.0		263.0	226.0	
			1.2	20.0		209.0	180.0	16.9
				22.0		260.0	202.0	
				24.0		279.0	224.0	
				26.0		299.0	246.0	
				28.0		318.0	268.0	
				30.0		338.0	290.0	
		BH-P9	1.0	20.0	2.0	142.0	117.0	4.1
				22.0		175.0	135.0	
				24.0		191.0	152.0	
				26.0		208.0	170.0	
				28.0		224.0	187.0	
				30.0		240.0	205.0	
			1.2	20.0		186.0	152.0	6.2
				22.0		207.0	175.0	
				24.0		251.0	197.0	
				26.0		271.0	220.0	
				28.0		291.0	242.0	
				30.0		312.0	265.0	

Chainage Old (km)	Chainage New (km)	BH. No.	Diameter of Pile (m)	Length of piles below cut-off (m)	Cut-off level below EGL (m)	Safe load carrying capacity of single pile (T)		
						In compression	In uplift	In Lateral Fixed Head
42+256	45+497	BH-P10	1.0	20.0	2.0	164.0	138.0	6.7
				22.0		209.0	157.0	
				24.0		227.0	176.0	
				26.0		246.0	196.0	
				28.0		264.0	215.0	
				30.0		283.0	234.0	
			1.2	20.0		231.0	184.0	9.9
				22.0		267.0	208.0	
				24.0		305.0	233.0	
				26.0		328.0	258.0	
				28.0		351.0	283.0	
				30.0		374.0	308.0	
		BH-P11	1.0	20.0	2.0	173.0	140.0	6.3
				22.0		201.0	161.0	
				24.0		222.0	182.0	
				26.0		266.0	204.0	
				28.0		287.0	225.0	
				30.0		307.0	246.0	
			1.2	20.0		244.0	187.0	9.3
				22.0		272.0	216.0	
				24.0		313.0	245.0	
				26.0		359.0	272.0	
				28.0		385.0	299.0	
				30.0		410.0	326.0	
		BH-P12	1.0	20.0	2.0	146.0	126.0	13.2
				22.0		160.0	142.0	
				24.0		174.0	157.0	
				26.0		189.0	173.0	
				28.0		203.0	189.0	
				30.0		218.0	205.0	
			1.2	20.0		189.0	162.0	17.2
				22.0		207.0	183.0	
				24.0		225.0	203.0	
				26.0		243.0	224.0	
				28.0		261.0	245.0	
				30.0		279.0	265.0	

Notes : -

1. Permissible lateral deflection has been taken 5mm.
2. The self weight of the pile has been taken into account while computing the Safe Load Carrying Capacity of Pile in uplift only and not considered for vertical load capacity in compression.
3. The safe load carrying capacity of piles have been worked out on the basis of IS: 2911 (Part-1/sec-2) – 2010 as per provisions / assumptions provided therein & are only an assessment based on characteristics of the sub-strata obtained at the locations of the above BHs. The safe load carrying capacities as tabulated above will further depend substantially on the piling technique adopted and equipment used for making the piles in the field. However, for the final designs & constructions, the safe/allowable load carrying capacities of these piles should be taken by conducting actual initial load tests on these piles by casting them in the respective areas.
4. While erecting normal bored cast in-situ pile, utmost care should be taken while flushing/cleaning the bottom of pile particularly prior to start of pouring of concrete so as o rest the pile in virgin soil only for obtaining full point bearing as while computing safe load carrying capacity of pile no bottom softening during erection of pile has been considered.
5. Further the pile should have necessary structural strength to transmit / sustain the design load.

***Notes:* -**

All The above recommendations are based on the field and laboratory tests conducted on selected soil/ rock core samples and our experience in this regard. If the actual substrata conditions during excavation for the foundation differ from the observations reported here, the design experts/consultants should be referred for suggestion, further investigations.

REFERENCES

1. IS 2911: Part 1 : Sec 2 : 2010 (Reaffirmed Year : 2020) Design And construction Of pile foundations - Code Of Practice Part 1 Concrete Piles Section 2 Bored Cast In-situ Concrete Piles.
2. IS 2911 : Part 4 : 2013 (Reaffirmed Year : 2018) Design and construction of pile foundations - Code of practice : Part 4 Load test on piles .
3. IS 6403 : 1981 (Reaffirmed Year : 2016), Amd. 2 : 2018 Code of practice for determination of bearing capacity of shallow foundations.
4. IS 8009 : Part 1 : 1976 (Reaffirmed Year : 2018) Code of practice for calculation of settlements of foundations: Part 1 Shallow foundations subjected to symmetrical static vertical loads.
5. IS 8009 : Part 2 : 1980 (Reaffirmed Year : 2020) Code of practice for calculation of settlement of foundations: Part 2 Deep foundations subjected to symmetrical static vertical loading.
6. IS 1893 : Part 1 : 2016 (Reaffirmed Year : 2021) Criteria for Earthquake Resistant Design of Structures - Part 1 : General Provisions and Buildings.
7. IS 1904 : 2021 Draft Indian Standard for General requirements for design and construction of foundations in soils Code of practice third revision of IS 1904.
8. IS 456 : 2000 (Reaffirmed Year : 2021) Plain and Reinforced Concrete - Code of Practice (Including Amendment 1, 2, 3,& 4).
9. BS – 118 : 2015 Final Seismic Design of Bridges.
10. IS 2131 : 1981 (Reaffirmed Year : 2016) Method for standard penetration test for soils.
11. IS 2132 : 1986 (Reaffirmed Year : 2016) Code of practice for thin-walled tube sampling of soils.
12. IS 1892 : 1979 (Reaffirmed Year : 2016) Code of practice for subsurface investigation for foundations.
13. Bowles, J.E., 1982. Foundation design and analysis.
14. IS. 2720 (Part 3)-1980. Determination of Specific Gravity of Soil.
15. IS. 2720 (Part 4). 1985. Methods of Test for Soils: Grain Size Analysis.
16. IS. IS 2131, 1981. Method for standard penetration test for soils.
17. IS: 2720 (Part 11)–(1993). Determination of the shear strength parameters of a specimen tested in unconsolidated undrained triaxial compression without the measurement of pore water pressure.
18. IS: 2720 (Part 13) 1986 Method of test for soils, direct shear test. New Delhi, India.
19. IS: 2720 (Part 3/See 1)–(1980) Methods of test for soils, determination of specific gravity of soil. New Delhi, India.
20. IS: 2720 (Part 5) 1985 Methods of test for soils, determination of liquid and plastic limit of soils. New Delhi, India.

Abbreviations

BH	Borehole
ERT	Electrical Resistivity Test
EGL	Existing Ground Level
GWT	Ground Water Table
IS	Indian Standards
SPT	Standard Penetration Test
DS	Disturbed Soil
R.L.	Reduced Level
m	Metre
sp. gr.	Specific Gravity
%	Percentage
mg /l	Milligram per litre
mg /kg	Milligram per kilogram

APPENDIX – A (FIELD DATA RESULTS)

Appendix No.	ITEMS
A-1	LOCATION PLAN
A-2	FIELD BORE HOLE LOGS
A-3	SUB SOIL PROFILE DIAGRAM


Tea point
Ashok Villa
Rao Harish Hotel
CH-42+256 MJB (BH-P11)
CH-42+256 MJB (BH-P12)
CH-42+256 MJB (BH-P10)
CH-42+256 MJB (BH-P9)
MINI PIZZA HUT
V R HIGH School
KMP Flyover Pachgaon
CH-42+256 MJB (BH-P7)
Akash PG
HDFC Bank
SHRI SHYM COMMUNICATION
CH-42+256 MJB (BH-P1)
Delhi - Jaipur Expy
Shri Ram Optical
Manish Sharma Dhaba
Geeta Garments
Google Earth
N

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133716 m	*Easting :*685810 m
Reduced Level (m):(+)261.500	*BH. No. :*BH-P1	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*20-11-2022	*Date of Completion :*21-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
0.0		DS									
0.5											
1.0	1	UDS-1									
1.5											
2.0											
2.5	2.5	SPT-1	2	4	6	10					
3.0											
3.5							Yellowish brown, Sandy silt of low plasticity	ML-CL			
4.0	4	UDS-2									
4.5											
5.0											
5.5	5.5	SPT-2	3	5	8	13					
6.0											
6.5											
7.0	7	UDS-3									
7.5											
8.0											
8.5	8.5	SPT-3	7	9	12	21	Yellowish brown, Silty clay of low plasticity with gravel	CL			
9.0											
9.5											
10.0	10	UDS-4									

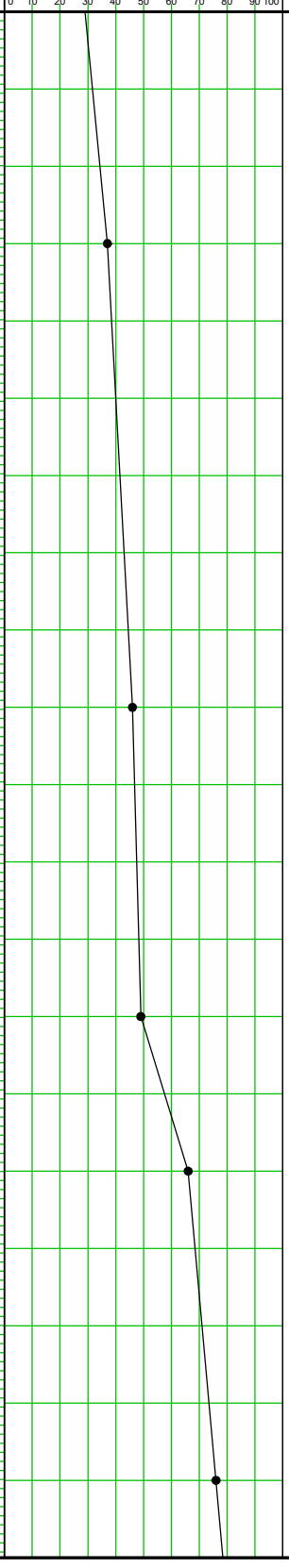
(Depth v/s SPT N Value) axis: 0 10 20 30 40 50 60 70 80 90 100

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133716 m	*Easting :*685810 m
Reduced Level (m):(+)261.500	*BH. No. :*BH-P1	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*20-11-2022	*Date of Completion :*21-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
10.0											
10.5											
11.0											
11.5	11.5	SPT-4	9	16	21	37					
12.0											
12.5											
13.0	13	UDS-5									
13.5											
14.0											
14.5	14.5	SPT-5	11	19	27	46					
15.0							Yellowish brown, Silty clay of low plasticity with gravel	CL			
15.5											
16.0	16	UDS*									
16.5	16.5	SPT-6	12	17	32	49					
17.0											
17.5	17.5	SPT-7	19	24	42	66					
18.0											
18.5											
19.0											
19.5	19.5	SPT-8	21	27	49	76					
20.0											



UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133716 m	*Easting :*685810 m
Reduced Level (m):(+)261.500	*BH. No. :*BH-P1	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*20-11-2022	*Date of Completion :*21-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
20.0											
20.5	20.5	SPT-9	24	32	49	81	Yellowish brown, Silty clay of low plasticity with gravel	CL			
21.0											
21.5											
22.0											
22.5	22.5	SPT-10	19	21	34	55					
23.0											
23.5	23.5	SPT-11	25	34	41	75					
24.0											
24.5											
25.0											
25.5	25.5	SPT-12	19	25	37	62	Yellowish brown, Dense to dense, Sandy silt of low plasticity	ML-CL			
26.0											
26.5	26.5	SPT-13	30	39	48	87					
27.0											
27.5											
28.0											
28.5	28.5	SPT-14	31	35	51	86					
29.0											
29.5	29.5	SPT-15	22	41	49	90	Yellowish brown, Silty Sand	SM			
30.0											

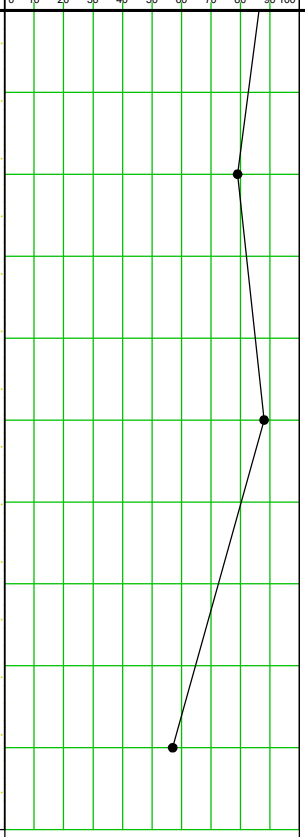
(Depth v/s SPT N Value) axis: 0 10 20 30 40 50 60 70 80 90 100

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133716 m	*Easting :*685810 m
Reduced Level (m):(+)261.500	*BH. No. :*BH-P1	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*20-11-2022	*Date of Completion :*21-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
30.0											
30.5											
31.0	31	SPT-16	25	34	45	79					
31.5											
32.0											
32.5	32.5	SPT-17	31	39	49	88	Yellowish brown, Silty Sand	SM			
33.0											
33.5											
34.0											
34.5	34.5	SPT-18	20	27	30	57					
35.0											



UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133807 m	*Easting :*685841 m
Reduced Level (m):(+)263.750	*BH. No. :*BH-P7	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*19-11-2022	*Date of Completion :*20-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
0.0		DS									
0.5											
1.0	1	SPT-1	3	7	9	16					
1.5											
2.0											
2.5	2.5	UDS-1									
3.0											
3.5											
4.0	4	SPT-2	4	5	11	16					
4.5											
5.0							Yellowish brown, Silty clay of low plasticity with gravel	CL			
5.5	5.5	UDS-2									
6.0											
6.5											
7.0	7	SPT-3	6	9	11	20					
7.5											
8.0											
8.5	8.5	UDS-3									
9.0											
9.5											
10.0	10	SPT-4	8	11	15	26					

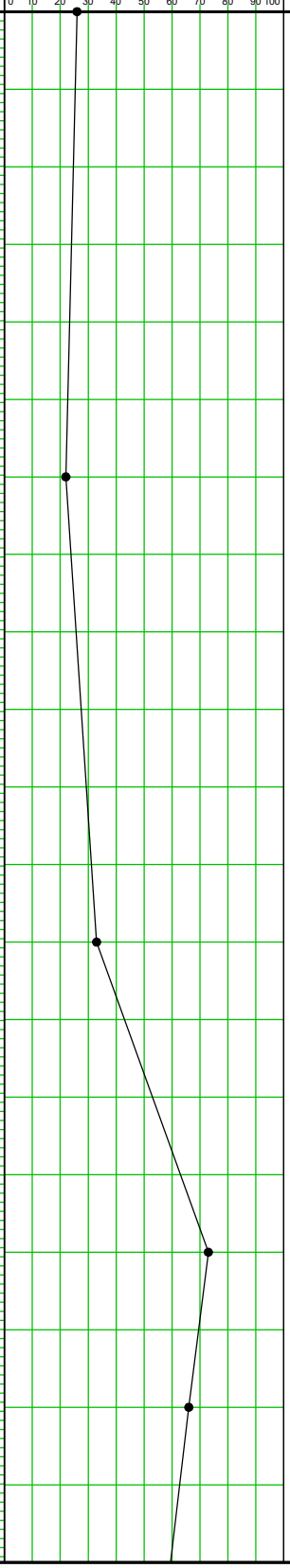
(Depth v/s SPT N Value) axis: 0 10 20 30 40 50 60 70 80 90 100

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133807 m	*Easting :*685841 m
Reduced Level (m):(+)263.750	*BH. No. :*BH-P7	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*19-11-2022	*Date of Completion :*20-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
10.0											
10.5											
11.0											
11.5	11.5	UDS-4									
12.0											
12.5											
13.0	13	SPT-5	7	9	13	22					
13.5											
14.0											
14.5	14.5	UDS-5									
15.0							Yellowish brown, Silty clay of low plasticity with gravel	CL			
15.5											
16.0	16	SPT-6	11	14	19	33					
16.5											
17.0											
17.5	17.5	UDS*									
18.0	18	SPT-7	17	31	42	73					
18.5											
19.0	19	SPT-8	13	29	37	66					
19.5											
20.0											



UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133807 m	*Easting :*685841 m
Reduced Level (m):(+)263.750	*BH. No. :*BH-P7	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*19-11-2022	*Date of Completion :*20-11-2022	

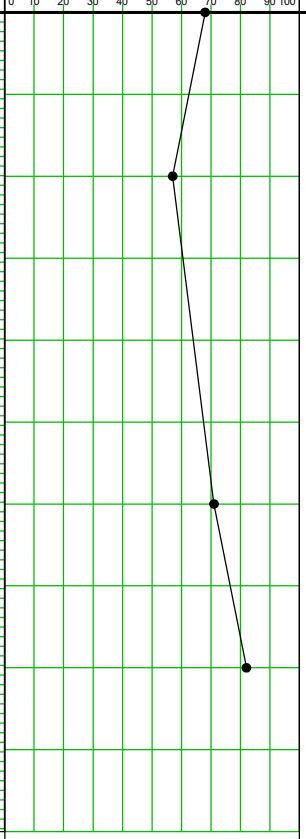
Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
20.0											
20.5	20.5	UDS*									
21.0	21	SPT-9	11	21	32	53					
21.5											
22.0	22	SPT-10	19	26	37	63					
22.5											
23.0											
23.5	23.5	UDS*									
24.0	24	SPT-11	22	31	44	75					
24.5											
25.0	25	SPT-12	25	36	41	77	Yellowish brown, Silty clay of low plasticity with gravel	CL			
25.5											
26.0											
26.5	26.5	UDS*									
27.0	27	SPT-13	19	26	33	59					
27.5											
28.0	28	SPT-14	15	31	36	67					
28.5											
29.0											
29.5	29.5	UDS*									
30.0	30	SPT-15	12	29	39	68					

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133807 m	*Easting :*685841 m
Reduced Level (m):(+)263.750	*BH. No. :*BH-P7	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*19-11-2022	*Date of Completion :*20-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
30.0											
30.5											
31.0	31	SPT-16	19	24	33	57					
31.5											
32.0											
32.5	32.5	UDS*					Yellowish brown, Silty clay of low plasticity with gravel	CL			
33.0	33	SPT-17	24	29	42	71					
33.5											
34.0	34	SPT-18	27	33	49	82					
34.5											
35.0											



UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133938 m	*Easting :*685867 m
Reduced Level (m):(+)262.750	*BH. No. :*BH-P9	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*20-11-2022	*Date of Completion :*21-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
0.0		DS									
0.5											
1.0	1	UDS-1									
1.5											
2.0											
2.5	2.5	SPT-1	2	4	4	8					
3.0											
3.5											
4.0	4	UDS-2									
4.5											
5.0							Yellowish brown, , Sandy silt of low plasticity	ML-CL			
5.5	5.5	SPT-2	4	5	6	11					
6.0											
6.5											
7.0	7	UDS-3									
7.5											
8.0											
8.5	8.5	SPT-3	6	9	12	21					
9.0											
9.5											
10.0	10	UDS-4									

(Depth v/s SPT N Value) axis: 0 10 20 30 40 50 60 70 80 90 100

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133938 m	*Easting :*685867 m
Reduced Level (m):(+)262.750	*BH. No. :*BH-P9	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*20-11-2022	*Date of Completion :*21-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
10.0										0 10 20 30 40 50 60 70 80 90 100	
10.5											
11.0											
11.5	11.5	SPT-4	8	13	15	28	Yellowish brown, , Sandy silt of low plasticity	ML-CL			
12.0											
12.5											
13.0	13	UDS*									
13.5	13.5	SPT-5	7	14	17	31					
14.0											
14.5	14.5	SPT-6	6	16	20	36					
15.0											
15.5											
16.0	16	UDS-5									
16.5							Yellowish brown, Silty clay of low plasticity with gravel	CL			
17.0											
17.5	17.5	SPT-7	9	17	22	39					
18.0											
18.5											
19.0	19	UDS*									
19.5	19.5	SPT-8	11	19	25	44					
20.0											

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133938 m	*Easting :*685867 m
Reduced Level (m):(+)262.750	*BH. No. :*BH-P9	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*20-11-2022	*Date of Completion :*21-11-2022	

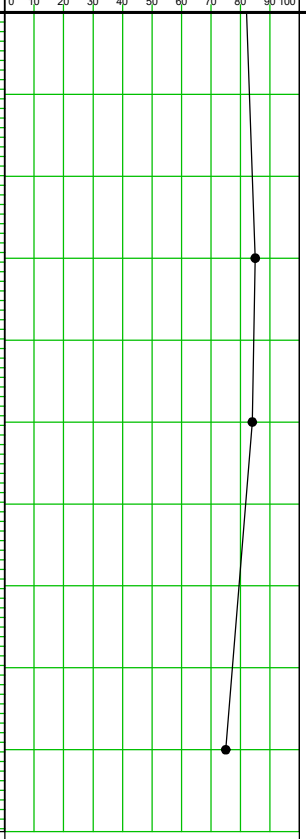
Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
20.0											
20.5	20.5	SPT-9	10	21	27	48					
21.0											
21.5											
22.0	22	UDS-6									
22.5											
23.0											
23.5	23.5	SPT-10	12	24	32	56					
24.0											
24.5											
25.0	25	UDS*					Yellowish brown, Silty clay of low plasticity with gravel	CL			
25.5	25.5	SPT-11	15	30	42	72					
26.0											
26.5	26.5	SPT-12	14	32	43	75					
27.0											
27.5											
28.0											
28.5	28.5	SPT-13	16	31	45	76					
29.0											
29.5	29.5	SPT-14	19	34	47	81					
30.0											

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133938 m	*Easting :*685867 m
Reduced Level (m):(+)262.750	*BH. No. :*BH-P9	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*20-11-2022	*Date of Completion :*21-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
30.0											
30.5											
31.0											
31.5	31.5	SPT-15	19	36	49	85					
32.0											
32.5	32.5	SPT-16	21	38	46	84	Yellowish brown, Silty clay of low plasticity with gravel	CL			
33.0											
33.5											
34.0											
34.5	34.5	SPT-17	24	35	40	75					
35.0											



UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133950 m	*Easting :*685863 m
Reduced Level (m):(+)263.228	*BH. No. :*BH-P10	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary/Shell	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*18-11-2022	*Date of Completion :*17-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
0.0		DS									
0.5											
1.0	1	SPT-1	2	3	5	8	Yellowish brown, Sandy silt of low plasticity	SM			
1.5											
2.0											
2.5	2.5	UDS-1									
3.0											
3.5											
4.0	4	SPT-2	3	5	7	12					
4.5											
5.0											
5.5	5.5	UDS-2									
6.0							Yellowish brown, Silty clay of low plasticity	CL			
6.5											
7.0	7	SPT-3	6	10	14	24					
7.5											
8.0											
8.5	8.5	UDS-3									
9.0											
9.5											
10.0	10	SPT-4	8	13	17	30					

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133950 m	*Easting :*685863 m
Reduced Level (m):(+)263.228	*BH. No. :*BH-P10	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary/Shell	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*18-11-2022	*Date of Completion :*17-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
10.0											
10.5											
11.0											
11.5	11.5	UDS*									
12.0	12	SPT-5	10	19	24	43					
12.5											
13.0	13	SPT-6	9	16	29	45	Yellowish brown, Silty clay of low plasticity	CL			
13.5											
14.0											
14.5	14.5	UDS-4									
15.0											
15.5											
16.0	16	SPT-7	15	27	39	66					
16.5											
17.0											
17.5	17.5	UDS-5									
18.0	18	SPT-8	17	30	44	74	Yellowish brown,Sandy Silt	ML-CL			
18.5											
19.0											
19.5											
20.0											

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133950 m	*Easting :*685863 m
Reduced Level (m):(+)263.228	*BH. No. :*BH-P10	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary/Shell	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*18-11-2022	*Date of Completion :*17-11-2022	

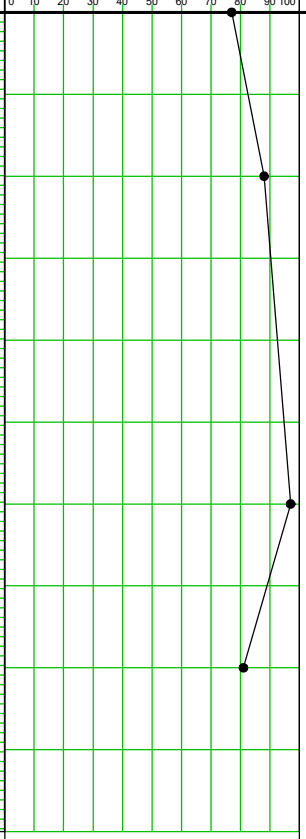
Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
20.0											
20.5	20.5	UDS-6									
21.0							Yellowish brown,Sandy Silt	ML-CL			
21.5											
22.0	22	SPT-9	11	21	32	53					
22.5											
23.0											
23.5	23.5	UDS*									
24.0	24	SPT-10	14	25	36	61					
24.5											
25.0	25	SPT-11	17	31	42	73					
25.5											
26.0							Yellowish brown, Silty clay of low plasticity	CL			
26.5	26.5	UDS*									
27.0	27	SPT-12	15	33	44	77					
27.5											
28.0	28	SPT-13	19	38	49	87					
28.5											
29.0											
29.5	29.5	UDS*									
30.0	30	SPT-14	17	31	46	77					

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133950 m	*Easting :*685863 m
Reduced Level (m):(+)263.228	*BH. No. :*BH-P10	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Rotary/Shell	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*18-11-2022	*Date of Completion :*17-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
30.0											
30.5											
31.0	31	SPT-15	15	37	51	88					
31.5											
32.0											
32.5	32.5	UDS*					Yellowish brown, Silty clay of low plasticity	CL			
33.0	33	SPT-16	22	42	55	97					
33.5											
34.0	34	SPT-17	19	39	42	81					
34.5											
35.0											



UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133970 m	*Easting :*685832 m
Reduced Level (m):(+)264.855	*BH. No. :*BH-P11	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Shell & Auger	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*16-11-2022	*Date of Completion :*17-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
0.0		DS									
0.5											
1.0	1	UDS-1					Yellowish brown, Sandy silt of low plasticity	SM			
1.5											
2.0											
2.5	2.5	SPT-1	6	7	9	16					
3.0											
3.5											
4.0	4	UDS-2									
4.5											
5.0											
5.5	5.5	SPT-2	5	9	12	21					
6.0							Yellowish brown, Silty clay of low plasticity	CL			
6.5											
7.0	7	UDS-3									
7.5											
8.0											
8.5	8.5	SPT-3	7	11	16	27					
9.0											
9.5											
10.0	10	UDS*									

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133970 m	*Easting :*685832 m
Reduced Level (m):(+)264.855	*BH. No. :*BH-P11	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Shell & Auger	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*16-11-2022	*Date of Completion :*17-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
10.0											
10.5	10.5	SPT-4	6	9	12	21					
11.0											
11.5	11.5	SPT-5	7	14	19	33					
12.0											
12.5							Yellowish brown, Silty clay of low plasticity	CL			
13.0	13	UDS-4									
13.5											
14.0											
14.5	14.5	SPT-6	6	16	21	37					
15.0											
15.5											
16.0	16	UDS*					Yellowish brown, Sandy silt of low plasticity	SM			
16.5	16.5	SPT-7	7	21	29	50					
17.0											
17.5	17.5	SPT-8	12	27	35	62					
18.0											
18.5											
19.0	19	UDS-5					Yellowish brown,Sandy Silt	ML-CL			
19.5											
20.0											

(Depth v/s SPT N Value) axis: 0 10 20 30 40 50 60 70 80 90 100

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133970 m	*Easting :*685832 m
Reduced Level (m):(+)264.855	*BH. No. :*BH-P11	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Shell & Auger	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*16-11-2022	*Date of Completion :*17-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
20.0											
20.5	20.5	SPT-9	11	16	27	43					
21.0											
21.5											
22.0	22	UDS-6									
22.5											
23.0							Yellowish brown,Sandy Silt	ML-CL			
23.5	23.5	SPT-10	14	17	29	46					
24.0											
24.5											
25.0	25	UDS*									
25.5	25.5	SPT-11	11	24	34	58					
26.0											
26.5	26.5	SPT-12	15	27	41	68					
27.0											
27.5											
28.0	28	UDS-7					Yellowish brown, Silty clay of low plasticity	CL			
28.5											
29.0											
29.5	29.5	SPT-13	14	31	42	73					
30.0											

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133970 m	*Easting :*685832 m
Reduced Level (m):(+)264.855	*BH. No. :*BH-P11	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Shell & Auger	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*16-11-2022	*Date of Completion :*17-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
30.0										0 10 20 30 40 50 60 70 80 90 100	
30.5											
31.0	31	UDS-8									
31.5											
32.0											
32.5	32.5	SPT-14	16	28	46	74	Yellowish brown, Silty clay of low plasticity	CL			
33.0											
33.5											
34.0											
34.5	34.5	SPT-15	19	31	42	73					
35.0											

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133961 m	*Easting :*685794 m
Reduced Level (m):(+)264.325	*BH. No. :*BH-P12	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Shell & Auger	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*14-11-2022	*Date of Completion :*15-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
0.0		DS									
0.5											
1.0	1	SPT-1	3	5	8	13					
1.5											
2.0											
2.5	2.5	UDS-1									
3.0											
3.5											
4.0	4	SPT-2	5	10	15	25					
4.5											
5.0							Yellowish brown, Silty clay of low plasticity	CL			
5.5	5.5	UDS-2									
6.0											
6.5											
7.0	7	SPT-3	4	12	18	30					
7.5											
8.0											
8.5	8.5	UDS*									
9.0	9	SPT-4	6	10	16	26					
9.5											
10.0	10	SPT-5	5	14	16	30					

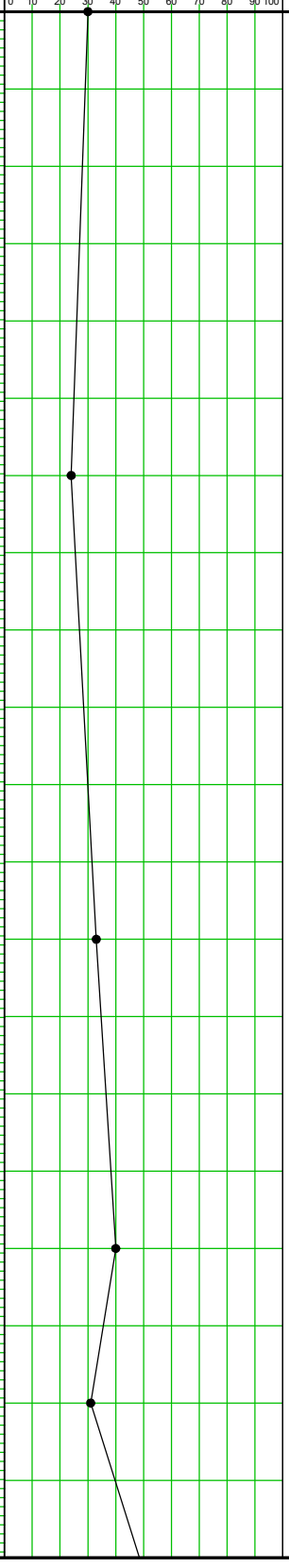
(Depth v/s SPT N Value) axis: 0 10 20 30 40 50 60 70 80 90 100

UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133961 m	*Easting :*685794 m
Reduced Level (m):(+)264.325	*BH. No. :*BH-P12	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Shell & Auger	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*14-11-2022	*Date of Completion :*15-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
10.0											
10.5											
11.0											
11.5	11.5	UDS-3									
12.0											
12.5											
13.0	13	SPT-6	6	9	15	24					
13.5											
14.0											
14.5	14.5	UDS-4									
15.0							Yellowish brown, Silty clay of low plasticity	CL			
15.5											
16.0	16	SPT-7	11	14	19	33					
16.5											
17.0											
17.5	17.5	UDS*									
18.0	18	SPT-8	9	16	24	40					
18.5											
19.0	19	SPT-9	10	14	17	31					
19.5											
20.0											



UDS*-UDS not recovered

FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133961 m	*Easting :*685794 m
Reduced Level (m):(+)264.325	*BH. No. :*BH-P12	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Shell & Auger	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*14-11-2022	*Date of Completion :*15-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
20.0											
20.5	20.5	UDS*									
21.0	21	SPT-10	15	25	41	66					
21.5											
22.0	22	SPT-11	20	27	38	65					
22.5											
23.0											
23.5	23.5	UDS*									
24.0	24	SPT-12	5	12	17	29					
24.5											
25.0	25	SPT-13	8	16	19	35	Yellowish brown, Silty clay of low plasticity	CL			
25.5											
26.0											
26.5	26.5	UDS*									
27.0	27	SPT-14	14	19	24	43					
27.5											
28.0	28	SPT-15	12	17	23	40					
28.5											
29.0											
29.5	29.5	UDS*									
30.0	30	SPT-16	11	16	29	45					

UDS*-UDS not recovered

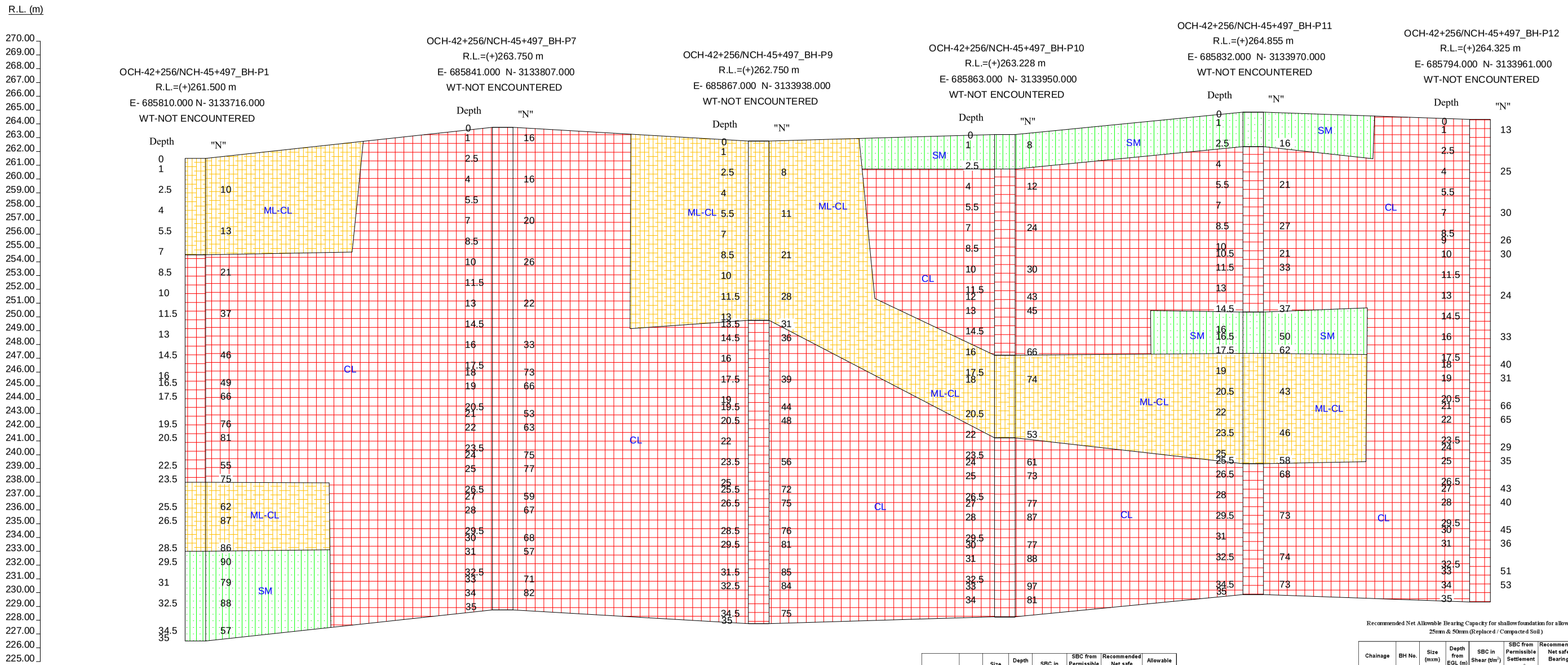
FIELD BOREHOLE LOG

*Project Name :*GTI for (HORC) project from Palwal to Harsana Kalan in the state of Haryana.		*Client :*HRIDCL
*BH Location/Chainage :*42+256 km	*Northing :*3133961 m	*Easting :*685794 m
Reduced Level (m):(+)264.325	*BH. No. :*BH-P12	*BH Termination Depth (m):*35
*Proposed / Existing Structure :*Major Bridge	*Water Table (m):*Not Encountered	*Inclination :* Vertical
*Boring type :*Shell & Auger	*Dia. of Boring :*150 mm	*Depth of Casing (m) :*Not Used
*Date of Start :*14-11-2022	*Date of Completion :*15-11-2022	

Depth (m)	In-Situ Sample Depth (m)	Sample Type	Blow counts per 15cm N1	N2	N3	SPT N Value	Strata Description	IS Classification	Graphic Log	(Depth v/s SPT N Value)	Special Observations
30.0										0 10 20 30 40 50 60 70 80 90 100	
30.5											
31.0	31	SPT-17	9	17	19	36					
31.5											
32.0											
32.5	32.5	UDS*					Yellowish brown, Silty clay of low plasticity	CL			
33.0	33	SPT-18	18	22	29	51					
33.5											
34.0	34	SPT-19	15	22	31	53					
34.5											
35.0											

UDS*-UDS not recovered

CONDUCTING GEOTECHNICAL INVESTIGATION, PREPARATION OF GEOTECHNICAL REPORT FOR DESIGNING OF BRIDGES AND FOR EMBANKMENT IN CONNECTION WITH CONSTRUCTION OF HARYANA ORBITAL RAIL CORRIDOR (HORC) PROJECT FROM PALWAL TO HARSANA KALAN INCLUDING CONNECTIVITY TO EXISTING IR NETWORK IN THE STATE OF HARYANA.



Note:-

The suitable Soil Improvement Methods (SSM) are recommended for those boreholes which are liquefiable more than 4.0mtr depth.

Chainage	BH No.	Size (mxm)	Depth from EGL (m)	SBC in Shear (t/m²)	SBC from Permissible Settlement (t/m²)	Recommended Net safe Bearing Capacity (t/m²)	Allowable Settlement (mm)
OCH-42+256 NCH-45+497	BH-P1	7.2 X 7.2	2.0	16.5	7.8	SSM	25
		7.2 X 7.2	3.0	16.7	9.3	SSM	
		7.2 X 7.2	4.0	21.1	11.5	SSM	
OCH-42+256 NCH-45+497	BH-P1	7.2 X 7.2	2.0	16.5	15.6	SSM	50
		7.2 X 7.2	3.0	16.7	16.5	SSM	
		7.2 X 7.2	4.0	21.1	23.0	SSM	

Recommended Net Allowable Bearing Capacity for shallow foundation for allowable settlement 25mm & 50mm (Replaced / Compacted Soil)

Chainage	BH No.	Size (mxm)	Depth from EGL (m)	SBC in Shear (t/m²)	SBC from Permissible Settlement (t/m²)	Recommended Net safe Bearing Capacity (t/m²)	Allowable Settlement (mm)
OCH-42+256 NCH-45+497	BH-P7	7.2 X 7.2	2.0	25.4	16.2	16.2	25
		7.2 X 7.2	3.0	27.2	19.3	19.3	
		7.2 X 7.2	4.0	29.1	23.6	23.6	
OCH-42+256 NCH-45+497	BH-P7	7.2 X 7.2	2.0	25.4	32.4	25.4	50
		7.2 X 7.2	3.0	27.2	38.6	27.2	
		7.2 X 7.2	4.0	29.1	47.2	29.1	

Chainage	BH No.	Size (mxm)	Depth from EGL (m)	SBC in Shear (t/m²)	SBC from Permissible Settlement (t/m²)	Recommended Net safe Bearing Capacity (t/m²)	Allowable Settlement (mm)
OCH-42+256 NCH-45+497	BH-P9	7.2 X 7.2	2.0	13.3	4.7	SSM	25
		7.2 X 7.2	3.0	15.2	5.1	SSM	
		7.2 X 7.2	4.0	17.1	5.2	SSM	
OCH-42+256 NCH-45+497	BH-P9	7.2 X 7.2	2.0	13.3	9.3	SSM	50
		7.2 X 7.2	3.0	15.2	10.1	SSM	
		7.2 X 7.2	4.0	17.1	10.4	SSM	
OCH-42+256 NCH-45+497	BH-P10	7.2 X 7.2	2.0	21.4	14.1	SSM	25
		7.2 X 7.2	3.0	22.2	18.7	SSM	
		7.2 X 7.2	4.0	23.0	19.8	SSM	
OCH-42+256 NCH-45+497	BH-P10	7.2 X 7.2	2.0	21.4	28.1	SSM	50
		7.2 X 7.2	3.0	22.2	37.4	SSM	
		7.2 X 7.2	4.0	23.0	39.5	SSM	
OCH-42+256 NCH-45+497	BH-P11	7.2 X 7.2	2.0	18.9	11.6	SSM	25
		7.2 X 7.2	3.0	19.6	14.5	SSM	
		7.2 X 7.2	4.0	20.3	15.4	SSM	
OCH-42+256 NCH-45+497	BH-P11	7.2 X 7.2	2.0	18.9	23.2	SSM	50
		7.2 X 7.2	3.0	19.6	29.0	SSM	
		7.2 X 7.2	4.0	20.3	30.7	SSM	

Recommended Net Allowable Bearing Capacity for shallow foundation for allowable settlement 25mm & 50mm (Replaced / Compacted Soil)

Chainage	BH No.	Size (mxm)	Depth from EGL (m)	SBC in Shear (t/m²)	SBC from Permissible Settlement (t/m²)	Recommended Net safe Bearing Capacity (t/m²)	Allowable Settlement (mm)
OCH-42+256 NCH-45+497	BH-P12	7.2 X 7.2	2.0	41.3	13.5	13.5	25
		7.2 X 7.2	3.0	43.8	15.2	15.2	
		7.2 X 7.2	4.0	46.3	17.2	17.2	
OCH-42+256 NCH-45+497	BH-P12	7.2 X 7.2	2.0	41.3	27.1	27.1	50
		7.2 X 7.2	3.0	43.8	30.4	30.0	
		7.2 X 7.2	4.0	46.3	34.4	30.0	

SYMBOL	DESCRIPTION
	SM- Silty Sand (Having fines Less Than 50% and no plasticity or below A-line)
	ML-CL -Sandy with clay (Having fines greater than 50% and in the hatched zone (LL<35 & 4<PI<7)
	CL-Silty Clay of low plasticity (Above A-line, LL<35)
Note:- Fines= Percentage of Silty + Clay A-line=.73(wl-20)	WATER TABLE

APPENDIX – B (LAB TEST RESULTS)

Appendix No.	ITEMS
B-1	SOIL CHARACTERISTICS SHEETS
B-2	RESULT OF CHEMICAL ANALYSIS OF SOIL SAMPLES
B-3	GSD CURVES
B-4	SHEAR CURVES

SOIL CHARACTERISTICS

Project	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.					Date of Boring			Chainage (km.)/Location	B.H. No.	Depth of Water Table	Termination Depth	Cordinates (E,N)		R.L.	Ref. Code
						20-11-2022	to	21-11-2022	42+256 Major Bridge	BH-P1	Not Encountered	35.00 m	685810.000 m	3133716.000 m	(+)261.500 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																			
DS	0.00	-	-	Yellowish brown, Sandy silt of low plasticity	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-1	1.00	-	-		ML-CL		6	53	32	4	0	5	0	26	21	5	-	1.72	13.40	1.52	2.66	DST	0.13	24	-	-	-	-	-	-	-	-	-
SPT-1	2.50	10	13		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-2	4.00	-	-		ML-CL		6	47	36	5	0	6	0	28	22	6	-	1.75	14.10	1.53	2.66	DST	0.15	24	-	-	-	-	-	-	-	-	-
SPT-2	5.50	13	16		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-3	7.00	-	-	Yellowish brown, Silty clay of low plasticity with gravel	CL		8	62	26	3	0	1	0	32	21	11	-	1.87	19.60	1.56	2.68	UUT	0.77	6	-	-	-	-	-	-	-	-	-
SPT-3	8.50	21	21		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-4	10.00	-	-		CL		8	61	27	2	0	2	0	33	22	11	-	1.93	20.40	1.60	2.68	UUT	1.38	6	-	-	-	-	-	-	-	-	-
SPT-4	11.50	37	37		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-5	13.00	-	-		CL		10	56	31	2	0	1	0	33	20	13	-	1.97	21.10	1.63	2.67	UUT	1.71	5	-	-	-	-	-	-	-	-	-
SPT-5	14.50	46	46		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	16.00	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-6	16.50	49	49		CL		11	59	27	1	0	2	0	31	21	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-7	17.50	66	66		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-8	19.50	76	76		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-9	20.50	81	81		CL		10	58	28	2	0	2	0	32	22	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-10	22.50	55	55		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-11	23.50	75	40	Yellowish brown, Dense to dense, Sandy silt of low plasticity	ML-CL		7	49	33	7	4	0	0	29	23	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-12	25.50	62	31		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-13	26.50	87	43		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Abbreviations:-
DS-Disturbed Sample, SPT-Standard Penetration Test, UDS-Undisturbed Sample, UDS*-UDS not recovered, DST-Direct Shear Test, UUT-Unconsolidated Undrained Triaxial Shear Test, DST+ - Direct Shear Test on Remoulded Sample, UUT+ - Unconsolidated Undrained Tri-axial Test on Remoulded Sample.

CEGTH
CEG TEST HOUSE
AND RESEARCH CENTRE PVT LTD

SOIL CHARACTERISTICS

Project	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.	Date of Boring			Chainage (km.)/Location	B.H. No.	Depth of Water Table	Termination Depth	Cordinates (E,N)		R.L.	Ref. Code
		20-11-2022	to	21-11-2022	42+256 Major Bridge	BH-P1	Not Encountered	35.00 m	685810.000 m	3133716.000 m	(+)261.500 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
SPT-14	28.50	86	40	Yellowish brown, Silty Sand	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-15	29.50	90	41		SM		0	20	78	2	0	0	0	-	NIL	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-16	31.00	79	36		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-17	32.50	88	40		SM		0	18	79	3	0	0	0	-	NIL	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-18	34.50	57	26		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Abbreviations:-
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CEGTH
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SOIL CHARACTERISTICS

Project	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.	Date of Boring			Chainage (km.)/Location	B.H. No.	Depth of Water Table	Termination Depth	Cordinates (E,N)		R.L.	Ref. Code
		19-11-2022	to	20-11-2022	42+256 Major Bridge	BH-P7	Not Encountered	35.00 m	685841.000 m	3133807.000 m	(+)263.750 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
DS	0.00	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-1	1.00	16	16		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-1	2.50	-	-		CL		9	61	26	4	0	0	0	31	21	10	-	1.80	19.40	1.51	2.68	UUT	0.61	5	-	-	-	-	-	-	-	-	-
SPT-2	4.00	16	16		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-2	5.50	-	-		CL		8	61	28	3	0	0	0	33	21	12	-	1.85	19.60	1.55	2.68	UUT	0.71	6	-	-	-	-	-	-	-	-	-
SPT-3	7.00	20	20		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-3	8.50	-	-		CL		11	54	31	4	0	0	0	33	22	11	-	1.89	20.10	1.57	2.68	UUT	0.99	5	-	-	-	-	-	-	-	-	-
SPT-4	10.00	26	26		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-4	11.50	-	-		CL		10	55	32	3	0	0	0	34	22	12	-	1.86	21.10	1.54	2.68	-	-	-	-	-	-	-	-	-	-	-	-
SPT-5	13.00	22	22		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-5	14.50	-	-	Yellowish brown, Silty clay of low plasticity with gravel	CL		10	54	25	3	0	8	0	32	21	11	-	1.95	21.40	1.61	2.68	UUT	1.21	5	-	-	-	-	-	-	-	-	-
SPT-6	16.00	33	33		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	17.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-7	18.00	73	73		CL		9	54	26	3	0	8	0	33	21	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-8	19.00	66	66		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	20.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-9	21.00	53	53		CL		8	56	25	3	0	8	0	32	21	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-10	22.00	63	63		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	23.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-11	24.00	75	75		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Abbreviations:-
DS-Disturbed Sample, SPT-Standard Penetration Test, UDS-Undisturbed Sample, UDS*-UDS not recovered, DST-Direct Shear Test, UUT-Unconsolidated Undrained Triaxial Shear Test, DST+ - Direct Shear Test on Remoulded Sample, UUT+ - Unconsolidated Undrained Tri-axial Test on Remoulded Sample.

CEG TEST HOUSE AND RESEARCH CENTRE PVT LTD

SOIL CHARACTERISTICS

Project	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.						Date of Boring			Chainage (km.)/Location	B.H. No.	Depth of Water Table	Termination Depth	Cordinates (E,N)		R.L.	Ref. Code
							19-11-2022	to	20-11-2022	42+256 Major Bridge	BH-P7	Not Encountered	35.00 m	685841.000 m	3133807.000 m	(+)263.750 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
SPT-12	25.00	77	77	Yellowish brown, Silty clay of low plasticity with gravel	CL		13	64	21	2	0	0	0	34	22	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	26.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-13	27.00	59	59		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-14	28.00	67	67		CL		11	64	23	2	0	0	0	33	22	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	29.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-15	30.00	68	68		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-16	31.00	57	57		CL		10	64	24	2	0	0	0	33	22	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	32.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-17	33.00	71	71		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-18	34.00	82	38		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Abbreviations:-
DS-Disturbed Sample, SPT-Standard Penetration Test, UDS-Undisturbed Sample, UDS*-UDS not recovered, DST-Direct Shear Test, UUT-Unconsolidated Undrained Triaxial Shear Test, DST+ - Direct Shear Test on Remoulded Sample, UUT+ - Unconsolidated Undrained Tri-axial Test on Remoulded Sample.

SOIL CHARACTERISTICS

Project	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.					Date of Boring			Chainage (km.)/Location	B.H. No.	Depth of Water Table	Termination Depth	Cordinates (E,N)		R.L.	Ref. Code
						20-11-2022	to	21-11-2022	42+256 Major Bridge	BH-P9	Not Encountered	35.00 m	685867.000 m	3133938.000 m	(+)262.750 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	$C_v \times 10^{-4}$ (cm^2/Sec)	$M_v \times 10^{-2}$ (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
DS	0.00	-	-	Yellowish brown, , Sandy silt of low plasticity	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-1	1.00	-	-		ML-CL		6	57	32	5	0	0	0	28	21	7	-	1.69	13.20	1.49	2.66	DST	0.13	24	-	-	-	-	-	-	-	-	-
SPT-1	2.50	8	10		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-2	4.00	-	-		ML-CL		6	49	36	7	0	2	0	28	22	6	-	1.72	13.40	1.52	2.66	DST	0.14	25	-	-	-	-	-	-	-	-	-
SPT-2	5.50	11	13		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-3	7.00	-	-		ML-CL		7	46	37	8	0	2	0	28	21	7	-	1.77	14.10	1.55	2.66	DST	0.15	25	-	-	-	-	-	-	-	-	-
SPT-3	8.50	21	21		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-4	10.00	-	-		ML-CL		6	45	38	9	0	2	0	29	22	7	-	1.79	14.60	1.56	2.67	DST	0.17	26	-	-	-	-	-	-	-	-	-
SPT-4	11.50	28	24		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	13.00	-	-	Yellowish brown, Silty clay of low plasticity with gravel	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-5	13.50	31	31		CL		6	66	18	2	0	8	0	32	21	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-6	14.50	36	36		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-5	16.00	-	-		CL		6	64	18	3	0	9	0	33	21	12	-	1.94	19.60	1.62	2.63	UUT	1.51	5	-	-	-	-	-	-	-	-	-
SPT-7	17.50	39	39		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	19.00	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-8	19.50	44	44		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-9	20.50	48	48		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-6	22.00	-	-		CL		12	69	18	1	0	0	0	33	22	11	-	1.97	20.10	1.64	2.66	UUT	2.10	5	-	-	-	-	-	-	-	-	-
SPT-10	23.50	56	56		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	25.00	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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DS-Disturbed Sample, SPT-Standard Penetration Test, UDS-Undisturbed Sample, UDS*-UDS not recovered, DST-Direct Shear Test, UUT-Unconsolidated Undrained Triaxial Shear Test, DST+ - Direct Shear Test on Remoulded Sample, UUT+ - Unconsolidated Undrained Tri-axial Test on Remoulded Sample.

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SOIL CHARACTERISTICS

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		20-11-2022	to	21-11-2022	42+256 Major Bridge	BH-P9	Not Encountered	35.00 m	685867.000 m	3133938.000 m	(+)262.750 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
SPT-11	25.50	72	72	Yellowish brown, Silty clay of low plasticity with gravel	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-12	26.50	75	75		CL		11	70	18	1	0	0	0	33	22	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-13	28.50	76	76		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-14	29.50	81	81		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-15	31.50	85	85		CL		13	68	18	1	0	0	0	34	22	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-16	32.50	84	84		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-17	34.50	75	75		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Abbreviations:-
DS-Disturbed Sample, SPT-Standard Penetration Test, UDS-Undisturbed Sample, UDS*-UDS not recovered, DST-Direct Shear Test, UUT-Unconsolidated Undrained Triaxial Shear Test, DST+ - Direct Shear Test on Remoulded Sample, UUT+ - Unconsolidated Undrained Tri-axial Test on Remoulded Sample.

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Project	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.	Date of Boring			Chainage (km.)/Location	B.H. No.	Depth of Water Table	Termination Depth	Cordinates (E,N)		R.L.	Ref. Code
		18-11-2022	to	17-11-2022	42+256 Major Bridge	BH-P10	Not Encountered	35.00 m	685863.000 m	3133950.000 m	(+)263.228 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
DS	0.00	-	-	Yellowish brown, Sandy silt of low plasticity	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-1	1.00	8	13		SM		0	21	78	1	0	0	0	-	NIL	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-1	2.50	-	-	Yellowish brown, Silty clay of low plasticity	CL		10	65	25	0	0	0	0	32	21	11	-	1.80	19.40	1.51	2.68	UUT	0.44	5	-	-	-	-	-	-	-	-	-
SPT-2	4.00	12	12		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-2	5.50	-	-		CL		10	64	26	0	0	0	0	33	21	12	-	1.82	19.70	1.52	2.68	UUT	0.91	6	-	-	-	-	-	-	-	-	-
SPT-3	7.00	24	24		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-3	8.50	-	-		CL		11	62	27	0	0	0	0	33	21	12	-	1.87	20.10	1.56	2.67	UUT	1.10	6	-	-	-	-	-	-	-	-	-
SPT-4	10.00	30	30		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	11.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-5	12.00	43	43		CL		10	62	28	0	0	0	0	32	21	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-6	13.00	45	45		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-4	14.50	-	-		CL		10	63	27	0	0	0	0	32	21	11	-	1.97	21.10	1.63	2.68	UUT	1.19	7	-	-	-	-	-	-	-	-	-
SPT-7	16.00	66	46	Yellowish brown,Sandy Silt	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-5	17.50	-	-		ML-CL		6	51	32	7	4	0	0	29	23	6	-	1.88	15.40	1.63	2.66	DST	0.15	24	-	-	-	-	-	-	-	-	-
SPT-8	18.00	74	48		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-6	20.50	-	-		ML-CL		6	50	33	7	4	0	0	29	23	6	-	1.90	15.80	1.64	2.66	DST	0.19	25	-	-	-	-	-	-	-	-	-
SPT-9	22.00	53	30	Yellowish brown, Silty clay of low plasticity	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	23.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-10	24.00	61	61		CL		12	66	21	1	0	0	0	33	22	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-11	25.00	73	73		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Abbreviations:-
DS-Disturbed Sample, SPT-Standard Penetration Test, UDS-Undisturbed Sample, UDS*-UDS not recovered, DST-Direct Shear Test, UUT-Unconsolidated Undrained Triaxial Shear Test, DST+ - Direct Shear Test on Remoulded Sample, UUT+ - Unconsolidated Undrained Tri-axial Test on Remoulded Sample.

CEG TEST HOUSE AND RESEARCH CENTRE PVT LTD

SOIL CHARACTERISTICS

Project	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.						Date of Boring			Chainage (km.)/Location	B.H. No.	Depth of Water Table	Termination Depth	Cordinates (E,N)		R.L.	Ref. Code
							18-11-2022	to	17-11-2022	42+256 Major Bridge	BH-P10	Not Encountered	35.00 m	685863.000 m	3133950.000 m	(+)263.228 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
UDS*	26.50	-	-	Yellowish brown, Silty clay of low plasticity	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-12	27.00	77	77		CL		10	67	22	1	0	0	0	34	22	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-13	28.00	87	87		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	29.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-14	30.00	77	77		CL		11	65	23	1	0	0	0	33	22	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-15	31.00	88	88		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	32.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-16	33.00	97	97		CL		10	67	22	1	0	0	0	34	22	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-17	34.00	81	81		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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		16-11-2022	to	17-11-2022	42+256 Major Bridge	BH-P11	Not Encountered	35.00 m	685832.000 m	3133970.000 m	(+)264.855 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
DS	0.00	-	-	Yellowish brown, Sandy silt of low plasticity	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-1	1.00	-	-		SM		0	21	78	1	0	0	0	-	NIL	NP	-	1.68	9.70	1.53	2.63	DST	0.00	30	-	-	-	-	-	-	-	-	-
SPT-1	2.50	16	20	Yellowish brown, Silty clay of low plasticity	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-2	4.00	-	-		CL		8	60	29	2	1	0	0	30	21	9	-	1.84	18.70	1.55	2.68	UUT	0.78	5	-	-	-	-	-	-	-	-	-
SPT-2	5.50	21	21		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-3	7.00	-	-		CL		8	54	36	2	0	0	0	32	22	10	-	1.86	19.20	1.56	2.68	UUT	1.02	6	-	-	-	-	-	-	-	-	-
SPT-3	8.50	27	27		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	10.00	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-4	10.50	21	21		CL		9	58	31	2	0	0	0	32	22	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-5	11.50	33	33		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-4	13.00	-	-		CL		8	59	31	2	0	0	0	32	22	10	-	1.89	20.10	1.57	2.70	UUT	1.04	6	-	-	-	-	-	-	-	-	-
SPT-6	14.50	37	28	Yellowish brown, Sandy silt of low plasticity	SM		0	24	71	3	2	0	0	-	NIL	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	16.00	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-7	16.50	50	35		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-8	17.50	62	41	Yellowish brown,Sandy Silt	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-5	19.00	-	-		ML-CL		7	48	35	7	3	0	0	30	23	7	-	1.84	16.40	1.58	2.66	DST	0.16	25	-	-	-	-	-	-	-	-	-
SPT-9	20.50	43	26		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-6	22.00	-	-		ML-CL		6	48	36	7	3	0	0	29	23	6	-	1.85	17.10	1.58	2.66	DST	0.18	26	-	-	-	-	-	-	-	-	-
SPT-10	23.50	46	25		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	25.00	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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SOIL CHARACTERISTICS

Project	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.	Date of Boring			Chainage (km.)/Location	B.H. No.	Depth of Water Table	Termination Depth	Cordinates (E,N)		R.L.	Ref. Code
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Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
SPT-11	25.50	58	58	Yellowish brown, Silty clay of low plasticity	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-12	26.50	68	68		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-7	28.00	-	-		CL		6	67	27	0	0	0	0	33	21	12	-	2.01	19.40	1.68	2.68	UUT	2.68	6	-	-	-	-	-	-	-	-	-
SPT-13	29.50	73	73		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-8	31.00	-	-		CL		7	64	29	0	0	0	0	32	21	11	-	2.02	20.10	1.68	2.68	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-14	32.50	74	74		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-15	34.50	73	73		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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		14-11-2022	to	15-11-2022	42+256 Major Bridge	BH-P12	Not Encountered	35.00 m	685794.000 m	3133961.000 m	(+)264.325 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
DS	0.00	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-1	1.00	13	13		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-1	2.50	-	-		CL		8	60	27	4	1	0	0	31	21	10	-	1.85	18.60	1.56	2.68	UUT	0.95	5	-	-	-	-	-	-	-	-	-
SPT-2	4.00	25	25		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-2	5.50	-	-		CL		9	59	27	4	1	0	0	30	21	9	-	1.92	19.10	1.61	2.68	UUT	1.14	5	-	-	-	-	-	-	-	-	-
SPT-3	7.00	30	30		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	8.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-4	9.00	26	26		CL		8	62	29	1	0	0	0	33	21	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-5	10.00	30	30		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-3	11.50	-	-	Yellowish brown, Silty clay of low plasticity	CL		6	59	32	1	0	2	0	33	21	12	-	1.89	19.60	1.58	2.68	UUT	0.98	6	-	-	-	-	-	-	-	-	-
SPT-6	13.00	24	24		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS-4	14.50	-	-		CL		7	64	28	1	0	0	0	33	21	12	-	1.96	20.10	1.63	2.68	UUT	1.25	5	-	-	-	-	-	-	-	-	-
SPT-7	16.00	33	33		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	17.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-8	18.00	40	40		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-9	19.00	31	31		CL		6	65	24	3	2	0	0	32	22	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	20.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-10	21.00	66	66				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-11	22.00	65	65		CL		7	62	28	2	1	0	0	33	22	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	23.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Abbreviations:-
DS-Disturbed Sample, SPT-Standard Penetration Test, UDS-Undisturbed Sample, UDS*-UDS not recovered, DST-Direct Shear Test, UUT-Unconsolidated Undrained Triaxial Shear Test, DST+ - Direct Shear Test on Remoulded Sample, UUT+ - Unconsolidated Undrained Tri-axial Test on Remoulded Sample.

CEGTH
CEG TEST HOUSE
AND RESEARCH CENTRE PVT LTD

SOIL CHARACTERISTICS

Project	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.	Date of Boring			Chainage (km.)/Location	B.H. No.	Depth of Water Table	Termination Depth	Cordinates (E,N)		R.L.	Ref. Code
		14-11-2022	to	15-11-2022	42+256 Major Bridge	BH-P12	Not Encountered	35.00 m	685794.000 m	3133961.000 m	(+)264.325 m	SR-544_21-22

Sample Type	Depth from G.L. (m)	Observed SPT Value (N)	Corrected SPT Value (N_c)	Soil Description	IS Classification	IS Symbol	Grain Size Distribution % wt retained							Atterberg Limits %				Bulk Density (g/cm^3)	Natural Moisture Content (%)	Dry Density (g/cm^3)	Specific Gravity	Shear Strength			Free Swell Index (%)	Swelling Pressure (kg/cm^2)	Permeability (cm/sec)	Consolidation Parameters				
							Clay	Silt	Sand			Gravel		Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit					Type of Test	Cohesion C (kg/cm^2)	Angle of Friction (φ°)				Void Ratio (e_0)	Pressure (kg/cm^2)	C_v x 10^{-4} (cm^2/Sec)	M_v x 10^{-2} (cm^2/Kg)	Compression Index (C_c)
									Fine	Medium	Coarse	Fine	Coarse																				
SPT-12	24.00	29	29	Yellowish brown, Silty clay of low plasticity	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-13	25.00	35	35		CL		6	63	28	2	1	0	0	32	22	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	26.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-14	27.00	43	43		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-15	28.00	40	40		CL		7	64	27	1	1	0	0	33	22	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	29.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-16	30.00	45	45		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-17	31.00	36	36		CL		6	65	27	1	1	0	0	33	22	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UDS*	32.50	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-18	33.00	51	51		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPT-19	34.00	53	53		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

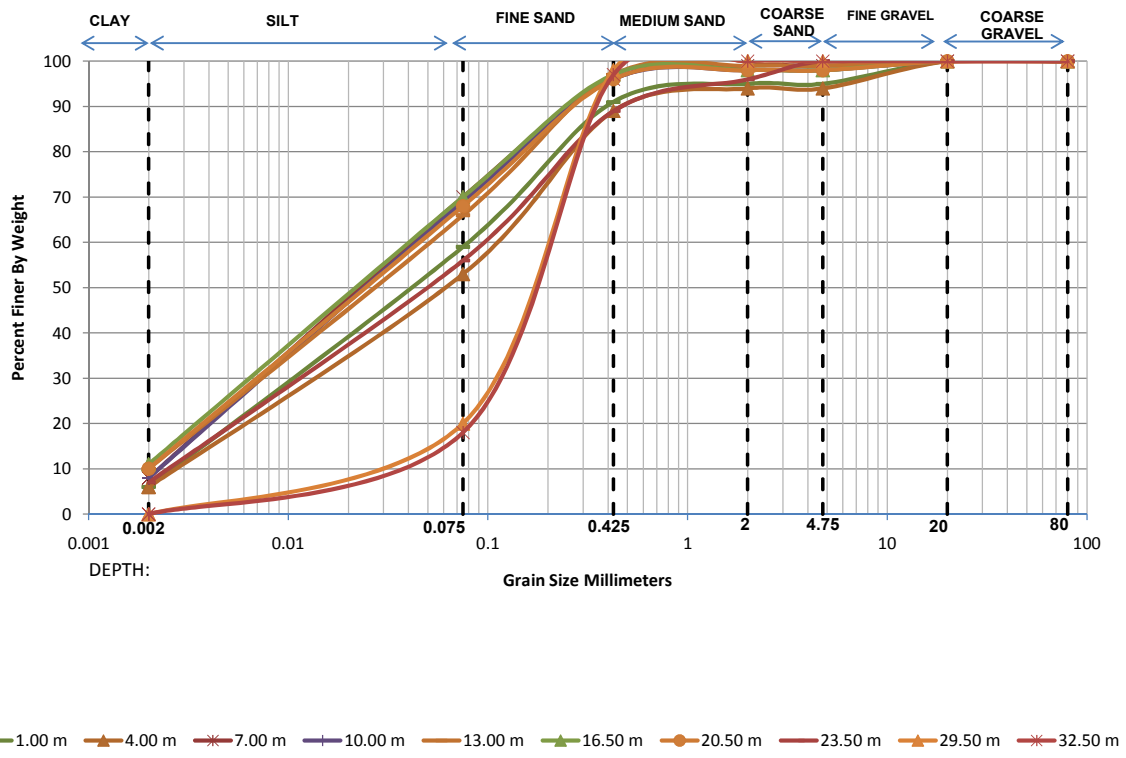
Abbreviations:-
DS-Disturbed Sample, SPT-Standard Penetration Test, UDS-Undisturbed Sample, UDS*-UDS not recovered, DST-Direct Shear Test, UUT-Unconsolidated Undrained Triaxial Shear Test, DST+ - Direct Shear Test on Remoulded Sample, UUT+ - Unconsolidated Undrained Tri-axial Test on Remoulded Sample.

RESULT OF CHEMICAL ANALYSIS OF SOIL SAMPLES

Sr. No	Chainage Old (km)	Chainage New (km)	BH No.	Depth of collected sample (m)	pH	Chlorides (Cl^-)		Sulphate (SO_3^{2-})	
						(mg/kg)	(%)	(mg/kg)	(%)
1.	42+256	45+497	BH-P1	4.00	8.24	57.14	0.0057	17.52	0.0018
			BH-P10	20.50	8.36	63.71	0.0064	21.34	0.0021

GRAIN SIZE DISTRIBUTION CURVES

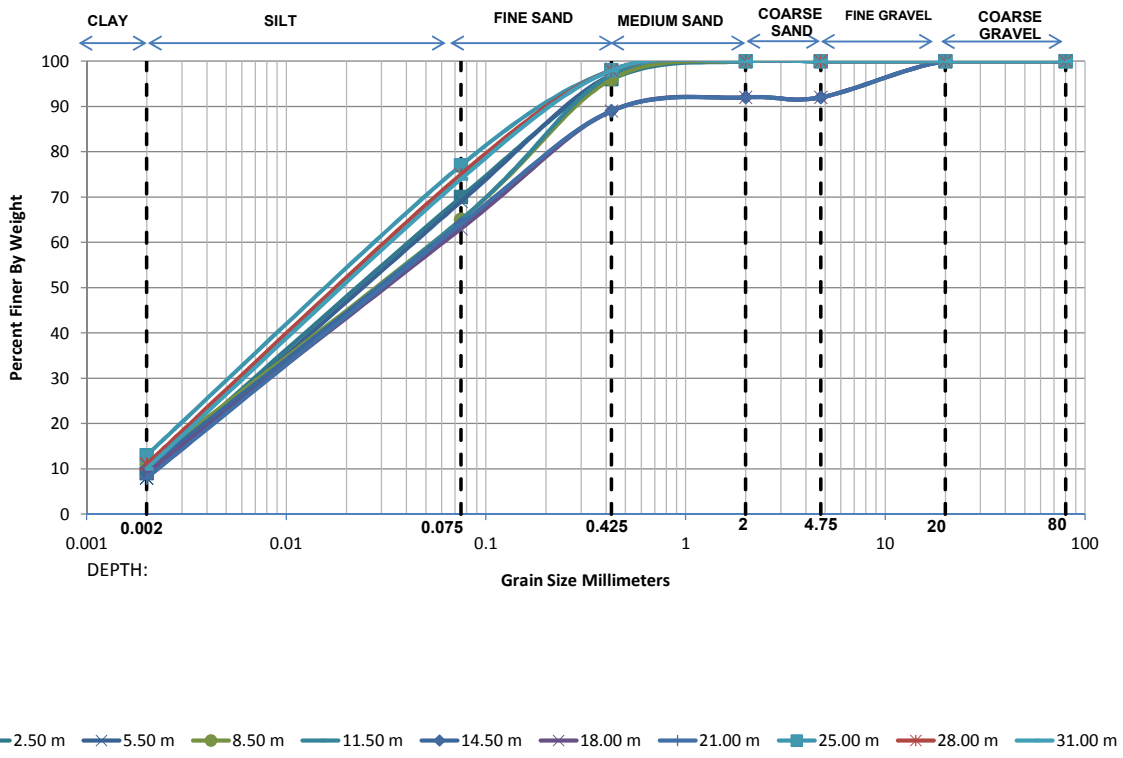
Project Name	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.
Location/Chainage	42+256 Major Bridge
B.H. No.	BH-P1



Depth	Grain Size Distribution % wt retained							D10	D30	D60	Cu	Cc
	Clay	Silt	Sand			Gravel						
			Fine	Medium	Coarse	Fine	Coarse					
1.00 m	6.00	53.00	32.00	4.00	0.00	5.00	0.00	0.0043	0.0227	0.0777	17.91	1.52
4.00 m	6.00	47.00	36.00	5.00	0.00	6.00	0.00	0.0045	0.0268	0.1010	22.45	1.57
7.00 m	8.00	62.00	26.00	3.00	0.00	1.00	0.00	0.0029	0.0159	0.0552	19.31	1.60
10.00 m	8.00	61.00	27.00	2.00	0.00	2.00	0.00	0.0029	0.0162	0.0568	19.84	1.62
13.00 m	10.00	56.00	31.00	2.00	0.00	1.00	0.00	0.0020	0.0154	0.0617	30.84	1.93
16.50 m	11.00	59.00	27.00	1.00	0.00	2.00	0.00	-	0.0132	0.0543	-	-
20.50 m	10.00	58.00	28.00	2.00	0.00	2.00	0.00	0.0020	0.0147	0.0579	28.97	1.86
23.50 m	7.00	49.00	33.00	7.00	4.00	0.00	0.00	0.0036	0.0233	0.0886	24.59	1.70
29.50 m	0.00	20.00	78.00	2.00	0.00	0.00	0.00	0.0284	0.1114	0.2058	7.24	2.12
32.50 m	0.00	18.00	79.00	3.00	0.00	0.00	0.00	0.0341	0.1197	0.2137	6.27	1.97

GRAIN SIZE DISTRIBUTION CURVES

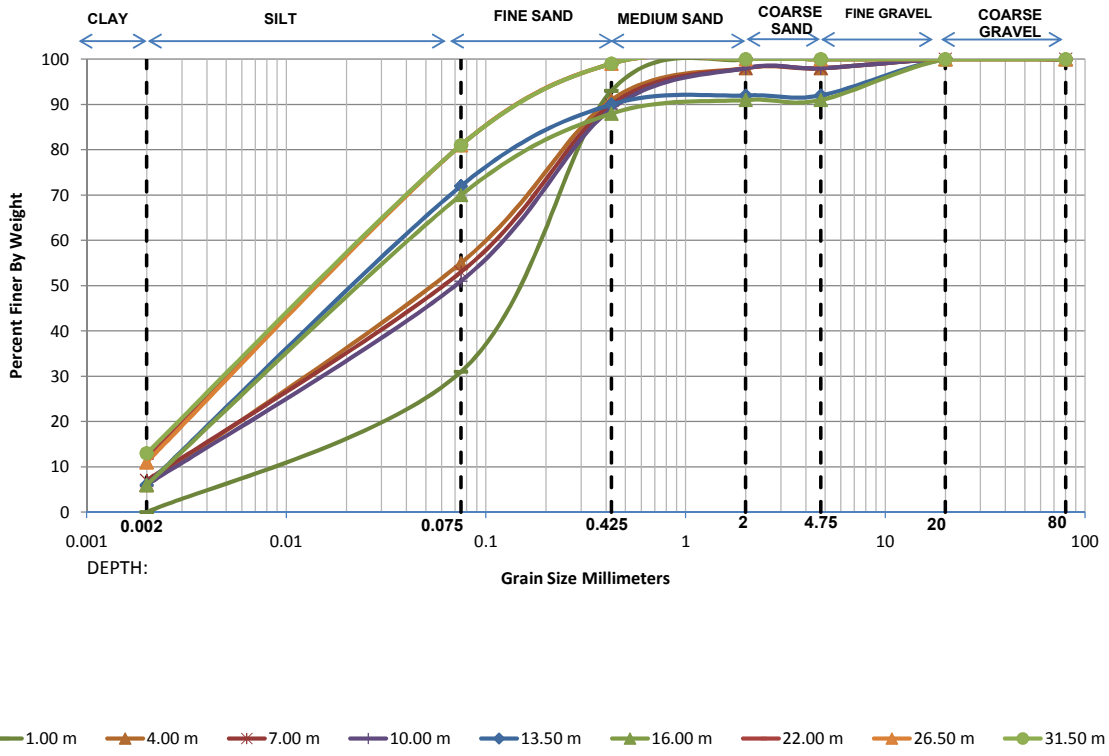
Project Name	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.
Location/Chainage	42+256 Major Bridge
B.H. No.	BH-P7



Depth	Grain Size Distribution % wt retained							D10	D30	D60	Cu	Cc
	Clay	Silt	Sand			Gravel						
			Fine	Medium	Coarse	Fine	Coarse					
2.50 m	9.00	61.00	26.00	4.00	0.00	0.00	0.00	0.0024	0.0150	0.0549	23.02	1.71
5.50 m	8.00	61.00	28.00	3.00	0.00	0.00	0.00	0.0029	0.0163	0.0569	19.85	1.63
8.50 m	11.00	54.00	31.00	4.00	0.00	0.00	0.00	-	0.0148	0.0634	-	-
11.50 m	10.00	55.00	32.00	3.00	0.00	0.00	0.00	0.0020	0.0158	0.0637	31.83	1.96
14.50 m	10.00	54.00	25.00	3.00	0.00	8.00	0.00	0.0020	0.0159	0.0655	32.75	1.93
18.00 m	9.00	54.00	26.00	3.00	0.00	8.00	0.00	0.0024	0.0173	0.0678	28.30	1.83
21.00 m	8.00	56.00	25.00	3.00	0.00	8.00	0.00	0.0029	0.0178	0.0658	22.79	1.67
25.00 m	13.00	64.00	21.00	2.00	0.00	0.00	0.00	-	0.0101	0.0436	-	-
28.00 m	11.00	64.00	23.00	2.00	0.00	0.00	0.00	-	0.0120	0.0470	-	-
31.00 m	10.00	64.00	24.00	2.00	0.00	0.00	0.00	0.0020	0.0131	0.0488	24.39	1.75

GRAIN SIZE DISTRIBUTION CURVES

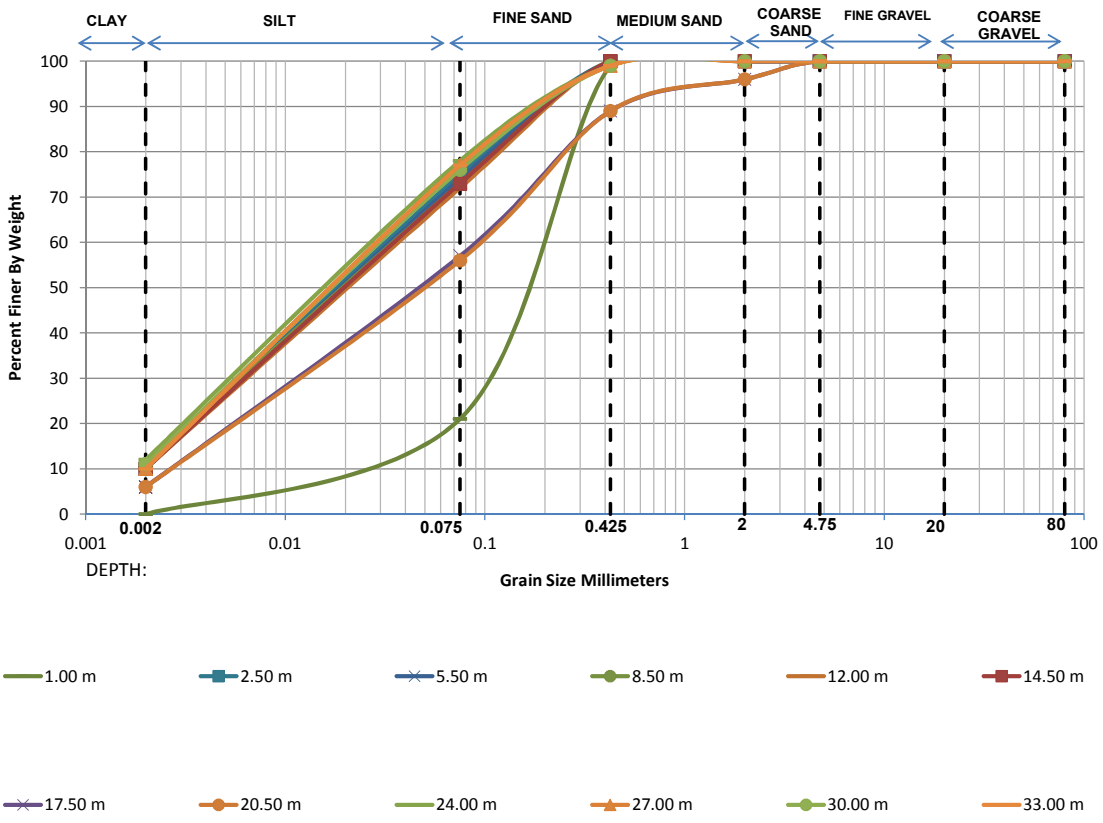
Project Name	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.
Location/Chainage	42+256 Major Bridge
B.H. No.	BH-P9



Depth	Grain Size Distribution % wt retained							D10	D30	D60	Cu	Cc
	Clay	Silt	Sand			Gravel						
			Fine	Medium	Coarse	Fine	Coarse					
1.00 m	0.00	31.00	62.00	7.00	0.00	0.00	0.00	0.0126	0.0717	0.1809	14.33	2.25
4.00 m	6.00	49.00	36.00	7.00	0.00	2.00	0.00	0.0044	0.0253	0.0918	20.66	1.57
7.00 m	7.00	46.00	37.00	8.00	0.00	2.00	0.00	0.0037	0.0257	0.1010	27.56	1.78
10.00 m	6.00	45.00	38.00	9.00	0.00	2.00	0.00	0.0046	0.0286	0.1106	24.20	1.61
13.50 m	6.00	66.00	18.00	2.00	0.00	8.00	0.00	0.0041	0.0173	0.0527	12.85	1.38
16.00 m	6.00	64.00	18.00	3.00	0.00	9.00	0.00	0.0041	0.0178	0.0555	13.46	1.38
22.00 m	12.00	69.00	18.00	1.00	0.00	0.00	0.00	-	0.0102	0.0397	-	-
26.50 m	11.00	70.00	18.00	1.00	0.00	0.00	0.00	-	0.0109	0.0402	-	-
31.50 m	13.00	68.00	18.00	1.00	0.00	0.00	0.00	-	0.0095	0.0392	-	-

GRAIN SIZE DISTRIBUTION CURVES

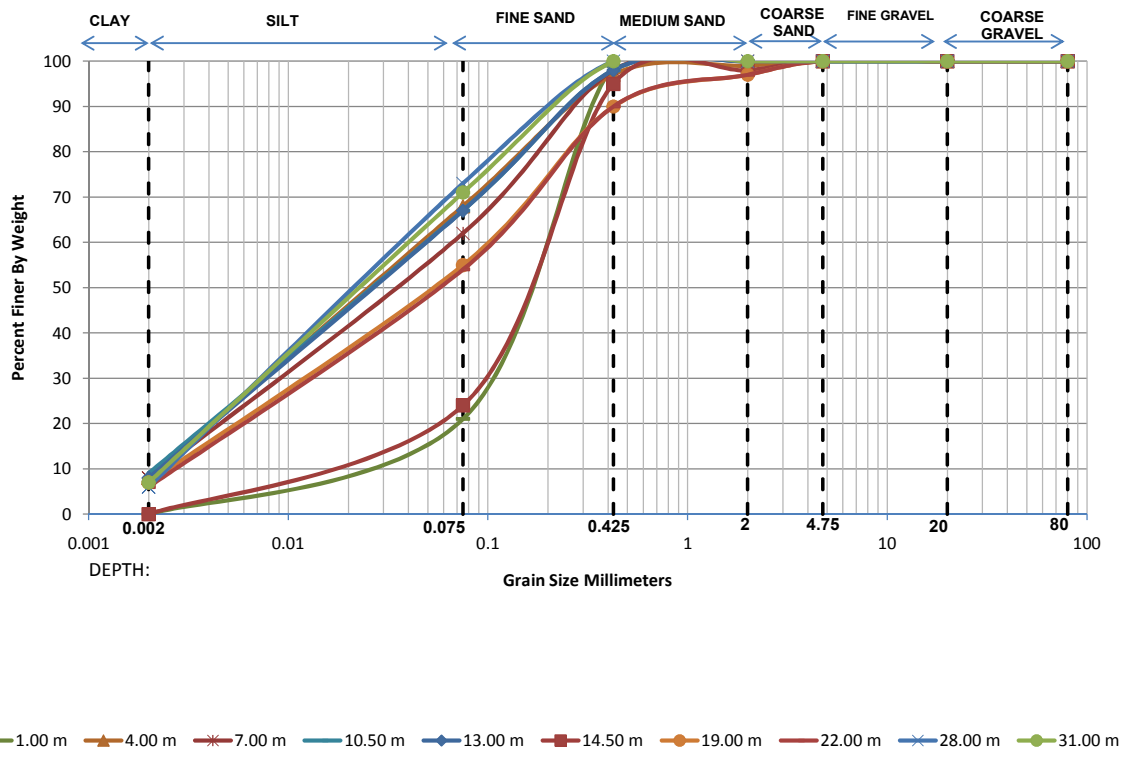
Project Name	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.
Location/Chainage	42+256 Major Bridge
B.H. No.	BH-P10



Depth	Grain Size Distribution % wt retained							D10	D30	D60	Cu	Cc
	Clay	Silt	Sand			Gravel						
			Fine	Medium	Coarse	Fine	Coarse					
1.00 m	0.00	21.00	78.00	1.00	0.00	0.00	0.00	0.0261	0.1073	0.2009	7.69	2.19
2.50 m	10.00	65.00	25.00	0.00	0.00	0.00	0.00	0.0020	0.0129	0.0476	23.79	1.74
5.50 m	10.00	64.00	26.00	0.00	0.00	0.00	0.00	0.0020	0.0131	0.0489	24.45	1.76
8.50 m	11.00	62.00	27.00	0.00	0.00	0.00	0.00	-	0.0125	0.0499	-	-
12.00 m	10.00	62.00	28.00	0.00	0.00	0.00	0.00	0.0020	0.0136	0.0517	25.85	1.79
14.50 m	10.00	63.00	27.00	0.00	0.00	0.00	0.00	0.0020	0.0134	0.0503	25.13	1.78
17.50 m	6.00	51.00	32.00	7.00	4.00	0.00	0.00	0.0044	0.0238	0.0846	19.30	1.53
20.50 m	6.00	50.00	33.00	7.00	4.00	0.00	0.00	0.0044	0.0245	0.0885	20.07	1.53
24.00 m	12.00	66.00	21.00	1.00	0.00	0.00	0.00	-	0.0107	0.0430	-	-
27.00 m	10.00	67.00	22.00	1.00	0.00	0.00	0.00	0.0020	0.0124	0.0451	22.53	1.71
30.00 m	11.00	65.00	23.00	1.00	0.00	0.00	0.00	-	0.0118	0.0458	-	-
33.00 m	10.00	67.00	22.00	1.00	0.00	0.00	0.00	0.0020	0.0124	0.0451	22.53	1.71

GRAIN SIZE DISTRIBUTION CURVES

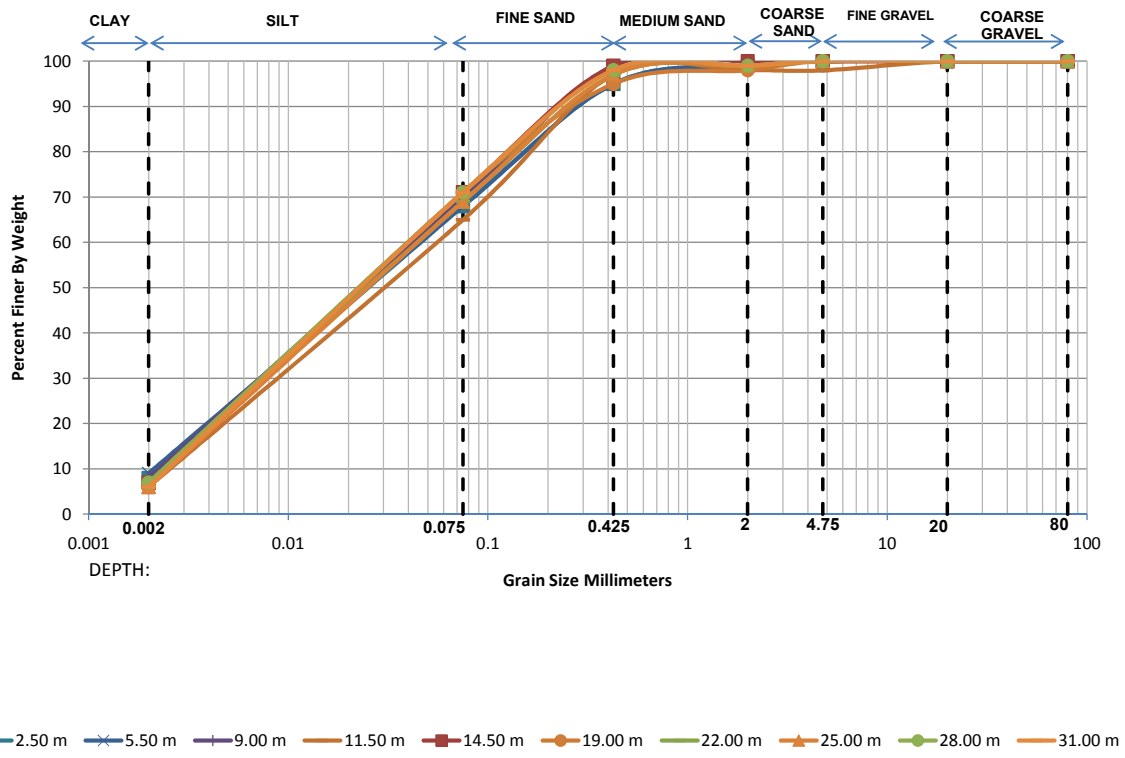
Project Name	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.
Location/Chainage	42+256 Major Bridge
B.H. No.	BH-P11



Depth	Grain Size Distribution % wt retained							D10	D30	D60	Cu	Cc
	Clay	Silt	Sand			Gravel						
			Fine	Medium	Coarse	Fine	Coarse					
1.00 m	0.00	21.00	78.00	1.00	0.00	0.00	0.00	0.0261	0.1073	0.2009	7.69	2.19
4.00 m	8.00	60.00	29.00	2.00	1.00	0.00	0.00	0.0029	0.0166	0.0586	20.40	1.64
7.00 m	8.00	54.00	36.00	2.00	0.00	0.00	0.00	0.0029	0.0191	0.0703	24.20	1.79
10.50 m	9.00	58.00	31.00	2.00	0.00	0.00	0.00	0.0024	0.0160	0.0601	25.13	1.79
13.00 m	8.00	59.00	31.00	2.00	0.00	0.00	0.00	0.0029	0.0170	0.0603	20.98	1.67
14.50 m	0.00	24.00	71.00	3.00	2.00	0.00	0.00	0.0203	0.0965	0.1987	9.78	2.30
19.00 m	7.00	48.00	35.00	7.00	3.00	0.00	0.00	0.0036	0.0241	0.0924	25.49	1.73
22.00 m	6.00	48.00	36.00	7.00	3.00	0.00	0.00	0.0045	0.0260	0.0964	21.55	1.57
28.00 m	6.00	67.00	27.00	0.00	0.00	0.00	0.00	0.0041	0.0173	0.0519	12.64	1.41
31.00 m	7.00	64.00	29.00	0.00	0.00	0.00	0.00	0.0034	0.0168	0.0543	15.81	1.51

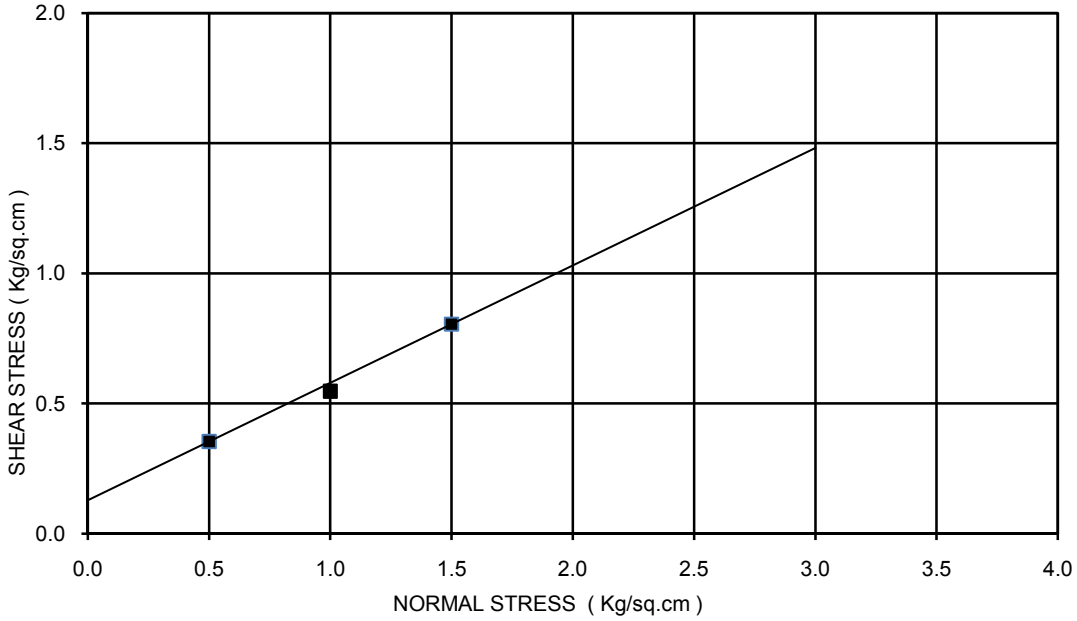
GRAIN SIZE DISTRIBUTION CURVES

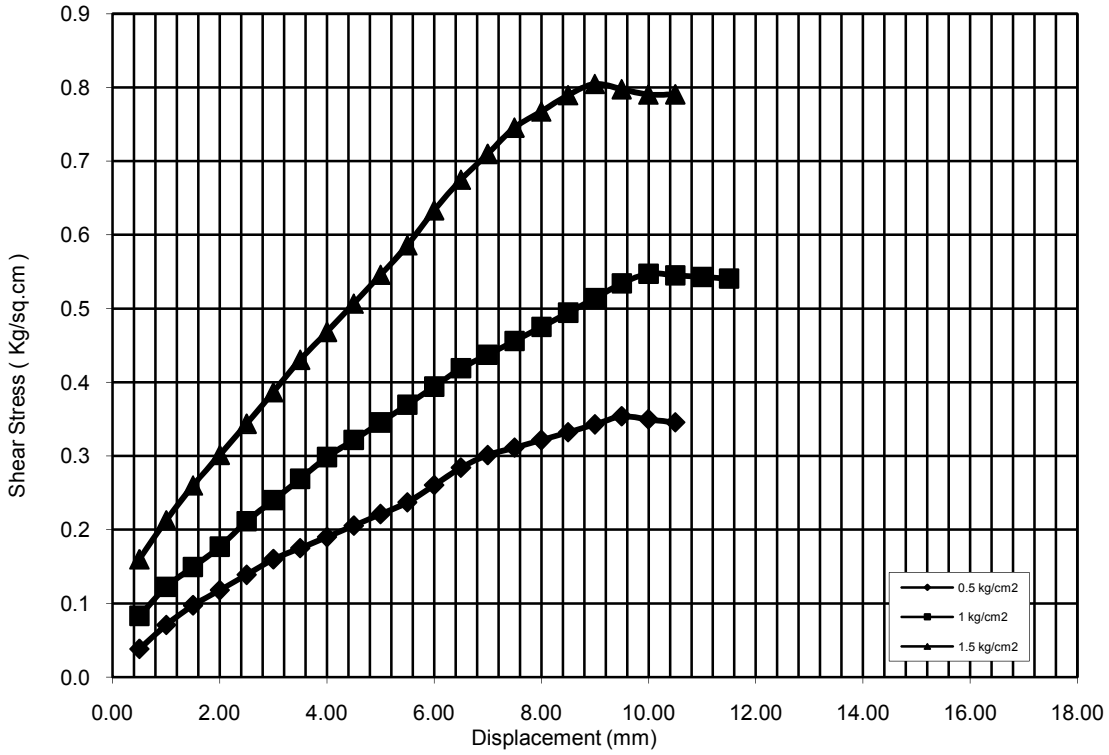
Project Name	Conducting geotechnical investigation, preparation of geotechnical report for designing of bridges and for embankment in connection with construction of Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.
Location/Chainage	42+256 Major Bridge
B.H. No.	BH-P12



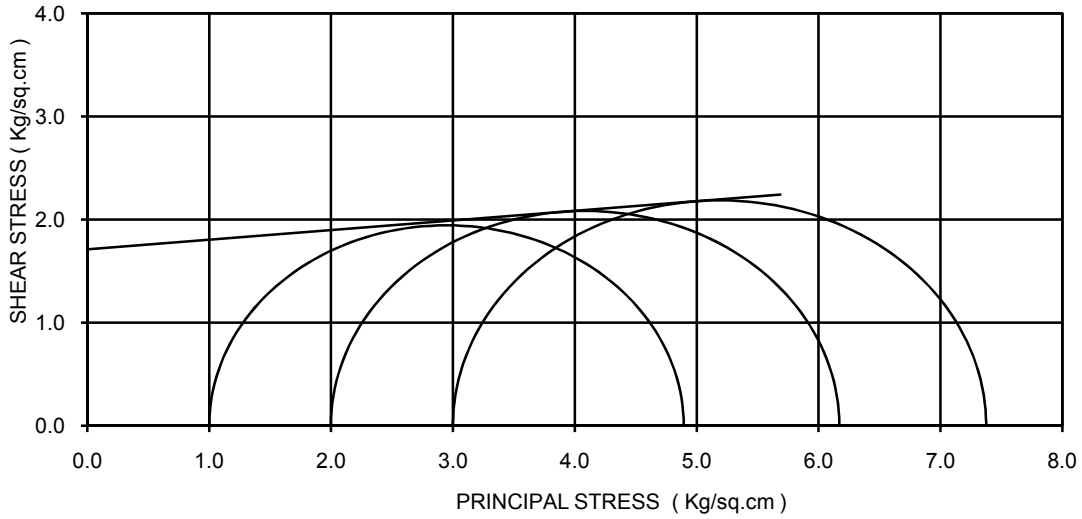
Depth	Grain Size Distribution % wt retained							D10	D30	D60	Cu	Cc
	Clay	Silt	Sand			Gravel						
			Fine	Medium	Coarse	Fine	Coarse					
2.50 m	8.00	60.00	27.00	4.00	1.00	0.00	0.00	0.0029	0.0165	0.0585	20.37	1.63
5.50 m	9.00	59.00	27.00	4.00	1.00	0.00	0.00	0.0024	0.0156	0.0582	24.36	1.74
9.00 m	8.00	62.00	29.00	1.00	0.00	0.00	0.00	0.0029	0.0160	0.0554	19.35	1.62
11.50 m	6.00	59.00	32.00	1.00	0.00	2.00	0.00	0.0042	0.0200	0.0644	15.25	1.47
14.50 m	7.00	64.00	28.00	1.00	0.00	0.00	0.00	0.0034	0.0168	0.0542	15.80	1.51
19.00 m	6.00	65.00	24.00	3.00	2.00	0.00	0.00	0.0041	0.0178	0.0544	13.19	1.41
22.00 m	7.00	62.00	28.00	2.00	1.00	0.00	0.00	0.0034	0.0173	0.0572	16.59	1.52
25.00 m	6.00	63.00	28.00	2.00	1.00	0.00	0.00	0.0042	0.0185	0.0575	13.83	1.43
28.00 m	7.00	64.00	27.00	1.00	1.00	0.00	0.00	0.0034	0.0167	0.0542	15.79	1.50
31.00 m	6.00	65.00	27.00	1.00	1.00	0.00	0.00	0.0041	0.0179	0.0545	13.21	1.42

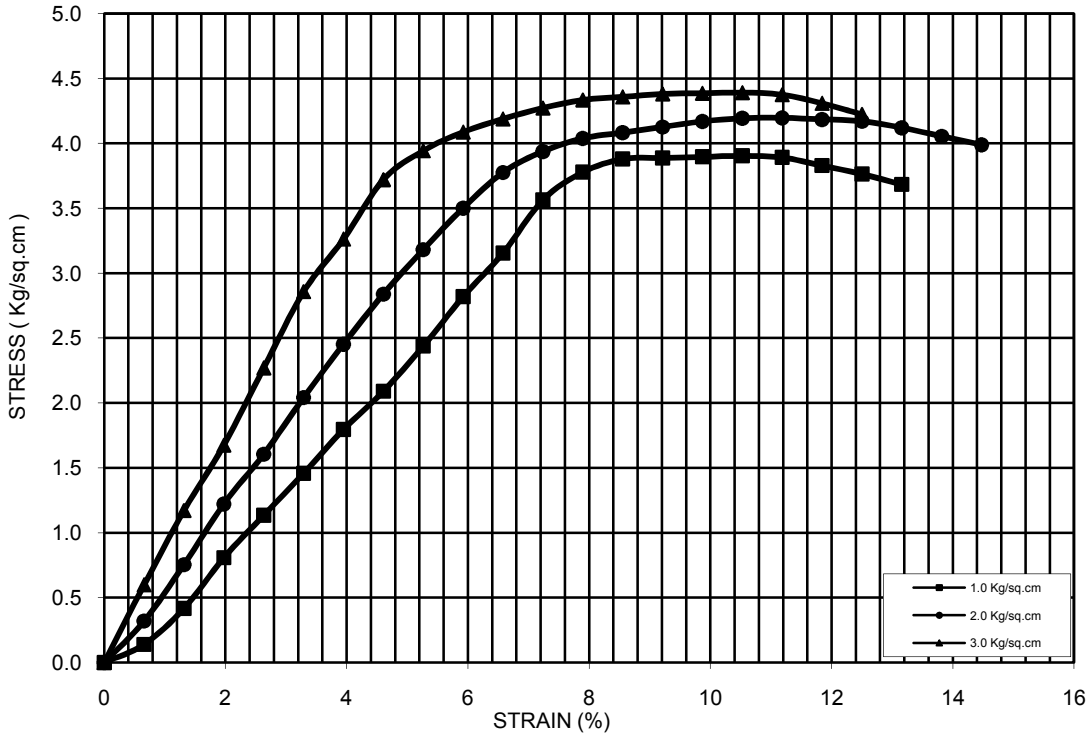
BORE HOLE NO: BH-P1
CH.-42+256
SAMPLE NO.: UDS-1
DEPTH: 1.00 m
COHESION(C)= 0.13 kg/sq.cm
ANGLE OF FRICTION(Phi): 24 deg
TYPE OF THE TEST: DST



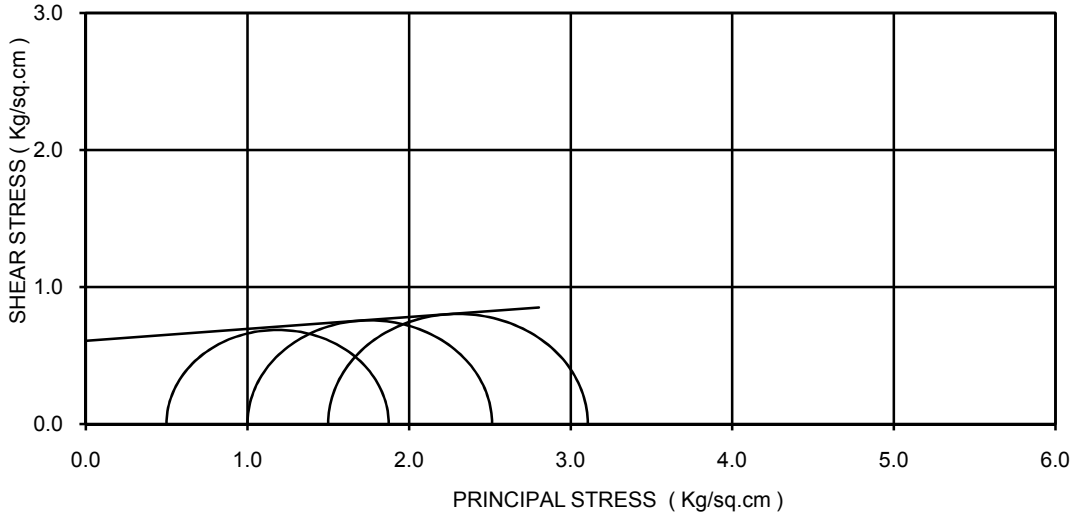


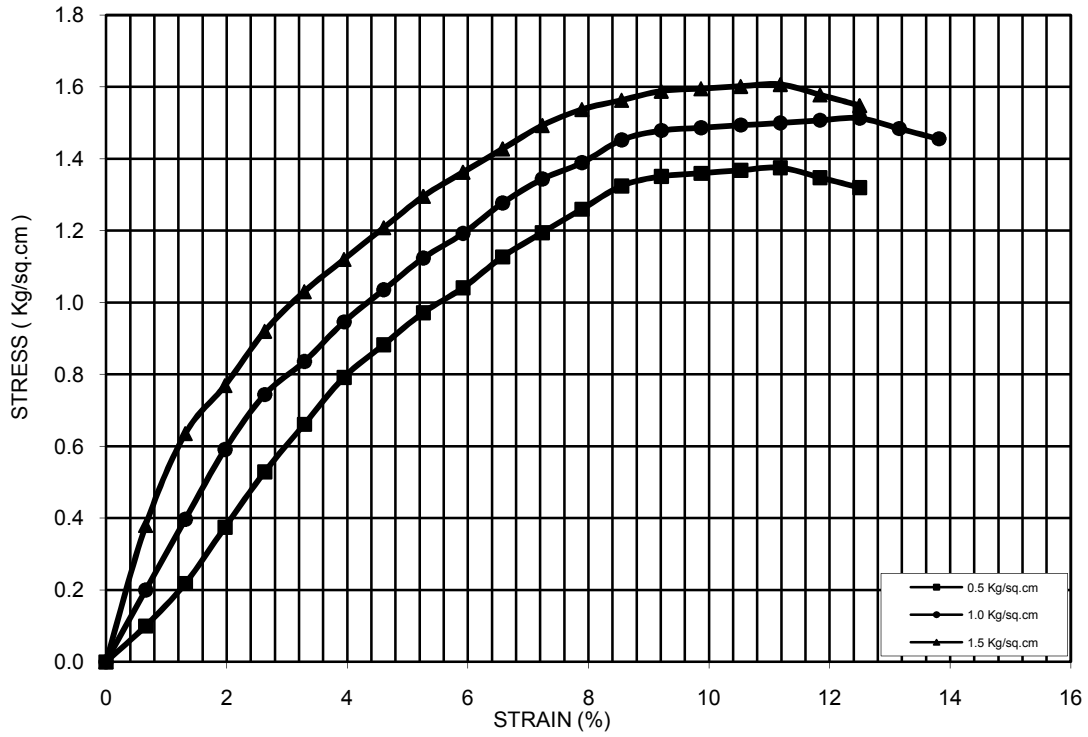
BORE HOLE NO: BH-P1
CHAINAGE : 42+256
SAMPLE NO.:-UDS-5
DEPTH: 13.00 m
COHESION(C)= 1.71 kg/sq.cm
ANGLE OF FRICTION(Phi): 5 deg
TYPE OF THE TEST: UUT



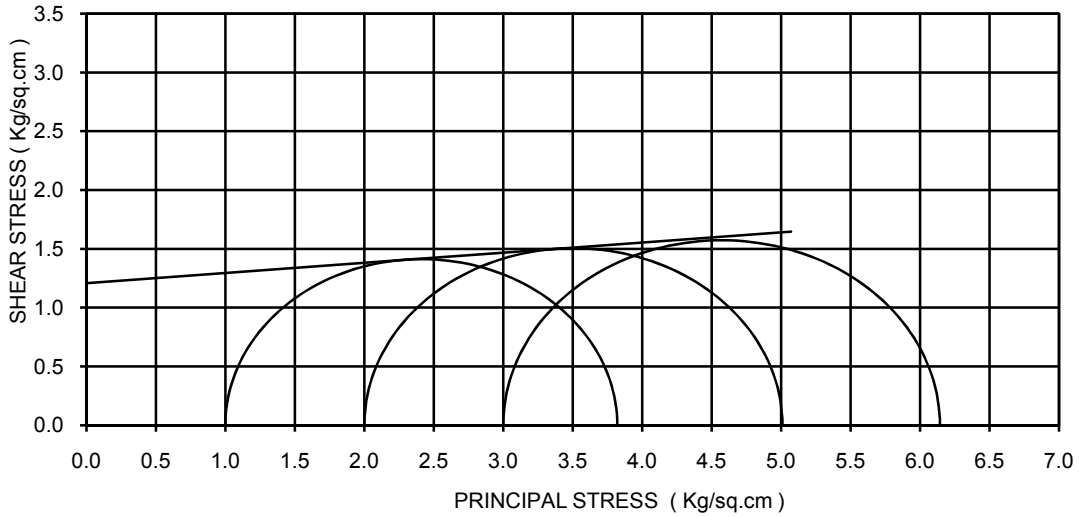


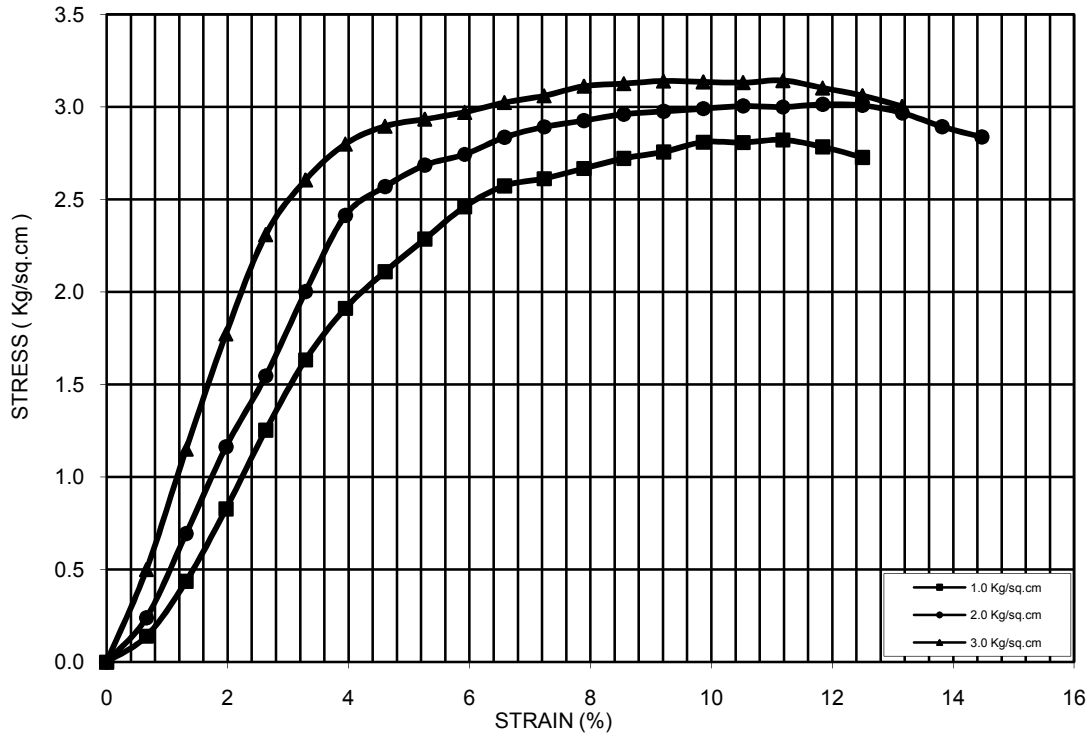
BORE HOLE NO: BH-P7
CHAINAGE = 42+256
SAMPLE NO.: UDS-1
DEPTH: 2.50m
COHESION(C)= 0.61 kg/sq.cm
ANGLE OF FRICTION(Phi): 5deg
TYPE OF THE TEST: UUT



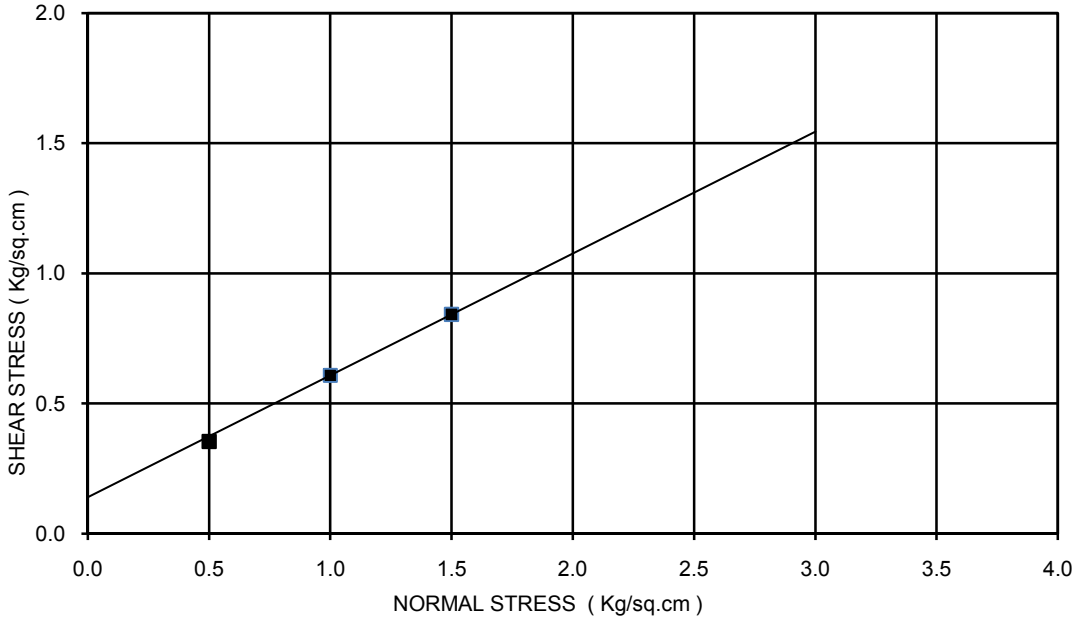


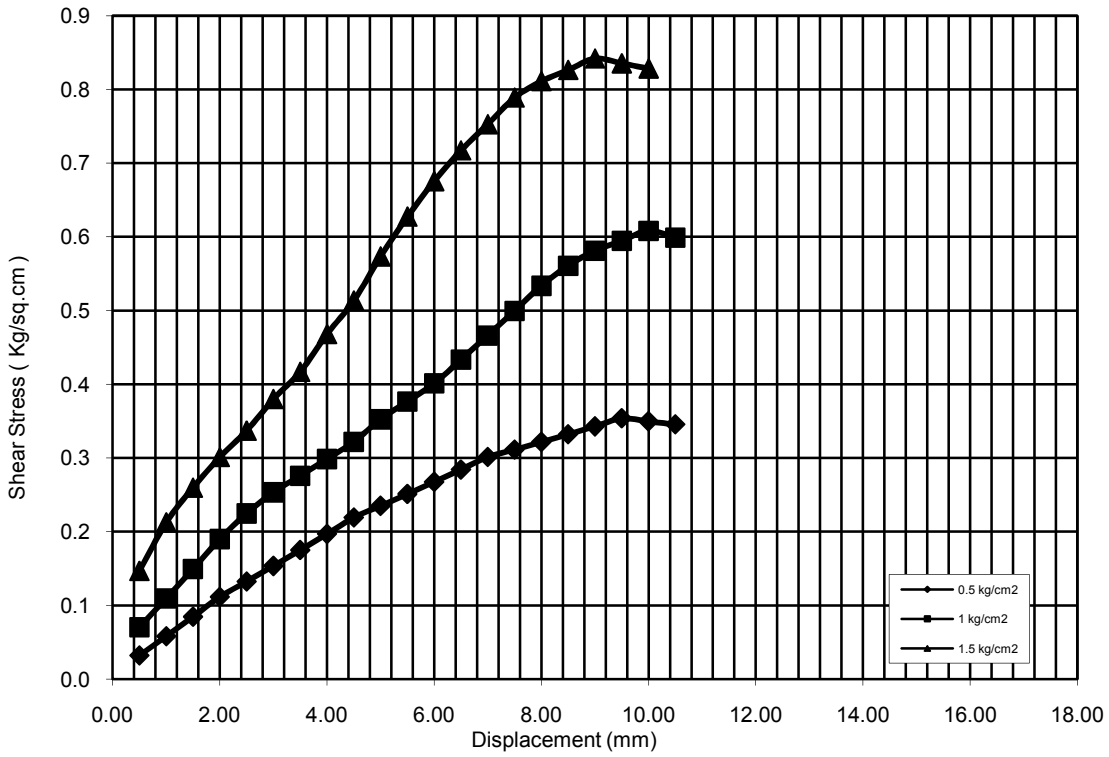
BORE HOLE NO: BH-P7
CHAINAGE = 42+256
SAMPLE NO.: UDS-5
DEPTH: 14.50 m
COHESION(C)= 1.21 kg/sq.cm
ANGLE OF FRICTION(Phi): 5 deg
TYPE OF THE TEST: UUT



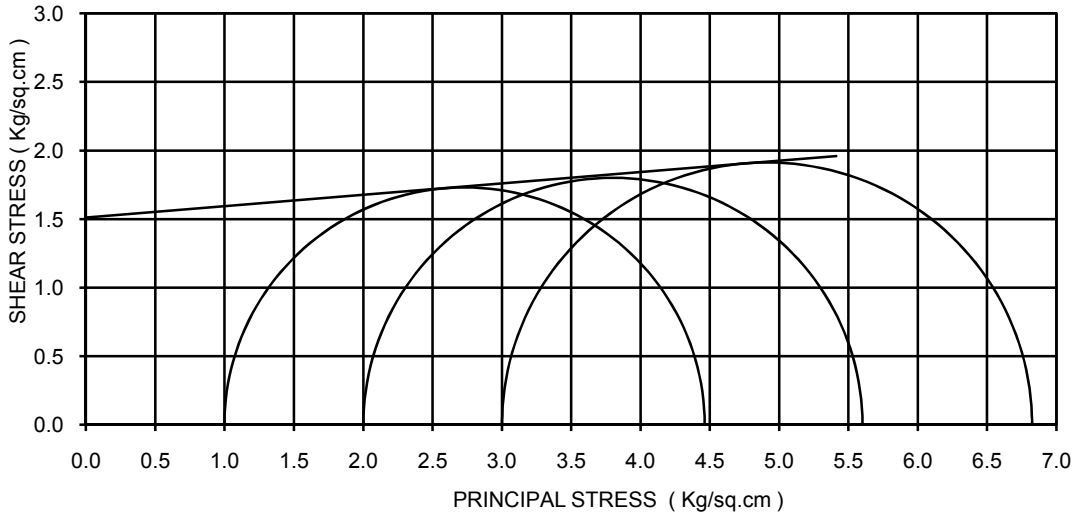


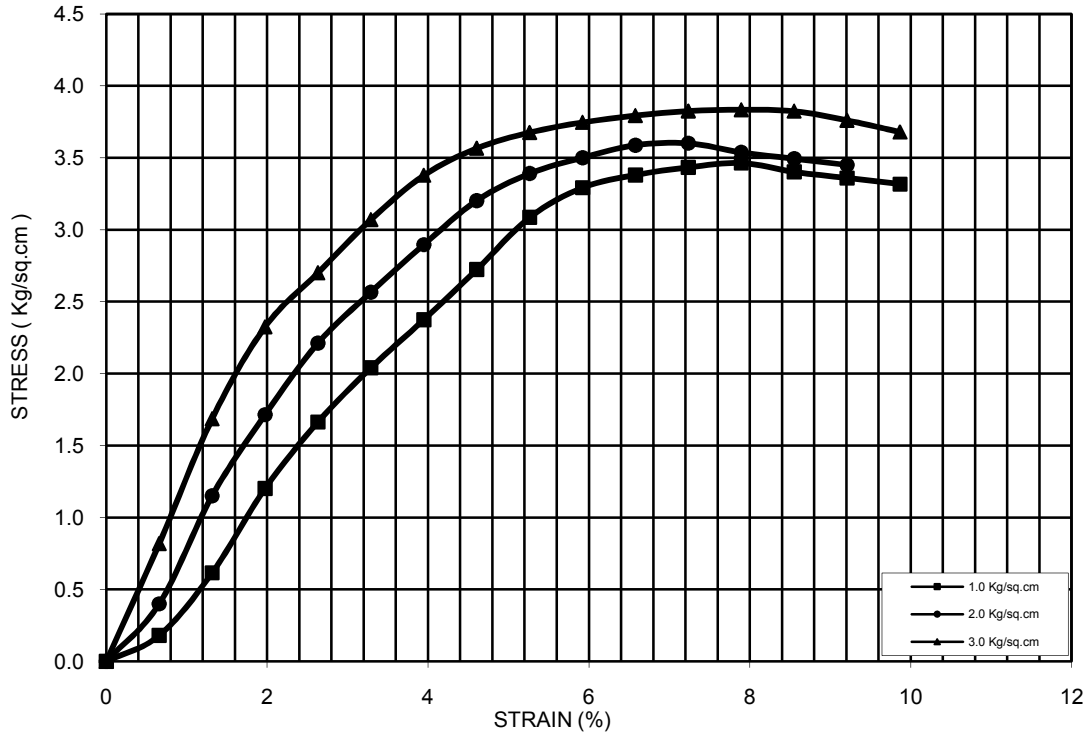
BORE HOLE NO: BH-P9
CHAINAGE : 42+256
SAMPLE NO.: UDS-2
DEPTH: 4.00 m
COHESION(C)= 0.14 kg/sq.cm
ANGLE OF FRICTION(Phi): 25 deg
TYPE OF THE TEST: DST



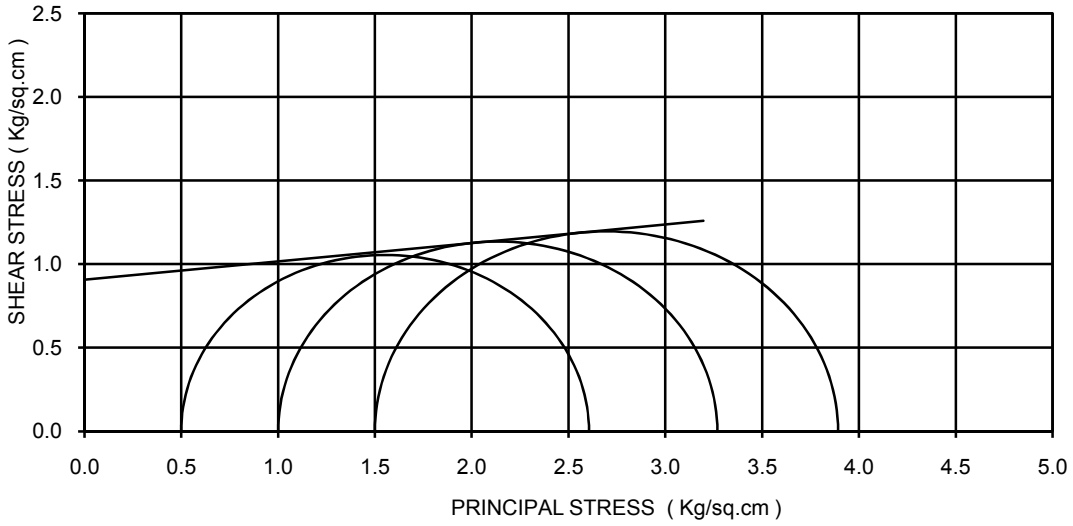


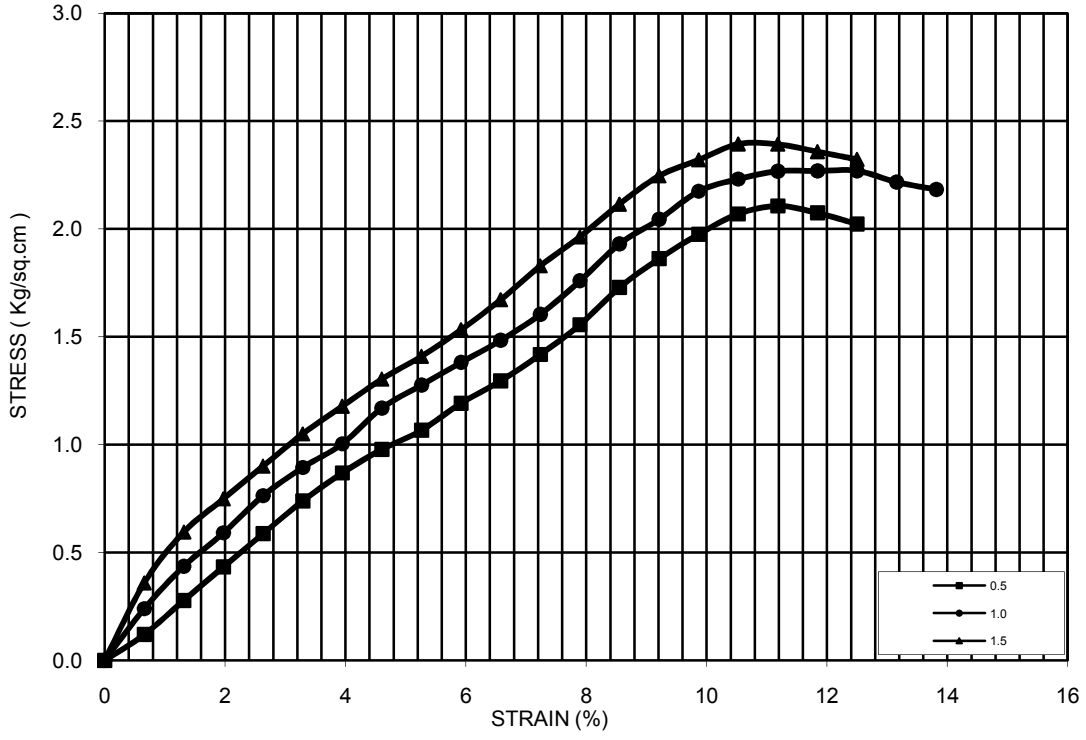
BORE HOLE NO: BH-P9
CHAINAGE : 42+256
BORE HOLE NO: UDS-5
DEPTH: 16.00
COHESION(C)= 1.51 kg/sq.cm
ANGLE OF FRICTION(Phi): 5 deg
TYPE OF THE TEST: UUT



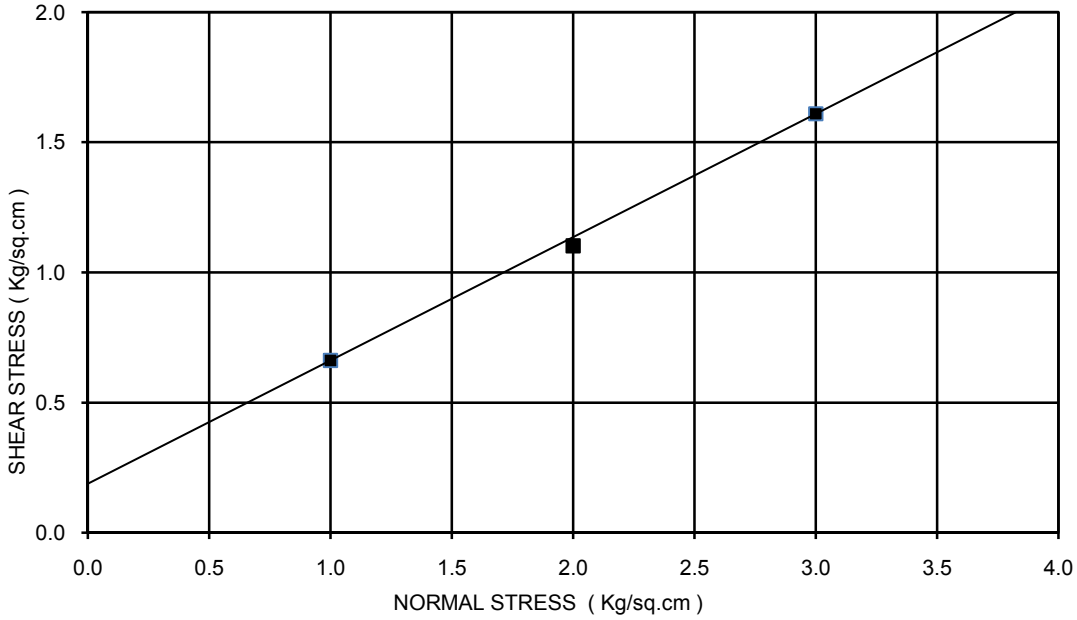


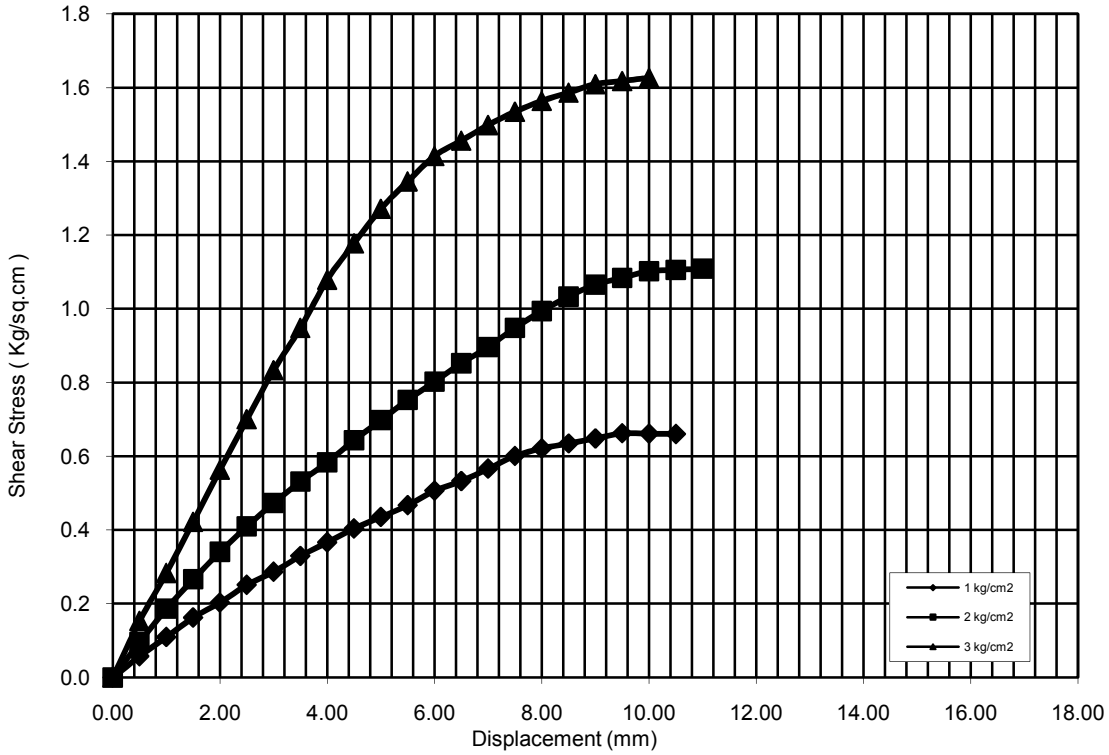
BORE HOLE NO: BH-P10
CHAINAGE = 42+256
SAMPLE NO.: UDS-2
DEPTH: 5.50 m
COHESION(C)= 0.91 kg/sq.cm
ANGLE OF FRICTION(Phi): 5 deg
TYPE OF THE TEST: UUT



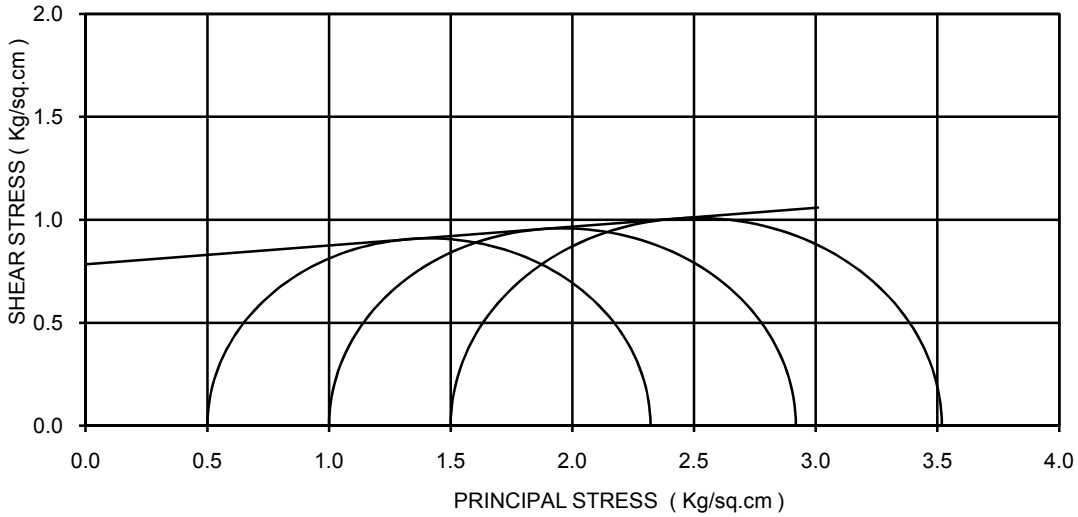


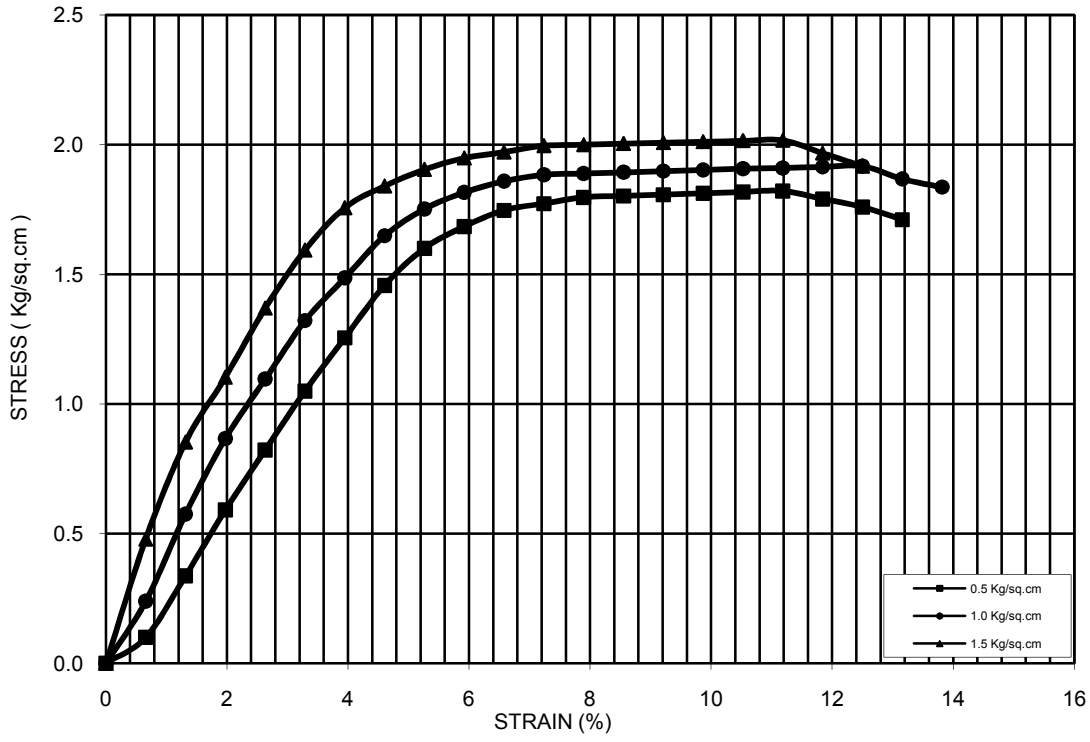
BORE HOLE NO: BH-P10
CHAINAGE= 42+256
SAMPLE NO.: UDS-6
DEPTH: 20.50 m
COHESION(C)= 0.19 kg/sq.cm
ANGLE OF FRICTION(Phi): 25 deg
TYPE OF THE TEST: DST



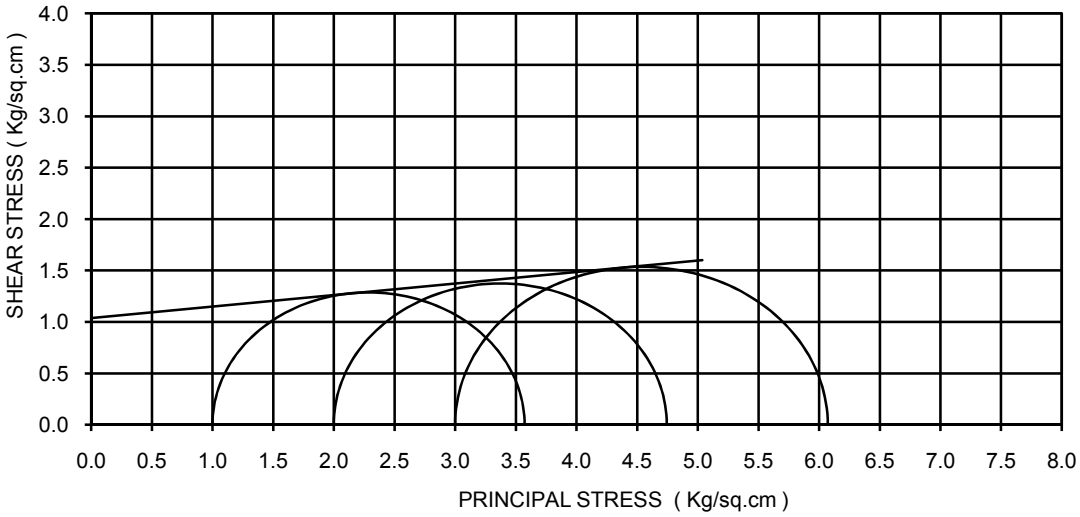


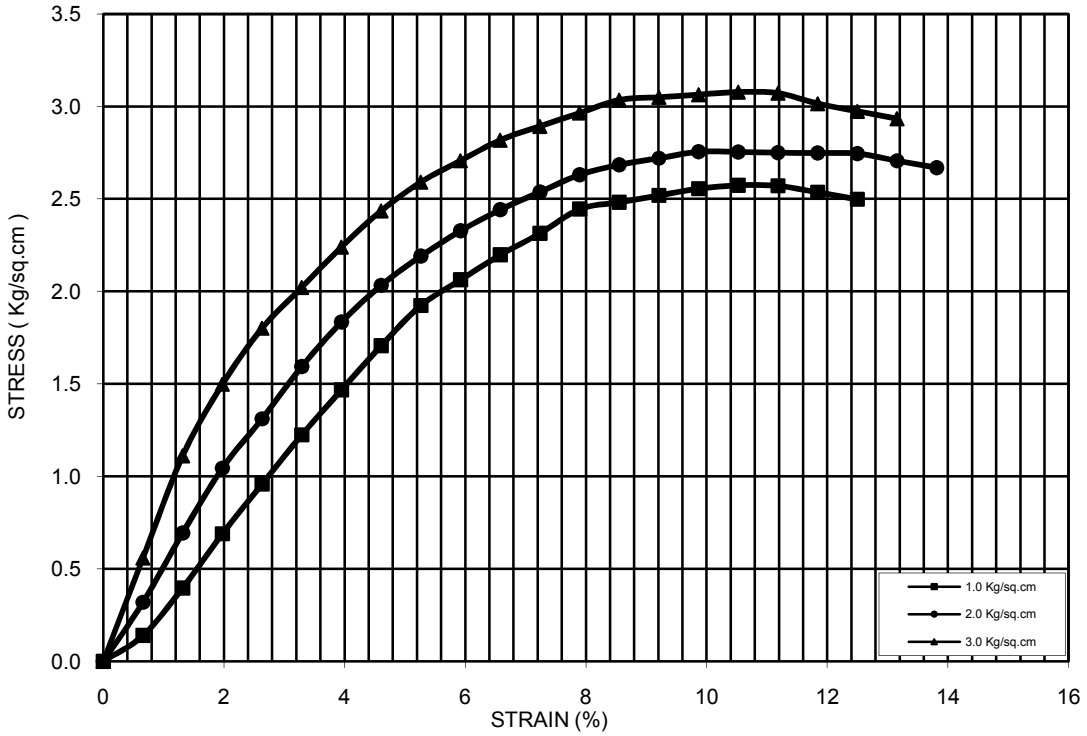
BORE HOLE NO:BH-P11
CH.-42+256
SAMPLE NO.: UDS-2
DEPTH: 4.00 m
COHESION(C)= 0.78 kg/sq.cm
ANGLE OF FRICTION(Phi): 5 deg
TYPE OF THE TEST: UUT



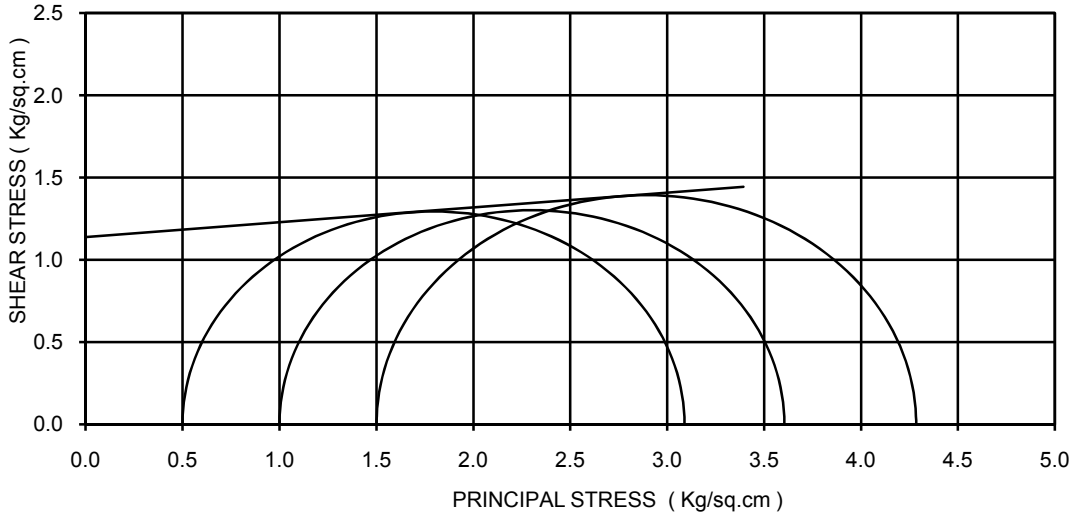


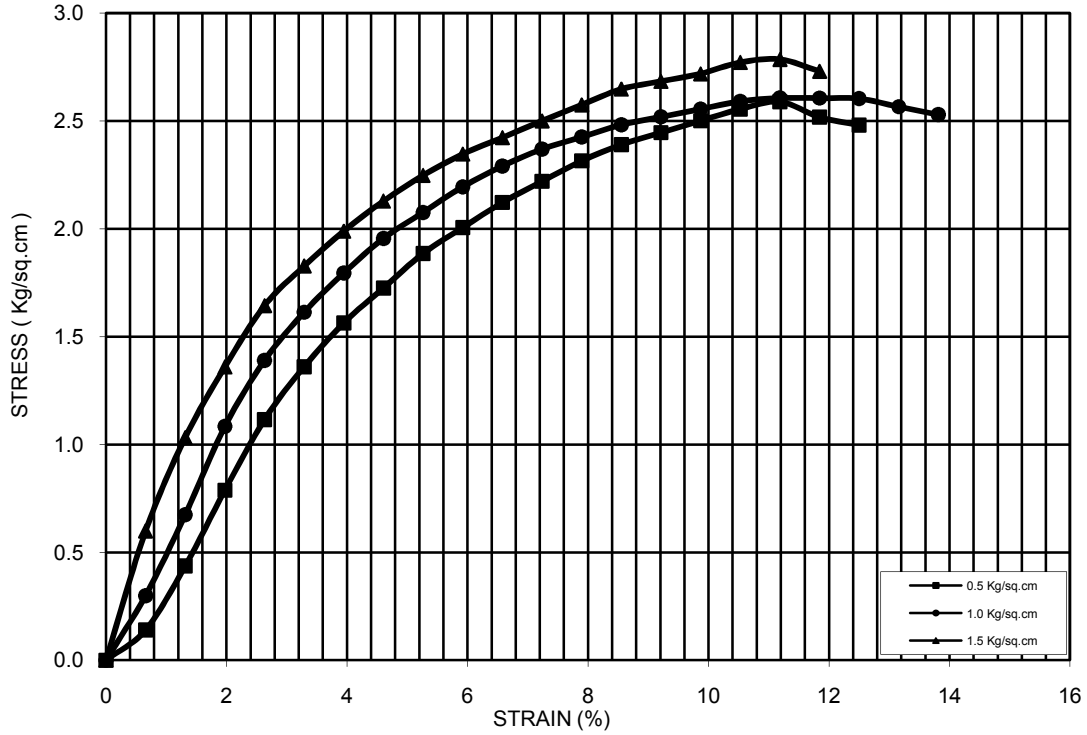
BORE HOLE NO: BH-P11
CHAINAGE : 42+256
SAMPLE NO.: UDS-4
DEPTH: 13.00 m
COHESION(C)= 1.04 kg/sq.cm
ANGLE OF FRICTION(Phi): 6 deg
TYPE OF THE TEST: UUT



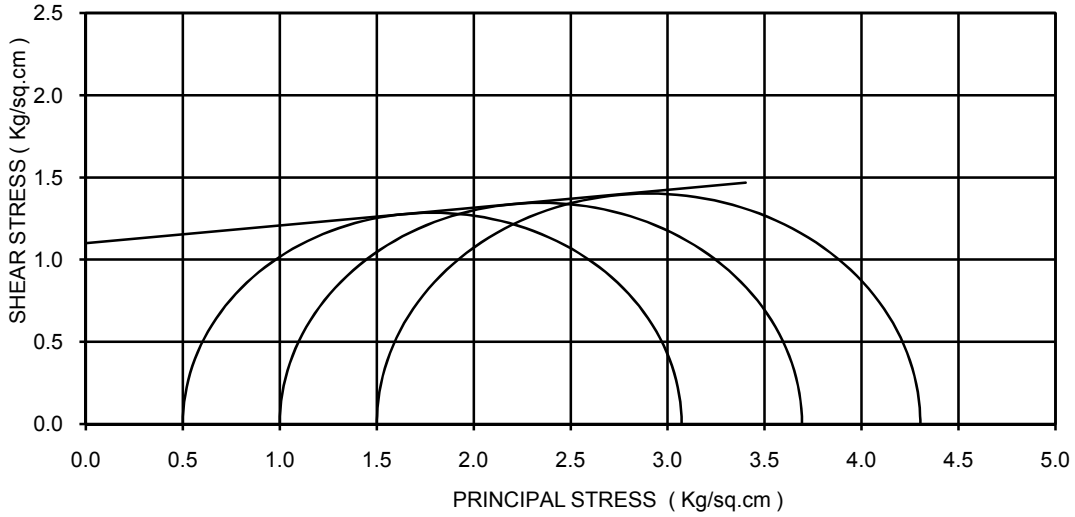


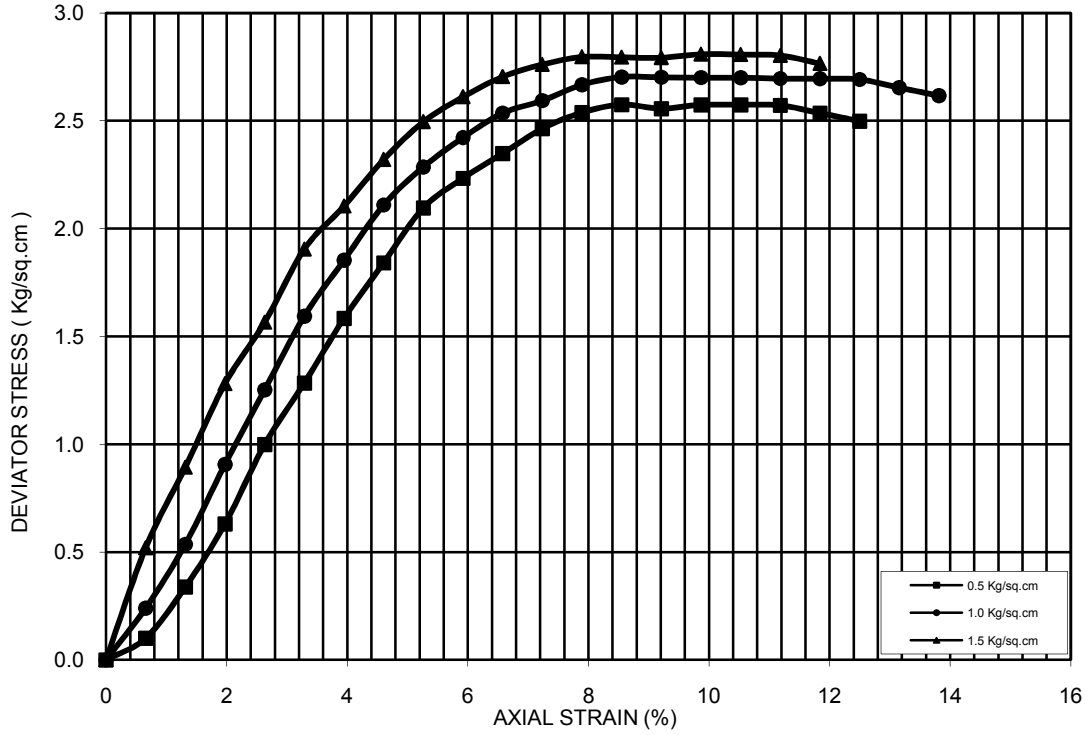
BORE HOLE NO: BH-P12
CHAINAGE : 42+256
SAMPLE NO.: UDS-2
DEPTH: 5.50 m
COHESION(C)= 1.14 kg/sq.cm
ANGLE OF FRICTION(Phi): 5 deg
TYPE OF THE TEST: UUT





BORE HOLE NO: BH-P12
CHAINAGE= 42+256
SAMPLE NO.: UDS-3
DEPTH: 8.50 m
COHESION(C)= 1.10 kg/sq.cm
ANGLE OF FRICTION(Phi): 6 deg
TYPE OF THE TEST: UUT





APPENDIX – C
(ANALYSIS & RECOMENDATION)

Appendix No.	ITEMS
C-1	SAMPLE CALCULATION SHEET OF LIQUEFACTION ANALYSIS RESULTS
C-2	SAMPLE CALCULATIONS FOR COMPUTATION OF ALLOWABLE BEARING CAPACITY OF SUB-STRATA FOR SHALLOW FOUNDATION
C-3	SAMPLE CALCULATION FOR COMPUTATION OF SAFE LOAD CARRYING CAPACITY OF NORMAL BORED CAST-IN-SITU RCC PILE IN COMPRESSION & UPLIFT
C-4	SAMPLE CALCULATION FOR COMPUTATION OF SAFE LOAD CARRYING CAPACITY OF NORMAL BORED CAST-IN-SITU RCC PILE IN LATERAL

Liquefaction Analysis as per IRC:75-2015, IS: 1893 (Part-1)-2016 & RDSO BS-118

Chainage (Km)	42+256	BH No.:-	BH-P1	Liquefiable upto=	8.50m	Water Table depth considered for analysis (m):-	0.00

Depth Below G.L. (z) in m	Observed SPT Value	Saturated Density (t/m^3)	Submerged Density (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Moisture Content @ 100% saturation	Strata Type	Liquefaction Check for Cohesive Strata	Fine Content (%)	Stress Reduction Coefficient (rd)	Total Overburden Press (σ_v), t/m^2	Effective Overburden (σ'_v), t/m^2	Critical Stress Ratio (CSR)	C_{HT}	C_{HW}	C_{SS}	C_{RL}	C_{BD}	C_{60}	Stress Normalization Factor(C_N)	SPT Corrected $(N1)_{60}$	α	β	$(N1)_{60CS}$	$CRR_{M=7.5}$	K_M	Kα	Kσ	CRR_{Mw}	FOS	Conclusion
2.50	10	1.95	0.95	26.00	21.00	5.00	28.20	Cohesive	Liquefiable	59	0.981	4.50	2.00	0.344	0.75	0.986	1.00	0.75	1.05	0.582	1.70	9.9	5.00	1.20	16.88	0.180	1.19	1	1.00	0.214	0.62	Liquefiable
5.50	13	1.95	0.95	28.00	22.00	6.00	27.77	Cohesive	Liquefiable	53	0.958	10.35	4.85	0.319	0.75	0.986	1.00	0.85	1.05	0.660	1.42	12.2	5.00	1.20	19.64	0.211	1.19	1	1.00	0.252	0.79	Liquefiable
8.50	21	1.98	0.98	32.00	21.00	11.00	26.79	Cohesive	Liquefiable	70	0.935	16.21	7.71	0.307	0.75	0.986	1.00	0.95	1.05	0.738	1.13	17.5	5.00	1.20	25.95	0.312	1.19	1	1.00	0.372	1.21	Non Liquefiable
11.50	37	2.00	1.00	33.00	22.00	11.00	25.19	Cohesive	Non-Liquefiable	-	0.867	22.14	10.64	0.281	0.75	0.986	1.00	1.00	1.05	0.776	-	-	-	-	-	-	-	-	-	-	>1	Non Liquefiable
14.50	46	2.02	1.02	33.00	20.00	13.00	23.90	Cohesive	Non-Liquefiable	-	0.787	28.15	13.65	0.253	0.75	0.986	1.00	1.00	1.05	0.776	-	-	-	-	-	-	-	-	-	-	>1	Non Liquefiable
16.50	49	2.02	1.02	31.00	21.00	10.00	23.90	Cohesive	Non-Liquefiable	-	0.733	32.19	15.69	0.235	0.75	0.986	1.00	1.00	1.05	0.776	-	-	-	-	-	-	-	-	-	-	>1	Non Liquefiable
17.50	66	2.02	1.02	31.00	21.00	10.00	23.90	Cohesive	Non-Liquefiable	-	0.707	34.21	16.71	0.226	0.75	0.986	1.00	1.00	1.05	0.776	-	-	-	-	-	-	-	-	-	-	>1	Non Liquefiable
19.50	76	2.02	1.02	31.00	21.00	10.00	23.90	Cohesive	Non-Liquefiable	-	0.653	38.25	18.75	0.208	0.75	0.986	1.00	1.00	1.05	0.776	-	-	-	-	-	-	-	-	-	-	>1	Non Liquefiable
20.50	81	2.02	1.02	32.00	22.00	10.00	23.90	Cohesive	Non-Liquefiable	-	0.627	40.27	19.77	0.199	0.75	0.986	1.00	1.00	1.05	0.776	-	-	-	-	-	-	-	-	-	-	>1	Non Liquefiable
22.50	55	2.02	1.02	32.00	22.00	10.00	23.90	Cohesive	Non-Liquefiable	-	0.573	44.31	21.81	0.182	0.75	0.986	1.00	1.00	1.05	0.776	-	-	-	-	-	-	-	-	-	-	>1	Non Liquefiable

Calculation of SBC for shallow foundations as per IS : 6403 - 1981

INPUT DATA

CH. (KM) :- 42+256

BH NO. :- BH-P1

Type of footing

1 Continuous Strip
2 Rectangular
3 Square
4 Circular

Square **3**

Angle of internal friction (ϕ^o)	26.00
Cohesion (c in t/m^2)	1.50
Void ratio (e), $e = (G.\gamma_w/\gamma_d)-1$	0.74
Direction of load with vertical (^{o})	0.00
Density of foundation soil (t/m^3) γ_{bulk}	1.75
Depth of water table(m)	0.00
Factor of safety	2.50

S.no.	Depth (m) of footing (D_f) below EGL	Width (m)
1	2.00	7.20
2	3.00	7.20
3	4.00	7.20

SHEAR FAILURE CRITERIA

Assumptions and formula used in calculation as per IS:6403-1981 are given below -

NOTE: The type of failure used for bearing capacity analysis depends upon the value of void ratio (see IS 6403 : 1981, Page No. 9, Table No. 3).

The ultimate net bearing capacity in case of general shear failure is given by (from IS 6403 : 1981, page No. 8)

$$q_d = c\,N_c\,s_c\,d_c\,i_c + q\,(N_q-1)\,s_q\,d_q\,i_q + (1/2)\,B\,\gamma\,N_\gamma\,s_\gamma\,d_\gamma\,i_\gamma\,W'$$

The ultimate net bearing capacity in case of local shear failure is given by (from IS 6403 : 1981, page No. 8)

$$q'_d = (2/3)\,c\,N'_c\,s_c\,d_c\,i_c + q\,(N'_q-1)\,s_q\,d_q\,i_q + (1/2)\,B\,\gamma\,N'_\gamma\,s_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

$d_c = 1+ 0.2\,(D_f/B)*SQRT(N_\phi)$

$d_q = d_\gamma = 1$ for $\phi < 10^o$

$d_q = d_\gamma = 1 + 0.1\,(D_f/B)*SQRT(N_\phi)$ for $\phi > 10^o$

(from IS 6403 : 1981, page No. 9)

$N_\phi = \tan^2(\pi/4 + \phi/2)$

ϕ' is friction angle for local shear failure = $\tan^{-1}(0.67\tan\phi)$

OUTPUT

The computer aided results for shear failure criteria are tabulated below. The results are interpolated values of bearing capacity obtained from general and local shear failure criteria.

Bearing capacity factors : (from IS 6403 : 1981, page No. 8, Table No. 1)

ϕ	26.00	ϕ'	18.10
N_c	22.25	N'_c	13.18
N_q	11.85	N'_q	5.31
N_γ	12.54	N'_γ	4.12

Shape factors : (from IS 6403 : 1981, page No. 8, Table No. 2)

S.no.	Width(m)	S_c	S_q	S_γ
1	7.20	1.30	1.20	0.80
2	7.20	1.30	1.20	0.80
3	7.20	1.30	1.20	0.80
		1.30	1.20	0.80
		1.30	1.20	0.80
		1.30	1.20	0.80

Depth factors : (from IS 6403 : 1981, page No. 9)

S.no.	Depth(m)	Width(m)	dc	d_q	d_γ
1	2.00	7.20	1.09	1.04	1.04
2	3.00	7.20	1.13	1.07	1.07
3	4.00	7.20	1.18	1.09	1.09

Inclination factors : (from IS 6403 : 1981, page No. 9)

$i_c = (1-\alpha / 90)^2$	$i_q = (1-\alpha / 90)^2$	$i_\gamma = (1- \alpha / \phi)^2$
1.00	1.00	1.00

Water table factor : (from IS 6403 : 1981, page No. 9)

S.no.	Depth(m)	Width(m)	Z_w/B	W'
1	2.00	7.20	-0.28	0.50
2	3.00	7.20	-0.42	0.50
3	4.00	7.20	-0.56	0.50

Safe Bearing Capacity

S.no.	Depth(m)	Width(m)	SBC in (t/m^2)		
			General shear	Local shear	Recommended
1	2.00	7.20	40.19	15.01	16.45
2	3.00	7.20	45.56	17.12	18.75
3	4.00	7.20	51.10	19.30	21.12

SETTLEMENT CALCULATION AS PER 8009 Part-1 1976														CH. (KM): 42+256				BH NO. :- BH-P1		
Layer	Depth below FGL (m)	From (m)	To (m)	Layer Thickness	Stress at Foundation level (Kg/Cm2)	Length (m)	Breadth (m)	Layer Thickness(m)	Dispersed Length (m)	Dispersed Breadth (m)	Stress Increment at top for cohesionless layer & at mid Depth for cohesive layer (kg/Cm2)	Average N-Value	Mvc (Cm^2/Kg)	Consolidation Settlement (mm)	Settlement (mm) for 10 t/m2 (from IS:8009 (Part I), Fig. 9, Page NO. 17)	Settlement in Non-Cohesive Soil Si (mm)	Total Settlement (mm)	Depth Factor	Rigidity Factor	Corrected Total Settlement (mm)
Layer 1		2.00	7.00	5.00				5.00	7.20	7.200	0.779	15			22.00	24.40	24.40			
Layer 2		7.00	12.80	5.80				5.80	15.100	15.100	0.177	54	0.0025	2.54			2.54			
	2.00				0.78	7.20	7.20											0.93	1.00	25.00
Layer 1		3.00	7.00	4.00				4.00	7.20	7.200	0.927	15			22.00	24.61	24.61			
Layer 2		7.00	13.80	6.80				6.80	14.600	14.600	0.225	54	0.0025	3.78			3.78			
	3.00				0.93	7.20	7.20											0.88	1.00	25.00
Layer 1		4.00	7.00	3.00				3.00	7.20	7.200	1.150	15			22.00	24.21	24.21			
Layer 2		7.00	14.80	7.80				7.80	14.100	14.100	0.300	54	0.0025	5.78			5.78			
	4.00				1.15	7.20	7.20											0.83	1.00	25.00

SETTLEMENT CALCULATION AS PER 8009 Part-1 1976														CH. (KM): 42+256				BH NO. :-		BH-P1
Layer	Depth below FGL (m)	From (m)	To (m)	Layer Thickness	Stress at Foundation level (Kg/Cm2)	Length (m)	Breadth (m)	Layer Thickness(m)	Dispersed Length (m)	Dispersed Breadth (m)	Stress Increment at top for cohesionless layer & at mid Depth for cohesive layer (kg/Cm2)	Average N-Value	Mvc (Cm^2/Kg)	Consolidation Settlement (mm)	Settlement (mm) for 10 t/m2 (from IS:8009 (Part I), Fig. 9, Page NO. 17)	Settlement in Non-Cohesive Soil Si (mm)	Total Settlement (mm)	Depth Factor	Rigidity Factor	Corrected Total Settlement (mm)
Layer 1		2.00	7.00	5.00				5.00	7.20	7.200	1.559	15			22.00	48.80	48.80			
Layer 2		7.00	12.80	5.80				5.80	15.100	15.100	0.354	54	0.0025	5.08			5.08			
	2.00				1.56	7.20	7.20											0.93	1.00	50.00
Layer 1		3.00	7.00	4.00				4.00	7.20	7.200	1.854	15			22.00	49.23	49.23			
Layer 2		7.00	13.80	6.80				6.80	14.600	14.600	0.451	54	0.0025	7.57			7.57			
	3.00				1.85	7.20	7.20											0.88	1.00	50.00
Layer 1		4.00	7.00	3.00				3.00	7.20	7.200	2.301	15			22.00	48.43	48.43			
Layer 2		7.00	14.80	7.80				7.80	14.100	14.100	0.600	54	0.0025	11.55			11.55			
	4.00				2.30	7.20	7.20											0.83	1.00	50.00

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 20.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 101+830 **Dia of pile =** 1.00 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.00	2.00	0.00	2.00					0.72	200	0.07											
1.00		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								314.29		0.00	
1.00		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								314.29		0.00	
1.00		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								314.29		0.00	
1.00		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								314.29		24.95	
1.00		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								314.29		52.78	
1.00		13.00	15.00	1.71	5	1.00	0.26	0.97	200	1.15								314.29		34.26	
1.00		15.00	22.00	1.71	5	1.00	0.26	0.97	700	1.25	1.25	0.88	0.19	25	9	10.00	10.88	314.29	7857.14	121.80	115.08
																				233.79	115.08

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (233.79 + 115.08) / 2.5 Qa,uplift = 233.79 / 3 + 39.27

Qa,comp.= 139.55 T Qa,uplift = 117.20 T

Say **Qa,comp.= 139.00 T** **Qa,uplift = 117.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 22.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.00 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.00	2.00	0.00	2.00					0.72	200	0.07											
1.00		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								314.29		0.00	
1.00		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								314.29		0.00	
1.00		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								314.29		0.00	
1.00		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								314.29		24.95	
1.00		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								314.29		52.78	
1.00		13.00	15.00	1.71	5	1.00	0.26	0.97	200	1.15								314.29		34.26	
1.00		15.00	23.50	1.71	5	1.00	0.26	0.97	850	1.25								314.29		147.90	
1.00		23.50	24.00	0.19	25	1.00	1.00	0.88	50	1.25	1.25	0.88	0.19	25	9	10.00	10.88	314.29	7857.14	12.12	115.08
																				272.01	115.08

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (272.01 + 115.08) / 2.5 Qa,uplift = 272.01 / 3 + 43.2

Qa,comp.= 154.84 T Qa,uplift = 133.87 T

Say **Qa,comp.= 154.00 T** **Qa,uplift = 133.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 24.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.00 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.00	2.00	0.00	2.00					0.72	200	0.07											
1.00		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								314.29		0.00	
1.00		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								314.29		0.00	
1.00		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								314.29		0.00	
1.00		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								314.29		24.95	
1.00		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								314.29		52.78	
1.00		13.00	15.00	1.71	5	1.00	0.26	0.97	200	1.15								314.29		34.26	
1.00		15.00	23.50	1.71	5	1.00	0.26	0.97	850	1.25								314.29		147.90	
1.00		23.50	26.00	0.19	25	1.00	1.00	0.88	250	1.25	1.25	0.88	0.19	25	9	10.00	10.88	314.29	7857.14	60.59	115.08
																				320.48	115.08

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (320.48 + 115.08) / 2.5 Qa,uplift = 320.48 / 3 + 47.12

Qa,comp.= 174.22 T Qa,uplift = 153.95 T

Say **Qa,comp.= 174.00 T** **Qa,uplift = 153.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 26.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.00 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.00	2.00	0.00	2.00					0.72	200	0.07											
1.00		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								314.29		0.00	
1.00		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								314.29		0.00	
1.00		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								314.29		0.00	
1.00		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								314.29		24.95	
1.00		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								314.29		52.78	
1.00		13.00	15.00	1.71	5	1.00	0.26	0.97	200	1.15								314.29		34.26	
1.00		15.00	23.50	1.71	5	1.00	0.26	0.97	850	1.25								314.29		147.90	
1.00		23.50	28.00	0.19	25	1.00	1.00	0.88	450	1.25	1.25	0.88	0.19	25	9	10.00	10.88	314.29	7857.14	109.06	115.08
																				368.95	115.08

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (368.95 + 115.08) / 2.5 Qa,uplift = 368.95 / 3 + 51.05

Qa,comp.= 193.61 T Qa,uplift = 174.03 T

Say **Qa,comp.= 193.00 T** **Qa,uplift = 174.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 28.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.00 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.00	2.00	0.00	2.00					0.72	200	0.07											
1.00		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								314.29		0.00	
1.00		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								314.29		0.00	
1.00		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								314.29		0.00	
1.00		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								314.29		24.95	
1.00		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								314.29		52.78	
1.00		13.00	15.00	1.71	5	1.00	0.26	0.97	200	1.15								314.29		34.26	
1.00		15.00	23.50	1.71	5	1.00	0.26	0.97	850	1.25								314.29		147.90	
1.00		23.50	28.50	0.19	25	1.00	1.00	0.88	500	1.25								314.29		121.17	
1.00		28.50	30.00	0.00	31	1.00	1.00	0.81	150	1.25	1.25	0.88	0.19	25	9	10.00	10.88	314.29	7857.14	35.30	115.08
																				416.36	115.08

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (416.36 + 115.08) / 2.5 Qa,uplift = 416.36 / 3 + 54.98

Qa,comp.= 212.58 T Qa,uplift = 193.77 T

Say **Qa,comp.= 212.00 T** **Qa,uplift = 193.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 30.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.00 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.00	2.00	0.00	2.00					0.72	200	0.07											
1.00		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								314.29		0.00	
1.00		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								314.29		0.00	
1.00		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								314.29		0.00	
1.00		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								314.29		24.95	
1.00		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								314.29		52.78	
1.00		13.00	15.00	1.71	5	1.00	0.26	0.97	200	1.15								314.29		34.26	
1.00		15.00	23.50	1.71	5	1.00	0.26	0.97	850	1.25								314.29		147.90	
1.00		23.50	28.50	0.19	25	1.00	1.00	0.88	500	1.25								314.29		121.17	
1.00		28.50	32.00	0.00	31	1.00	1.00	0.81	350	1.25	1.25	0.81	0.00	31	9	24.74	25.99	314.29	7857.14	82.37	250.42
																				463.43	250.42

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (463.43 + 250.42) / 2.5 Qa,uplift = 463.43 / 3 + 58.9

Qa,comp.= 285.54 T Qa,uplift = 213.38 T

Say **Qa,comp.= 285.00 T** **Qa,uplift = 213.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 20.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.20 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.20	2.00	0.00	2.00					0.72	200	0.07											
1.20		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								377.14		0.00	
1.20		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								377.14		0.00	
1.20		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								377.14		0.00	
1.20		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								377.14		29.94	
1.20		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								377.14		63.33	
1.20		13.00	18.00	1.71	5	1.00	0.26	0.97	500	1.29								377.14		105.20	
1.20		18.00	22.00	1.71	5	1.00	0.26	0.97	400	1.54	1.54	0.88	0.19	25	9	10.00	10.88	377.14	11314.29	87.38	199.87
																				285.85	199.87

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (285.85 + 199.87) / 2.5 Qa,uplift = 285.85 / 3 + 56.55

Qa,comp.= 194.29 T Qa,uplift = 151.83 T

Say **Qa,comp.= 194.00 T** **Qa,uplift = 151.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 22.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.20 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.20	2.00	0.00	2.00					0.72	200	0.07											
1.20		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								377.14		0.00	
1.20		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								377.14		0.00	
1.20		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								377.14		0.00	
1.20		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								377.14		29.94	
1.20		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								377.14		63.33	
1.20		13.00	18.00	1.71	5	1.00	0.26	0.97	500	1.29								377.14		105.20	
1.20		18.00	23.50	1.71	5	1.00	0.26	0.97	550	1.54								377.14		120.14	
1.20		23.50	24.00	0.19	25	1.00	1.00	0.88	50	1.54	1.54	0.88	0.19	25	9	10.00	10.88	377.14	11314.29	17.11	199.87
																				335.73	199.87

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (335.73 + 199.87) / 2.5 Qa,uplift = 335.73 / 3 + 62.2

Qa,comp.= 214.24 T Qa,uplift = 174.11 T

Say **Qa,comp.= 214.00 T** **Qa,uplift = 174.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 24.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.20 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.20	2.00	0.00	2.00					0.72	200	0.07											
1.20		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								377.14		0.00	
1.20		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								377.14		0.00	
1.20		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								377.14		0.00	
1.20		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								377.14		29.94	
1.20		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								377.14		63.33	
1.20		13.00	18.00	1.71	5	1.00	0.26	0.97	500	1.29								377.14		105.20	
1.20		18.00	23.50	1.71	5	1.00	0.26	0.97	550	1.54								377.14		120.14	
1.20		23.50	26.00	0.19	25	1.00	1.00	0.88	250	1.54	1.54	0.88	0.19	25	9	10.00	10.88	377.14	11314.29	85.56	199.87
																				404.17	199.87

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (404.17 + 199.87) / 2.5 Qa,uplift = 404.17 / 3 + 67.86

Qa,comp.= 241.62 T Qa,uplift = 202.58 T

Say **Qa,comp.= 241.00 T** **Qa,uplift = 202.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 26.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.20 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.20	2.00	0.00	2.00					0.72	200	0.07											
1.20		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								377.14		0.00	
1.20		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								377.14		0.00	
1.20		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								377.14		0.00	
1.20		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								377.14		29.94	
1.20		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								377.14		63.33	
1.20		13.00	18.00	1.71	5	1.00	0.26	0.97	500	1.29								377.14		105.20	
1.20		18.00	23.50	1.71	5	1.00	0.26	0.97	550	1.54								377.14		120.14	
1.20		23.50	28.00	0.19	25	1.00	1.00	0.88	450	1.54	1.54	0.88	0.19	25	9	10.00	10.88	377.14	11314.29	154.00	199.87
																				472.62	199.87

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (472.62 + 199.87) / 2.5 Qa,uplift = 472.62 / 3 + 73.51

Qa,comp.= 268.99 T Qa,uplift = 231.05 T

Say **Qa,comp.= 268.00 T** **Qa,uplift = 231.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 28.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.20 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.20	2.00	0.00	2.00					0.72	200	0.07											
1.20		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								377.14		0.00	
1.20		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								377.14		0.00	
1.20		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								377.14		0.00	
1.20		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								377.14		29.94	
1.20		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								377.14		63.33	
1.20		13.00	18.00	1.71	5	1.00	0.26	0.97	500	1.29								377.14		105.20	
1.20		18.00	23.50	1.71	5	1.00	0.26	0.97	550	1.54								377.14		120.14	
1.20		23.50	28.50	0.19	25	1.00	1.00	0.88	500	1.54								377.14		171.11	
1.20		28.50	30.00	0.00	31	1.00	1.00	0.81	150	1.54	1.54	0.88	0.19	25	9	10.00	10.88	377.14	11314.29	52.30	199.87
																				542.03	199.87

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (542.03 + 199.87) / 2.5 Qa,uplift = 542.03 / 3 + 79.17

Qa,comp.= 296.76 T Qa,uplift = 259.84 T

Say **Qa,comp.= 296.00 T** **Qa,uplift = 259.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

NAME OF PROJECT:- "GTI for designing of bridges and embankment for Haryana Orbital Rail Corridor (HORC) project from Palwal to Harsana Kalan including connectivity to existing IR network in the state of Haryana.

Length of Pile below cut of level = 30.00 m **Bore Hole No =** BH-P1 **Ch. (KM)** 42+256 **Dia of pile =** 1.20 m **Cut-off Level =** 2.00 m below EGL

Restricting PD to 15D **Water Table depth considered for analysis =** 0.00 m **Scour Depth =** Non-scourable **Liquefaction Depth =** 8.50 m

Dia. of Pile	Cut-off Depth	Soil layers		Properties of layers/for Skin Friction							For End Bearing										
		from	to	c	Ø	k	α	γeff	ΔL	pd (s.f)	Pd (e.b)	γeff	c	Ø	Nc	Nq	Ny	As/cm	Ap	qs	Qp
(m)	(m)	(m)	(m)	kg/cm^2	deg			gm/cc	cm	kg/cm^2	kg/cm^2	gm/cc	kg/cm^2	deg				cm^2	cm^2	t	t
1.20	2.00	0.00	2.00					0.72	200	0.07											
1.20		2.00	4.00	0.13	25	1.00	1.00	0.72	200	0.22								377.14		0.00	
1.20		4.00	7.00	0.15	25	1.00	1.00	0.75	300	0.40								377.14		0.00	
1.20		7.00	8.50	0.77	6	1.00	0.59	0.87	150	0.58								377.14		0.00	
1.20		8.50	10.00	0.77	6	1.00	0.59	0.87	150	0.71								377.14		29.94	
1.20		10.00	13.00	1.38	6	1.00	0.34	0.93	300	0.91								377.14		63.33	
1.20		13.00	18.00	1.71	5	1.00	0.26	0.97	500	1.29								377.14		105.20	
1.20		18.00	23.50	1.71	5	1.00	0.26	0.97	550	1.54								377.14		120.14	
1.20		23.50	28.50	0.19	25	1.00	1.00	0.88	500	1.54								377.14		171.11	
1.20		28.50	32.00	0.00	31	1.00	1.00	0.81	350	1.54	1.54	0.81	0.00	31	9	24.74	25.99	377.14	11314.29	122.03	444.78
																				611.76	444.78

Qu,comp.= qs + Qp Qu,uplift = Safe Frictional Resistance + Weight of Pile

Qa,comp.= (611.76 + 444.78) / 2.5 Qa,uplift = 611.76 / 3 + 84.82

Qa,comp.= 422.62 T Qa,uplift = 288.74 T

Say **Qa,comp.= 422.00 T** **Qa,uplift = 288.00 T**

*FOS for Vertical Capacity of pile in compression = 2.5

**FOS for Uplift Capacity of pile = 3.0

Lateral Load capacity of Pile

BH-P1
Ch. (KM): 42+256

Type of Strata = Clayey

Le = Embedded Length of Pile in Meter = 20.000 m **Fck = 35.0 N/mm^2** **D = 100 cm**

Bed level 0.0 m

Pile cap bottom level -2.0 m

E =	Young's Modulus of Pile (Kg/cm^2)	=	$5000\sqrt{F_{ck}}$ N/mm^2	=	295803.99	Kg/cm^2
I =	Moment of Inertia (cm^2)	=	$\pi xD^4/64$	=	4908738.5	cm^4
c =	weighted mean of cohesion along the length of pile from the top of scour depth to bottom of pile			=	1.550	Kg/cm^2
q_u =	Unconfined Compression Strength	=	2 x c	=	3.100	Kg/cm^2
k_1 =	Modulus of Subgrade Reaction for cohesive soil (from Table 4)			=	5.580	kg/cm^3
K =		=	$k_1 x 0.3/(1.5xB)$	=	1.116	kg/cm^3
R,	Relative stiffness factor in Preloaded Clay R =		$\sqrt[4]{EI/KD}$	=	**337.7**	cm

For Long Pile If $L_e > 3.5R$

L1 =	=	**650.000**	cm
L_1/R	=	1.92	

For Fixed Head Pile

L_f/R	=	**1.569**	From Fig. 4
Lf	=	529.76	cm
Equivalent length of cantilever L= $L1+L_F$: 650.00 + 529.75864	=	**1179.76**	cm

Y = Pile Head Deflection (Cm) = $\frac{Q(L_1 + L_F)^3}{12\ EI}$ (for fixed Head pile)

Q = Lateral Load in Kg

Lateral Load For Pile Head Deflection 0.5 cm Q	=	5305.736	Kg
	=	**5.3**	**T**

Lateral Load capacity of Pile

BH-P1
Ch. (KM): 42+256

Type of Strata = Clayey

Le = Embedded Length of Pile in Meter = 20.000 m **Fck = 35.0 N/mm^2** **D = 120 cm**

Bed level 0.0 m

Pile cap bottom level -2.0 m

E =	Young's Modulus of Pile (Kg/cm^2)	=	$5000\sqrt{F_{ck}}$ N/mm^2	=	295803.99	Kg/cm^2	
I =	Moment of Inertia (cm^2)	=	$\pi xD^4/64$	=	10178760.2	cm^4	
c =	weighted mean of cohesion along the length of pile from the top of scour depth to bottom of pile			=	1.550	Kg/cm^2	
q_u =	Unconfined Compression Strength	=	2 x c	=	3.100	Kg/cm^2	
k_1 =	Modulus of Subgrade Reaction for cohesive soil (from Table 4)			=	5.580	kg/cm^3	
K =		=	$k_1 x 0.3/(1.5xB)$	=	0.930	kg/cm^3	
R,	Relative stiffness factor in Preloaded Clay R =		$\sqrt[4]{EI/KD}$	=	**405.3**	cm	

For Long Pile If $L_e > 3.5R$

L1 =	=	**650.000**	cm
L_1/R	=	1.60	

For Fixed Head Pile

L_f/R	=	**1.598**	From Fig. 4
Lf	=	647.44	cm
Equivalent length of cantilever L= $L1+L_F$: 650.00 + 647.4427	=	**1297.44**	cm

Y = Pile Head Deflection (Cm) = $\frac{Q(L_1 + L_F)^3}{12\ EI}$ (for fixed Head pile)

Q = Lateral Load in Kg

Lateral Load For Pile Head Deflection 0.5 cm Q	=	8271.525	Kg
	=	**8.3**	**T**

Tender No. HORC/HRIDC/C-23/2022
Attachment 13
to
Corrigendum No. 2

Part 2, Section VII-8: Tender Drawings and Documents

Section VII-8B: Documents

List of Documents

6. List of Existing Structures to be Dismantled

List of Existing Structures to be Dismantled

(Ref. Sub-Clause 10.14, Appendix 10, Section VII-9: Appendices, Part 2 – Employer's Requirements)

C23 Section: Existing Structures							
S. No	**Type of Structure**	**Chainage (in m)**	**District**	**Sub Division**	**Length of obstruction to be considered (in m)**	**Chainage**	
						From	**To**
Structures in Main Line							
1	Two Houses	30040	NUH	Tauru	20	30030	30050
2	Boundary Wall	30330	NUH	Tauru	80	30290	30370
3	Borewell with one room	30580	NUH	Tauru	10		
4	Four Houses	31130	NUH	Tauru	20	30120	30140
5	Borewell	31400	NUH	Tauru	10		
6	Borewell	31740	NUH	Tauru	10		
7	Borewell with one room	33360	NUH	Tauru	20	33350	33370
8	One House	33460	NUH	Tauru	30	33445	33475
9	Poultry Farm	33550	NUH	Tauru	40	33530	33570
10	Two Room	33880	NUH	Tauru	20	33870	33890
11	Borewell with one room	34020	NUH	Tauru	10		
12	Paulty farms and well	34100	NUH	Tauru	20		
13	Boundary wall	34660	NUH	Tauru	85	34660	34745
14	House	34800	NUH	Tauru	40	34780	34820
15	House + Boundary wall	35200	NUH	Tauru	20	35190	35210
16	Borewell with one room	36210	NUH	Tauru	10		
17	Bore well, Poultry shed	36440	NUH	Tauru	60	36420	36480
18	Bore well, Two Room	36480	NUH	Tauru			
19	Borewell with one room	36630	NUH	Tauru	10		
20	Borewell with one room	36960	NUH	Tauru	10		
21	One Room	37080	NUH	Tauru	10		

C23 Section: Existing Structures							
S. No	Type of Structure	Chainage (in m)	District	Sub Division	Length of obstruction to be considered (in m)	Chainage	
						From	To
22	Borewell with Two room	37630	NUH	Tauru	10		
23	Borewell with one room	38310	NUH	Tauru	10		
24	Borewell with one room	38920	NUH	Tauru	10		
25	Borewell with one room	39000	NUH	Tauru	10		
26	Borewell	39260	NUH	Tauru	10		
27	House , Poultry Shed	39340	NUH	Tauru	60	39300	39360
28	Borewell	39455	NUH	Tauru	10		
29	Borewell with one room	40310	Gurugram	Gurugram	10		
30	Borewell with one room	40450	Gurugram	Gurugram	10		
31	Borewell with one room	40980	Gurugram	Gurugram	10		
32	House in Ag. Field	41580 to 41660	Gurugram	Gurugram	80	41580	41660
33	House + Bore well	42460	Gurugram	Gurugram	30	42445	42475
34	water tank	42580	Gurugram	Gurugram			
35	Dhaba + Under Constructed Swimming Pool	42830	Gurugram	Gurugram	45	42810	42855
36	Bore well + one room	42960	Gurugram	Gurugram	10		
37	Gaushala Shed + Three Houses	43300 to 43360	Gurugram	Gurugram	60	43300	43360
38	Boundary Wall	43450	Gurugram	Gurugram	50	43450	43500
39	2 Houses and 1 bore well	43640	Gurugram	Gurugram			
40	Boundary wall	43720 to 43780	Gurugram	Gurugram	60	43720	43780
41	Cardboard Factory	43800	Gurugram	Gurugram	120	43720	43840
42	House	43900	Gurugram	Gurugram			
43	Four Houses	43890 to 43940	Gurugram	Gurugram	50	43890	43940
44	One Room	44530			20	44510	44530

C23 Section: Existing Structures							
S. No	Type of Structure	Chainage (in m)	District	Sub Division	Length of obstruction to be considered (in m)	Chainage	
						From	To
45	House + Factory + Boundary wall	44500			190	44990	45180
46	Boundary wall	45680	Gurugram	Gurugram	60	45650	45710
47	House	46000			50	45990	46040
48	Bore well and one room	46150	Gurugram	Gurugram	10		
49	Bore well and one room	46410	Gurugram	Gurugram	10		
50	Gaushala Shed	46640	Gurugram	Gurugram	10		
51	Bore well and one room	47100	Gurugram	Gurugram	10		
52	Borewell	47180	Gurugram	Gurugram	10		
53	House	48080	Gurugram	Gurugram	30	48080	48110
54	Bore Well and three Houses	48284	Gurugram	Gurugram	140	48200	48340
55	Teen Shed Room	48396	Gurugram	Gurugram	30	48380	48410
56	Bore well and one room	48930	Gurugram	Gurugram	10		
57	Bore Well	48980	Gurugram	Gurugram	10		
58	House	56064	Gurugram	Pataudi	30	55970	56000
59	Bore well and one room	56150	Gurugram	Pataudi	10		
60	Room	56200	Gurugram	Pataudi	10		
61	Bore well and one room	56514	Gurugram	Pataudi			
62	one room	57434	Gurugram	Pataudi	10		
63	Bore well and one room	57814	Gurugram	Pataudi	10		
64	Bore well	58614	Gurugram	Pataudi	10		
65	Bore Well and Room	58884	Gurugram	Pataudi	10		
66	Ice Factory	59164	Gurugram	Pataudi	60	59134	59194
67	Teen Shed Milk Dairy	59334	Gurugram	Pataudi	30	59320	59350
Structures in Connectivities							

C23 Section: Existing Structures							
S. No	**Type of Structure**	**Chainage (in m)**	**District**	**Sub Division**	**Length of obstruction to be considered (in m)**	**Chainage**	
						From	**To**
New Patli - Patli Connectivity							
68	Borewell with one room	1930	Gurugram	Pataudi	10		
New Patli - Sultanpur Connectivity							
69	Two Houses	1170 to 1200	Gurugram	Pataudi	30	1170	1200
70	House	1650	Gurugram	Pataudi	30	1630	1660
71	One Room	3220	Gurugram	Pataudi	10	3220	3230
72	Two Rooms	3700	Gurugram	Pataudi	20	3690	3710
Sultanpur Yard Modification							
73	6 houses & 1 flour Factory	0.00 to 130m	Gurugram	Pataudi	130	0	130

Tender No. HORC/HRIDC/C-23/2022

Attachment 14
to
Corrigendum No. 2

Part 2, Section VII-7: Employer's Requirements -Outline Construction Specifications (OCS)-Civil

Chapter 7: Items Included in Schedule-B

CHAPTER-7
ITEMS INCLUDED IN SCHEDULE-B

7.1 Schedule B1

This Schedule includes items of work based on North Western Railways Unified Standard Schedule of Rates (NWR USSOR)-2019

The scope of work, specifications, method of measurement and payment for items included in Schedule No. B1 shall be governed by NWR USSOR and Indian Railway Unified Standard Specifications (Formation works, Bridges and P.way Works) – 2019.

7.2 Schedule B2

This Schedule includes items of work based on Northern Railways Unified Standard Schedule of Rates (NR USSOR)- 2010

The scope of work, specifications, method of measurement and payment for items included in Schedule No. B2 shall be governed by NR USSOR and Indian Railway Unified Standard Specifications for Works and Material – 2010.

7.3 Schedule B3

This Schedule includes items of work based on Delhi Schedule of Rates (DSR), 2021

The scope of work, specifications, method of measurement and payment for items included in Schedule B3 shall be governed by DSR 2021 and CPWD Specifications - 2019.

7.4 Schedule-B4

This Schedule includes Non-Schedule (NS) items.

7.4.1 NS Item No. 1: Earthwork in Railway Embankment

Earthwork in embankment for 32.5t axle load and as per RDSO specification No. RDSO/2020/ GE:004 September 2020 "Comprehensive Guidelines and Specification for Railway Formation" with contractor's own earth from borrow areas including all lead, lift, ascent, descent, royalty, taxes, cess, compensation, crossing of nallahs /stream and other obstructions including mechanical compaction in layers with watering, handling, re-handling, dressing of banks to the final profile with all labour, material, tools, plant, machinery and equipment, taxes, cess etc. as a complete job in accordance with the specification and drawings.

Note: 10% of payment shall be withheld till the slopes are dressed to the required profile and compacted mechanically with vibratory slope rollers as per RDSO guidelines.

I. Method Statement

The Contractor shall submit Method Statement for carrying out earthwork in embankment to the Engineer for approval.

II. Execution

Earthwork in embankment shall be carried as per Clause 3 of Section VII-5: Employer's requirements-ODS-Civil and Chapter 2 of Section VII-6: Employer's Requirements-OCS-Civil

III. Method of Measurement

Measurement for payment for earthwork in embankment shall be in-situ volume as measured in cubic meter (cum) from the levels recorded prior to any filling work and the lines and grades shown on the Drawings or established at the Site by the Engineer. Payment shall be made at the Unit Price per cubic metre, entered in the Priced Bill of Quantities. 10% payment shall be withheld till the slopes are dressed to the required profile and compacted mechanically with vibratory slope rollers as per RDSO guidelines.

7.4.2 NS Item No. 2: Blanketing material

Supplying and laying blanketing material produced through mechanical means using crushers and pug mill for 32.5 T axle load as per RDSO specification No. RDSO/2020/GE:004 September 2020 "Comprehensive Guidelines and Specification for Railway Formation" over the top of subgrade including all lead, lift, ascent, descent, royalty, taxes, cess, crossing of nallahs /stream and other obstructions including mechanical compaction in layers not exceeding 300 mm thick with vibratory rollers, watering, handling, re-handling and dressing of formation to the final profile with all labour, material, tools, plants, machinery and equipment, taxes, cess, etc. as a complete job in accordance with the specification and drawings.

Note: 10% of payment shall be withheld till the slopes are dressed to the required profile and compacted mechanically with vibratory rollers as per RDSO guidelines.

I. Method Statement

The Contractor shall submit Method Statement for providing blanketing to the Engineer for approval.

II. Execution

i. After conducting necessary tests and field trials the Contractor shall get the blanket material approved from the Engineer.

ii. The work of blanketing shall be carried out in accordance with RDSO specification No. RDSO/2020/GE:004 September 2020 "Comprehensive Guidelines and Specification for Railway Formation".

III. Method of Measurement

Measurement for payment of blanketing shall be as per the cross section shown in the Drawings or established at the Site by the Engineer. Payment will be made at the Unit Price per cubic metre, entered in the Priced Bill of Quantities. 10% payment shall be withheld till the slopes are dressed to the required profile and compacted mechanically with vibratory slope rollers as per RDSO guidelines.

7.4.3 NS Item No.3: Reinforced Cement Concrete

Supplying and laying in position M-35 RCC as per approved design mix with admixtures and manufactured in fully automatic batching plant and transported to site of work in transit mixer for all lifts & leads, having continuous agitated mixer, pumping concrete from transit mixer to site of laying, compacting, finishing & curing, with all labour, material, tools, plants, machinery and equipment, taxes, cess etc., as a complete job ,but excluding supplying & fixing form work (centering & shuttering), in accordance with the specification and drawings.
Notes: –

(i) Cost of cement is included in the above item.
(ii) Cost of Reinforcement steel is not included in the above item and will be paid separately under relevant item of Schedule B1.
(iii) Cost of supplying & fixing form work (centering & shuttering) is not included in the above item (except pile cap & open foundation) and will be paid separately under relevant item of Schedule B1

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work of bridges to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement, the Specification and the Drawings. RCC work shall comply with the provisions of Annexure OCS -1 & 2 of Section VII-6: Employer's requirements-OCS-Civil.

II. Method of Measurement

Measurement for payment of this item shall be the quantity of RCC worked out/measured in cum from the Drawings. Payment will be made at the Unit Price per cubic meter entered in the Priced Bill of Quantities.

7.4.4 NS Item No.4: Bored cast in-situ Piling

Boring 1200 mm diameter piles using Hydraulic Rig in all kinds of strata including boulder studded soil, underground structure like channel, sewer manholes, old foundation or any other obstruction, irrespective of sub-soil water level in all conditions whether dry or under water, shoe and temporary casing pipe, if required, with contractor plant, machinery & equipment for pile boring, use of bentonite slurry including all operations, cleaning of bore holes, supplying and laying in-situ with tremie pipe M-35 RCC in piles as per approved design mix with admixtures and manufactured in fully automatic batching plant and transported to site of work in transit mixer for all lifts & leads, having continuous agitated mixer, pumping concrete from transit mixer to site of laying including supplying & fixing form work (centering & shuttering), compacting, finishing, curing, chipping off pile top to remove laitance concrete above cut off level, removal and disposal of surplus excavated earth/debris/muck outside ROW including all lead, lift, ascends, descends, loading, unloading handling, re-handling, crossing of stream, nallahs, railway track, level crossing etc. with all labour, material, tools, plants, machinery and equipment, taxes, cess etc. as a complete job in accordance with the Specification and the Drawings.

Notes:

i. Cost of cement is included in the above item.
ii. Cost of Reinforcement steel is not included in the above item and will be paid separately under relevant item of schedule-B1.
iii. Cost of temporary casing pipe is included in the above item. However, the cost of permanent casing pipe is not included in this item and shall be paid separately under relevant item of schedule B1, if required and approved by the Engineer.

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work of piling. The work shall be carried out strictly in accordance with the approved Method Statement, Manual on the design and construction of Well and Pile foundations, Sub-clause 3.5.3 to 3.5.9 of Section VII-6: Employer's requirements-OCS-Civil and Annexure OCS-1 & 2 of Section VII-6: Employer's requirements-OCS-Civil) and the Drawings.

II. Method of Measurement

The method of measurement for payment of piles shall be the length of pile in running metres from founding level to bottom of pile cap as established at the Site by the Engineer. Payment will be made at the Unit Price per running metre, entered in the Priced Bill of Quantities.

7.4.5 NS Item No.5: Earthwork in Filling

Earthwork in filling with contractor's own earth of approved quality from borrow areas including all lead all lead, lift, ascent, descent, royalty, taxes, cess, compensation, crossing of nallahs /stream and other obstructions including mechanical compaction in layers with watering to 95% of MDD (as per IS 2720 part 8), handling, re-handling, dressing to the final profile with all labour, material, tools, plant, machinery and equipment, taxes, cess etc. as a complete job in accordance with the specification and drawings.

I. Method Statement

This item will be used for earthwork in filling for other than Railway embankment. The Contractor shall submit Method Statement for carrying out the work to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement.

II. Method of Measurement

Measurement for payment for earthwork in filling will be the in-situ volume as measured in cubic meter (cum) from the levels recorded prior to any filling work and the lines and grades shown on the Drawings or established at the Site by the Engineer. Payment will be made at the Unit Price per cubic metre, entered in the Priced Bill of Quantities. 10% payment shall be withheld till the slopes are dressed to the required profile and compacted mechanically with vibratory rollers

7.4.6 NS Item No.6: Self Supported Galvalume Roof

Providing, fabricating & laying of colour coated galvalume (Proflex system roofing) material for self supported roofing system , material shall be of following specification, BMT 0.90mm to 1.00mm,APT 0.95mm tolerance +/- 0.02mm thick ,Width 605 mm or as decided by railway (Tolerance +/- 2mm),including supplying, loading ,transporting, uploading & stacking at site ,fabricating and laying with all contractors tools, plants, machineries materials and fixtures labours including all lead and lift and laps/wastage if any etc. complete. The colour of sheet will be decided by the Engineer. The rate is also inclusive of designing of roofing system, proof checking and providing execution drawing. Fabrication and installation of self supported roofing.

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement and the Drawings. The work shall comply with the provisions of RDSO Repot No. RDSO/WKS/2015/3 -April'2015 on Self Supporting Roofing System.

II. Method of Measurement

Measurement for payment of this item shall be the area of roof in plan worked out/measured in square meter (Sqm) from the Drawings/site. Payment will be made at the Unit Price per Sqm entered in the Priced Bill of Quantities

7.4.7 NS Item No. 7: Stainless Steel Railing

Providing and fixing stainless steel (Grade 304) railing made of hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, including fixing the railing with necessary accessories & stainless steel dash fasteners , stainless steel bolts etc., of required size, on the top of the floor or the side of waist slab with suitable arrangement as per approval of the Engineer, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.)

I. Method Statement

The Contractor shall submit Method Statement for fixing of stainless steel (Grade 304) for railing in staircase, balconies, pedestrian subway, Enquiry/Reservation counters to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method statement and the Drawings.

II. Material

The stainless steel (304 grade) shall conform to IS 6911 : 2017. Fabrication of railing shall be done as shown in the Drawings. Fabrication of all stainless-steel sections should be done only with tools dedicated to stainless steel materials. Tooling and work surfaces must be thoroughly cleaned before use.

Following items shall be ensured:

i. Removal of all moisture by blowing with dry air or heating with a torch.
ii. Elimination of organic contaminates like oil, paints, anti-spatter compounds, grease, pencil marks, cutting compounds, adhesive from protective paper, soap used for leak testing etc.
iii. Plasma cutter to be used for cutting stainless steel.
iv. Zinc contamination to be avoided.
v. Brushes or tools previously used on galvanized steel not to be used.

III. Fixing

Railing shall be fixed with necessary accessories and stainless-steel dash fasteners & stainless-steel bolts etc. of required size, on the top of the floor or the side of waist slab with suitable arrangement as per approval of the Engineer.

IV. Method of Measurement

Only weight of stainless-steel members shall be considered in kg for the purpose of measurement. Fixing accessories such as nuts, bolts, fasteners etc. shall be deemed to be included in this item and shall not be paid separately. The rate shall include the cost of materials and labour involved in all the operations described above. Nothing extra shall be paid for fixing arrangements i.e. drilling, providing nuts & bolts etc.

7.4.8 NS Item No. 8: H- beam sleeper

Supplying, fabricating, transportation and fixing galvanized H-Beam sleepers as per RDSO drawing RDSO/B/1636/4/R & RDSO/B/1636/5 with latest alteration and specifications thereto complete with all fittings and fixtures including the cost of all steel sections, all fittings and fixtures ,elastomeric pad, galvanized bolts, nuts, washer, split pin, fish plates 1m and 0.6m long along with fish bolts and nuts for 60Kg running rail and 52Kg guard rail respectively, track fittings and fastenings (Zero Toe Load Fastening) for 60 kg running rail and 52 Kg guard rail as per RDSO drg -RDSO/T-8759 to RDSO/T8765. labour, lead, lift, plants and equipment including galvanized work of full steel components complete in all respects as per approved drawing and technical specifications & as per direction of Engineer on Open Web Girder (OWG) bridges. The rate is also inclusive of the cost of supply of approved quality of epoxy/adhesive and fixing of elastomeric pads with different components of steel sleepers & girder in accordance with approved drawings. The steel to be supplied by the contractor for fabrication of steel H-Beam sleepers shall conform to IS-2062-2006, Grade B0 only. The rate is also inclusive of inspection charges of components of sleepers including all fixtures & fastening, galvanization etc. from the reputed laboratory/organization. Elastomeric pad plate and other track fittings shall be procured from RDSO approved source.

Notes: Payment under this item shall be made in following manner;

i. 75% of the rate shall be paid after fabrication, galvanization and transportation of H beam sleepers to the site and submission of material test certificate of manufacturer and inspection certificate of the agency nominated by the Engineer.
ii. 15% of the rate shall be paid after supply of fittings to the site and submission of inspection certificate of the agency nominated by the Engineer.
iii. iii. 10% of the rate will be paid after fixing H Beam sleepers to the girder in satisfactory manner.
iv. In case fixing is not required, then balance payment will be released on handing over of the sleepers after making recovery @ Rs.850/- per sleeper.

I. Method Statement

The Contractor shall submit Method Statement for fabrication and inspection/testing of steel-H beam sleeper and its fittings/fixtures to the Engineer for approval.

II. Execution

i. Steel used for fabrication of H-beam sleepers shall be of grade E-250 B0 quality as mentioned in para 8.2 of IRS B 1-2001.

ii. H-beam sleepers shall be fabricated as per RDSO drg. RDSO/B-1636/4/R & RDSO B-1636/5 & RDSO specification No. BS: 45 and other relevant specifications.

iii. Tie angle on H-beam sleepers can be dispensed with.

iv. All track fittings shall be procured from RDSO approved source. H- beam sleeper and fittings shall be inspected and passed by agency approved by the Engineer at the fabricator's/ manufacturer's works before supply.

III. Measurement

Measurement of H-beam sleepers shall be done in number. Payment under this item shall be made in following manner.

i. 75% of the rate shall be paid after fabrication, galvanization and transportation of H beam sleepers to the site and submission of material test certificate of manufacturer and inspection certificate of the agency nominated by Engineer.

ii. 15% of the rate shall be paid after supply of fittings to the site and submission of inspection certificate of the agency nominated by Engineer.

iii. 10% of the rate will be paid after fixing H Beam sleepers to the girder in satisfactory manner. In case fixing is not required, then balance payment will be released on handing over of the sleepers after making recovery @ Rs.850/- per sleeper.

7.4.9 NS Item No.9: Pathway on Open Web Girder Bridges

Supplying, fabrication and fixing pathway on Open Web Girder bridges with hollow steel, rolled and chequered plate including welding / bolting, priming painting with one coat ready mix Zinc Chromate conforming to IS:104 with DFT of 25-30Microns, followed by one coat of Zinc Chrome red oxide conforming to IS:2074 with DFT of 25 Microns with all material, labour, T&P as a complete job as RDSO drawing No. CBS 0045

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work of pathway on OWG bridges to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement, the Specifications and the Drawings. The work shall comply with the provisions of Annexure OCS-3 of Section VII-6: Employer's Requirements-OCS-Civil. Hollow steel sections shall conform to IS: 4923, steel tube sections to IS: 1148, chequered plate to IS:3502 and rolled sections to IS:2062.

II. Method of Measurement

Measurement for payment of this item shall be the weight of metal in the fabricated structure worked out/computed on the basis of nominal weight of materials and exact cut size of the member used in the structure as per drawing in MT. No additional payment shall be made for welds, bolt & nuts etc. Payment will be made at the Unit Price per MT entered in the Priced Bill of Quantities.

7.4.10 NS Item No. 10: Protection work using Precast CC blocks

Casting, supplying and laying of Pre-cast CC blocks of size 25x25 x20cm. or of required size as directed by the Engineer for protective works at bridges & banks like pitching, flooring, etc. using M20 design concrete mix with 20mm aggregate size including Contractor's shuttering, leading to bridge site from casting depot, including dressing and levelling of surface, providing gravel backing, laying & jointing blocks with cement mortar 1:3 with Contractor's labour and as directed by Engineer-in-charge (All labour and material including cement by contractor).

Notes:

i. Cost of cement is included in the item

ii. Payment for gravel backing will be paid under. NS item no -11of this Schedule.

iii. 60% Payment shall be made after casting of pre-cast concrete blocks and bringing them at work site. The balance 40% will be made on completion of laying and finishing.

iv. Measurement is based on quantity calculation of blocks used only (no. of blocks x volume of one block).

I. Method Statement

The Contractor shall submit Method Statement for, supplying and laying of precast concrete blocks for protective works at bridges to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement and Tender drawings (GC-HRIDC-SK-GEN-015) given in Section VII-8: Tender Drawings and Documents, Part-2 Employer’s Requirements.

II. Material

The work shall consist of precast cement concrete blocks in M-20 grade of size 25 cm x 25 cm x 20 cm in a casting yard. The Contractor shall establish a casting yard for manufacture of precast cement concrete blocks. The casting yard shall have facilities for casting, compaction by mechanical vibration, curing and loading of cement concrete block into trucks/tractor trollies. Concrete shall conform to Annexure OCS -1 of Section VII-6: Employer’s requirements-OCS-Civil.

III. Execution

a) Before laying the pitching, the sides of banks shall be trimmed to profile and compacted by vibratory roller to the required slope and profiles marked by means of line and pegs at intervals of 3 metres to ensure regular straight work and a uniform slope throughout. Depressions shall be filled and thoroughly compacted.
b) A layer of 150 mm thick well graded gravel/ stone aggregate shall be laid over prepared earth slope, watered and compacted.
c) Over the compacted gravel/stone aggregate layer, a RCC grid frame of size 1750 mm x 1750 mm of M-35 grade concrete shall be laid. After these grids have attained sufficient strength pre-cast CC block shall be placed inside the grids. The joints of CC blocks shall be sealed with cement mortar 1:3.
d) Toe wall shall invariably be provided at the location of pitching. The pitching shall proceed from toe wall towards the top. Payment of toe wall shall be made separately under Schedule 'B1'

IV. Method of Measurement

Measurement shall be in cubic meter based on quantity calculation of only the blocks used (i.e. number of blocks x volume of one block). Payment of RCC used in grid frame shall be done under Item No. NS-3 of this Schedule.

7.4.11 NS Item No. 11: Gravel Base Layer Below Pre-Cast CC Block

Supplying and laying of 150mm thick well graded stones aggregate/gravel as base layer over the embankment slopes with manual dressing, watering & compaction including the cost of supply of all material, labour, lead, lift, tools, plants, crossing of tracks etc. complete as per approved drawings and technical specifications.

I. Method Statement

The contractor shall submit method statement for laying of stone aggregate/gravel layer to the Engineer for approval.

II. Material

Stone aggregate/gravel for base layer shall be hard & well graded. Maximum particle size shall be limited up to 40 mm and fines (particle <75micron) shall be limited upto 12%.

III. Execution

Stone aggregate/gravel shall be laid in uniform layer over levelled and compacted embankment slopes. Base layer shall be watered and compacted manually before laying of CC blocks.

IV. Method of Measurement

Measurement shall be in cubic meter based on the area and thickness of layer.

7.4.12 NS Item No.12: Boulder Backing

Providing Boulder Backing behind wing wall, return wall, retaining wall with hand packed boulders & cobbles not less than 15cm in any direction & not less than 15kg (except smaller boulders required for filling voids) including all lead, lift, labour & other incidental charges as complete work in all respect. Cost of boulder/cobbles is included in this item.

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement.

II. Method of Measurement

Measurement for payment of this item shall be the quantity of boulder backing worked out/measured in cum from the Drawings/site. Payment will be made at the Unit Price per cubic meter entered in the Priced Bill of Quantities.

7.4.13 NS Item No. 13: Weep Holes

Providing and fixing of 75mm dia PVC pipe for weep holes in abutments, Wing Wall, Return Wall, Face wall, retaining wall etc. at suitable intervals as directed by the Engineer-.

I. Method Statement.

The method statement for providing and fixing of weep holes shall be submitted by the Contractor to the Engineer for approval. The pipes for weep holes shall be UPVC pipe, Type A conforming to IS:13592

II. Execution

Pipe for weep holes shall be placed at the specified locations and spacing in abutment, return walls and retaining walls etc. as shown in the Drawings.

III. Method of Measurement

Measurement for payment for weep holes shall be in running metres as shown in the Drawings.

7.4.14 Item No.14: Precast RCC Retaining Wall

Manufacturing, transportation (including loading & unloading) and installation in position (including joining and grouting) M-50 or higher grade precast reinforced cement concrete segmental retaining walls of specified height (height measured from founding level) as per the directions of the Engineer. Precast reinforced retaining walls shall be factory-made, and steam cured in a controlled environment with weep holes and in-built inserts for handling/ transportation. Dimensional tolerances shall be as per IS: 6408 (part 2) for PC Class 6.

Notes:

1. This item includes cost of all the materials, labour, machinery, tools & plant etc. complete required for manufacture of precast segments except Steel Reinforcement which shall be paid separately under relevant item of schedule B1.

2. Boulder Backing and backfilling of filter media behind wall shall be paid separately under NS-12 of this schedule and relevant item of schedule B1.

3. Excavation of soil for foundation shall be paid separately under item (USSOR item No. 022010) of Schedule B1.

4. Before placing of wall segments, 20 mm thick stiff 1:3 cement mortar bedding layer shall be laid over a levelling course of 150 mm thick of M20 concrete. Payment for M20 concrete shall be made under relevant item (USSOR-2019 item 022040) of Schedule B1and for mortar under relevant item (DSR Item no. 3.8) of Schedule- B3.

5. 60% of the rate shall be paid on receipt of the precast retaining wall segments at site and balance 40% will be paid on fixing the same in position in satisfactory condition.

I. Method Statement

The Contractor shall submit detailed design & drawings and Method Statement for carrying out the work to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement and the Drawings. RCC work shall comply with the provisions of Annexure OCS -1 & 2 of Section VII-6: Employer's requirements-OCS-Civil. Special care shall be taken in lifting and transportation of precast segments to avoid impact and damage.

II. Method of Measurement

Measurement for payment of this item shall be the quantity of concrete in precast segment worked out/measured in cum from the Drawings. Payment will be made at the Unit Price per cubic meter entered in the Priced Bill of Quantities.

7.4.15 NS Item No.15: Precast RCC Drain with Cover

Manufacturing, transportation (including loading & unloading) and installation in position (including joining and grouting) M-50 or higher grade precast reinforced cement concrete U-shaped drain with cover as per the directions of the Engineer. Precast reinforced U-shaped drain shall be factory-made, and steam cured in a controlled environment with inserts for handling/transportation. Dimensional tolerances shall be as per IS: 6408 (part 2) for PC Class 6.

Notes: -

1. This item includes cost of all the materials, labour, machinery, tools & plant etc. complete required for manufacture of precast segments except Steel Reinforcement which shall be paid separately under relevant item of schedule B1.
2. Excavation of soil for foundation shall be paid separately under item (USSOR item No. 022010) of Schedule B1.
3. Before placing wall segments, 20 mm thick stiff 1:3 cement mortar bedding layer shall be laid over a levelling course of 150 mm thick of M20 concrete. Payment for M20 concrete shall be made under relevant item (USSOR-2019 item 022040) of Schedule B1and for mortar under relevant item (DSR Item no. 3.8) of Schedule- B3.
4. 60% of the rate shall be paid on receipt of the precast drain segments at site and balance 40% will be paid on fixing the same in position in satisfactory condition.

I. Method Statement

The Contractor shall submit detailed design & drawings and Method Statement for carrying out the work to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement and the Drawings. RCC work shall comply with the provisions of Annexure OCS -1 & 2 of Section VII-6: Employer's requirements-OCS-Civil. Special care shall be taken in lifting and transportation of precast segments to avoid impact and damage.

II. Method of Measurement

Measurement for payment of this item shall be the quantity of concrete in precast segment worked out/measured in cum from the Drawings. Payment will be made at the Unit Price per cubic meter entered in the Priced Bill of Quantities.

7.4.16 Item No. 16: Linking of Track on H- beam sleeper

Linking of track on H- beam sleepers on Open Web Girder (OWG) bridges with 60 Kg running rail and 52 kg guard rail with track fittings/fastenings including leading of Running and guard rails from bridge approach and fixing of running rails & guard rails, bending of guard rails, notching, drilling of holes, cutting of rails etc., as directed and making track structure fit for normal speed. (Rails will be supplied by the Employer free of cost)

I. Method Statement

The Contractor shall submit Method Statement for linking of track to the Engineer for approval.

II. Execution

i. Running rail and guard rail shall be fixed on H- beam sleeper as per assembly drawings (No. RDSO/T-8759 to RDSO/T-8765 with latest alterations/corrections) and provisions of IRPWM.

ii. Holes in the flange of guard rail shall be drilled after fixing the sleeper and running rail in position.

iii. Track shall be fit for normal speed and tolerances shall be as per permissible limits specified in IRPWM.

III. Measurement

Measurement for payment of linking of track shall be done in running track meter

7.4.17 NS Item No.17: MS angle expansion Joint

Supplying and fixing M.S. Angles 100 mm x 100 mm x 10mm size conforming to IS:2062 in expansion joint of Composite girder bridges including provision of 10mm dia dowel bar & 12mm dia anchor bolts at 150 mm centre to centre, and 250mm wide GI plate over the top of angles as per relevant RDSO standard drawing with all material, labour, T&P as a complete job.

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work of expansion joint in composite bridge girders to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement, the Specifications and the Drawings. The work shall comply with the provisions of Annexure OCS-3 of Section VII-6: Employer's Requirements-OCS-Civil. Mild steel bolt and nuts shall conform to IS: 226 & IS: 1148 but shall have minimum tensile strength of 44 Kg/sqm and minimum percentage elongation of 14.

II. Method of Measurement

Measurement for payment of this item shall be the length of the expansion joint across the track measured/worked out in meter as per the Drawings. Payment will be made at the Unit Price per meter entered in the Priced Bill of Quantities.

7.4.18 Item No.18: Metallic Guided bearing

Supply and fixing of Metallic Guided Bearing in position true to line and level as per RDSO drawing No. RDSO/B-11754/3R2 and IRC:83 pt. III-2018 including supply & grouting of anchor bolts with approved non-shrinking epoxy grout with all material, labour, T&P as a complete job.

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement, the Specifications and the Drawings.

II. Method of Measurement

Measurement for payment of this item shall be in number. Payment will be made at the Unit Price per unit entered in the Priced Bill of Quantities.

7.4.19 NS Item No.19: Bed Plate

Supply, fabrication and erection of bed plate of approved sizes as per relevant RDSO drawing No. RDSO/B-11751/4R2, B-11753/5R1, B-11754/3R2 with upto date corrections, in exact position over bed block on pier/abutments by giving full and even bearing, setting them on the layer of free flow non-shrinkable grouting compound, scrapping or chipping of bed block, if required, fabrication and fixing of HD bolts of suitable sizes along with nuts, washers etc., grouting of holes by epoxy mortar after fixing HD bolts with all labour, material, T & P as a complete job..

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement, the Specifications and the Drawings. The work shall comply with the provisions of Annexure OCS-3 of Section VII-6: Employer's Requirements-OCS-Civil.

II. Method of Measurement

Measurement for payment of this item shall be the weight of metal in the fabricated structure worked out/computed on the basis of the drawing in Kilogram. No additional payment shall be made for bolt & nuts etc and no deductions shall be made for holes. Payment will be

made at the Unit Price per kg entered in the Priced Bill of Quantities. Payment will be made at the Unit Price per unit entered in the Priced Bill of Quantities.

7.4.20 NS Item No.20: Precast RCC Facia Panels of RE Wall

Designing, Providing and erection of specified grade precast RCC Facia Panel of thickness 180 mm made with M-35 Grade Concrete Batching plant, Transit Mixer, Concrete Pump and Vibrator for retaining earth with all element and accessories including reinforcing element complete as per approval drawing and Section 3100 of MORT&H specification including all material labour machinery etc. (Scope of work including designing, getting approval, casting in yad, curing, storing, Transporting, lifting, placing in position, erection with all necessaries fasteners etc complete). The cost of cement & steel are include in this item & no separate payment shall be paid whatsoever. The rate also include cost for excavation, foundation, reinforcing element, fasteners, drainage layer, drain pipe, coping beam and other accessories for which nothing extra shall be paid.

Mode of Payment:

1- **Casting of RE Panel: 60%**
2- **Erection & fixing: 35 %**
3- **Completion in all respects: 5%**

I. Method Statement

The Contractor shall submit detailed design & drawings and Method Statement for carrying out the work to the Engineer for approval. The work shall comply with the provisions of Section 3100 of MORTH Specifications for Road and Bridge Works. Geogrid shall be used as reinforcing element. The work shall be carried out strictly in accordance with the approved Method Statement and the Drawings. RCC work shall comply with the provisions of Annexure OCS -1 & 2 of Section VII-6: Employer's requirements-OCS-Civil. Special care shall be taken in lifting and transportation of precast segments to avoid impact and damage.

II. Method of Measurement

Measurement for payment of this item shall be the area of precast facia panels worked out/measured in Sqm from the Site/Drawings. Payment will be made at the Unit Price per Square meter entered in the Priced Bill of Quantities.

7.4.21 NS Item No.21: Back Fill in RE Wall

Providing Placing & Compacting to desired density approved backfill material in layers as per approved methodology including testing of reinforced fill portion in approaches between reinforced soil (RS) wall panels as per approved drawing as per Section 3103 of MORT&H Specification. The soil should be predominantly coarse grained, not more than 10 % of

particles should pass 75 micron sieve. The item shall be measured and paid for the finished volume of backfill and sub-grade placed in position excluding the volume of filter media at base and behind the RE Wall

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work to the Engineer for approval. The work shall comply with the provisions of Section 3100 of MORTH Specifications for Road and Bridge Works. Geogrid shall be used as reinforcing element. The work shall be carried out strictly in accordance with the approved Method Statement and the Drawings.

II. Method of Measurement

Measurement for payment of this item shall be the quantity of back fill worked out/measured in cum from the Drawings/site. Payment will be made at the Unit Price per cubic meter entered in the Priced Bill of Quantities.

7.4.22 NS Item No.22: RCC Crash Barrier

Providing & constructing of RCC Crash Barrier of M35 at the edge of road , approaches to bridge structures and medians, constructed with specified grade of concrete using batching plant , transit mixer, concrete pump and vibrator with 450 mm long at expansion joint filled with premolded asphalt filler board, keyed to the structure on which it is built and installed as per design and dimension in the approved drawing and at location directed by the engineer, all as specified as per Section 809 of MORT&H Specification including all material labour, scaffolding etc.

I. Method Statement

The Contractor shall submit Method Statement for carrying out the work to the Engineer for approval. The work shall be carried out strictly in accordance with the approved Method Statement and the Drawings. RCC work shall comply with the provisions of Annexure OCS -1 & 2 of Section VII-6: Employer's requirements-OCS-Civil.

II. Method of Measurement

Measurement for payment of this item shall be the quantity of concrete in crash barrier worked out/measured in cum from the Drawings/site. Payment will be made at the Unit Price per cubic meter entered in the Priced Bill of Quantities.

Tender No. HORC/HRIDC/C-23/2022
Attachment 15
to
Corrigendum No. 2

Part 2, Section VII-8: Tender Drawings and Documents

Section VII-8B:

List of Documents

1. List of Curve and Gradients/R1

1. List of Curve and Gradients/R1

PKG-C23 Gradient Details (km 29.200- km 49.700)							
S. No.	Chainage KM		Length	Gradient	RISE/FALL	PFL	
	From	upto	metre	1 in		From	To
1	28420.000	29960.000	1540.000	160	R	247.78	257.405
2	29960.000	31080.000	1120.000	152	R	257.405	264.774
3	31080.000	31940.000	860.000	175	R	264.774	269.688
4	31940.000	32200.000	260.000	LEVEL		269.688	269.739
5	32200.000	33399.509	1199.509	1200	F	269.739	268.74
6	33399.509	33699.509	300.000	3000	F	268.74	268.64
7	33699.509	33939.509	240.000	LEVEL		268.64	268.64
8	33939.509	34524.257	584.748	220	F	268.64	265.89
9	34524.257	34879.509	355.252	750	R	265.89	266.336
10	34879.509	35034.415	154.906	LEVEL		266.336	266.336
11	35034.415	35519.509	485.094	5000	R	266.336	266.428
12	35519.509	35914.509	395.000	195	F	266.428	264.403
13	35914.509	36364.509	450.000	165	F	264.403	261.675
14	36364.509	36824.509	460.000	165	R	261.675	264.463
15	36824.509	37064.510	240.001	LEVEL		264.463	264.463
16	37064.510	37744.506	679.996	165	F	264.463	260.342
17	37744.506	38384.506	640.000	200	R	260.342	263.542
18	38384.506	38524.506	140.000	LEVEL		263.542	263.542
19	38524.506	39564.506	1040.000	200	F	263.542	258.342
20	39564.506	39924.506	360.000	552	R	258.342	258.994
21	39924.506	40064.506	140.000	LEVEL		258.994	258.994
22	40064.506	40544.506	480.000	200	F	258.994	256.594
23	40544.506	41084.512	540.006	900	R	256.594	257.194
24	41084.512	41954.506	869.994	155	R	257.194	262.807

PKG-C23 Gradient Details (km 29.200- km 49.700)							
S. No.	Chainage KM		Length	Gradient	RISE/FALL	PFL	
	From	upto	metre	1 in		From	To
25	41954.506	43264.506	1310.000	1200	R	262.807	263.899
26	43264.506	43584.506	320.000	155	R	263.899	265.963
27	43584.506	44129.344	544.838	330	R	265.963	267.315
28	44129.344	44804.344	675.000	165	R	267.315	271.706
29	44804.344	45088.261	283.917	200	R	271.706	273.181
30	45088.261	45776.311	688.050	LEVEL		273.181	273.181
31	45776.311	45899.352	123.041	200	F	273.181	272.566
32	45899.352	46649.347	749.995	400	F	272.566	270.691
33	46649.347	46784.347	135.000	150	F	270.691	269.791
34	46784.347	48184.184	1399.837	163	F	269.791	261.202
35	48184.184	48685.184	501.000	200	F	261.202	258.697
36	48685.184	49452.301	767.117	400	R	258.697	260.614
37	49452.301	51047.000	1594.699	155	F	260.614	257.081

Horizontal Curve Details

S. No.	Curve No.	SIDE	DEGREE	RADIUS	DEF. ANGLE (Delta)	CANT {SE) (mm)	TANGENT LENGTH	CCL	TRANSITION LENGTH	CH. TPTC-1	CH. TPTC-2	TOTAL LENGTH
1	14	*LHS*	0.438	4000.000	19°57'37"	30.000	743.900	**1313.500**	**80.000**	28486.954	29960.434	1473.480
2	15	*LHS*	1.966	890.000	26°31'44"	145.000	284.500	**260.900**	**150.000**	31126.993	31687.918	560.925
3	16	*RHS*	0.499	3505.400	03°03'35"	30.000	143.600	**87.200**	**100.000**	32479.484	32766.658	287.174
4	17	*RHS*	0.875	2000.000	14°15'45"	80.000	315.200	**367.700**	**130.000**	34420.023	35047.728	627.705
5	18	*LHS*	0.530	3300.000	7°52'53"	35.000	277.300	**353.900**	**100.000**	36868.221	37422.137	553.916
6	19	*LHS*	0.610	2870.000	20°14'07"	40.000	567.100	**903.600**	**110.000**	39689.383	40812.944	1123.561

Horizontal Curve Details

S. No.	Curve No.	SIDE	DEGREE	RADIUS	DEF. ANGLE (Delta)	CANT {SE) (mm)	TANGENT LENGTH	CCL	TRANSITION LENGTH	CH. TPTC-1	CH. TPTC-2	TOTAL LENGTH
7	20	*LHS*	0.350	5000.000	1°43'10"	20.000	115.000	**70.000**	***80.000***	41377.845	41607.887	230.042
8	21	*LHS*	0.350	5000.000	1°30'05"	20.000	105.500	**51.000**	**80.000**	42467.917	42678.945	211.028
9	22	*LHS*	1.795	975.000	19°35'28"	160.000	257.700	**151.700**	**180.000**	43622.056	44133.762	511.706
10	23	*RHS*	0.972	1800.000	4°48'48"	100.000	140.600	**21.000**	**130.000**	44260.050	44541.086	281.036
11	24	*LHS*	3.500	500.000	16°34'33"	150.000	132.000	**22.700**	**120.000**	44851.854	45114.616	262.762
12	25	*RHS*	4.000	437.500	20°21'27"	105.000	113.400	**85.000**	**70.000**	45243.401	45468.362	224.961
13	26	*RHS*	4.000	437.500	15°28'23"	80.000	84.400	**68.000**	**50.000**	45698.954	45866.928	167.974
14	27	*RHS*	0.625	2800.000	4°3'14"	45.000	154.100	**88.100**	**110.000**	45935.763	46243.832	308.069
15	28	*RHS*	1.400	1250.000	8°29'50"	120.000	162.700	**44.900**	**140.000**	46294.845	46619.755	324.910
16	29	*LHS*	1.129	1550.000	13°5'40"	130.000	262.700	**183.700**	**170.000**	46818.226	47341.914	523.688
17	30	*LHS*	1.151	1520.000	16°50'33"	135.000	314.800	**266.100**	**180.000**	47564.307	48190.444	626.137
18	31	*RHS*	1.167	1500.000	10°5'29"	110.000	202.300	**123.900**	**140.000**	49037.443	49441.304	403.861
19	26	*RHS*	0.500	3500.000	19°57'37"	30.000	665.900	**1119.300**	**100.000**	28468.502	29787.983	1319.481
20	27	*RHS*	2.000	875.000	26°31'44"	150.000	280.900	**253.900**	**150.000**	*31110.614*	31664.553	*553.939*
21	28	*LHS*	0.500	3500.000	3°03'35"	30.000	143.500	**86.900**	**100.000**	32460.925	32747.810	286.885
22	29	*LHS*	0.854	2050.000	14°15'45"	75.000	321.400	**380.200**	***130.000***	34394.257	35034.415	640.158
23	30	*RHS*	0.547	3200.000	7°52'53"	35.000	275.400	**330.200**	***110.000***	36850.244	37400.394	550.150
24	31	*RHS*	0.614	2850.000	20°14'07"	40.000	563.600	**896.500**	**110.000**	39674.412	40790.909	1116.497
25	32	*RHS*	0.437	4005.300	1°43'10"	30.000	100.100	**40.200**	**80.000**	41375.332	41575.520	200.188
26	33	*RHS*	0.437	4005.300	1°30'05"	30.000	92.500	**25.000**	**80.000**	42463.663	42648.620	184.957
27	34	*RHS*	1.832	955.300	19°35'28"	165.000	254.300	**144.900**	**180.000**	43609.185	44114.083	504.898
28	35	*LHS*	0.854	2050.000	4°48'48"	75.000	151.100	**42.100**	**130.000**	44233.970	44536.050	302.080
29	36	*RHS*	3.844	455.300	16°34'33"	150.000	120.600	**19.900**	**110.000**	44848.326	45088.261	239.935
30	37	*LHS*	3.889	450.000	20°21'27"	100.000	115.600	**89.400**	**70.000**	45217.729	45447.158	229.429
31	38	*LHS*	3.889	450.000	15°28'23"	80.000	86.100	**71.400**	**50.000**	45690.412	45861.772	171.360

Horizontal Curve Details

S. No.	Curve No.	SIDE	DEGREE	RADIUS	DEF. ANGLE (Delta)	CANT {SE) (mm)	TANGENT LENGTH	CCL	TRANSITION LENGTH	CH. TPTC-1	CH. TPTC-2	TOTAL LENGTH
32	39	*LHS*	0.699	2505.300	4°3'14"	45.000	138.700	**77.200**	**100.000**	45932.932	46210.151	277.219
33	40	*LHS*	1.250	1400.000	8°29'50"	125.000	178.800	**57.200**	**150.000**	46260.238	46617.404	357.166
34	41	*RHS*	1.163	1505.300	13°5'40"	135.000	262.500	**163.300**	**180.000**	46800.129	47323.459	523.330
35	42	*RHS*	1.168	1498.000	16°50'33"	140.000	311.500	**259.600**	**180.000**	47550.700	48170.350	619.650
36	43	*LHS*	1.129	1550.000	10°5'29"	105.000	201.800	**142.700**	**130.000**	49021.483	49424.232	402.749

Gradient Details PKG-C23 (km 55.600- km 61.500)

S. No.	Chainage KM		Length	Gradient	RISE/FALL	PFL		Remarks
	From	upto	metre	1 in		From	To	
1	*55585.806*	*55804.097*	*218.291*	LEVEL		235.902	235.975	**Main Line**
2	*55804.097*	*56329.075*	*524.978*	165	F	235.984	232.856	
3	*56329.075*	*57026.475*	*697.4*	155	F	232.863	227.185	
4	*55206.475*	*58999.075*	*3792.6*	1004	F	226.619	225.335	
5	*58999.075*	*59219.075*	*220*	LEVEL		225.154	225.335	
6	*59219.075*	*59839.075*	*620*	170	F	225.152	221.723	
7	*59839.075*	*59979.075*	*140*	LEVEL		221.708	221.708	
8	59979.075	60524.075	545	155	R	221.708	225.188	
9	60524.075	60704.075	180	LEVEL		225.224	225.224	
10	60704.075	60894.075	190	155	F	225.224	223.998	
11	60894.075	61184.746	290.671	165	F	223.968	223.239	
12	61184.746	61595.051	410.305	265	R	222.178	223.761	
1	0	700	700	1004	R	226.217	226.914	**New Patli -Patli**

Gradient Details PKG-C23 (km 55.600- km 61.500)

S. No.	Chainage KM		Length	Gradient	RISE/FALL	PFL		Remarks
	From	upto	metre	1 in		From	To	
2	700	1847.724	1147.724	230	F	226.914	221.927	
3	1847.724	2418.056	570.332	LEVEL		221.927	221.927	
4	2418.056	2968.371	550.315	220	R	221.927	224.428	
5	2968.371	3247.861	279.49	4692	R	224.428	224.428	
6	3247.861	3760.79	512.929	585	R	224.428	225.365	
1	*0*	*830*	*830*	1004	F	226.217	225.221	**New Patli -Sultanpur**
2	*830*	1250	*420*	LEVEL		225.221	225.221	
3	1250	2310.92	1060.92	170	F	225.221	218.98	
4	2310.92	2881.479	570.559	5632	R	218.98	219.251	
5	2881.479	3840.926	959.447	200	F	219.251	214.454	
6	3840.926	4114.38	273.454	400	F	214.454	213.77	

Horizontal Curve Details

S. No.	Curve No.	SIDE	DEGREE	RADIUS	DEF.ANGLE (Delta)	CANT {SE) (mm)	TANGENT LENGTH	Circular Curve Length (CCL)	TRANSITION LENGTH	CH. TPTC-1	CH. TPTC-2	TOTAL LENGTH	Remarks
1	47	*LHS*	1.171	1494.700	11°47'23"	125.000	231.700	152.100	155.000	55849.683	56311.801	462.118	**Main Line UP line**
2	48	RHS	0.250	7005.300	1°02'52"	15.000	94.100	68.100	60.000	59280.924	59469.034	188.110	
3	49	LHS	0.648	2700.000	3°07'27"	40.000	138.600	17.100	130.000	60907.606	61184.746	277.140	
4	50	*RHS*	2.481	705.300	9°16'39"	120.000	107.000	13.700	100.000	61381.500	61595.160	213.660	

Horizontal Curve Details

S. No.	Curve No.	SIDE	DEGREE	RADIUS	DEF.ANGLE (Delta)	CANT (SE) (mm)	TANGENT LENGTH	Circular Curve Length (CCL)	TRANSITION LENGTH	CH. TPTC-1	CH. TPTC-2	TOTAL LENGTH	Remarks
1	35	RHS	1.167	1500.000	11°47'23"	140.000	*244.600*	128.000	180.000	*55838.456*	56326.415	*487.959*	**Main Line DN line**
2	38	*LHS*	0.250	7000.000	1°02'52"	15.000	94.000	68.000	60.000	59444.976	59632.989	188.013	
3	39	*RHS*	0.700	2500.000	3°07'27"	45.000	133.100	6.200	130.000	60929.518	61195.740	266.222	
4	40	LHS	2.500	700.000	9°16'39"	120.000	111.500	2.600	110.000	61376.441	61599.049	222.608	
1	1	RHS	1.795	975.000	5°05'30"	45.000	58.300	56.600	30.000	163.031	279.67	116.639	**New patli to patli**
2	2	RHS	1.795	975.000	5°05'30"	45.000	58.300	56.800	29.900	279.675	396.188	116.513	
3	3	*LHS*	2.917	600.000	42°05'15"	65.000	250.900	400.700	40.000	622.495	1103.186	480.691	
4	4	*RHS*	2.961	591.000	115°38'57"	85.000	969.700	1132.700	60.000	1471.172	2723.916	1252.744	
5	5	*LHS*	1.000	1750.000	2°21'07"	50.000	60.900	21.800	50.000	3119.295	3241.119	121.824	
6	6	*LHS*	1.000	1750.000	1°34'27"	35.000	39.000	18.100	30.000	3364.032	3442.113	78.081	
1	1	*LHS*	1.795	975.000	5°05'30"	45.000	58.300	56.600	30.000	163.031	279.676	116.645	**New patli to Sultanpur**
2	2	*RHS*	1.795	975.000	5°05'30"	45.000	58.300	56.800	*29.900*	279.676	396.118	116.442	
3	3	*RHS*	3.889	450.000	7°32'22"	55.000	44.600	29.200	30.000	786.182	875.36	89.178	
4	4	*RHS*	1.944	900.000	18°45'31"	60.000	168.700	254.600	40.000	1058.681	1393.319	334.638	
5	5	*LHS*	3.804	460.000	65°57'46"	55.000	313.600	499.500	30.000	2956.77	3516.32	559.55	
6	6	*LHS*	3.977	440.000	43°00'17"	60.000	188.400	300.200	30.000	3550.337	3910.537	360.2	

Tender No. HORC/HRIDC/C-23/2022
Attachment 16
to
Corrigendum No. 2

Part 2, Section VII-8: Tender Drawings and Documents

Section VII-8B:

List of Documents

APPROVED MANUFACTURES/SUPPLIERS LIST/R1

APPROVED MANUFACTURES/SUPPLIERS LIST/R1

All materials and products shall conform to the Outline Construction Specification (OCS), BIS codes and other relevant codes etc. and shall be of make as approved by the Engineer.

The list of approved makes for products and materials is given below. Other equivalent manufacturers may also be considered with prior approval of the Engineer, if found conforming to all standards. Such requests should be made with all documents to the Engineer at least 45 days before the material is required and any order shall be placed only after receiving the written approval of the Engineer.

S. No.	Details of Materials/ Products	Manufacturer's Name
1.	Cement	ACC, Ultratech, Ambuja Cements, JK Lakshmi, JSW, JK Cement, Lafarge, *Shree Cement, Birla Cement, Grasim*
2.	Reinforcement Bars	*SAIL, JSW STEEL, TATASTEEL, RINL, JSPL*
3.	Epoxy	FOSROC, SIKA QUALCRETE, BASF, CICO, MC–BAUCHEMIE, MAPEI, CHRYSO, Huntsmen Advanced Materials
4.	Expansion Joints for Viaduct	Prequalified Manufacturers as per RDSO's latest approved list
5.	Admixtures	FOSROC, SIKA, MBT, MC-BAUCHEMIE, PIDILITE, CHRYSO, BASF, MAPEI, CICO
6.	Pile Integrity Testing	CIMEC, Geodynamics, AIMIL, CBRI, Pile Dynamic, CEGTH, FUGRO
7.	*Anchor Fastener	HILTI, FISHER, *BOSCH*, (Please note that ETA Certification is mandatory for using/supplying fasteners for load bearing structural members)
8.	Structural Steel	TATA, SAIL, ESSAR, *JSPL, JSW*
9.	Pre- stressing Strand (LRPC)	TATA SSL Ltd, USHA MARTIN
10.	*Pot/Elastomeric /Spherical Bearings	Prequalified Manufactures as per RDSO's latest approved list.
11.	HDPE Sheathing	Rex *Polyextrusion*, Gwalior Poly Pipes Ltd, Dynamic Prestress, JK Prestressing
12.	Formwork Release Agent	FOSROC, MC BAUCHEMIE, CICO, BASF, MAPEI, MBT, CHRYSO
13.	*Prestressing System	Freyssinet, BBR, VSL, Dynamic, Killick Nixon, Tensacciai (India Ltd.), JK Prestressing, Usha Martin, VSIL

S. No.	Details of Materials/ Products	Manufacturer's Name
14.	*Reinforcement Couplers	DEXTRA, , SANFIELD, SPLICETECH COUPLERS
15.	Hollow Sections, Pipes	Surya Pipes, Hi-Tech Pipes, JSW, JSPL, TATA.
16.	Drainage Pipes	Tirupati Plastomatics, Duraline, REX, STIPL
17.	Acrylic Textured Coatings	Spectrum, Surfa Nova, Jotun, Asian Paints, Berger, Hempel, DULUX
18.	Non Shrink Grout	FOSROC, Fairmate, BASF, SIKA, CICO, MBT, MC-Bauchemie, CHRYSO
19.	Bonding Coat	CICO, FOSROC, BASF, SIKA, MAPEI, MC-BAUCHEMIE, CHRYSO
20.	Polysuphide Sealant	CICO, PIDILITE, BASF, FOSROC, SIKA, CHRYSO
21.	*Steel Structural Fasteners	Sundram Fasteners, Nelson, *Dextra India*, Panchsheel, Pooja Forge (Please note that ETA Certification is mandatory for using/supplying fasteners for load bearing structural members)
22.	*Corrosion Protection Paints	Berger, Johnson Nicholson, Nerolac, Asian Paints, Akzo Nobel, Jotun
23.	Fire Resistant Paint	Akzo Nobel, PPG, Jotun
24.	Water stopper/ Bar	Greenstreak, Duron, Maruti, Kanta Rubber
25.	*Liquid Polymer membrane waterproofing	BASF, MAPEI , NINA, CICO, MYK Schomburg, Geo-Constech
26.	Curing Compound	FOSROC, CHRYSO, CICO, MC- BAUCHEMIE, MAPEI, MBT
27.	*Polycarbonate Sheets	Gallina Acroplus, Coxwell, Poly U, Fabic, Lexan, (SABIC Innovative Plastics), DANPALON, GE Plastics, VMI Plastics, Power Chem Plast
28.	Fly Ash	Thermal Plants, Ashcrete, Ultra Pozz, Star Pozz, Ashtech
29.	*Pre-Coated Profiled Metal Sheetings	TATA Blue Scope, Multicolor, Essar Steel, Bhushan Steel, Ispat Profile India
30.	Fly Ash Block/ AAC Block	Siporex, Ascolite, J.K. Laxmi, Ashtech
31.	Rock Bolts/Swellex Bolts	Geo Constech, DSI, Atlas Copco, FIREP International, Minova
32.	Soft eye GFRP	Dextra, FIREP International, Minova, Hughes Brothers, Geo Constech
33.	Polymer	WALLGRIP, TRISHUL, Shubham Minerals, Goldy Minerals, GeoPolymer

S. No.	Details of Materials/ Products	Manufacturer's Name
34.	Welding electrodes	Ador welding Ltd.(Advani-Oerlikon),ESAB, D&H Welding Electrodes, Modi Arc
35.	Aluminium Sheets	Hindustan Aluminium, Jindal, Balco
36.	Vitrified Tiles	Asian Tiles, Somany, Johnson, Bell Ceramics, Kajaria, Simpolo
37.	Ceramic Tiles	NITCO, Orient, Regency Ceramics
38.	Wall Putty	JK White, Birla
39.	Flush Doors	Samrat, Kanchan, Prima Swastik, Kutty, Diamond
40.	Adhesives	Pidilite, Araldite, Toyo Ferrous Crete
41.	Plywood	Duroply, Century Plywood, Green Plywood, Kitply
42.	Veneers	Green Plywood, Century Plywood, Kitply
43.	FloatGlass/Toughened Glass/Insulated Glass/Laminated Glass	Saint Gobbain, Modiguard, Tata Float, Float Glass, Asahi Float
44.	Heavy Duty Chequered Tiles	NITCO. Hindustan Tiles, Super Tiles & Marbles Pvt.Ltd.
45.	Heavy Duty Vitrified Tiles	Kajaria World
46.	Emulsion Paint	Asian Paints, Berger, Nerolac, Johnson & Nicholson, Dulux, ICI
47.	Synthetic Enamel	Asian Paints, Berger, Nerolac, Johnson & Nicholson, Dulux, ICI
48.	Paver Blocks	As approved by the Engineer
49.	Sanitary & Bath Fittings	Hindware, Parryware, Jaquar, HR & Johnson, Cera, , Somany, Asian Granito
50.	Aluminium doors & windows	Sehgal & Sehgal Industries
51.	Yellow Tactile Tiles	Palican
52.	SS Railing	The Cavalier, D Line India, DOORMAT, Panchal Enterprises, SS Enterprises
53.	Glass Mosaic Tiles	Mridul Enterprises, Krishna,Italia,Bissazza,Kenzai,Opio
54.	Granite Slabs & Tiles	As approved by the Engineer.

NOTE: For the categories marked as *, the enclosed undertaking performa should be duly filled and signed by authorized representatives of concerned agencies.

UNDERTAKING

Name of Contract: **Date of start of work:**

Category of work: **Date of completion of work:**

This is to certify that work of …… (Category to be mentioned) at …… (Location) of the contract.....(Name of contract) has been executed/completed in accordance with the manufacturer's/supplier's specifications and as per the approved method statement.

The work has been jointly inspected by authorised representative of ……(Manufacturer/supplier), …… (Executing agency) &…….. (Contractor) during its execution and all non-conformities observed during inspection have been complied to achieve the best industry standards.

The undersigned take full responsibility of the overall adequacy, accuracy, effectiveness & warranty (upto design life) of the completed work as per the provision of the contract……. (Contract number) and Outline Construction Specifications of the Part 2- Employer's Requirements.

(Stamp and Signature)	**(Stamp and Signature)**	**(Stamp and Signature)**
Manufacturer Representative	**Executing agency Representative**	**Contractor Representative**