Schedules

SCHEDULE – A

(See Clause 10.1)

SITE OF THE PROJECT

1 Background

Ministry of Road Transport & Highways vide OM No. NH14012/27/2014-P&M dated 21.12.2017 issued Guidelines and SOP for implementation of Bharatmala Pariyojana wherein development of 35 nos. Multimodal Logistics Parks have been proposed with the objective to improve the efficiency of the existing corridors (GQ and NS-EW) by removing the congestion points through access control, uniform corridor tolling, bypasses, ring roads etc. Guwahati was one among the 35 proposed locations for developing a Multimodal Logistic Park which was subsequently shifted to Jogighopa.

Further in a meeting chaired by Secretary MoRT&H it was decided that to enhance the multimodality of the site the development of Inland Water Terminal (IWT) on River Brahmaputra at Jogighopa will also be integrated in this project.

Govt. of Assam has allocated 200 acres of land belonging to Ashok Paper Mill (APM) for developing the MMLP at Jogighopa and Inland Waterways Authority of India (IWAI) also agreed to allocate 40 acres for land for development of IWT

2 The Site

2.1 Jogighopa is a small town located on the banks of the Brahmaputra River in the Bongaigaon district in the state of Assam. Bongaigaon, the District Headquarter is approximately 45 km to the North of the Jogighopa and distance from Guwahati is around 150 Km. Map 1.1 shows the location and regional connectivity of Jogighopa.

By road Jogighopa can be accessed through NH 17 (Sevoke (West Bengal) to Guwahati (Assam)) and via rail it is connected through Kolkata – Bongaigaon and Kolkata – Guwahati line. Bongaigaon – Guwahati stretch of NH 17 is a part of the proposed Northeast Economic Corridor. Jogighopa is also located on the NW-2 stretch from Dhubri to Sadiya on River Brahmaputra. It is directly connected to important ports like Haldia and Kolkata on the eastern coast via Indo-Bangladesh Protocol route.

The proposed site for MMLP is approximately 3.0 Km away from the Jogighopa Railway station. The MMLP Site is to the North of NH-17 whereas the IWT site is to the south of NH-17 along river Brahmaputra. Presently the MMLP site within APM can be accessed through the existing Saibari-Jogighopa Road. There

is an existing railway siding from Jogighopa Railway station to Ashok paper mill (APM), but it is in a defunct state from last three decades. The Map 1.1 shows the location of site.

2.2 The dates of handing over the Right of Way to the Contractor are specified in Annex-II of this Schedule-A.

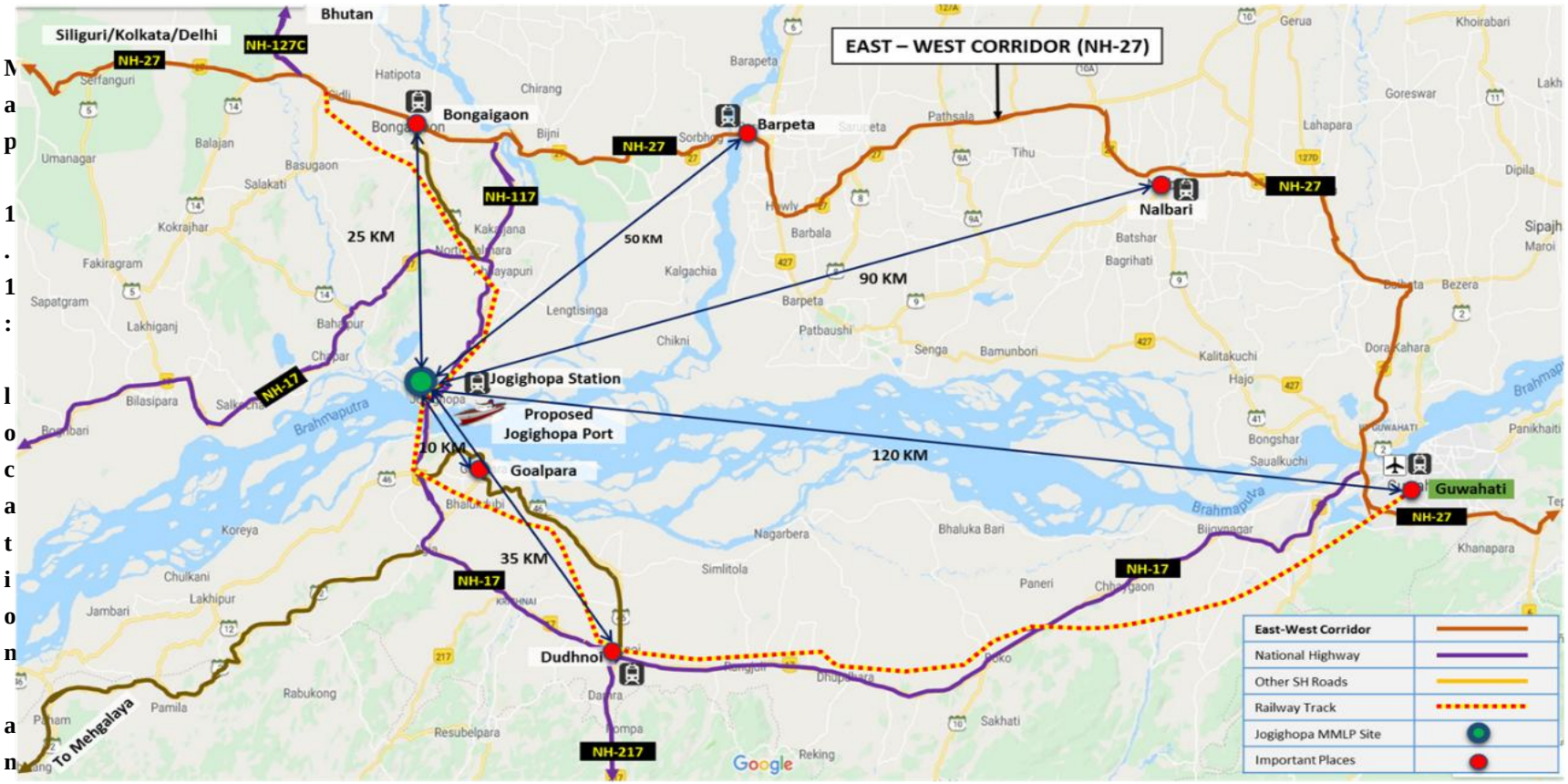
2.3 The status of the environment clearances obtained or awaited is given in Annex-III.

3 About the Project

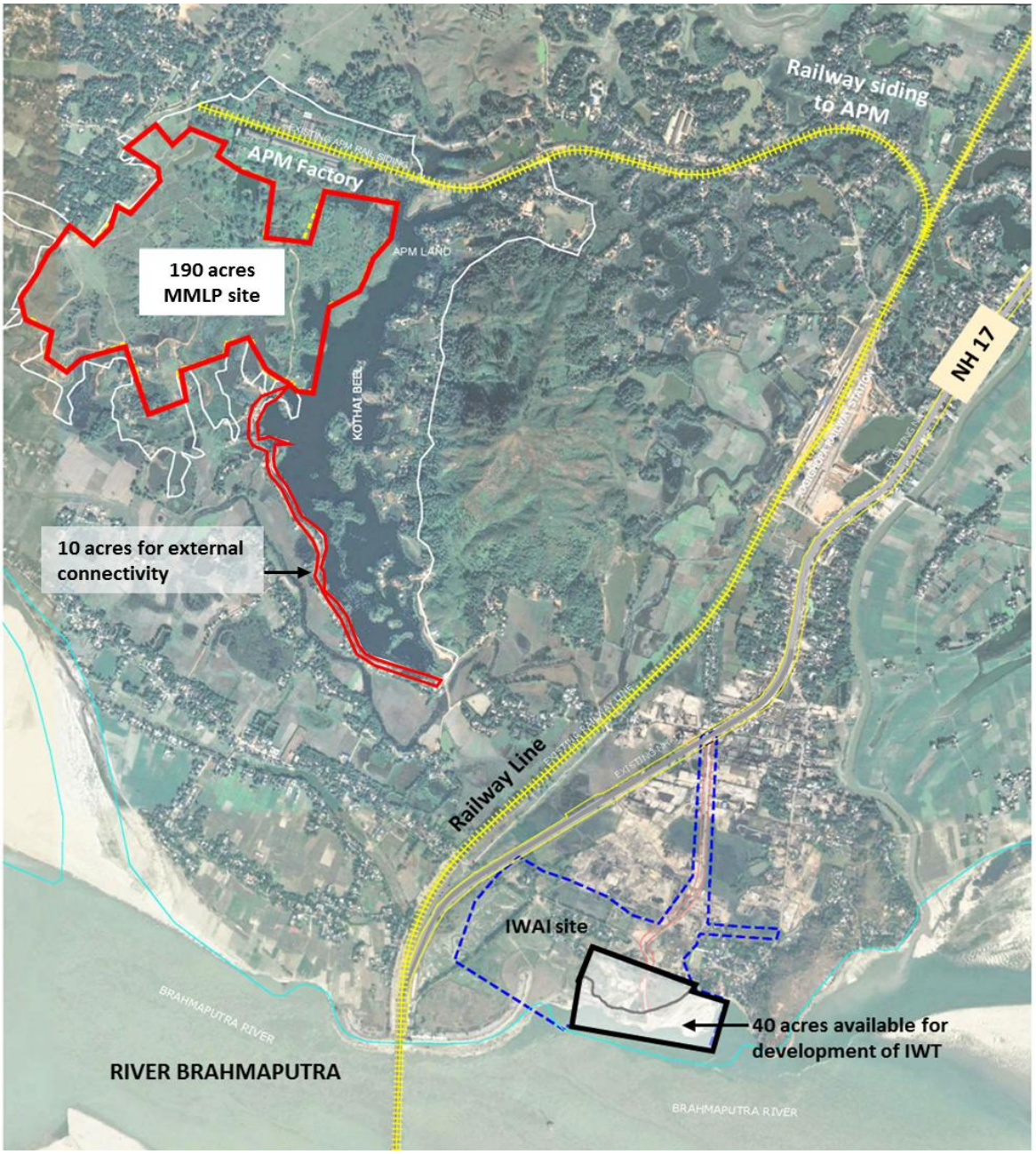
The development of Multi Modal Logistics Park at Jogighopa comprises of three Key components

1. 190 acres of Multi Modal Logistics park at Ashok Paper Mill site
2. External Road and Rail connectivity to the logistics park and Inland water terminal
3. 40 acres of Inland water terminal (IWT)

The project will be developed in two phases. **Phase-I** will be 102 acres of Logistics park along with the external road and rail connectivity between Logistic park and IWT. Remaining 88 acres of logistic park and 40 acres of IWT will be developed in **Phase-II**.



Map 1.1: location and regional connectivity of Jogighopa



Map 1.2: Location of Site

Annex I

(Schedule-A)

Site

[Note: Through suitable drawings and description in words, the land, buildings, structures and road works comprising the Site shall be specified briefly but precisely in this Annex-I.]

1. Site

The project highway aims at developing a new standard 4-lane road with paved shoulder along with widening the existing 2-lane/single lane road to a standard 4-lane carriageway with paved shoulder.

The project has two road parts. The 1st part starts from Port connectivity road and runs almost in west direction to reach MMLP with connectivity to NH-17 with a length of 2.886 km. The 2nd part (Port Connectivity Road) starts from NH-17 and runs almost in south direction to reach Port with a length of 1.155 km.

Thus the construction package for the project includes developing a new standard 4-lane road with paved shoulder and widening the existing 2-lane/single lane road to a standard 4-lane carriageway with paved shoulder.

The Index Map of the Project Highway is appended at the end of this Schedule–A.

2. Land

The project passes mostly through land area of Assam Paper Mill, IWAI, Railway and NH. A part of the connectivity passes through private land.

As per available revenue maps, average total existing ROW is of the order of 10.0m to 12.0m along port connectivity road for length of about 1.155 km.

3. Carriageway

Roadway Width

Variable cross-sectional parameters were found for the project road as mentioned below

Stretch	Existing Carriageway		Existing Shoulder		Remarks
	Type	Average Width (m)	Type	Average Width (m)	
MMLP Connecting Road (0+000 to 1+400)					This stretch is green field alignment
MMLP Connecting Road (1+400 to 2+835)	Earthen	3.0	Earthen	1.5	
Port Connecting Road (0+000 to 1+155)	Bituminous	5.5	Earthen	1.5 to 2.0	

4. Major Bridges

The Site includes the following Major Bridges:

Sl No.	Road Segment	Name of Stream	Existing Chainage (km)	Type of Structures			Span Arrangement (Nos.xLength in m)	Overall Width (m)	Remarks
				Foun-dation	Sub-Structure	Super Structure			
NIL									

5. Road Over Bridges (ROB) / Road Under Bridges (RUB)

The Site includes the following ROB/RUB:

Sl.	Road	Existing	Type of Structure	No. of Spans with	Width (m)

No.	Segment	Chainage (km)	Foundation	Super Structure	Span Length (m)	
NIL						

6. Railway Level Crossings

The Site has following Level Crossings:

Sl No.	Existing Chainage (km)	Description	Railway Section	Remarks
NIL				

7. Grade Separators

The Site includes the following grade separators:

Sl. No.	Road Segment	Existing Chainage (km)	Type of Structure		No. of Spans with Span Length (m)	Width (m)
			Foundation	Super Structure		
NIL						

8. Minor Bridges

The Site includes the following minor Bridges:

Sl No.	Road Segment	Name of Stream	Existing Chainage (km)	Type of Structures			Span Arrangement (Nos.xLength in m)	Overall Width (m)	Remarks
				Foundation	Sub-Structure	Super Structure			
NIL									

9. Underpasses (vehicular, non-vehicular)

The Site includes the following underpasses:

Sl. No.	Road Segment	Existing Chainage (km)	Type of Structure	No. of Spans with Span Length (m)	Width (m)
NIL					

10. Culverts

The Site includes the following culverts:

Sl. No.	Road Segment	Existing Chainage (km)	Type	Span Arrangement		Length (m)	Width(m)
				(No.)	(Length, m)		
MMLP Connectivity Road							
NIL							
Port Connectivity Road							
1	Port Road	0+300	RCC Box Culvert	1	3.2	3.2	9.2

11. Causeway:

The Site includes the following causeway:

Sl. No.	Road Segment	Existing Chainage (km)	Type of Structures	Span Arrangement		Length (m)	Width(m)
				(No.)	(Length, m)		
NIL							

12. Total Number of Structures

Structure Type	Numbers		
	Part-1 (MMLP Connectivity Road)	Part-2 (Port Connectivity Road)	Total

Major Bridge	0	0	**0**
Minor Bridge	0	0	**0**
Slab Culvert	0	1	**1**
HP Culvert	0	0	**0**
Chocked	0	0	**0**
Vented Causeway	0	0	**0**
Causeway without Vent	0	0	**0**
Total	**0**	**1**	**1**

13. Bus Bays

The details of bus bays on the Site are as follows:

Sl. No.	Road Segment	Existing Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
NIL					

14. Truck Lay Bye

The details of truck lay byes on the Site are as follows:

Sl. No.	Road Segment	Existing Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
NIL					

15. Roadside Drains

The details of the road side drains on the Site are as follows:

Sl. No.	Road Segment	Existing Location		Type	
		From (km)	To (km)	Masonry/CC (Pucca)	Earthen (Kutcha)
NIL					

16. Major Intersections

The details of major intersections are as follows:

Sl No.	Road Segment	Name	Existing Chainage (km)	Type	Side
MMLP Connectivity Road					
NIL					
Port Connectivity Road					
1	Port Connectivity Road	Jogighopa	0+000	3-Legged	Both

17. Minor Intersections

The details of major junctions are as follows:

Sl No.	Name	Existing Chainage (km)	Type	Side
MMLP Connectivity Road				
NIL				
Port Connectivity Road				
1	Village	0+870	3-Arm	RHS
2	Village	0+940	3-Arm	LHS

18. Bypasses

The details of existing bypasses are as follows:

Sl. No.	Name of Bypass (Town)	Road Segment	Existing Chainage		Length (km)	Carriageway	
			From (km)	To (km)		Width m)	Type
NIL							

19. Other Structures

The details of other structures are as follows:

Sl. No.	Type	Existing Chainage (km)	Length (m)	Width
NIL				

20. Permanent Bridge, Bypass or Tunnel Costing Rs. 50 Crore or More

-NIL-

Annex-II

(Schedule-A)

Dates for Providing Right of Way

Design Chainage (km)		**Length (m)**	**Proposed ROW (m)**	**Date of Providing ROW***
From	**To**			
(i) Full Right of Way (ROW) Width				
MMLP Connectivity Road				
0+000	0+500	500	45	September, 2020
0+560	0+800	240	45	
0+800	1+380	580	45	
Port Connectivity Road				
NIL				
(ii) Partial Right of Way (ROW) Width				
MMLP Connectivity Road				
0+500	0+560	60	45	
1+380	2+886	1506	45	
Port Connectivity Road				
0+000	1+155	1155	30	
(iii) Balance Right of Way (ROW) Width				
MMLP Connectivity Road				
0+500	0+560	60	45	
1+380	2+886	1506	45	
Port Connectivity Road				
0+000	1+155	1155	30	

* The dates specified herein shall in no case be beyond 150 (one hundred and fifty) days after the Appointed Date.

Annex-III

(Schedule-A)

Environmental Clearances

The Environment Impact Assessment (EIA) Notification 2006, Ministry of Environment, Forest & Climate Change, Government of India, came into effect from 14th September 2006. The EIA Notification, 2006 specifies the requirement of prior clearance from MOEF&CC for certain development projects specified under the schedule of the Notification.

The External Trunk Connectivity does not attract the conditions of obtaining environmental clearance as per EIA Notification 2006 and its amendments thereafter.

The Internal Infrastructure works is falling under category B of 8(b). Form 1 and Form 1A submitted for required Environmental Clearance.

SHEDULE - B

(See Clause 2.1)

DEVELOPMENT OF THE PROJECT

1 Introduction

1.1 About the Project

The development of Multi Modal Logistics Park at Jogighopa comprises of three Key components

1. 190 acres of Multi Modal Logistics park at Ashok Paper Mill site
2. External Road and Rail connectivity to the logistics park and Inland water terminal
3. 40 acres of Inland water terminal (IWT)

The project will be developed in two phases. **Phase-I** will be 102 acres of Logistics park along with the external road and rail connectivity between Logistic park and IWT. Remaining 88 acres of logistic park and 40 acres of IWT will be developed in **Phase-II**.

Under this scope, **Package-1 of Phase-I** will be developed.

1.2 Phase-1 of Multi Model Logistic Park

As per the Draft Policy for developing a MMLP there will be five broad zones:

1) Commodity storage zone – dedicated zones for different types of commodity and bonded storage yard along with vehicle loading ramps, cross docking facilities.
2) Intermodal zone – rail siding area for intermodal freight transfer; terminals for inland waterways, wherever applicable.
3) Value added services zone- Package, Re-packaging, Processing, Reprocessing.
4) Ancillary services zone – dedicated area for other value-added services such as customs clearance, vehicle service area, office spaces, restaurant, Retail & wholesale, Hotels and entertainment etc.
5) Vehicle parking zone – dedicated area for vehicle parking.

A tentative Master Plan for the 190 acres of the Logistic Park that caters to the above five zones and other supporting utilities for smooth function of the activities. Refer **Map 2.1** for Master Plan

ACTIVITIES	AREA (ACRES)	PHASE -I
Core Logistics Area	**118.84**	**55.08**
Warehousing & Cold storage	*86.58*	28.78
Value added services	*3.27*	
Rail siding	*14.14*	13.63
Container Yard	*9.89*	9.89
Exim /Bonded/ Quarantine/testing facility	*4.96*	2.78
Ancillary Logistic	**4.79**	**4.79**
Admin	*1.4*	1.4
Lodging/ Boarding/ Vehicle maintenance/ Dhabas	*1.2*	1.2
Office for transporters / vehicle sales	*1.52*	1.52
Petrol Pump	*0.67*	0.67
Commercial / Service apartments	**6.08**	**1.97**
MMLP Internal Roads	**23.38**	**17.94**

ACTIVITIES	AREA (ACRES)	PHASE -I
Truck Parking	**10.99**	**6.92**
Utilities	**6.08**	**4.46**
Green and Landscaped areas	**19.84**	**10.9**
TOTAL	**190**	**102**

1.3 External Road and Rail Connectivity

The proposed MMLP site at APM land doesn't have a direct access from NH 17. Moreover, the IWT site will also require connectivity to MMLP for seamless movement of goods. Considering the fact that connectivity plays a critical role in successful functioning of a logistics park and for the purpose of integrating the two sites (APM & IWT) it is proposed to have a direct road and rail connectivity between APM site and IWT site as well as with NH 17. The external road and rail alignment is shown is **Map 2.2**.

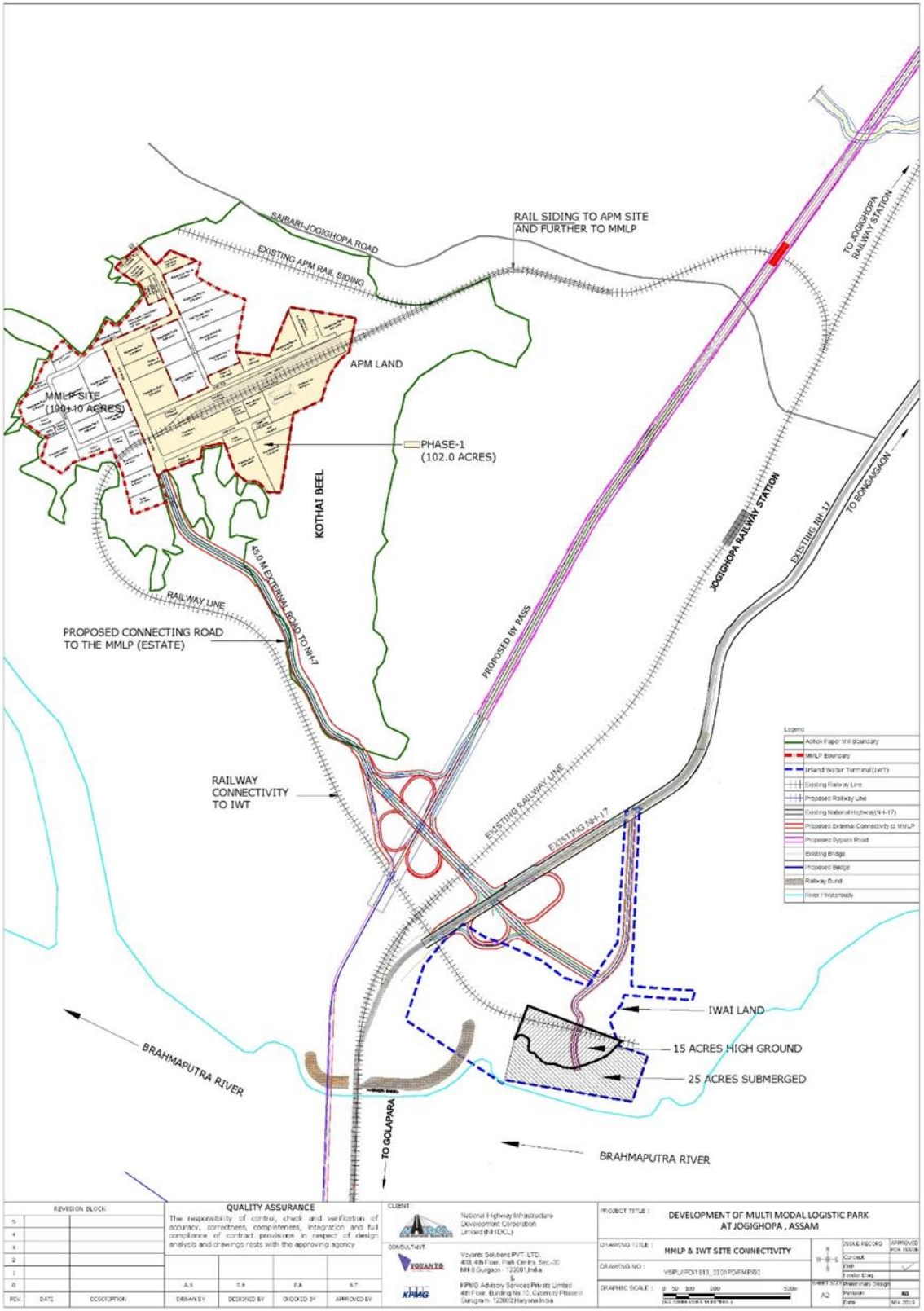
The external Road connectivity will have the following components.

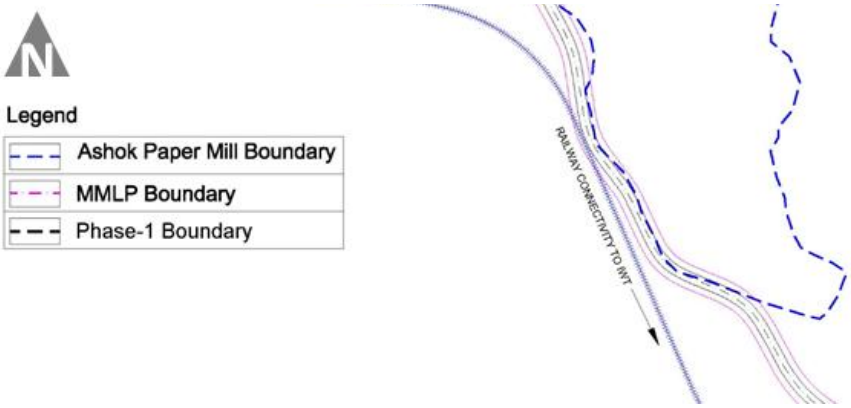
- ✓ 2.1 Km (MMLP to NH 17)
- ✓ 1.0 Km (NH 17 to IWT)
- ✓ Length of clover leaf at NH-17
- ✓ 1 RUB (proposed road crossing railway line)

The external Rail connectivity will have the following components. Total rail length 6.78 Km (Jogighopa railway station to IWT)

- ✓ 2.6 Km (revival of existing siding)
- ✓ 1.07 Km (within MMLP)
- ✓ 3.11 Km (MMLP to IWT)

MAP :2.1Master Plan for 190 acres of Logistic Park





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Map 2.2: External Road and Rail Alignment

1.4 Project Packaging

In order to initiate the development work at site, NHIDCL has decided to invite tenders for Phase-I development only. The Phase-I has been divided into three packages.

1) **Package I**: For all road works i.e. external and internal and development of utilities of main line on **EPC mode**. The following works are to be developed under **Package I**.
    a. External truck connectivity with MMLP
        i. MMLP Connecting Road as green field alignment from 0+000 chainage to 1+400 chainage.
        ii. Improving and upgradation of MMLP Connecting Road from chainage 1+400 to 2+835 chainage as per design specifications and standards outlined in **Schedule–D.**
        iii. Improving and upgradation of Port Connecting Road from chainage 0+000 to 1+155 chainage as per design specifications and standards outlined in **Schedule–D.**
    b. Internal Infrastructure Development as below
        i. Rigid Pavement as internal roadwork including culverts, etc.
        ii. Storm water drainage system along the road
        iii. Intake works at Brahmaputra river
        iv. Rising Main from Intake to WTP inside MMLP site
        v. Potable, Fire and recycled water supply network along the road
        vi. Sewerage system including plot connectivity along the road
        vii. Power supply network along the road
        viii. Street lighting along the road
        ix. Data & telecommunication along the road
        x. Landscaping work along the road
2) **Package II**: For MMLP facility on **EPC mode** for following:
    a. Outer Boundary wall for 190 Acres land including two gates.
    b. Site Leveling & Grading.
    c. Plot Demarcation / Toe wall.
    d. Admin Building.
    e. Custom Service Building.
    f. Electrical Sub-stations.
    g. Landscaping works
    h. Water & Sewage Treatment Plant.
3) **Package III**: Construction of embankment for main track and siding of railway line upto top of the embankment ready for laying of ballast, sleepers and track on **Item Rate Contract**.
4) Under this scope, **Package-II of Phase-I** will be developed.

2 Development of the Project

Development of the Project shall include construction of the Project as described in this Schedule-B and in Schedule-C.

3 Specifications and Standards

The Project shall be designed and constructed in conformity with the Specifications and Standards specified in Schedule-D.

4 Appointed Date and Start of Work

EC is under process for Internal development. In this regard, Contractor will start the survey, investigation work, preparation of design, working drawing from the date of agreement signed and provision of payment is mentioned at Schedule H and can be claimed even before the appointed date.

The appointed date shall be declared as per Article 8 of DCA during or after September 2020 with completion period of 18 Months.

Annex – I

(Schedule-B)

SCOPE OF PROJECT

1. Scope of the Project

The Contractor shall do survey, design and construct the Multimodal Project in accordance with the provisions of this Agreement. Such Project Description shall include:

2. Description of Project

The development of Multimodal Logistic park package-II shall comprise of;

2.1 Outer Boundary wall for 190 Acres land including two gates.
2.2 Site Leveling & Grading.
2.3 Plot Demarcation / Toe wall.
2.4 Admin Building.
2.5 Custom Service Building.
2.6 Electrical Sub-stations.
2.7 Landscaping works
2.8 Water & Sewage Treatment Plant.

2.1 Outer Boundary wall for 190 Acres land with including two gates.

Outer Boundary wall shall be done for total Multimodal park area of 190 Acres and the length of boundary to be construct is 5221.00 m. The scope of work includes the following:

1. Survey, Design and provide pile foundation and pile cap/ raft along the boundary wall and RCC wall should be made up to the height of finish ground level above 300 mm and weep holes as per required, as per the layout plan shown in drawing no. VSPL/IPD/1819_030/IPD/FMP/BW-01 and as per the approved detailed design prepared by the EPC contractor.
2. Design and provide RCC column above Finish ground level up to 3.0 m height and coping as per the section shown in drawing no. VSPL/IPD/1819_030/IPD/FMP/BW-03.
3. Scope of work includes all types of masonry including plaster and weather shield exterior paint as per the section shown in drawing no. VSPL/IPD/1819_030/IPD/FMP/BW-03.
4. Design and provide Concertina wire with required frames and grout along the boundary wall as per the section shown in drawing no. VSPL/IPD/1819_030/IPD/FMP/BW-03.
5. Design and provide expansion joints as per the approved detailed design prepared by the EPC contractor.

6. Design and provide two Gates with security block as per the plan and section shown in drawing no. VSPL/IPD/1819_030/IPD/FMP/BW-04 & 05
7. Detailed designing of Security Block (Security room, toilet & Guard room) area as per drawing shown complete with all the external and internal utility services as per the layout plan shown in drawing and all necessary surveys to do the work.
8. Construction of RCC framed structures of Security Block (Security room, toilet & Guard room) as per the layout plan shown in drawing no.
9. The Civil work for the Security Block includes the work of providing the concealed conduits for electricity, pipe lines for water, drainage, sewerage, IT, Communication, HVAC, Firefighting etc., in the permanent civil structure. Scope of the work for the Security block includes construction of all associated civil works such as storage tanks, sumps, wells, buildings etc. required for the proper functioning of the MEP, electricity, sewage and sewerage system as per the detailed design to be done by the EPC contractor and approve– by the Authority.

   Note - The work also includes the (i) providing the flooring, doors, windows, ventilators (ii) MEP works – providing plumbing, electrical, Soak pit CCTV & Surveillance system, PA System, Firefighting, Fire Alarm & Dedicator, IT, Communication system, furnishing and finishing work etc. for the Building which is required to make the Building operational.
10. Scope of work includes Water proofing and anti-termite treatment work complete of security block and boundary wall as per the approved design and specification.
11. Scope of work includes connectivity of all utilities of building with the road utilities networking lines as per the detailed design to be done by the EPC contractor and approve– by the Authority.
12. Detailed designing and construct of Gates for MS Structure with Aluminum Composite Panel of 4mm thick in aluminum Transom and Mullion, as per specifications in Schedule D, of approved colour rapping all around the frame as per drawing shown.
13. Scope of work includes sign boards of MMLP JOGIGHOPHA in gates as per the drawing shown and detailed design to be done by the EPC contractor and approve– by the Authority.
14. Scope of work includes Four weighbridge of 100 Tones. as per the drawing shown and detailed design to be done by the EPC contractor and approve– by the Authority.

2.2 Site Leveling & Grading.

The existing level of site plan is as per drawing no. VSPL/IPD/1819_030/IPD/FMP/CP-01. The level of site to be achieved as per levels shown in drawing no. VSPL/IPD/1819_030/IPD/FMP/PL-01. Site levelling & Grading shall be done for total Multimodal park area of 190 Acres as drawing mentioned above. The scope of work includes the following:

1. Contractor should do all the survey as per the requirement to do the works.
2. Clearing jungle including uprooting rank vegetation, grass, bushes, shrubs, saplings and disposal of unserviceable materials and stacking of serviceable material to be used or auctioned, lead as per the site condition including removal and disposal of top organic soil not exceeding 150 mm in thickness as per Technical Specification.
3. Cutting of trees, including cutting of trunks, branches and removal of stumps & roots, refilling, compaction of backfilling and stacking of serviceable material by manual means with all lifts as per Technical Specification.
4. Dismantling of existing structures like temporary roads, sheds, culverts, bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceable material and stacking the serviceable material with all lifts and lead as per the site condition as per Technical Specification.
5. Scope of work includes wherever required cutting of existing soil/rock and filling over existing soil/rock as per the required lead with proper compact as per technical specification over to facilitate gravity flow of storm water drainage and sewage flow as much as possible.

2.3 Plot Demarcation / Toe wall.

Various plots have been marked for future development. These plot are hatched in drawing no. VSPL/IPD/1819_030/IPD/FMP/BW-02. Scope of include construction of toe wall (To receive of boundary wall in future construction of phase II) upto 600 mm above the finished Ground level as per clause 2.2 above. Plot Demarcation / Toe wall shall be done for Phase –I, the length of Toe walls to be construct is 6522.00 m as per the drawing. The scope of work includes the following:

1. Survey, Design and provide pile foundation and pile cap/ raft along the Tow wall and RCC wall should be made up to the height of finish ground level above 600 mm and weep holes as per required, as per the layout plan shown in drawing no. VSPL/IPD/1819_030/IPD/FMP/BW-02 and as per the approved detailed design prepared by the EPC contractor.

2.4 Admin Building.

The scope of work includes construction of Admin Building in the hatched plot of drawing no. VSPL/IPD/1819_030/IPD/ FMPA/BPD/4A. The detailed scope is:

1. Detailed designing of Admin Building for built-up area of approx. 5837.00 sqm. complete with all the external and internal utility services as per the layout plan shown in drawing and all necessary surveys to do the work.
2. Construction of RCC framed structures of Admin Building as per the layout plan shown in drawing no.
3. Scope of work includes all types of masonry (internal and external) including plaster (internal and external) as per the approved detailed design prepared by the EPC contractor.
4. Outer articulation element of metal covering each Admin Building from two sides as per layout plan stipulated in drawing "Proposed Floor plan, elevation & section of station building", duly painted to match the architecture of the building
5. Exterior façade of the Building Covering Double Glass Unit (DGU) and Aluminum Composite Panel of 4mm thick in aluminum Transom and Mullion, as per specifications, of approved colour, with toughened heat resistant treated and heat soaked glass of Saint Gobain, Asahi (AIS), Modi or equivalent make.
6. The Civil work for the Building includes the work of providing the plinth protection, flooring, internal paints as per schedule and weather shield paint at exterior, Doors & window, false ceiling in concealed conduits for electricity, light fixtures, sanitary fittings, pipe lines for water supply, drainage, sewerage, IT, Communication, HVAC, Firefighting etc., in the permanent civil structure. Scope of the work for the Building includes construction of all associated civil works such as storage tanks, sumps, wells, buildings etc. required for the proper functioning of the MEP, Lifts, escalators, water, electricity, sewage and sewerage system as per the detailed design to be done by the EPC contractor and approve– by the Authority.

   Note - The work also includes the (i) providing the doors/windows/ventilators (ii) MEP works – providing plumbing, lifts, pumps, escalators, Soak pit, flooring, CCTV & Surveillance system, PA System, Fire fighting, Fire Alarm & Dedicator, electrical, IT, Communication system, furnishing and finishing work etc. for the Building which is required to make the Building operational.
7. Scope of work includes Water proofing and anti-termite treatment work and providing the steel grills and gates duly painted complete as per the approved design and specification.
8. Scope of work includes gypsum false ceiling work on chairman room, vice chairman room, PA room, office area, dispensary, training labs, class room, entrance lobby, café and display /exhibition hall as shown in drawing complete as per the approved detailed design prepared by the EPC contractor.
9. Scope of work includes External Development work of plot boundary wall & gates, inside plot roads & parking area, landscaping work and all utilities complete as per the detailed design to be done by the EPC contractor and approve– by the Authority.

10. Design and provide expansion joints as per the approved detailed design prepared by the EPC contractor.
11. Scope of work includes connectivity of all utilities of building with the road utilities networking lines as per the detailed design to be done by the EPC contractor and approve– by the Authority.
12. Scope of work includes 100 KW On grid Rooftop Solar Power Plant to be developed at the admin building with all utilities complete as per the detailed design to be done by the EPC contractor and approve– by the Authority.
13. Area of Admin Building to be construct as mention below:

	Area of Admin Building		
Slo. No.	**Particulars**	**Area in sqm.**	**Remarks**
Ground Floor			
1	MAINTENANCE	72.30	
2	BOARD OF DIRECTOR	72.30	
3	CHAIRMAN CABIN + P.A ROOM + TOILET	33.30	
4	VICE CHAIRMAN / MD OFFICE	33.30	
5	BANK	33.30	
6	OFFICE -1	33.30	
7	OFFICE - 2	33.30	
8	OFFICE - 3	33.30	
9	OFFICE - 4	33.30	
10	DISPENSARY	85.22	
11	TRAINING LAB -1	94.15	
12	TRAINING LAB -2	94.15	
13	CLASS ROOM -1	67.92	
14	CLASS ROOM -2	76.57	
15	TOILET -2	24.65	
16	ENTRANCE LOBBY	33.30	
17	DISPLAY / EXHIBITION HALL	102.53	
18	TOILET -1	33.30	
19	PANTRY - 1 & 3	20.68	
20	CAFÉ	33.94	
21	MULTI PURPOSE HALL	93.10	
22	PANTRY - 2	6.87	
23	STAFF OFFICE /ACCOUNTS	22.07	
24	DEAN OF STUDIES	8.85	
25	2 M WIDE CORRIDOR	227.14	
26	1.8 M WIDE CORRIDOR	11.30	
27	2.5 M WIDE CORRIDOR	30.54	
28	LIFT LOBBY	15.36	
	Total	**1459.34**	

Ist Floor			
1	TOILET -2	24.65	
2	TOILET -1	33.30	
3	PANTRY - 1 & 3	20.68	
4	CAFÉ	33.94	
5	1.8 M WIDE CORRIDOR	11.30	
6	LIFT LOBBY	15.36	
7	OPEN WORK SPACE	1320.11	
	Total	**1459.34**	
IInd Floor			
1	TOILET -2	24.65	
2	TOILET -1	33.30	
3	PANTRY - 1 & 3	20.68	
4	CAFÉ	33.94	
5	1.8 M WIDE CORRIDOR	11.30	
6	LIFT LOBBY	15.36	
7	OPEN WORK SPACE	1320.11	
	Total	**1459.34**	
IIIrd Floor			
1	TOILET -2	24.65	
2	TOILET -1	33.30	
3	PANTRY - 1 & 3	20.68	
4	CAFÉ	33.94	
5	1.8 M WIDE CORRIDOR	11.30	
6	LIFT LOBBY	15.36	
7	OPEN WORK SPACE	1320.11	
	Total	**1459.34**	
	Total Area (Ground +Ist +IInd +IIIrd)	**5837.36**	

Note : The area statement subjected to change and conceptual drawing / design and not legal offering.

2.5 Custom Services Building.

The scope of work includes construction of Custom Services Building in the hatched plot of drawing no. VSPL/IPD/1819_030/IPD/FMPA/BPD/4A. The detailed scope is:

1. Detailed designing of Custom Services Building for built-up area of 1455.34 sqm. complete with all the external and internal utility services as per the layout plan shown in drawing and all survey to do the work
2. Construction of RCC framed structure and Pre-Engineered Steel Building of custom services building as per the layout plan shown in drawing no.
3. Scope of work includes all types of masonry (internal and external) including plaster (internal and external) as per the approved detailed design prepared by the EPC contractor.
4. Outer wall of building should be pre-coated Galvalume Steel Sheet as per layout plan stipulated in drawing and as per the approved detailed design prepared by the EPC contractor.
5. Roof of building should be Double Skin pre-coated Galvalume Steel Sheet with insulation as per layout plan stipulated in drawing no. … as per the approved detailed design prepared by the EPC contractor.
6. The Civil work for the Building includes the work of providing the plinth protection, flooring, internal paints as per schedule and weather shield paint at exterior, Doors & window as per schedule, conduits for electricity, light fitting, sanitary fittings, pipe lines for water supply, drainage, sewerage, IT, Communication, Firefighting etc., in the permanent civil structure. Scope of the work for the Building includes construction of all associated civil works such as storage tanks, sumps, wells, buildings etc. required for the proper functioning of the MEP, Lifts, escalators, water, electricity, sewage and sewerage system as per the detailed design to be done by the EPC contractor and approve– by the Authority.

   Note - The work also includes the (i) providing the doors/windows/ventilators (ii) MEP works – providing Plumbing, Soak pit, flooring, firefighting, Fire Alarm & detector, electrical, IT, Communication system, furnishing and finishing work etc. for the Building which is required to make the Building operational.
7. Scope of work includes Water proofing and anti-termite treatment work and providing the steel grills and gates duly painted complete as per the approved design and specification.
8. Scope of work includes External Development work of plot boundary wall & gates, inside plot roads & parking area, landscaping work and all utilities complete per the approved design and specification.
9. Design and provide expansion joints as per the approved detailed design prepared by the EPC contractor.
10. Scope of work includes connectivity of all utilities of building with the road utilities networking lines as per the detailed design to be done by the EPC contractor and approve– by the Authority
11. Area of Custom Building to be construct as mention below:

Area statement of Custom Building			
Slo. No.	**Particulars**	**Area in sqm**	**Remarks**
Ground Floor			
1	SHIPPING AREA	135.00	
2	VAS AREA	124.46	
3	SORTING AREA	83.53	
4	UNPACKING/SORTING AREA	143.31	
5	GENTS TOILET	9.80	
6	LADIES TOILET	9.80	
7	LOCKER ROOM	12.74	
8	PALLET RACKS AREA	522.00	
9	SHIPPING DOCK AREA	95.00	
10	RECEIVING DOCK AREA	76.48	
11	MAIN ENTRANCE	8.47	
12	RAMP AREA	32.96	
	Total	**1253.55**	
Mezzanine Floor			
1	RECEPTION	38.71	
2	PANTRY	13.72	
3	STORE ROOM	14.70	
4	OFFICE	38.08	
5	MANAGER CABIN	10.20	
6	SUPERVISOR CABIN	10.20	
7	MEETING ROOM	32.9	
8	SERVER ROOM	35	
9	CORRIDOR	8.28	
	Total	**201.79**	
	Total Area (Ground+Mezzanine)	**1455.34**	

Note : The area statement subjected to change and conceptual drawing / design and not legal offering.

2.6 Electrical Sub-stations.

The scope of work includes construction of Electrical Sub-station in the hatched plot of drawing no. VSPL/IPD/1819_030/IPD/ FMPA/BPD/4A. The detailed scope is:

This scope of work shall include Site visit, Survey, Design, engineering, manufacture, shop testing, inspection, packing, dispatch, loading, unloading and storage at site, storage and construction insurance, assembly, erection, civil structural, architectural work, complete pre-commissioning, testing & commissioning at site, obtaining statutory clearance & certification (if any) and handing over to owner after satisfactory commissioning of entire work coming under this contract with all required work to complete this project. The broad details of scope of works as follow:

A. Establishment of AIS type 132/33 KV substation with 2x16 MVA, 132/33 KV power transformers and 2nos.132 KV feeder and 4 nos. 33 KV feeder complete as per **AEGCL technical specifications** – 1No.
Brief equipment details of substation are given below for reference only.

Sl. No	DESCRIPTION	Unit	Tentative Qty.
I	CIVIL WORKS (Control Room Building, bore well, fencing, road, cable duct, foundations etc.)	Lot	1
II	**ELECTRICAL WORKS**		
1	132 kV AB Switch with earth blade	Nos	2
2	132 kV AB Switch w/o earth blade	Nos	6
3	132 kV SF6 Breaker	No	4
4	132 kV CTs(Single Phase)	Nos	12
5	132 kV PTs(Single Phase)	Nos	3
6	132 kV LAS (Single Phase)	Nos	6
7	33 kV AB Switch	Nos	12
8	33 kV VCB (2 LV Breaker) outdoor	Nos	2
9	33 kV VCB (4 feeder)	Nos	4
10	33 kV VCB (Bus coupler)	No	1
11	33 kV CTs	Nos	18
12	33 KV PTs(outdoor)	Nos	3
13	33 kV LAS - Stn type	Nos	6
14	33 kV LAS - Disn. Type	Nos	12
15	Earthing and Painting	LS	1
16	Outdoor illumination	LS	1
17	110V DC indoor C&R panel for GC breaker	No	2
18	110V DC indoor C&R panel for LV breaker	Nos	2
19	110V DC indoor C & R (2 feeder) panel	Nos	2
Sl. No	**DESCRIPTION**	**Unit**	**Tentative Qty.**
20	110V DC Annunciator Panel 100 windows	No	1
21	Control cable	Lot	1
22	110 V DC, Battery set with stand	Set	2
23	110 V , Battery charger	set	2

24	Fire Fighting equipment's	Lot	1
25	110 V D.C Distribution Panel	set	1
26	A.C Panel	set	1
27	33 kV /433 V Station Transformer	No	1
28	P&T Phone	No	1
29	T&P materials	LS	1
30	T&P furniture	LS	1
31	Scientific Instruments	LS	1
36	16 MVA, 132/33-11 kV Power Transformer with OLTC	No	2
40	132 KV Structure	set	1
41	33 KV Structure	set	1

B. Supply, erection, testing commissioning of 33/11kV Indoor Type Substation with 2x5MVA Power Transformer complete unit and 6 Nos. 11 KV outgoing feeders etc. complete as per **APDCL technical specification** - 1Nos. Brief equipment details of substation are given below for reference only.

S. No.	Description of Item	Unit	Tentative Qty.
A	**CIVIL WORKS (Control Room Building, bore well, fencing, road, cable duct, foundations etc.)**	Lot	1
i	Land Development and Compound Walling		
ii	Design Substation Building according to CBR value		
iii	Foundation for Power Transformer & Station Transformer, oil soak pit, cable trench, foundation of lighting poles		
iv	Sanitary and Water Supply works Sump Well for water storage		
v	Construction of Internal road inside the substation area		
vi	Provision of Main Gate		
B	**ELECTRICAL WORKS**		
1	5MVA, 33/11kV ONAN POWER TRANSFORMER with OLTC outdoor Type	Nos.	2
2	33kV VCB Indoor Panel switchboard comprising of 3 Nos. Incomer rating of 630 A,36 kV class VCB, 25kA,3 Sec., and 2nos. 630 A,36 kV, VCB Outgoing feeders, 25kA,1 Sec, rating and 1 Bus Coupler including CT's, CBT's, Busbar wiring etc. complete in all respect for the system	Set	1
3	11 kV VCB Indoor Panel switchboard comprising of 2 Nos. Incomer rating of 630A,12 kV class VCB,25KA, 3 Sec., 1 No. Bus Coupler rating of 630A, 12 kV class VCB, 25KA, 1 Sec and 8nos. 630 A,12 kV VCB Outgoing feeders, 25 KA,1 Sec, rating including CT's, CBT's, Busbar wiring etc. complete in all respect for the system,	Sets	1
4	AFPC Panel with Capacitor Banks [Indoor Type]	Sets	1
5	110V DC Battery bank and Battery Charger	Sets	1
6	ACDB & DCDB	Each	1
7	Power Cable, Control Cable and Cable terminations	Lot	1
8	Cable Trays	Lot	1
9	STATION TRANSFORMERS(11/0.433 KV)	No	1
10	Soil Resistivity Testing and designing of Earthing , Earthing Materials	Lot	1
11	FIRE FIGHTING AND SAFETY ITEM	Lot	1
12	UPS SYSTEM	Set	2

13	Outdoor and Indoor Illumination	Lot	1
14	Air Conditioner	No	2

The bidder on its own responsibility may visit and examine the Site of Works and its surroundings and obtain information that may be necessary for preparing the bid.

2.7 Landscaping Works.

The scope of work includes landscaping works in the hatched plot of drawing no. VSPL/IPD/1819_030/IPD/LS-01. In addition, trees to be planted all along the boundary walls. landscaping work of green area is mention below

MMLP Phase - I,			
Sl. No.	**Name of Area**	**Area**	**Unit**
1	GREEN 4	10786.8	Sqm
2	GREEN 5	6676.00	Sqm
3	GREEN 6	8285.53	Sqm
4	GREEN 7	2392.39	Sqm
5	Buffer Green	15858.48	Sqm
6	Peripheral Green	50873.76	Sqm
Total Area of Green to be developed		**94,873.00**	**Sqm**

The scope of work for the parks includes the following:

1. Detailed designing of these parks complete with all the external and internal utility services as per the layout plan shown in drawing and all necessary surveys to do the work.
2. Construction and Maintain for 2 years after virtual completion certificates of Grass, plants, Trees, Shrubs, Hedges & tree gaurd as per the layout plan shown in drawing and as per the approved detailed design prepared by the EPC contractor.
3. Scope of work includes compound wall upto height of 1.2 m (including MS Grill / railing) above FGL with gates. including plaster and exterior weather shield paint as per the approved detailed design prepared by the EPC contractor.

4. Scope of work includes paved area with chequered tiles, stone benches, lamp post, sheds, fountain as per the layout plan shown in drawing and as per the approved detailed design prepared by the EPC contractor.
5. Scope of work includes 2 years of maintenance for landscaping work with proper staff, good earth, water, manure, sludge and seasoning plants & flowers complete as required to maintain.

2.8 Water & Sewage Treatment Plants.

The scope of work includes construction of Water & Sewage Treatment Plants in the hatched plot of drawing no. VSPL/IPD/1819_030/IPD/FMPA/BPD/4A. The detailed scope is:

1. Water Treatment Plants

Work under this Contract consists of furnishing all material, labor, tools & tackles, equipment and appliances necessary to completely install the various systems as required by the drawings, specifications hereinafter and given in the schedule of quantities.

Without restricting to the generality of the foregoing system shall include the following:

- Water Treatment Plant: 2.0 MLD
- Raw Water Sump at WTP :150 KLD

This specification covers the general requirement and specification regarding the construction and operation of conventional water treatment plants including pre-chlorination, aeration, flocculation (rapid & slow mixing) & sedimentation, rapid gravity filtration and post chlorination adopted for surface waters laden with algae or other microorganisms.

The Contractor to prepare the Design as per CPHEEO Manual for water supply. The same should be approved by engineer before execution.

2. Sewage Treatment Plants

Work under this Contract consists of furnishing all material, labor, tools & tackles equipment and appliances necessary to completely install the various systems as required by the drawings, specifications hereinafter and given in the schedule of quantities.

Without restricting to the generality of the foregoing system shall include the following:

- Sewage treatment plant (0.5MLD).

The Contractor should prepare the Design as per CPHEEO Manual for Sewerage & Sanitation. The same should be approved by engineer before execution.

The broad design parameters and specifications for the works are provided in this section of document, but the general specifications for all works are provided in subsequent sections.

The design shall be based on based on proven technology such as SBR. Hence the technical specification for SBR is provided. **However, it is liberty of the bidder to choose any technology.** It is the responsibility of the contractor to make design and detailed engineering for the sewage treatment plant. In the first instance the contractor will submit the process design, lay out plan and hydraulic flow diagram for the approval of the client.

After approval of these documents the contractor will prepare and submit the general arrangement drawings for various components of the project. Once these drawings are approved, the contractor will go ahead with the structural designs and submit the structural drawings for approval. Then the contractor will prepare and submit the good for construction drawings for approval. After approval of these drawings only the contractor will do the construction work

SCHEDULE – C

(See Clause 2.1)

PROJECT FACILITIES

----------NIL----------

SCHEDULE – D

(See Clause 2.1)

SPECIFICATIONS AND STANDARDS

1 Boundary Wall & Site Grading.

(A) SITE GRADING

1.0 Indian Standards

Indian Standards to be followed are

All relevant latest Indian Standards as specified or not stated shall be applicable.

1) IS 1498 Classification and identification of soils for general engineering purpose.

2) IS 3764 Safety code for excavation Work.

3) IS 4081 Safety code for blasting and related drilling operation.

4) IS 2720 Method of tests for soils.

1.1 Site Clearance

1.1.1 Prior to the start of any activity of earth-work, the area under construction shall be cleared of shrubs, vegetation, grass, brushwood, trees and saplings of girth upto 30 cm measured at a height of 1 meter above ground level. All rubbish must be removed and stacked at a distance of 50 meter outside the periphery of the area under clearance or location as decided by the Construction Manager.

1.2 Setting Out

1.2.1 The contractor shall prepare detailed setting out drawings based on the layout drawings and those shall be submitted to the CM prior to commencement of work. Bench Marks and Reference Lines shall be established, by the contractor with approval of the CM.

1.2.2 The contractor shall do the setting out with the use of theodolite and like instruments at site, based on details given to him. He shall erect timber profiles, masonry pillars, burjis, etc. for his use. All markings on these duration of the project setting out shall be maintained for the entire duration of the project. Setting out shall be approved by the CM before the commencement of any work.

1.3 Excavation in Soils

1.3.1 The work shall be done as per C.P.W.D specifications with upto date correction slips and Indian Standard Codes of practice shall be applicable unless specified otherwise. In all cases the latest revisions of the codes shall be referred to.

1.3.2 The Contractor shall furnish all tools, plants, instruments, JCB's/Excavators, qualified supervisory personnel, labour, materials, any temporary works, consumables, any and every thing necessary, whether or not such items are specifically stated here, in accordance with the Employer's Requirements for completion of works till commissioning of entire work/system.

1.4 Protection/ Barricading

1.4.1 The contractor at his cost shall provide fencing/ Barricading and/or other suitable measures for protection against risk of accidents due to open excavation.

1.4.2 Where excavation is to be carried out below the foundation level of an adjacent structure, and to avoid underpinning, precautions such as shoring and strutting, etc. must be taken. No excavation should start as such measures are taken to the satisfaction of the CM. Payments for such work shall not be made separately unless specified otherwise.

1.5 Filling

Prior to commencement of any filling either as backfill to excavations, the Contractor shall submit in writing to the Engineer for 'Notice of No Objection' his proposals for carrying out the Work such that the optimum use may be made of excavated material. The proposals shall include details of the compaction plant and methods for adjusting the moisture content of the material.

No filling shall commence until the 'Notice of No Objection' to his proposals have been received from the Engineer.

Fill Material

(1) Fill material shall be obtained only from a source agreed with the Engineer

(2) Fill material, other than for road works, shall be evenly graded granular material. Material with more than 20% passing a 75 micron sieve or more than 10% in excess of 75mm size shall be considered as unsuitable for use in the Works.

(3) Before compacting the fill material, clods or hard lumps of earth over 75mm in greatest dimension shall be broken up.

(4) The following types of material are considered unsuitable and shall not be used for filling.

(a) Materials from swamps, marshes or bogs.

(b) Peat, loam, fine silt, log, stump or organic or perishable materials.

(c) Material susceptible to spontaneous combustion.

(d) Clay of liquid limit exceeding 80% and plasticity index exceeding 55%.

(e) Materials containing salts prone to inducing leaching in the embankment.

(f) Any contaminated and environmentally unacceptable material.

(5) The Contractor shall carry out the following initial tests on the proposed material. Thereafter, one set of tests shall be carried out for each 2000 m3 of fill, supplied to Site or as noticed by Engineer.

(a) Wet sieve analysis.

(b) Dry density/moisture content relationship

Backfill - General

Except around structures, excavations shall be backfilled with suitable excavated material

and/or noticed material compacted in layers of 300mm maximum loose thickness to achieve a density of at least 95% of the maximum dry density.

Backfill to Structures

(6) The Contractor shall not backfill around structures until the structural elements have attained adequate strength.

(7) The backfill material shall be selected excavated material or sand, thoroughly compacted in layers not exceeding 200mm loose thickness to achieve a density of at least 95% of the maximum dry density.

Tests

Testing of Fill – General

(1) Classification tests as per relevant Standards to which the Engineer has given his Notice of No Objection shall be carried out to ensure that true comparisons can be made between in- situ densities, laboratory compaction densities and field trial densities so that the variations in properties of the fill materials can be determined.

(2) Tests shall be carried out on fill to determine the degree of compaction achieved, at the rate of one test for either each 1000 m3 placed or each layer whichever is the more frequent. Compacted layers shall not be covered without Notice of No Objection from the Engineer.

(3) The density of individual compacted layers shall be determined by a method agreed by the Engineer.

(4) The in-situ dry density of fill shall average 95% of the maximum reached in trials. No single result shall be less than 92% and no more than 25% of the results on any one layer shall fall between 92% and 95%. The average shall be computed from the total number of tests on any one layer where the extent of the layer is defined by the Contractor when submitting same for inspection.

Materials for Fill

(5) In addition to the general requirements for fill material, the material in the topmost layer shall not exceed the following test values.

Plasticity Index : 6% Liquid Limit : 35%

(6) Total fines content shall not exceed 15% and Uniformity Coefficient (Cu) shall not be less than 4.

(7) The laboratory California Bearing Ratio (CBR) value at 95% maximum dry density achieved after soaking for 96 hours shall not be less than 30%.

Testing of Fill

(8) Tests shall be carried out on the top layer of fill as shown in the following table. Tests shall be carried out as required by the accepted test procedures

Test	Frequency of test (not less than one test per…)
A. Laboratory tests to monitor the consistency of the noticed material during construction:	
Maximum dry density	1000 m2

Optimum moisture content	1000 m2
Grading	1000 m2
Plasticity index	1000 m2
Linear shrinkage	1000 m2
CBR Value	2000 m2
B. In situ tests to confirm that the required degree of compaction is being achieved during construction:	
Dry density	250 m2
CBR Value	1500 m2

1.6 Disposal of Surplus Earth

1.6.1 Surplus earth shall be used to the maximum extent in backfilling. Earth useful for filling shall be separately stacked as directed by the EIC from time to time. Approved quality earth shall be used in the filling. It shall be consolidated as detailed and approved by the CM.

1.6.3 All surplus and unusable earth shall be disposed off outside the site.

(B) BOUNADARY WALL

1. SCOPE OF WORK

1.1 Work under this Contract consists of furnishing all material, labour, tools & tackles, equipment and appliances necessary to completely install the various systems as required by the drawings, specified hereinafter and given in the schedule of quantities.

1.2 Without restricting to the generality of the foregoing the system shall include the following:

a) External drainage lines, chambers, and other allied works.

2 FOR UNDERGROUND DRAINS

The minimum width of trenches, shall be kept at the bottom, as required for sections of drains provided. The connection from road side sump to the drain should be with RCC pipes as per IS:783-1985 & I.S:458-1988 with latest amendments.

3 REINFORCED CEMENT CONCRETE AND MASONRY WORKS

3.1 Materials

a) Water

Water used for all the constructional purposes shall be clear and free from oil, acid, alkali, organic and other harmful matters, which shall deteriorate the strength and durability of the structure. In general, the water suitable for drinking purposes shall be considered good enough for constructional purpose.

b) Aggregate for Concrete

The aggregate for concrete shall be in accordance with I.S: 383 and I.S: 516-1959 in general, these shall be free from all impurities that may cause corrosion of the reinforcement. Before actual use these shall be washed in water, if required as per the direction of Construction Manager. The size of the coarse aggregate shall be as per I.S:383.

c) Sand

Sand for various constructional purposes shall comply in all respects with I.S 650 and I.S. 2116. It shall be clean, coarse, hard and strong, sharp edged, durable, uncoated, free from any mixture of clay, dust, vegetable matters, mica, iron impurities, soft or flaky and elongated particles,

alkali, organic matters, salt, loam and other impurities which may be considered by the Construction Manager as harmful for the construction conforming to the relevant IS specification.

d) Cement

The cement used for all the constructional purposes shall be ordinary Portland cement or rapid hardening Portland cement conforming to I.S: 269 or IS :8112 .

e) Mild Steel Reinforcement

High strength deformed steel round bars conforming to all requirements of I.S:1786-1985 shall be used as reinforcement for R.C.C.

f) Bricks

Bricks shall be first class designation 75 and have uniform colour, thoroughly burnt but not over burnt, shall have plain rectangular faces with parallel sides and sharp right angled edges. They should give a ringing sound when struck. Brick shall not absorb more than 20% to 22% of water, when immersed in water for 24 hours. Bricks to be used shall be approved by the Construction Manager.

g) Other Materials

Other materials not fully specified in these specifications and which may be required in the work shall conform to the latest I.S. All such materials shall be approved by the Construction Manager before use.

3.2 Cement Concrete (Plain or Reinforced)

a) Cement concrete in bedding, cradles, foundations and RCC slabs for all works shall be mixed by a mechanical mixer of quantities of the concrete poured at one time permit.

b) Rate for cement concrete shall be inclusive of all shuttering and centering at all depths and heights if not mentioned otherwise.

c) Concrete work shall be of such thickness and mixes given in the schedule of quantities and drawings.

d) All concrete work shall be cured for a period of at least 10 days. Such work shall be kept moist by means of wet gunny bags at all times. All pipes, trenches and foundations shall be kept dry during the curing period.

3.3 Masonry work

Masonry work for drain and gully chambers and such other works as required shall be constructed from first class brick in cement mortar 1:4 (1 cement: 4 coarse sand) or as mentioned in the bill of quantities . All joints shall be properly raked to receive plaster.

3.4 Plaster & Pointing

The wall of drain shall be plastered inside with 12mm thick cement plaster 1:3 (1 cement: 3 course sand) finished smooth and used for atleast 10 days.

3.5 Construction of open surface drain

The open drain shall be of the size as specified in the item and laid to such gradients and in such location as may be shown in the relevant drawing or as directed by Construction Manager/Owner.

The size of the drain as specified shall be the width of the drain at the top, measured between the masonry walls. The drain shall be given, as far as possible, uniform slope from the starting point to the discharge point.

The average depth of the various size of drains are mentioned in the Bill of Quantities.

3.6 Road Gully Chamber

3.6.1 All chambers and other such works as specified shall be constructed in first class designation 75 FPS brick in cement mortar 1:4 mix (1 cement: 4 coarse sand) or as specified in the schedule of quantities. All chambers etc., shall be supported on base of cement concrete of such thickness and mix as given in the BOQ or shown on the drawings.

3.6.2 The chamber shall be connected to the nearest main storm water drain by RCC pipe of specified size as given in BOQ and drawings and as per site requirement. The chamber shall be built at the location fixed by Construction Manager.

3.6.3 The chamber shall be provided with horizontal pre cast SFRC gratings of the required pattern and size as specified in BOQ.

3.6.4 CI vertical grating of required size and approved design pattern shall be provided at mouth of interconnecting pipe from side road channel to main surface drain.

4. REINFORCED CEMENT CONCRETE PIPES

4.1 All RCC pipes for drainage lines where specified shall be centrifugally spun RCC pipes of specified class, and shall confirm to I.S:458-1988.

Pipes shall be true and straight with uniform bore, throughout. Cracked, warped pipes shall not be used on the work. All pipes shall be tested by the manufacturer and the Contractor shall produce, the certificate to that effect from the manufacturer.

4.2 Laying

The pipe shall be laid as per provision of I.S: 783-1983.

5. RCC SLAB COVER

Drain shall be provided with precast RCC slab where necessary, details of which are as specified in the Bill of Quantities or as given in drawing.

6. MEASUREMENTS

6.1 The measurements shall be done conforming to IS:1200-1979-1981 with latest amendments to date and as per latest CPWD specifications and/or as specified in the respective heads of various item of works to be executed and as described in detail BOQ .

6.1 The measurement for excavation shall be done as specified in para 3 of the section 2

6.3 Chambers

a) All chambers shall be measured by numbers & shall include all items specified above & necessary excavation, refilling & disposal of surplus earth.

b) Chambers with depths greater than specified under the main item shall be paid for under "extra depth" & shall include all items as given for chambers. Measurement shall be done to the nearest cm. Depth of the chambers shall be measured from top of the chamber cover to bottom of channel.

6.4 Brick masonry and cement concrete shall be measured per cubic metre and shall include all items as given in the schedule of quantities.

6.5 Cement plaster shall be measured in square metre of the area.

Admin Building.

Finishing Schedule of Admin Building as given below

GROUND FLOOR				
1	STAIR CASE (INTERNAL)	Wall	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed make
		Riser	Granite	18 mm or higher from repute make
		Tread	Granite	18 mm or higher from repute make
		Landing	Granite	18 mm or higher from repute make
		Skirting	Granite	18 mm or higher from repute make
2	RECEPTION	Floor	Granite	18 mm or higher from repute make
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
3	ENTRANCE LOBBY	Floor	Granite	18 mm or higher from repute make
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
4	OFFICE 1	Floor	Vitrified tiles (matt finish)	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
5	OFFICE 2	Floor	Vitrified tiles (matt finish)	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
6	OFFICE 3	Floor	Vitrified tiles (matt finish)	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
7	OFFICE 4	Floor	Vitrified tiles (matt finish)	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
8	TOILETS	Floor	Ceramic tiles matt finish	Ceramic tiles (300 x 300) reputed Make
		Dado	Ceramic tiles matt finish	Finish : Glossy | Size : 300x450mm
		Wall	Distemper	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Distemper	Nerolac, Asian paints, ICI or other reputed Make
9	PASSAGE (CORRIDOR)	Floor	Granite	18 mm or higher from repute make
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make

10	MAINTENANCE	Floor	Kota Stone	25mm thick
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
11	BOARD OF DIRECTORS	Floor	Laminate Wooden flooring	1216 x 196 x 8mm reputed make, Armstrong
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
12	CHAIRMAN CABIN	Floor	Laminate Wooden flooring	1216 x 196 x 8mm reputed make, Armstrong
		Dado or skirting	Engineer wood	Reputed Makee
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
13	VICE CHAIRMAN/ MD OFFICE	Floor	Laminate Wooden flooring	1216 x 196 x 8mm reputed make, Armstrong
		Dado or skirting	Engineer wood	Reputed Makee
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
14	P.A ROOM	Floor	Vitrified tiles	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
15	BANK	Floor	Vitrified tiles	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
16	DISPENSARY	Floor	Vitrified tiles	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
17	TRAINING LAB	Floor	Granite	18 mm or higher from repute make
		Dado	Engineer wood	Reputed make
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
18	CLASS ROOM	Floor	Vitrified tiles	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
19	DISPLAY/EXHINITION HALL	Floor	Granite Flooring	18 mm thick.
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
20	PANTRY	Floor	Ceramic mat finish tiles Ceramic tiles 150x150	Asian, kajaria, somany
		Dado	ceramic tiles Ceramic tiles 150x150 up to 2100 high	Asian, kajaria, somany
		Wall	Distemper	Nerolac, Asian paints, ICI or other reputed make
		Ceiling	Distemper	Nerolac, Asian paints, ICI or other reputed make

21	CAFE	Floor	Vitrified tiles	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
22	MULTI PURPOSE HALL	Floor	Vitrified tiles	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
23	STAFF OFFICE/ ACCOUNTS	Floor	Vitrified tiles (matt finish)	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
24	DEAN OF STUDIES	Floor	Vitrified tiles	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
25	LIFT LOBBY	Floor	Granite	18 mm or higher from repute make
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
1^{st},2^{nd},3^{rd} TYPICAL FLOORS				
1	OPEN WORK SPACE	Floor	Vitrified tiles	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
2	PANTRY	Floor	Ceramic mat finish tiles Ceramic tiles 150x150	Asian, kajaria, somany
		Dado	ceramic tiles Ceramic tiles 150x150 up to 2100 high	Asian, kajaria, somany
		Wall	Distemper	Nerolac, Asian paints, ICI or other reputed make
		Ceiling	Distemper	Nerolac, Asian paints, ICI or other reputed make
3	CAFE	Floor	Vitrified tiles	REPUTED MAKEE (600 x 600)
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
4	TOILETS	Floor	Ceramic tiles matt finish	Ceramic tiles (300 x 300) reputed Make
		Dado	Ceramic tiles matt finish	Finish : Glossy | Size : 300x450mm
		Wall	Distemper	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Distemper	Nerolac, Asian paints, ICI or other reputed Make
5	LIFT LOBBY	Floor	Granite	18 mm or higher from repute make
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make

6	CORRIDOR	Floor	Granite	18 mm or higher from repute make
		Wall	Acrylic Emulsion	Nerolac, Asian paints, ICI or other reputed Make
		Ceiling	Acrylic distemper	Nerolac, Asian paints, ICI or other reputed Make
		Floor	Granite	18 mm or higher from repute make

External Development work for road & parking should be design & construct as a rigid pavement/ concrete flooring.

Custom Building.

Finishing Schedule of Custom Building as given below

Sl. No	Description	Specification
1	Foundation	Pile Foundation as per structural design based on soil investigation.
2	Structure	Pre - engineered steel Building.
3	Wall Cladding	External wall-Brick work /Autoclaved Aerated Concrete (ACC) Block work upto height of 3.0 m and on above Pre-coated Galvalume Steel Sheet. Internal wall-Brick work /Autoclaved Aerated Concrete (ACC) Block work full height /as per section.
4	Roofing	Double skin insulated roof system having Top & Bottom sheet of Pre-coated Galvalume Steel Sheet and in between sheets, there will be 50 mm insulation of Rockwool / Glass wool. Turbo Ventilating System is also included at the top of the roof.
5	Outer Doors & Windows	Anodized / Power coated / Polyester powder coated windows / doors. Glazing with reflective glass or double glass using float glass. Rolling shutters : Mild steel
5	Internal Doors	Frames of 2nd class Indian teakwood or equivalent or T-iron frame, pressed steel frames as per CPWD specification. Door shutters : Panelled type in 2nd class teak wood or flush door with commercial ply as per CPWD specification.
6	Fittings	Anodized Aluminum / Stainless steel or equivalent.
7	Floorings- Storage Area, VAS, Sorting, Unpacking, Pallet rack, shipping dock, receiving dock,	Vacuum dewatered concrete flooring and Hardener also provided at the top.
8	Floorings- Locker Room, office Area	Vitrified Tiles
8	Toilets Flooring	Ceramic floor tiles Matt finish / anti skid of approved design.
9	Skirting / Dado in Toilets	Ceramic glazed tiles.
10	Finishing External	Weather-shield / Premium Acrylic smooth exterior finish with additive of silicone on external brick / block works.
11	Internal	Acrylic /oil bound distemper on brick / block works. Synthetic enamel paint on all steel structure works.

12	External Building Paved	Rigid pavement. / Concrete flooring.

2.6 Electrical Sub Stations.

A. GENERAL REQUIREMENTS:

1. Definitions

In the specification the following words and expressions shall have the meanings hereby assigned to them.

(a) This specification covers the design, manufacturing, supply, installation, testing & commissioning of 132/33kV, 2X16MVA AIS Type Substation and 33/11kV, 2X5MVA Indoor Substation consisting of subsoil survey and investigation, topographical survey including inspecting and testing, insurance, packing, delivery to the site, unloading, complete construction, erection. All civil works including site levelling, diverting of water sources which may flow during rain, foundations, fences, compound walls, roads, finishing, site testing (including relay setting calculations) of the entire substation on the EPC basis.

The Contractor shall carry out all work, whether specified in detail or not, in accordance with the Employer's Requirements

(b) Provided and its derivatives means the complete design, manufacture, delivery, installation, testing and commissioning of the works inclusive of such ancillary services as inspection and witnessed testing at the places of manufacturer, workshop and handling on site, site trials and all such other services as are noted in the specification or reasonably necessary for the safe, reliable and efficient completion of the contract.

(c) "Intent of Specification" the specification covers the general requirements for Survey, design, engineering, manufacture, testing, delivery, storing at site, installation, testing, commissioning the equipment required under this contract.

(d) For the Substation Construction Work (Supply, erection, testing commissioning of 33/11kV Indoor Type Substation, 132/33kV Main Receiving Substation), **Assam Power Distribution Company Limited (APDCL) and Assam Electricity Grid Corporation Ltd. (AEGCL)** specification of material will be considering for design and construction of the equipment/materials.

2. Service Conditions:

The equipment/materials offered will be entirely satisfactory for operation under the climatic conditions indicated below:

a)	Maximum ambient air temperature (in shade)	45°C
b)	Minimum Night Temperature	0°C
c)	Reference ambient day temperature	45°C
d)	Maximum Relative humidity	100%

e) Altitude above M.S.L. upto 1000 M

f) Maximum wind pressure As per IS 802 latest code

g) Seismic Intensity Zone-V as per IS 1893

2.7 Landscaping Works.

Items of Landscaping works as given below

MMLP PHASE 1 PARKS				
Sl No.	**Elements**	**Area**	**Unit**	**Remarks**
1	**Green -4**			
1.1	Grass Area	10759.00	Sqm	
1.2	Stone Benches	25	Nos	
1.3	Ziziphus jujube tree	35	Nos	
1.4	Mesua ferrea tree	70	Nos	
2	**Green -5**			
2.1	Grass Area	6676.00	Sqm	
2.2	Stone Benches	15	Nos	
2.3	Ziziphus jujube tree	20	Nos	
2.4	Mesua ferrea tree	40	Nos	
3	**Green -6**			
3.1	Grass Area	7739.00	Sqm	
3.2	Paved Area	546.00	Sqm	
3.3	Stone Benches	20	Nos	
3.4	Lamp Post	53	Nos	
3.5	Shed	8	Nos	
3.6	Fountain	1	Nos	
3.7	Ziziphus jujube tree	46	Nos	
3.8	Mesua ferrea tree	94	Nos	
4	**Green -7**			
4.1	Grass Area	2116.00	Sqm	
4.2	Paved Area	259.00	Sqm	
4.3	Stone Benches	9	Nos	
4.4	Lamp Post	53	Nos	
4.5	Shed	2	Nos	
4.6	Ziziphus jujube tree	15	Nos	
4.7	Mesua ferrea tree	16	Nos	

5	**Buffer Green**			
5.1	Grass Area	13858.00	Sqm	
5.2	Stone Benches	25	Nos	
5.3	Ziziphus jujube tree	40	Nos	
5.4	Mesua ferrea tree	80	Nos	
5.5	Bamboo Plantation	2000.00	Sqm	
6	**Periferial Green**			
6.1	Bamboo Buddha valley plant	50373.00	Sqm	

Schedule of Landscaping works as given below

Landscaping Works Description
Trenching in ordinary soil up to a depth of 60 cm including removal and stacking of serviceable materials and then disposing of surplus soil, by spreading and neatly leveling within a lead of 50 m and making up the trenched area to proper levels by filling with earth or earth mixed with sludge or / and manure before and after flooding trench with water.
Site dump manure from approved source screened through sieve of I.S. designation 20 mm
Site dump manure from approved source screened through sieve of I.S. designation 16 mm
Site dump manure from approved source screened through sieve of I.S. designation 4.75 mm
Spreading of sludge, dump manure and/or good earth in required thickness as per direction of officer-in-charge
Mixing earth and sludge or manure in the required proportion specified or directed by the Officer-in-charge.
Grassing with selection No. 1 grass including watering and maintenance of the lawn for 60 days or more till the grass forms a thick lawn, free from weeds and fit for mowing including supplying good earth, if needed (the grass and earth shall be paid for separately).
a) In rows 5 cm apart in either direction
Digging holes in ordinary soil and refilling the same with the excavated earth mixed with manure or sludge in the ratio of 2:1 by volume (2 parts of stacked volume of earth after reduction by 20% : 1 part of stacked volume of manure after reduction by 8%) flooding with water, dressing including removal of rubbish and surplus earth, if any, with all leads and lifts
Holes 1.2 m dia and 1.2m deep as per require plants.
Holes 90 cm dia and 90 cm deep as per require plants.
Holes 60 cm dia and 60 cm deep as per require plants.
Holes 45 cm dia and 45 cm deep as per require plants.
Anti termite treatment by digging pits 30 cm deep and 4 cm dia, 6 to 7 holes around the tree using chemical emulsion at the rate of 1.5 liter per hole in two time or more application to get the trees free from termite infection chemicals used Chlorpyriphos 20% EC in the ratio of 1% concentration and as per direction of officer-in-charge.
Anti termite treatment of lawn area through premise 30.50% I P. one liter premise diluted in 499 liters water and applying solution @ 1.00 litre solution per sqm lawn or bed area.(two application) i/c cost of chemical)and as per direction of officer-in-charge.and as per direction of officer-in-charge.
Plantation of Trees, Shrubs, and Hedge at site i/c watering and removal of unserveiceable material's as per direction of officer in charge.

Azadirachta indica (Neem) plant of height 120-130 cm.
Butea frondosa (Flame of Forest) plant of height 60-75 cm.
Cassia fistula (Amaltash) plant of height 120-135 cm
Cassia siamea plant of height 150-165 cm.
Delonix regia (Gulmohar) plant of height 150-165 cm.
Ficus elatica Decora (Rubber Plant) plant of height 45-60 cm.
Jacaranda mimosifolia plant of height 150-165 cm.
Polyalthia longifolia (Ashok) plant of height 180-195 cm.
Terminalia arjuna plant of height 150-165 cm.
Roystonea Regia (Palm Tree) plant of height 270-300 cm bottom grith 40 -50 cm
Albizia Lebbeck (Parrot Tree) plant of height 150-165 cm.
Pisonia Alba plant of height 30 cm to 45 cm. in 20 cm
Canna Hybrid (Lilly) plant of height 30 cm to 45 cm. in 20 cm
Allamanda cathartica plant of height 30 cm to 45 cm. in 20 cm
Dracaena margineta plant, having ht. 30 cm to 45 cm with colourfull leaves, fresh and healthy.
Bougainvillea (Variety Butiana, Lady Mary Baring, Mahara,Mohan,Scarlet Queen, Varigata, Glabra Formosa, Peruviana Odissi, Partha, Subhra,Thimma, Spectabilis L.N Birla, Refulgens) plant of height 30 cm. to 45 cm.
Nerium oleander (kaner) dwarf of height 30-40 cm.
Duranta Golden plant, having ht.15 to 20 cm bushty shape plant with fresh and healthy leaves
Bamboo Buddha valley plant with fresh & healthy 3 to 4 suckers having 75 to 90 cm ht.
Neelgiri/Mexican grass turf with earth 50mm to 60mm thickness of existing ground prepared with proper level and ramming with tools wooden (Dhurmos) and than rolling the surface with light roller make the surface smoothen and light waterning with sprinkler and maintenance for 30 days or more till the grass establish properly.
Selection no. 1 grass turf with earth 50mm to 60mm thickness on existing ground prepared with proper level and ramming with required tools wooden and than rolling the surface with light roller make the surface smoothen and light watering the same.
M.S. flat iron tree guard 60 cm dia and 2 m high, above ground consisting 4 nos 25 x 6 mm, 2.25 m long and 8 nos 25 x 3 mm 2 m long verticals M.S. flats, riveted to 3 nos 25 x 6 mm M.S. flat iron rings in two halves, fixing together at site with required six numbers of 8 mm dia and 30 mm long bolts, including painting two coats with synthetic enamel paint of approved brand and manufacture over a coat of primer. One name plate of 1 mm thick M.S. sheet of size 250x100 mm shall be welded to the tree guard near the middle height and lettered CPWD / PWD/ any other approved name. The tree guard shall be suitably fixed to the ground by embedding four legs of tree guard in pits of suitable dia and to a depth of 25 cm, refilling the pits with soil and ramming, complete.
Fountain with water supply pumping arrangements and 16 nos Multi colour L.E.D lights arrangements, automatic colour changing timer control as directed by the EIC
Decorative Designer lamp post made of Galvanised Mild Steel Pipes fitted with cast aluminium fixture duly polyrethane paint coated fitted with 30watt. LED Lamp and 2 nos. LED Tubes(T-8).
Stone Benches of size 1550 X 610 X 550 mm Complete as per Approved drawings & Specifications or as per directions of Engineer-in-charge

I. TECHNICAL SPECIFICATIONS FOR WATER TREATMENT PLANT

1.1 Scope of Work

Work under this Contract consists of furnishing all material, labor, tools & tackles, equipment and appliances necessary to completely install the various systems as required by the drawings, specifications hereinafter and given in the schedule of quantities.

Without restricting to the generality of the foregoing system shall include the following:

- Water Treatment Plant: 2.0 MLD
- Raw Water Sump at WTP :150 KLD

This specification covers the general requirement and specification regarding the construction and operation of conventional water treatment plants including pre-chlorination, aeration, flocculation (rapid & slow mixing) & sedimentation, rapid gravity filtration and post chlorination adopted for surface waters laden with algae or other microorganisms.

The Contractor to prepare the Design as per CPHEEO Manual for water supply. The same should be approved by engineer before execution.

1.2 Required Drinking Standards

An abstract of parameters is indicated in the following Table.

Sl. No	Parameter	Indian Standard
		Maximum Value
1	Turbidity (NTU)	1
2	Colour (on Pt-Co-scale)	5
3	Taste	Unobjectionable
4	Odour	---- do----
5.	pH	7.00 to 8.50
6	Total dissolved	500
	Solids (mg/l)	
7	Total hardness	200
	(mg/l) (as$CaCo_3$)	
8	Chlorides (mg/l) (as Cl)	200
9	Sulphates (mg/l) (asSO_4)	200
10	Fluorides (mg/l) (as F)	1
11	Nitrates (mg/l) (as NO3)	45
12	Calcium (mg/l) (as Ca++)	75
13	Magnesium	30
	(mg/l) (asMa++)	If there are 250 mg/l of
		sulphate, mg content can be

Sl. No	Parameter	Indian Standard
		Maximum Value
		increased to 125 mg/l
14	Iron (mg/l)	0.1
	(as Fe)	
15	Manganese	0.05
	(mg/l) (as Mn)	
16	Copper	0.05
	(mg/l) (as Cu)	
17	Zinc (mg/l)	5
	(as Zn)	
18	Phenolic compound	0.001
	(mg/l)(asC_6H_5	
	OH phenol)	
19	Anionic Detergents (mg/l)	0.2
	as MBAS)	
20	Mineral Oil (mg/l)	-
21	Alkalinity	200
22	Al	0.03

1.3 Recommended Guidelines for Physical and Chemical Parameters

The contractor shall design the process in such a way that the treatment quality attains the following limits or even better. The treated water shall meet the norms as per 'Water Supply and Treatment', Central Public Health and Environmental Engineering Organization, Ministry of Works and Housing, New Delhi, 1999 as given below.

Sl.No.	Characteristics	Acceptable
1	Turbidity (NTU)	1
2	Colour (Units on Platinum Cobalt scale)	5
3	Taste and Odour	Unobjectionable
4	pH	7.0 to 8.5
5	Total dissolved solids (mg/I)	500
6	Total hardness (as $CaCo_3$) (mg/I)	200
7	Chlorides (as CI) (mg/I)	200
8	Sulphates (as SO_4) (mg/I)	200
9	Fluorides (as F) (mg/I)	1
10	Nitrates (as NO_3) (mg/I)	45
11	Calcium (as Ca) (mg/I)	75
12	Magnesium (as Mg) (mg/I)	<30
If there are 250 mg/I of sulphates, Mg content can be increased to a maximum of 125		

Sl.No.	Characteristics	Acceptable
mg/I with reduction of sulphates at the rate of 1 unit per every 2.5 units of sulphates		
13	Iron (as Fe) (mg/I)	0.1
14	Manganese (as Mn) (mg/I)	0.05
15	Copper (as Cu) (mg/I)	0.05
16	Aluminum (as Al) (mg/I)	0.03
17	Alkalinity (mg/I)	200
18	Residual Chorine (mg/I)	0.2
19	Zinc (as Zn) (mg/I)	5
20	Phenolic compounds (as Phenol) (mg/I)	0.001
21	Anionic detergents (mg/I) (as MBAS)	0.2
22	Mineral Oil (mg/I)	0.01
TOXIC MATERIALS		
23	Arsenic (as As) (mg/I)	0.01
24	Cadmium (as Cd) (mg/I)	0.01
25	Chromium (as hexavalent Cr) (mg/I)	0.05
26	Cyanides (as CN) (mg/I)	0.05
27	Lead (as Pb) (mg/I)	0.05
28	Selenium (as Se) (mg/I)	0.01
29	Mercury (total as Hg) (mg/I)	0.001
30	Polynuclear aromatic hydrocarbons (PAH) (ug/I)	0.2
31	Pesticides (total, mg/l)	Absent
	RADIO ACTIVITY+	
32	Gross Alpha activity (Bq/I)	0.1
33	Gross Beta activity (Bq/I)	1

Notes

- The figures indicated under the column 'Acceptable' are the limits up to which water is generally acceptable to the consumers.
- Figures in excess of those mentioned under 'Acceptable' render the water not acceptable, but still may be tolerated in the absence of an alternative and better source but up to the limits indicated under column "Cause for Rejection" above which the sources will have to be rejected.
- it is possible that some mine and spring waters may exceed these radio activity limits and, in such cases, it is necessary to analyze the individual radio-nuclides in order to assess the acceptability or otherwise for public consumption.

1.4 Applicable Quotes and Specifications

The following specifications, Standards and codes are made part of these specifications. All standards, specifications, codes of practice referred to herein shall be shall be the latest

editions including all applicable official amendments and versions. In case of discrepancy between these specifications and those referred to herein, these specifications shall govern:

IS 9222:1990 (Part 1)	Specification for Handling and Dosing Devices for Chemical Devices for Water Treatment
IS 7090:1985	Guidelines for Rapid Mixing Devices.
IS7208: 1992	Flocculator Devices Guidelines
IS10313:1982	Requirements for Setting Tank (Clarifier Equipment) for Water Treatment Plant
IS8419:1977 (Part 1)	Requirements for Filtration Equipment – Filtration Media – Sand and Gravel
IS8419:1984 (Part 2	Requirements for Rapid Sand Gravity Filtration Equipment – Under Drainage System
IS10553:1983 to 1985 (Part 1 to Part 5)	Requirements for Chlorination Equipment's.
IS 210:1978	Grey Iron Castings
IS 260:1969	Aluminum Sulphate, non – ferric
IS 325: 1978	Three Phase Induction Motors
IS 381:1972	Sodium Silicate
IS 711:1970	Ferric Chloride, Technical
IS 732:	Code of Practice for Electrical Wiring Installations
Part 1:1983	Definitions and General Requirements
Part 2:1983	Design and Construction
Part 3:1982	Inspection and Testing of Installations
IS 1435:1960	Platform Weighing Machines
IS 1439:1959	Steel Yards
IS 1854:1964	Person Weighing Machines
IS 4200:1984	Sodium Aluminate
IS 4691:1985	Degrees of protection provided by enclosures for rotating electrical Machinery
IS 5216:	Recommendations on safety procedures and practices in electrical work
Part 1: 1982	General
Part 2: 1982	Life Saving Techniques
IS6362:1971	Designation of methods of cooling for rotating electrical machines

IS226:1975	Structural Steel
IS1477:1971	
(Part 1 & 2)	Code of Practice for Painting of Ferrous Metals in Buildings
IS3930:1979	Flame and induction Hardening Steels
IS4691:1985	Degrees Protection provided by enclosure for rotating electrical machinery

1.5 Detailed specifications of WTP components follows

1.6 Flash Mixer

Supply, erection and commissioning at site mechanical components for new **flash mixer** in 4.0 mts dia, 4.20 m deep RCC structure to cater to a flow of 1.171 cum/sec, including

totally enclosed fan cooled type (IS 6362:1971) squirrel cage induction motor with SS shaft motor with enclosure protection IP 54 or superior, worm gear arrangements with steel reduction gears (IS 3930:1979), MS solid shaft not less than 50 mm, shaft bearings, shaft couplings of CI not less than grade FG 200 of IS 210:1978, 6 mm MS paddles (IS 226:1975) etc. with support spanning the tank complete including painting of one coat zinc chromate primer and at least three finishing coat of paint (IS1477- part 1 & 2).

1.7 Clarifloculator.

Supply, erection and commissioning at site brand new clarifloculator (mechanical components) as per the following materials of construction including rotating access bridge cum walkway 1.20 mts wide with hand railing of structural steel, outer rack arm and inner rake arm , scrapper blade assembly, central cage, traction carriage assembly, vertical flocculation paddles of MS, traction motors with chain operating/ worm gear reduction mechanism, traction rail etc. complete for 30 mts dia clarifloculator including fabrication of bridge and assembling the units and trial run.

Sl. No:	**Components**	**Material**	**Reference to Indian Standards**
1	**2**	**3**	**3**
1	a) Influent Pipe (Pipe laid across the tank inside)	Cast Iron Pipe	Class LA of IS: 1536 – 1976 or IS: 1537 - 1976
		Steel Pipe(lined)	
		RCC conduit	
	b) Pipe fittings	Cast Iron	IS: 1538 - 1976
2	Sludge draw off pipe		
	a) Pipe	Cast Iron	IS: 1536 – 1976 and IS 1537 - 1976
	b) Sluice Valve	Cast Iron	IS 780 - 1980
3	Sludge Scrapping		
	a) Scraper Blades	Mild Steel	IS: 2276 - 1975
	b) Frame/ rake arm	Mild Steel	IS: 226 - 1975

Sl. No:	Components	Material	Reference to Indian Standards
	c)Rotating/Fixed Bridge		
	i) Bridge	Mild Steel RCC	IS: 226-1975
	ii) Traction rail	Mild Steel	IS: 226-1975
	iii) Walkway	Anti-corrosive paint or Epoxy painted or galvanized mild steel grill or galvanized chequered plate	IS: 226-1975
	iv) Hand railing	Anti-corrosive paint or Epoxy painted or galvanized mild steel angle or galvanized tube	IS: 226-1975
	d) Driving equipment		
	i) Main driving wheel	Cast Iron	IS: 210 – 1978 IS: 1030 - 1974
	ii) Worm gear	Cast Iron	IS: 210 – 1978 IS: 617 - 1975
	iii) Bevel gear	Cast Iron	IS: 210 – 1978
	iv) Spur gear	Alloy Steel	IS: 1570 - 1961
	v) Gear box cover	Cast Iron	IS: 210 – 1978
	vi) Cover for main driving wheel	Mild steel (epoxy coated or galvanized)	IS: 226 – 1975
		Cast Iron	
			IS: 210 – 1978
	vii) Housing for main driving wheel	Cast Iron	IS: 210 – 1978
	viii) Worm gear housing	Cast Iron	IS: 210 – 1978
	ix) Bearing Balls	High Carbon Steel	IS: 2898 – 1976
	x) Coupling	Cast Iron	IS: 2693 – 1964
	xi) Chain sprocket drive	Steel	IS: 2403 – 1975
	xii) Traction Wheel	Rubber/chrome – nickel tyred or carbon steel case hardened	
			-
	xiii) Shaft	Cold finished steel	IS: 1570-1961
	xiv) Cage	Mild steel	IS: 226-1975
	xv) Weirs	Mild steel/	IS: 226 – 1975
		Fibre reinforced	
		plastic	
	xvi) Dispersion Box	Mild Steel	IS: 226 - 1975

1.8 V-Notch.

Supplying and erecting of 8 mm thick 90 ^{0} MS **V-notch** suitable to measure 750 cum/hr to 5000 cum/hr, pained with food grade corrosion resisting primer and painting, including fixing in place as directed by the Engineer or his representative.

1.9 Air Blower

Twin lobe rotary positive displacement type **air blower**, air cooled model with MS fabricated base plate, suction filter, safety valve, vee belts and vee belt pulley for motor, capacity 1113 cum/hr at a pressure of 0.35 Kg/sq.cm suction and discharge silencers with 25 HP electric motor.

1.10 Loss of Head Gauge.

Dial type pedestal mounted single water column **loss of head gauge** to show 2.5 mts loss of head through filters comprising of dial type pedestal mounted loss of head indicator, stilling chamber, cord and cord casing etc complete.

1.11 Outlet Flow Controller.

Automatic filter **outlet flow controller** type PSTN (double beat type) comprising of a) 350 mm double entry filter outlet control valve. b) rate setting device. c) orifice gear assembly. d) controller float (GI) e) filter float (GI). f) controller float lever and interconnections.

1.12 Rate of Flow Indicator

Dial type rate of flow indicator for clear water to show 1.5 times the average flow rate, comprising of a dial type pedestal mounted rate of flow indicator, stilling chamber, cord and cord casing pipe.

1.13 Alum Dosing System

Alum dosing system comprising of a) SS fabricated alum agitator with reduction gear and suitable HP TEFC motor. b) PVC piping. c) alum tray for 2.6mx2.6mx 1.6m alum tank.

1.14 Constant Head Dosing Box

Constant head dosing box made out of strong MS sheet with corrosion resisting epoxy coating, PP inlet valve and calibrated outlet SS needle valve with rate of flow indicator.

1.15 Lime Agitator

Lime agitator comprising of SS shaft, SS paddles, TEFC electric motor and reduction gear mounted on a common base frame for 4.6m dia and 4.3 m deep lime tank.

1.16 Chlorinator

Vacuum operated gaseous chlorinator of 10 Kgs/hr capacity comprising of chlorine filter, chlorine pressure gauge, vacuum gauge, water pressure gauge, flow meter, flow regulating valve, vacuum injector with suitable capacity booster pump with copper pipe from chlorine cylinder to chlorinator and solution feed piping.

1.17 Emergency kit for Chlorine Repair

Emergency repair kit for chlorine ton cylinder having a) assembly for repair leaks of chlorine tonner valve. b) assembly for repair of tonner body c) assembly for repair leaks of filling plug. d)canister type gas mask e) PVC chlorine resisting clothing f) necessary tools for operation of kit. Steel box for keeping all the items.

1.18 Sludge Thickener Mechanical Component

Sludge thickener mechanical component comprising of the following: -

a) 1 no full diameter fixed bridge 1000 mm wide with chequered plate walk way. The bridge is made of welded and bolted steel sections.
b) Central cage structure.
c) MS fabricated feed well.
d) Two sets of scrappers for all motors, supported by MS flat, bolted with MS bolts.
e) Picket fence arrangement.
f) Driving mechanism consisting of 1.5 HP 1000 rpm electric motor, reduction gear, worm and spur gear.
g) Central turn table.
h) Torque overload protection device including overload indication and alarm.
i) Electric control panel comprising of incoming isolator, phase indicators and starters.

1.19 Sludge Centrifuge.

Centrifuge shall be capable of handling sludge consisting of minimum 1% solids by weight. The de-watered cake shall be based on minimum consistency of 20% by weight dry solids. The centrifuge shall have sufficient clarifying length and differential rpm so that separation of solids is effective. The centrifuge shall have central lubrication. The centrifuge and its accessories shall be mounted on a common base frame so that entire assembly can be installed on an elevated structure. The wetted parts shall be of stainless steel 304. The bowl shall be protected with flexible connections so that vibrations are not transmitted. The base frame shall be epoxy painted steel and provided with anti-vibration pads. The drive motor shall be of 1450 rpm. The noise level shall be 88 dB (A) measured at 1 m distance under dry run and vibration below 50 micron. Adequate sound proofing shall be provided for the housing (enclosure) of the centrifuge to ensure that the noise level at 5 mts distance from the enclosure is less than 75 dB (A).

1.20 Sludge Pump

Application	Sludge
Capacity	10 cum/hr.
Head	5 mts.
Pump type	Non-clog self-priming
Suction & delivery	80 x 80
MKW/HP/RPM	0.75/1.0/1450
Shaft seal	Mechanical seal.
Material of construction.	
Casing/impeller	Cast iron/SS 316.

Shaft SS 410.

1.21 Screw Pump for Thickened Sludge

Positive displacement type pump with design conforming to IS 6595 and performance as per IS 9137. The power rating of the pump motor shall be 115% of that required by the pump at duty point. The material of construction shall be as follows.

Screw Alloy steel. **Base plate** CI/MS epoxy coated. **Fastener** SS AISI 304.

The pump efficiency shall be not less than 30% and maximum speed of 960 rpm. Pump shall be with SS screw rotor and SS stator body with suitable TEFC motor on common MS base plate. The ball passing size shall be minimum of 25 mm.

1.22 The components of the Filtration Plant are as follows.

A. Civil Works:

all works of VRCC shall be in M30 design mix.

1) Stilling chamber.
2) Venturi flume channel with measuring devices
3) Flash mixer chamber
4) Tube settler &flocculation tanks.
5) Filter house, chemical house, Alum store, laboratory office room chlorination plant room, toilet etc. (All items shall be under RCC roof only). Separate Isolated chemical house & chlorinator room for treatment 15.00 MLD & above. For more than 5 MLD separate Chemical house must be provided.
6) Wash water tank of suitable capacity.
7) All the doors and windows are of aluminum make
8) All pipes and valves in filter beds are of D.I. make & connection from Flash mixer to Tube settler / Flocculation tank, sludge disposal pipes are of C.I. make.
9) The bottom level of the clear water control chamber must be above G.L to dispose the leakage water by gravity.
10) Clarifloculator bridge including sludge scrapping arrangement shall be with stainless steel of Grade 304 for chemical resistance and durability.

B. Mechanical Equipment

1) Alum dosing equipment
2) Flash mixer equipment.
3) Sludge disposal fittings by gravity
4) Filtration plant equipment instrumentation and piping.
5) Clarifloccualation equipment (with stainless steel blades) with rotating bridge arrangement etc.,
6) Wash water tank fittings and pump sets with 100% stand by.
7) Air blower with motor 100% stand by and pipe connections.

8) Chlorination equipment and pipe connections with chlorinator of 100% standby, Vacuum feed Gas Chlorination has to provided.
9) Spares & Tools for 2 years
10) Gaseous Chlorination with cylinders has to provided.

C. Electrical Equipment

1) Necessary power supply wiring to motors and switches bus bar connections as per I.E. Rules
2) Internal wiring and illumination and fittings and fixtures for internal and external lighting exhaust fans, ceiling fans etc.
3) Erecting mechanical & Electrical equipment, trial run for 90 days 23.50 hours per day testing the treated water for efficient standards and maintenance of records and imparting training to staff.
4) Supply of 6 - sets of completion plans and maintenance manual and brochures.

D. Equipment for Flow measurements

1) Automated Lab testing equipment of internationally reputed make and consumables for one year. For filtration plants of capacity 10 MLD and more automated online testing equipment shall be installed.
2) Automation for flow of Conductivity, Turbidity value, Residual Chlorine with recording & Storage facility (Computer based) &Alarm by SMS or other methods.
3) Off - Site Supervisory and Data Accusation (OSSADA) system for Raw water and clear water measuring, recording, Off-Site Digital Display and data Transmission to Cell Phone (SMS).

II. TECHNICAL SPECIFICATION FOR SEWAGE TREATMENT PLANT

2.1 Scope of Work

Work under this Contract consists of furnishing all material, labor, tools & tackles equipment and appliances necessary to completely install the various systems as required by the drawings, specifications hereinafter and given in the schedule of quantities.

Without restricting to the generality of the foregoing system shall include the following:

- Sewage treatment plant (0.5MLD).

The Contractor should prepare the Design as per CPHEEO Manual for Sewerage & Sanitation. The same should be approved by engineer before execution.

The broad design parameters and specifications for the works are provided in this section of document, but the general specifications for all works are provided in subsequent sections.

The design shall be based on based on proven technology such as SBR. Hence the technical specification for SBR is provided. **However, it is liberty of the bidder to choose any technology.** It is the responsibility of the contractor to make design and detailed engineering for the sewage treatment plant. In the first instance the contractor will submit the process design, lay out plan and hydraulic flow diagram for the approval of the client.

After approval of these documents the contractor will prepare and submit the general arrangement drawings for various components of the project. Once these drawings are approved, the contractor will go ahead with the structural designs and submit the structural drawings for approval. Then the contractor will prepare and submit the good for construction drawings for approval. After approval of these drawings only the contractor will do the construction work

2.2 Design, Build, Own, operate and Transfer works (DBOOT works):

Raw Sewage Quality

An abstract of Raw sewage characteristics is indicated in the following Table.

Sl.No.	Parameter	Values	Unit of measurement
1	Bio-chemical Oxygen Demand	250 - 325	Mg/l
2	Chemical Oxygen demand	400 - 700	Mg/l
3	Total suspended solids	200 - 300	Mg/l
4	Total Kjeldahl Nitrogen (as N)	30 - 45	Mg/l
5	Ammonia Nitrogen (as N)	10-20	Mg/l
6	Total Phosphorous (as P04)	5-10	Mg/l
7	Fecal Coliform	10 ^ 6	MPN/100 ml
8	Ph	7 - 8	
9	Oil and grease	5-10	Mg/l

2.3 Treated Effluent Quality

The contractor shall design the process in such a way that the treated effluent quality attains the following limits or even better. The treated sewage shall meet the latest discharge norms as prescribed by the CPCB/TNPCB.

Sl.No.	Parameters/Pollutants	Values	Unit of measurement
1	Bio-chemical Oxygen Demand (as BODs)	10 or less	Mg/l
2	Total suspended solids	50 or less	Mg/l
3	Chemical oxygen demand	50 or less	Mg/l
4	pH	6.5 - 9.0	
5	Oil and grease	Less than or equal to 5 mg/l	Mg/l
6	Total Nitrogen	10 or less	Mg/l
7	Ammonia Nitrogen	5 or less	Mg/l
8	Total Phosphorous (as P04)	2 or less	Mg/l
9	Fecal Coliform	Less than 1000.	MPN/100ML

2.4 Technical specification for various components works

The turnkey work shall have the following major components as detailed below.

(a**) Wet well and sewage Pumping station**

(i) Receiving Chamber

(ii) Mechanical Coarse Screen Channels

(iii) Raw Sewage Sump and Pump House with Diesel Generating Set

(iv) Pumped Wastewater Conveyance & Flowmeter

(b) Sewage Treatment Plant

(i) Inlet Chamber

(ii) Mechanical Fine Screen Channels

(iii) Mechanical Grit removal facility

(iv) Division Box

(v) SBR Process Units

(vi) Chlorine Contact Tank

(vii) Chlorine House (viii) Outlet Channel (ix) Sludge Sump

(x) Sludge pump house

(xi) Centrifuge platform

(xii) Administration building (Office, conference room, wash room, workshop/ tool room, laboratory, MCC and Control Room)

(xiii) Blower Room

(xiv) Security cabin &Toilet Block

(xv) Interconnecting Piping

(xvi) Plant Utilities

(xvii) Electrical & Instrumentation Works

(c) Tertiary Treatment Plant

(i) Rapid sand filters

(ii) Treated water reservoir and Pumping station

2.5 Wet well and sewage pumping station

i) Receiving Chamber with velocity control device

The gravity outfall sewer will discharge the raw sewage into a Receiving chamber. The function of the Receiving chamber is to distribute the flow for process units. The Receiving Chamber shall be designed for peak flow. The Receiving chamber shall consist of sluice gate on downstream for flow regulation. Sluice gate shall be installed such that it is possible to operate them manually, inspection as well as operation by standing on a platform constructed at a suitable elevation adjoining and circumventing the inlet chamber. There shall be a provision of one bye pass channel along with gates. Alternatively, plant bypass can be provided from existing / proposed manhole before pumping station. The inlet chamber shall be of adequate size to meet the requirements of workability inside it. The receiving chamber shall be provided with an odour control arrangement (Covered with odour treatment arrangement) and shall be water tight to prevent seepage of the sewage out of the inlet chamber. The entire construction shall be in M25 grade concrete (Sulphate resistant Cement) and as per IS 3370. RCC access platform minimum 1000 wide with railing as per specifications shall be provided on one side of the chamber: Information related to receiving chamber is summarized below:

Parameters	**Value STP**
Total Average Flow	0.50mld
Peak factor	3
Number of units	One No.
Detention period	30 seconds
Free Board	0.5 meter

ii) Mechanical Coarse Screen Channels

Two mechanical screens of 20 mm working with one manual standby screen is proposed in the screen chamber. The screen channels shall be designed for peak flow. The mechanical and manual bar screens shall be made of 10 mm thick Stainless Steel (SS 316) flats. Conveyor Belt and chute arrangement shall be provided to take the screenings to the screenings dropped from chute will be collected in a container (to be supplied by contractor) of approx. 1.5m3capacity. Manually operated aluminum gates are provided at the upstream and downstream ends to regulate the flow.

RCC Platforms shall be provided at the upper level to enable operation of the railings shall be provided around the entire periphery of the as well as for the platform. The entire structure

is to be M 25 sulphate resistant concrete and as per IS 3370 including the platform for the gates.

RCC staircase 900 mm wide shall be provided for access from the ground level to the top of the unit & to the operating platforms. Information related to screen and screen channel is summarized below:

Parameters	Values
Cross section of the bars	50 mm x 10 mm
Opening in screen	20 mm
Free board	0.5m
Angle of inclination	75
Gates 1 for each channel at inlet and outlet	Manual CI Gate
MOC	MS
Operation	Timer operated
Reduction Gear Box Type	Worm / helical
Reduction gear Material of Construction	Standard
Motor HP	As per approved design
	Conveyor belt for conveying away the screened materials, 2 Wheeled

iii) Raw Sewage Sump and Pump House with Diesel Generating Set

Sewage enters into wet well of the pumping station after screening. The wet well shall be circular in shape and shall be designed for an average flow. The capacity of the wet well should be kept such that the detention time in the wet well shall be minimum 5 minutes of peak flow and the maximum detention time shall not exceed 30 minutes at average flow.

Following criteria shall be considered to size the sump:

(i) That the pump of the minimum duty/ capacity would run for at least 5 minutes considering no inflow or

(ii) The capacity of the sump is to be so kept that with any combination of inflow and pumping the operating cycle for any pump will not be less than 5 minutes and

(iii) The arrangement of the submersible pumps as per pump manufacturer's data i.e. spacing between pumps, minimum space between pump and wall etc.

(iv) The side water depth (live liquid depth) shall be minimum 2.5 meter. In addition to the above liquid depth an additional depression shall be provided to ensure adequate submergence of the pump as per the manufacture's recommendations Pumping station

should have a room adequate for installing electrical panels. Suitable arrangement should be provided for lifting of pumps.

The wet well, piping and appurtenances have to be designed for ultimate capacity for each zone. IS: 3370 and IS: 4111 (part 4) shall be followed for the design and construction of wet well. Pumping machinery shall be designed for present capacities with average flow and a peak factor of 2.25. There shall be minimum four submersible pumps (2 working + 2 standby). The pumps shall be Submersible raw sewage pumps with centrifugal, non-clog type design. The speed of pump shall be 1450 rpm. The impeller should be of a non-clog design with smooth passage and solid handling capability of 100 mm size.

The pumps shall have cutting edges facing the impellor to share the floating and suspended clogging materials like fibers, plastics, etc. The pumps will have automatic coupling arrangement at discharge end for removal and a guide pipe and chain in SS 304 will be provided for removal and lowering of pumps. Pump shall run smooth without undue noise and vibration. Noise level shall be limited to 85db at 1.86m. Vibration shall be limited as per BS 4675 Part I.

Bearing shall be easily accessible for inspection and maintenance. The bearings shall be having a minimum life of 25000 hours of working. The motor shall be squirrel cage type. Suitable for three phase supply continuous duty with class 'F' insulation. Motor shall have integral cable parts and the cable entries shall be sealed. The cables shall be leak tight with respect to liquids and firmly attached to the terminal block. The Motor shall be designed for non-overloading characteristic of quantity. The Motor HP shall be at least 10% more than required at duty point.

The critical speed of the rotor shall be at least 30% above the operating speed. Complete rotor shall be balanced dynamically. The moisture sensor of the tripping unit shall be located inside the oil chamber. Information related to wet well is summarized below:

Parameters	**Values**
No. of pumps	2 Nos. Working + 100% Stand by
Capacity of each	As per approved design
Wet Well	RCC with sulphate resistant cement
Speed (nominal)	1450 RPM
Motor	HP, 415 V, 3 phase, 50 Hz f
MOC	CI casing, CF-8M impeller, SS-410 shaft
Insulation	Class F
Protection	IP 68
Hrs. of operation	24hours
Type of pump	Submersible, non-clog, Centrifugal
MOC	CI

Parameters	Values
Level switch	Level switch in pump for tripping off at low level and high level with alarm
Accessories	MS rigid type base plate suitable for mounting both pump and motor, flexible coupling, coupling guards, foundation bolts.

The size of the sump shall be suitable to accommodate the number of pumps required for operation and easy maneuverability of pumps. There shall be an Integral Electrical cum Control Panel room for the pumps and coarse Screens located near the sump.

The room shall be suitable sized to house the Electrical cum Control Panel, space for spare parts and a maintenance area, etc. and be complete with the following accessories:

(i) A Diesel Generator Set of suitable capacity to operate wet well pumps and campus lighting shall be installed near to wet well, to take care of gravity inflow of sewage during power break downs. Suitable electric panel with changeover mechanism shall also be provided.

(i) Hoist – comprising of I- Girder and a 3 ton or more chain pulley (the chain pulley block capacity to be 1½ Ton or 3 times the maximum single unit/ weight that may be required to be removed for maintenance) with horizontal travel on the I-beam.

(ii) The room shall be so covered from sides to protect it from the elements and be suitable for protection from the natural elements. Ventilation in the sheds shall be as per NBC norms specified in the Civil Construction manual.

(iii) The shed shall be suitably designed to avail of natural lighting

(iv) Adequate number of fire extinguishers is to be provided as per Electricity Authority norms.

(v) Internal Illumination and campus lighting shall be of levels as per relevant BIS and National Building Code.

Testing's:

(i) Hydrostatic Testing: All pressure parts of pumps prior to assembly, shall be subjected to hydrostatic tests at 1.5 times the maximum pressure obtained with the delivery valve closed and suction pressure at maximum, or twice the working pressure whichever is higher for a duration of 10 minutes.

(ii) Balancing Test: Impeller and pump rotating assembly shall be dynamically balanced.

(iii) Performance Test: Each pump shall be tested for full operating range individually to BS: 5316: Part 2. Test shall be carried out for performance at rated speed with minimum NPSH as available at site.

(iv) Pump performance shall be within the tolerance limits specified in BS: 5316: Part 2.

(iv) Pumped Wastewater Conveyance & Flow meter

The pumped flow from the pumping station to the elevated head works inlet chamber of the plant shall be taken through a CI / DI K-9 Class pipeline. The rising main shall be designed for ultimate average flow with a peak factor of 2.25. An electromagnetic flow meter shall be installed in the rising main for measurement of flow.

(a) The pipeline shall be adequately sized to have a minimum velocity of at least 1.2 m/s at minimum flow conditions and not more than 2.5 m/sec at pumped peak flow.

(b) The pump head shall be adequately sized to give a residual discharge head as per CPHEEO manual.

2.6 Sewage treatment plant

(i) Inlet Chamber

Inlet Chamber will receive raw sewage from the raw sewage pumping station. Inlet chamber shall be designed for average flow of ultimate capacity with a peak factor of 2.25. The entire construction is in M25 grade concrete (Sulphate resistant cement) and as per IS 3370. RCC access platform minimum 1000 wide with railing as per specifications shall be provided on one side of the chamber: RCC staircase 900 mm wide shall be provided for access from ground level to the top of the unit & to the operating platforms. Information related to inlet chamber is summarized below:

Parameters	Values
Total Average Flow in mld	Ultimate Capacity
Peak factor	2.25
Number of units	One No.
Detention period	30 seconds
Free Board	0.5 meter

(ii)Mechanical Fine Screen Channels

Two mechanical screens of 6 mm as working and one manual screen of 10mm opening as standby are proposed in the screen chamber. The screen channels shall be designed for peak flow. The clear opening for mechanical screen shall be 6mm. The mechanical and manual bar screens shall be of 3mm thick Stainless Steel (SS316) flats. Conveyor Belt and chute arrangement shall be provided to take the screenings to the drop point, from where it will be collected in a trolley of approx. 1 m3 capacity. This trolley will be housed in a roofed enclosure with proper access, screen washing arrangement and drain. Manually operated gates shall be provided at the upstream and down stream ends to regulate the flow. RCC Platforms shall be provided at the upper level to enable operation of the gates. Railings shall be provided around the entire periphery of the platform.

Parameters	Values
Number of screen channels	3 Nos
Number of Screens	2 Mechanical working (Each 50% Peak flow) + 1 Manual standby (100% Peak flow)
Design flow considered to each Channel	Peak Flow
Approach Velocity at Average Flow (m/s)	0.3 minimum
Velocity through Screen at Average flow (m/s)	0.6
Velocity through Screen at Peak Flow in m/s	1.2
Opening in screen	6 mm for Mechanical and 10 mm for manual
Channel Size	Approved Design
Minimum Free Board	0.5m
Angle of inclination	45
MOC	3 mm thick Stainless Steel (SS316)
Operation	Timer operated
Reduction Gear Box Type	Worm / helical
Reduction gear Material of Construction	Standard
Motor HP	As per design
Accessories	Conveyor belt for conveying away the screened materials with 2 wheeled trolleys

The entire

structure is to be M 25 concrete with sulphate resistant cement and as per IS 3370 including the platform for the gates. RCC staircase 900 mm wide shall be provided for access from the ground level to the top of the unit & to the operating platforms. Information related to fine screen is summarized below:

(iii)Mechanical Grit Removal Facility

Two mechanical grit chambers, both working, are proposed after screening unit. The mechanical grit chambers shall be Square Mechanical Detritus Tank each designed for average flow of Ultimate capacity with a peak factor of 2.25.

Detritus tank chamber shall have the following:

One tapered inlet channel running along one side with deflectors for entry of sewage into the grit chamber. The minimum SWD of the units shall be adopt on the basis of design requirement of the unit.

One tapered outlet channel for collecting the degritted sewage, which overflow over a weir into the outlet channel. Outlet channel of adequate size and shall be designed to ensure that no settling takes place.

One sloping grit classifying channel into which the collected grit will be classified.

The grit from classifier will be collected in a wheeled trolley (to be supplied by contractor) of approx. 1.5 m3 capacity. This trolley will be housed in a roofed enclosure with proper access, grit washing arrangement and drain.

A grit scraping mechanism with adjustable influent deflector. Reciprocating rake mechanism to remove the grit.

Organic matter return pump

Aluminum gates shall be provided at the entrance and at the outlet of the chamber. To enable easy operation of the gates, RCC platforms with Gl railing shall be provided at the upper level. Access shall provided from this level to a mechanism supporting beam of the grit chamber. The entire construction shall be in M25 grade concrete (Sulphate resistant Cement) and as per IS 3370. RCC staircase 900 mm wide shall provided for access from the ground level to the top of the unit & to the operating platforms. Information related to grit chamber is summarized below,

Parameters	**Values**
No. of grit chambers	2
Type	Square type RCC construction
Detention Time	1 min
Particle size to be removed	0.15 mm or more
Grit storage space	As per design
Free board to be provided	500 mm
MOC	M25 ,RCC

Parameters	Values
Accessories	Scraper mechanism with bridge, screw conveyor, chute for grit dumping

(iv) Division Box

The designed peak flow shall be equally divided using adjustable aluminum overflow weir plates and distributed to SBR Process units via pipe / channel. Sluice gates including all specials shall be provided on all weirs for isolation. RCC access platform, staircase, railing and covers over division boxes are provided as per requirement.

(v) SBR Process Units

(a) SBR Unit

The biological treatment section comprising SBR process has to be installed and equipped for the present average flow only. However, suitable space provisions shall be made for the future unit of additional balance ultimate flows while planning the layout,

The civil works shall be carried out in such a way that the additional unit can be integrated into the system without any shut downs.

(ii) The complete biological system has to be designed for handling peak flow capacity. In addition, 0.5m free board shall be provided to each tank. Maximum liquid depth of tank shall be restricted to 5.5m.

(iii) SBR Process basins will be constructed in M25 grade concrete (Sulphate resistant Cement) and as per IS 3370. RCC staircase 900 mm wide is provided to each basin for access from the ground level to the operating platforms. All platforms and walkways shall be provided with hand railings as per tender specifications. 1.2 m Plinth protection along periphery shall be provided as per technical specifications.

(iv) The system should work on a intermittent influent condition. No influent / effluent equalization tanks or flash filling is accepted

(b) Decanting Device

Clarified effluent is removed during the decant period .The contractor shall provide necessary suitable decant mechanisms for the purpose to achieve the performance parameters as per bid document . There should be minimum 1 decanter per basin.

(c) Aeration System

Diffusers

The Aeration facility shall be provided for present units of 400 KLD but planning shall be done for future extension .

Only fine bubble EPDM / PU membrane diffusers shall be acceptable with minimum membrane diffuser to floor coverage area of 5%. Diffusers shall be submerged fine bubble / fine pore, high transfer efficiency, low maintenance, non-buoyant type. Diffusers shall be tubular (membrane) type. Material of construction for (entire under water system including

accessories shall be of non corrosive. Complete diffuser as a unit shall be assembled at the manufacturing factory level.

SPECIFICATIONS FOR SEWAGE TREATMENT PLANT (MECHANICAL)

2.7 GENERAL

Except as otherwise specified under this section all equipment and material shall comply with the requirements of applicable latest editions of Standards and Codes of Practice of the Bureau of Indian Standard (BIS) or where IS codes do not exist, of British Standards (BS). In case equipment / materials are offered to other Standards the equipment / materials shall be equal or superior to those specified and full details of deviation shall be furnished.

2.8 Materials:

All materials proposed to be used in the work shall be the most suitable for the duty concerned and shall be new and of first-class commercial quality, free from imperfection and selected for long life and minimum maintenance.

2.9 Quality and Workmanship

All equipment supplied shall be new and of first-class quality. All identical items of the plant and their component parts shall be completely interchangeable. Spare parts shall be manufactured from the same materials as the original parts and shall fit on all identical items. All equipment shall operate without excessive vibration and with minimum noise. All rotating parts shall be both statically and dynamically balanced.

2.10 Painting

All structures, supports and enclosures shall be painted with epoxy paint, as per specifications, to avoid corrosion due to atmospheric conditions. All carbon steel parts shall be sand blasted to near white cleaning before application of paint. The Contractor has to submit the paint details with color charts for approval of the Engineer.

2.11 Materials of Construction

Materials of Construction of various components shall be as specified under the respective items.

2.12 Sewage Pumps

General

The pumps offered shall be non-clog submersible type. The design, manufacture and testing of pumps shall conform to IS:5600/IS:8034 with latest amendments or any equivalent international standards. The performance of pumps shall be guaranteed as per IS : 5120 and IS : 9137. **Standards**

Pumps of a particular category shall be identical and shall be suitable for parallel operation with equal load division. Components of identical pumps shall be interchangeable.

Duty

The pumps shall give total discharge against total head, as shall be designed most economically. The pumps shall be offered with minimum 60% efficiency. Characteristic curve for pumps shall be furnished with calculation for power requirement. The HP arrived at end

must not be overloading for the required discharge. The direction of rotation shall be clockwise when viewed from motor side.

The discharge requirement for sewage pumps have been indicated in respective units comprising such pumps. The total head for pumps shall be calculated on the basis of levels, distances etc., as per Hydraulic diagram and civil details.

Considering various losses and minimum residual head of 3.0 m the bidder shall prepare system resistance curves for maximum and minimum static head conditions and shall match with them the performance curves of pumps offered. The pumps shall be non-clog single/multi stage vertical centrifugal or submersible type, single delivery to a common discharge manifold.

Design Requirements

The pumps shall be capable of developing required total head at the rated capacity. Shut off heads for pumps operating in parallel shall be the same.

Pumps shall be suitable for single as well as parallel efficient operation at any point in between the minimum and maximum system resistance. Bidders are required to superimpose the pump performance curves, for single and parallel operations with the system resistance curves for minimum and maximum static head conditions and submit the same with the bid.

The total head capacity curve of the pumps shall be continuously rising towards shut off. The shut off head of the pump shall be minimum 110% and maximum 130% of the specified head. The pumps shall deliver minimum 125% of its rated capacity at 75% of the specified total head.

The speed of the pump shall not exceed 1500 rpm. The duty point of the pump shall be to the left of BEP or at the BEP (Best Efficiency Built).

Pump motor power rating shall be the larger of the following:

- 110% of the maximum power required by the pump from zero discharge to duty point total head.
- 115% of the power required at duty point.

Power requirement for the above purpose shall be worked out considering 1% negative tolerance on quoted efficiency figure.

Pump operation shall be smooth without undue noise and vibration. The velocity of vibration shall be within 4.5 mm/sec. The noise level shall be limited to 80 dB(A) at a distance of 1.0 m for the minimum flow pumps and 90dB(A) at a distance of 1.0m for the peak flow pumps.

Construction

Casing: The pump casing shall be robust in construction and shall be made of close grained Nickel Cast Iron, conforming to IS: 210 Gr FG 260 1.5 to 2% Ni.and free from any casting defects.

Impeller: Impellers for pumps shall be of ASTM A744 CF8, non-clog type with machined internal and external surfaces and shall be securely keyed to the shaft. Arrangement shall be provided to prevent loosening during operation including rotation in reverse direction.

Shaft: The pump shaft shall be of Stainless Steel SS AISI 316 accurately turned and ground to receive renewable shaft sleeves as per SS AISI 410. The impeller keyed with shaft shall be carried by suitable grease lubricated self-aligning roller bearings and deep groove thrust / ball bearing to take maximum thrust, with guiding sleeves etc. Free shaft extension to be provided for mounting flexible coupling. The shaft shall be protected by shaft protecting sleeves. The rotating assembly shall be statically and dynamically balanced. All rotating part sub-assemblies shall be dynamically balanced.

Glands and Seals: The stuffing boxes are to be of sufficient depth and to be soft packed and provided with adjustable bronze glands conforming to IS: 318 Gr LTB – 2. It shall be of suitable design, easily detachable from the pump casing with appropriate lubricating arrangements. The stuffing box shall be suitable for repacking by removing the gland and lantern ring.

Bearings: Suitable anti-friction and thrust bearings to be provided to take up the radial load and axial thrust respectively. Bearings shall be easily accessible to facilitate inspection and maintenance. Bearings shall be grease lubricated.

Other Features: Pump casing rings shall be of renewable type. Shaft sleeves shall be of replaceable type. Axially split type lantern ring shall be provided. Tapping at discharge nozzles shall be provided for pressure gauge connection.

Accessories: The pump shall be provided with the following accessories

Pressure gauge: 150 mm dia. Suitable range with Cu connecting pipes, gooseneck and cocks.

Suitable piping for collection and leading of gland leaks etc., up to 3m away.

Documents: The bidder shall furnish the details of type mark, rating of pumps offered with material details, characteristic curves and guaranteed efficiency. Characteristic curves shall be duly signed by the pump manufacturer.

Testing: Standard running test as per IS 5120, at a rated speed shall be carried out at the manufacturer's works to measure capacity, power and efficiency. Pumps having specified minimum efficiency will only be accepted. The pumps shall be tested over the range covering from shut off head to duty point head.

The duration of test shall be minimum one hour. For plotting the performance curve five readings, approximately equidistant, shall be taken.

Material test certificates for casing, shaft, impeller and other major components shall be furnished by the Contractor.

Excess Sludge Pumps / Return Sludge Pumps

The general description of the excess sludge pumps and numbers required for the process are enumerated in paragraph 3.9.4 and 3.9.5. The pumps shall be of submersible / horizontal centrifugal non clog type as shall be proposed by the bidder to achieve maximum economy. The design, manufacture, testing and performance of these pumps shall conform to the relevant BIS code with latest amendments or any equivalent international standards.

The material of construction of the pump shall be as follows:

Casing and Impeller: CI Grade FG 260 conforming to IS: 210-1993;
Auto Coupling / Integral Bend: CI Grade FG 260 conforming to IS: 210-1993;
Shaft: AISI 410;
Guide Pipe and Lifting Chain: SS 304
Mechanical Seal - Pump side: Silicon Carbide;
Mechanical Seal – Motor side: Cast Cr Mo Steel;

Motor: Suitable type and capacity for 415 V (± 10%), 3 phase, 50 Hz power system;
Motor Insulation: Class F;
Motor Protection: Class of IP 68:
Motor Parts: CI Grade FG 260 conforming to IS: 210-1993;

Sludge Transfer Pumps to Centrifuge

The general description of the sludge transfer pumps and numbers required for the process are enumerated in paragraph 3.13.2.2. The pumps shall be of Screw type as shall be proposed by the bidder to achieve maximum economy. The design, manufacture, testing and performance of these pumps shall conform to the relevant BIS code with latest amendments or any equivalent international standards.

The Pump and Bearing housing of the pump shall be of CI. The Rotor shall be of Alloy Steel HCP and the shaft of Alloy Steel HCP UG. Other rotating parts shall also be of alloy steel. The stator shall be Nitrite bonded and the sealing shall be of soft cotton packing. The pump shall be fitted with suitable motor for 415 V (± 10%), 3 phase, 50 Hz power system of Class F insulation with Protection Class of IP 68.

Air Blowers in SBR System

General

The general description of blowers, type and numbers required for the process is enumerated in paragraph 3.9.3 (ii). The design, manufacture, testing and performance of blowers shall however conform to the relevant BIS code with latest amendments or any equivalent international standards.

Duty

Each blower shall be capable to render minimum air flow of 5500 m3/h at a minimum discharge pressure of 0.7 kg/cm^2. The total head of discharge shall be designed most economically.

The blower operation shall be smooth without undue noise and vibration. The noise level shall be limited to 60 dB(A) at a distance of 3.0 m from the blower.

Materials of Construction

Casing/Covers/Oil Box: The blower casing and covers shall be robust in construction and shall be made of CI Casting Grade FG 260 conforming to IS: 210-1963.

Rotor: The rotor shall be of CI Casting Grade FG 260 conforming to IS: 210-1963.

Drive Shaft: The drive shaft shall be of EN18/EN19 conforming to BS 970-1955

Oil Box: The oil box of the blower shall be of CI FG 260 conforming to IS: 210-1963

Gears: The gears shall be of 20 MnCr5 BS970-3 / AISI5120, Hardened and ground.

Pulley: Shall be of CI FG 260 conforming to IS: 210-1963

Bearings: Suitable anti-friction and thrust bearings to be provided to take up the radial load and axial thrust respectively. Bearings shall be easily accessible to facilitate inspection and maintenance. Bearings shall be grease lubricated.

Accessories: Accessories shall comprise V-belt drive, flexible expansion joints, drive, inlet silencer, discharge silencer, pressure relief valve, etc. and those not specified, but required for completeness of the system.

Documents: The bidder shall furnish the details of type mark, rating of Blowers with material details.

Testing: Standard running test as per relevant IS code shall be carried out at the manufacturer's works to measure capacity, power and efficiency. Material test certificates for casing, shaft and other major components shall be furnished by the Contractor.

Air Blowers in sludge transfer system to Centrifuge

General

The general characteristics, standard and materials of construction of these blowers are similar to as enumerated in Paragraph 5.2.6 above except that there shall be minimum 2 working and 1 standby blowers in the sludge transfer system each capable to render minimum air flow of 300m^3/h of air flow at 0.4 kg/cm^2 of discharge pressure.

Mechanical Bar Screen

Bar screen shall be provided with a mechanically cleaning rake having teeth to mesh with the bars of the screen so arranged as to clean the bars of the screen while moving upwards and discharge the screening by means of an automatic scraper provided at the top and thereafter return to the bottom channel. The rake rising and lowering mechanism shall consist of a wire rope operated by the driving unit provided at the top. The motor shall have an automatic arrangement for reversing the rake at required limit. The raking mechanism shall be enclosed in sheet steel housing and arranged to discharge screenings through a hopper at the top of the housing which will deliver the screenings to a hand trolley placed there. Suitable safety devices shall be provided to prevent damage to the mechanism or to drive unit such as directional reversal mechanism and switch, limit switch, rope overload switch and its alarm etc. The screen shall be provided with float control mechanism so as to ensure automatic operation of Bar-screen due to difference of level on upstream and downstream of Bar-screen due to choking of screens. There shall be 2 (two) screens for screening coarse materials followed by further 2 (two) screens for screening finer materials. The screens shall generally conform to IS:6280. The screen shall consist of the following:

(i) Screen of 50mm x 10mm thick Stainless Steel (SS 316) flats conforming to IS: 6603-2001, 20 mm clear opening spread in the entire width of the channel with an inclination of 60^0 - 80^0 to the horizontal – for screening coarse materials and Screen of 50mm x 3 mm thick Stainless Steel (SS 316) flats conforming to IS: 6603-2001, 6

mm clear opening spread in the entire width of the channel with an inclination of 45^0 to the horizontal – for screening coarse materials.

(ii) Mechanical support housing

(iii) Bar rake and support

(iv) Rake and rake guide

(v) Rake frame and rake

(vi) Rake raising and lowering mechanism

(vii) Rake scraper

(viii) Gear box with TEFC motor suitable for 415 +10% volts, 3 phase, 50 cycles AC supply

(ix) Magnetic reversing type starter with extra weather proof push button switch, no load and over load relays

(x) Alarm bell and indoor relays and starter and switches in the control panel

(xi) On/Off automatic/manual switch and reset push button near the screen

(xii) Float controls for automatic operation

(xiii) Floats with rods and suitable guide pipes

(xiv) Mercury switches

All the moving parts in open shall be provided with covers.

The screen shall be robust and shall be provided with a most efficient arrangement to prevent the screenings from falling back into the sewage. The G.A. drawing and design of the mechanical bar screen shall be got approved from the employer before starting execution of the work.

Manual Bar Screen

The screen shall consist of a series of vertical bars spanning the screen chamber channel the frame work of the screen shall of robust construction. Bars shall be of 50mm x 10 mm thick Stainless Steel (SS 316) flats conforming to IS: 6603-2001, 20 mm clear opening spread in the entire width of the channel with an inclination of 60^0 - 80^0 to the horizontal – for screening coarse materials and 50 mm x 3 mm thick Stainless Steel (SS 316) flats conforming to IS: 6603-2001, 10 mm clear opening spread in the entire width of the channel with an inclination of 45^0 to the horizontal – for screening coarse materials.

The screens shall generally conform to IS:6280. The screen assembly shall be capable of easy removal for replacement.

Valves

The valves shall be manufactured and supplied for the work generally as per manufacturer's specifications adhering to relevant IS specifications and basic parameters indicated hereinafter. All valves shall have flanged connections. Dimensional tolerances on valve castings shall be as per IS: 5519. All valves shall be fixed at the required locations with necessary bolts, nuts, washers, gaskets, etc., complete and provided with cement concrete/structural support. All

valves shall be tested at works as per relevant code and supplied to site along with manufacture's test certificates for:

- Physical and chemical tests
- Hydrostatic tests

All valves shall have permanent markings indicating service, size, applicable code and pressure rating.

Sluice Valves

The sluice valves shall generally conform to IS 780 / IS 2906 - latest edition. The valves shall be tested as per code and shall be suitable for handling raw sewage. Valves shall close in the clockwise direction and flow of water shall be marked on the body of the valves with an indicating feather on each head stock to show whether the valve is open or shut. Valves of nominal size 300 mm and above shall be provided with channel and shoe arrangement. The driving end sealing shall be gland and stuffing box type. Stuffing box shall be easily accessible for adjustment and replacement of packing without disturbing any other part of valve or the operator assembly.

For valves located below floor / ground level suitable floor stand and extension bonnets shall be provided. These shall be complete with suitable extension stems and stem couplings. The floor stand shall be bolted to the floor and length of the extension bonnet shall be selected to keep height of hand wheel at about 1 m above the floor.

The valve body shall conform to to IS: 210 - Gr FG 260 with SS AISI 431 spindle. The Seat ring and Wedge Ring shall be of SS ASTM A744 CF8M and the Back Seat Bush shall be of bronze conforming to IS: 318 Gr LTB 2.

Reflux Valves

Reflux valves shall be of single door swing check type conforming to IS : 5312 part - 1 with by pass and allied controlling arrangement. The actual bore at any point shall not be less than the nominal size of the valve. The direction of flow shall be marked on the valve body. The valve shall be suitable for working pressure as specified. The valves shall be of non-slam characteristics without external dampening arrangement. The Reflex valves shall be CI conforming to IS:210 Gr FG 260. The Body Ring and Door Ring shall be of SS ASTM A744 CF8M and Hinge pin shall be SS AISI 431. The Bearing Bush of the Reflex valves shall be of bronze conforming to IS:318 Gr LTB2.

Crane

The crane shall be of single girder construction hand operated. The crane rail shall be 50 mm square bar. The load chain shall be grade M8 conforming to IS 3109 or grade 80 of IS: 6216. Hand chain shall be at least of grade 30 of IS:6216.

All gearing shall be totally enclosed. The gears shall be machine cut from solid cast or forged steel blanks. All pinions shall be forged carbon or heat treated alloy steel. All axles and shafts shall be of carbon steel. The lifting hook shall be forged, heat treated alloy or carbon steel conforming to IS: 8610 / IS: 3815. The brake for the lifting gear shall be screw and friction disc type and gear shall be resistance less during hoisting. Over load test with 150 % of rated load

shall be carried out for the chain pulley block and trolley. Overload test with 125% of rated load shall be carried out for the entire crane assembly.

The crane structure shall be degreased, cleared and all rust, scales, sharp edges removed and treated with one coat of primer and finished with two coats of final paint, as per painting specifications or as directed by the Engineer.

The following documents are to be furnished prior to supply of the crane:

(i) General arrangement drawing of crane with details

(ii) Note on erection and testing

(iii) Test certificate for hook, chain and chain pulley block assembly.

Pressure Gauges

Pressure gauges shall be chromium plated of suitable range provided with isolation valves, goose neck and connected by heavy duty copper piping and necessary brass fittings with provision for cleaning tubes without dismantling. Bourdon and sensing element shall be of SS 316 / Phosphor bronze. The dials of the gauge shall be marked both in kg/cm2 and lb/in2.

Level Indicator

The level indicators shall be mechanical float chord type complete with bottom anchor, guide wire, spring tension assembly and friction free pulleys. The pulleys and the chord shall be with weather proof enclosure. The scale shall be with black graduation on white background with red pointer attached to the counter weight and shall be located to be visible from the control location.

Sluice Gates

Sluice gates shall be rising spindle, flange-back flush bottom type conforming to AWWA-C501. The gates shall be designed for seating/ unseating heads as specified. The gates shall be provided with head stocks for smooth manual operation. Lifting lugs shall be provided on the gates. The Materials of construction of the gate components shall be as follows:

(i) Wall Thimble, Frame, Guide & Slide: CI conforming to IS:210 Gr FG 260

(ii) Seating Faces: SS ASTM A296 CF8

(iii) Wedge Block: CI conforming to IS:210 Gr FG 260 with SS ASTM A296 CF8 lining

(iv) Spindle: SS AISI 431

(v) Thrust Nut: SS ASTM A296 CF8

Before dispatch the gates shall be subjected to seat clearance check test, smooth movement test, leakage and hydrostatic test as per code. The leakage through the gate during leakage and hydrostatic test shall not exceed the limits as specified in the code for acceptance purpose.

Pipe Works

The pipe works for the STP involves manufacturing, supplying laying and jointing of suitable size

MS, DI, RCC, PVC and SS pipes along with matching specials etc. The specifications for manufacturing, supplying, laying and jointing of these pipes shall generally conform to the standard specifications.

Painting

All equipment of steel shall be provided with suitable epoxy or equivalent painting treatment to withstand corrosive treatment plant atmosphere. This also applies to switch board, transformers, MS structures, motors etc. The exposed portion of Copper / Aluminum / Steel connectors coming in the electrical circuit shall also be provided with suitable anti corrosive treatment against electrical and thermal reactions. All painting works shall be as per specifications.

Codes and Standards

A list of codes and Standards/Specifications for designing is provided below for reference only

Bureau of Indian Standards Codes

SP 7: 2005	National Building Code
IS 73: 1992	Paving Bitumen
IS 150: 1950	Ready mixed paint brushing, finishing stoving for enamel colour as required
IS 205: 1992	Non-ferrous metal Butt Hinges
IS 206: 1992	Tee and strap hinges
IS 207: 1964	Gate and shutter hooks and eyes
IS 208: 1987	Door handles
IS 210: 1993	Grey iron castings
IS 215: 1995	Road tar
IS 217: 1988	Cutback Bitumen
IS 269: 1989	33 grade Ordinary Portland Cement.
IS 278: 1978	Galvanised steel barbed wire for fencing
IS 280: 1978	Mild Steel wire for general engineering Purposes
IS 281: 1991	Mild Steel sliding door bolts for use with Padlocks
IS 362: 1991	Parliament hinges
IS 363: 1993	Hasps and staples
IS 383: 1970	Coarse and fine aggregates from natural Sources for concrete
IS 432: 1982	Mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement
	Part 1 Mild steel and medium tensile steel bars
	Part 2 Hard-drawn steel wire
IS 453: 1993	Double-acting spring hinges
IS 455: 1989	Portland slag cement
IS 456: 2000	Code of practice for plain and reinforced concrete
IS 457: 1957	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures
IS 458: 1988	Precast concrete pipes (with and without reinforcement)
IS 459: 1992	Corrugated and semi-corrugated asbestos cement sheets
IS 460: 1985	Test sieves
IS 516: 1959	Method of test for strength of concrete
IS 650: 1991	Standard sand for testing cement
IS 733: 1983	Wrought aluminium and aluminium alloy bars, rods and sections for

	general engineering purposes
IS 737 1986	wrought aluminium and aluminium alloy sheet and strip for general engineering purposes
IS 771 1979	Glazed fire-clay sanitary appliances
	Part 1 General requirements
	Part 2 Specific requirements of Kitchen and laboratory sinks
	Part 3/Sec. 1 Specific requirements of Urinals - Slab Urinals
	Part 3/Sec. 2 Specific requirements of Urinals - Stall Urinals
IS 774: 1984	Flushing cistern for water closets and urinals
IS 775: 1970	Cast iron brackets and supports for wash basins and sinks
IS 777: 1988	Glazed earthenware wall tiles
IS 778: 1984	Copper Alloy gate, globe and check valves for water works purposes
IS 779: 1994	Water meters
IS 780: 1984	Sluice valves for water works purposes (50 to 300 mm size)
IS 781: 1984	Cast copper alloy screw down bib taps and stop valves for water services
IS 783: 1985	Code of practice for laying of concrete pipes
IS 800: 2007	Code of practice for general construction in steel
IS 814: 1991	Covered electrodes for manual metal arc welding of carbon and carbon manganese steel
IS 875: 1987	Code of practice for design loads (other than earthquake) for buildings and structures
IS 883: 1994	Code of practice for design of structural timber in building
IS 909: 1992	Under-ground fire hydrant, sluice valve type
IS 1003:	Timber panelled and glazed shutters
	Part 1 1991 Door shutters
	Part 2 1994 Window and ventilator shutters
IS 1030: 1989	Carbon steel castings for general engineering purposes
IS 1038: 1983	Steel doors, windows and ventilators
IS 1077: 1992	Common burnt, clay building bricks
IS 1080: 1986	Design and construction of shallow foundation in soil(other than raft ring and shell)
IS 1161: 1979	Steel tubes for structural purposes
IS 1195: 1978	Bitumen mastic for flooring.
IS 1200	Part 1 Methodology of measurement of Building and Civil Engineering Works.
IS 1230: 1979	Cast iron rainwater pipes and fittings
IS 1237: 1980	Cement concrete flooring tiles
IS 1239: 1990	Mild steel tubes, tubular and other wrought steel fittings

	Part 1 Mild steel tubes
	Part 2 Mild steel tubular and other wrought steel pipe fittings
IS 1322: 1993	Bitumen felts for water proofing and damp-proofing
IS 1341: 1992	Steel butt hinges
IS 1343: 1980	Code of practice for Pre-stressed Concrete
IS 1346: 1991	Code of practice Waterproofing of roofs with bitumen felts
IS 1458: 1965	Railway bronze ingots and casting
IS 1489: 1991	Portland Pozzolana Cement.
IS 1536: 1989	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage
IS 1537:1976	Vertically cast iron pressure pipes for water, gas and sewage
IS 1538: 1993	Cast iron fittings for pressure pipes for water, gas and sewage
IS 1566: 1982	Hard-drawn steel wire fabric for concrete reinforcement
IS 1592: 1989	Asbestos cement pressure pipes
IS 1703: 1989	Copper alloy float values (horizontal plunger type) for water supply fittings
IS 1726: 1991	Cast iron manhole covers and frames
IS 1729: 1979	Sand cast iron spigot and socket soil waste and ventilating pipes, fitting and accessories
IS 1732: 1989	Dimensions for round and square steel bars for structural and general engineering purposes
IS 1785: 1983	Plain hard-drawn steel wire for prestressed concrete
	Part 1 Cold-drawn stress – relieved wire
	Part 2 As drawn wire
IS 1786: 1985	High strength deformed steel bars and wires for concrete reinforcement.
IS 1791: 1985	Batch type concrete mixers
IS 1795: 1982	Specifications for pillar taps for water supply purposes
IS 1834: 1984	Hot applied sealing compounds for joint in concrete
IS 1838: 1983	Pre-formed fillers for expansion joint in concrete pavements and structures (non extruding and resilient type)
	Part 1 Bitumen impregnated fibre
IS 1888: 1982	Method of load tests on soils
IS 1892: 1979	Code of practice for sub surface investigations for foundations
IS 1893: 1984	Criteria for earthquake resistant design of structures
IS 1893 2002	Criteria for earthquake resistant design of structures,
	Part 1 General Provisions and Buildings
IS 1904 1986	Design and construction of foundations in soils General Requirements
IS 1948: 1961	Aluminium doors, windows and ventilators
IS 1949: 1961	Aluminium windows for industrial buildings

IS 1977: 1976	Low Tensile Structural steel
IS 2004: 1991	Carbon steel forgings for general engineering purposes
IS 2062: 2006	Steel for general structural purposes
IS 2074: 1992	Ready mixed paint, air-drying, red oxide-zinc chrome, priming
IS 2090: 1983	High tensile steel bars used in prestressed concrete
IS 2114: 1984	Code of practice for laying in-situ terrazzo floor finish
IS 2116: 1980	Sand for masonry mortars
IS 2119: 1980	Code of practice for construction of brick-cum-concrete composite
IS 2202: 1991	Wooden flush door shutters
IS 2326: 1987	Automatic flushing cisterns for urinals
IS 2386: 1963	Methods of test for aggregates for concrete
	Part 1 Particle size and shape
	Part 2 Estimation of deleterious materialsand organic impurities
	Part 3 Specific gravity, density, voids, absorption and bulking
	Part 4 Mechanical properties
	Part 5 Soundness
	Part 6 Measuring mortar making properties of fine aggregates
	Part 7 Alkali – aggregate reactivity
	Part 8 Petrographic examination
IS 2430: 1986	Methods of sampling of aggregate for concrete
IS 2548: 1996	Plastic seats and covers for water closets
IS 2681: 1993	Non-ferrous metal sliding door bolts (aldrops) for use with padlocks
IS 2690: 1993	Burnt - clay for flat terracing Tiles
IS 2692: 1989	Ferrules for water services
IS 2720 1972-2002	Methods of Tests for Soils (all Parts)
IS 2751: 1979	Recommended practice for welding of mild steel plain and deformed bars used for reinforced construction
IS 2906:1984	Specification for sluice valves for water works purposes (350 to1200 mm size)
IS 2911: 2010	Code of practice for design and construction of pile foundations
	Part 1 Concrete piles
	Section 1 Driven cast –in-situ concrete piles
	Section 2 Bored cast-in-situ concrete piles
	Section 3 Driven precast concrete piles
	Section 4 Bored precast concrete piles
	Part 3 Under-reamed piles

	Part 4 Load test on piles
IS 2950: 1981	Code of practice for design and construction of raft foundations.
IS 3067 1988:	Code of Practice for General Design Details and Preparatory Work for Damp-Proofing and Water-Proofing of Buildings.
IS 3370: 2009	Code of practice for concrete structures for the storage of liquids
IS 3564: 1995	Hydraulically regulated door closers
IS 3812: 1981	Fly ash for use as pozzolan and admixture
IS 3847: 1992	Mortice night latches
IS 3955: 1967	Code of practice for design and construction of well foundations
IS 3989: 1984	Centrifugally cast (spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories
IS 4082: 1996	Recommendations on stacking and storage of construction materials and components at site
IS 4138: 1977	Safety code for working in compressed air
IS 4326: 1993	Earthquake resistant design and construction of buildings – code of practice
IS 4656: 1968	Form vibrators for concrete
IS 4736: 1986	Hot-dip zinc coatings on mild steel tubes
IS 4826: 1979	Hot-dipped galvanised coatings on round steel wires
IS 4925: 1968	Concrete batching and mixing plant
IS 4926: 1976	Ready mixed concrete
IS 4968: 1976	Method for sub surface sounding for soils
IS 5525: 1969	Recommendations for detailing of reinforcement in reinforced concrete works
IS 5529: 1985	Code of practice for in-situ permeability tests
IS 5640: 1970	Method of test for determining aggregate impact value of soft coarse aggregate
IS 5816: 1970	Method of test for splitting tensile strength of concrete cylinders
IS 5889: 1994	Vibratory plate compactor
IS 5892: 1970	Concrete transit mixers and agitators
IS 6003: 1983	Specification for indented wire for prestressed concrete
IS 6006: 1983	Specification for uncoated stress relieved strands for prestressed concrete
IS 6051: 1970	Code for designation of aluminium and its alloys
IS 6248: 1979	Specification for metal rolling shutters and rolling grills
IS 6403: 1981	Code of practice for determination of bearing capacity of shallow foundations
IS 6603: 1972	Stainless steel bars and flats
IS 6760: 1972	Slotted countersunk head wood screws
IS 6911: 1992	Stainless steel plate, sheet and strip

IS 7181: 1986	Horizontally cast iron double flanged pipes for water, gas and sewage
IS 7196: 1974	Hold fast
IS 7205: 1974	Safety code for erection of structural steel work
IS 7231: 1984	Specifications for plastic flushing cisterns for water closets and urinals
IS 7273: 1974	Method of testing fusion-welded joints in aluminium and aluminium alloys
IS 7293: 1974	Safety code for working with construction machinery
IS 7320: 1974	Concrete slump test apparatus
IS 7534: 1985	Sliding locking bolts for use with padlocks
IS 7861: 1975	Code of practice for extreme weather concreting
	Part 1 For Hot Weather concreting
	Part 2 For Cold Weather concreting
IS 7969: 1975	Safety code for handling and storage of building materials
IS 8009 1976	Calculation of settlement of foundations
IS 8041: 1990	Rapid – hardening Portland cement
IS 8112: 1989	43 grade ordinary Portland cement
IS 8142: 1994	Method of test for determining setting time of concrete by penetration resistance
IS 8500: 1991	Structural steel-micro alloyed (medium and high strength qualities)
IS 9013: 1978	Method of making, curing and determining compressive strength of accelerated cured concrete test specimens
IS 9103: 1979	Admixtures for concrete
IS 9284: 1979	Method of test for abrasion resistance of concrete
IS 9417: 1989	Recommendations for welding cold worked bars for reinforced concrete construction
IS 9595: 1996	Recommendations for metal arc welding of carbon and carbon manganese steels
IS 9762: 1994	Polyethylene floats (spherical) for float valves
IS 10262: 2009	Recommended guidelines for concrete mix design
IS 10379:1982	Code of practice for field control of moisture and compaction of soils for embankment and subgrade
IS 10500: 1991	Drinking water specification
IS 12269: 1987	53 grade ordinary Portland cement
IS 12894: 1990	Fly ash lime bricks
IS 13630: 1994	Ceramic tiles – methods of tests
IS 13920: 1993	Ductile detailing of reinforced concrete structures subjected to seismic forces
IS 15388: 2003	Specifications for Silica Fume

SP 36 (Part 1):	Compendium of Indian Standards on Soil Engineering (Laboratory
	Testing)
SP 36 (Part 2):	Compendium of Indian Standards on Soil Engineering (Field Testing)Indian Standard Hand Book on Steel Sections Part-I
CRRI and IOC,	New Delhi Bituminous Road Construction Hand Book

The Construction Technical Specifications as follow are based on latest edition of "Specifications for Building & Infrastructure works" of Morth/CPWD/ PWD Government of Assam specifications – latest editions with correction slips & amendments up to date to the extent they are applicable to the Works covered under scope of works

The Indian and International Standards as scheduled below have been used as base for the specifications. The Contractor shall be responsible for detailing his specifications submitted to the Engineer, as part of the Definitive Design Submission, the standards on which his materials and workmanship will be based. These shall be of similar or higher standard than those listed below. The Contractor is required to notice in the first instance the Indian Standards, and base the specifications on Indian Standards to the extent that they are applicable.

Alternative or additional codes and standards proposed by the Contractor shall be internationally recognised codes and shall be equivalent to or better than, Indian Standards issued by the Bureau of Indian Standards or any other Indian professional body or organisation, subject to being, in the opinion of the Engineer, suitable for incorporation or reference into the specifications. The specifications have been divided into different sections / sub-heads for convenience only. They do not restrict any cross-references. The Contractor shall take into account inter-relations between various parts of works/trades. No claim shall be entertained on the basis of compartmental interpretations.

Reference to the Standard Codes of Practice Legend:

ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing Materials
BS	British Standard
CPWD	Central Public Works Department
DIN	Deutsches Institut für Normung e.V.
IRC	Indian Road Congress
IRCEM	Institution de Retraite Complementarie des Employes de Particular
IRS	Indian Railway Standards
IS	Indian Standards
JIS	Japanese Industrial Standard
MORTH	Ministry of Road Transport and Highways
Gujarat PWD	Public Works Department Government of Gujarat
UIC	International Union of Railways
MOSSIR2009	Manual of standards & specifications of Indian Railways 2009

The detailed list of Standards referred to is mentioned in Section 1.1.8

Storing of Materials at site

All materials used in the Works shall be stored on racks, supports, in bins, silos, godowns, under cover etc. as appropriate to prevent deterioration or damage from any cause whatsoever to the entire satisfaction of the Engineer. The storage of materials shall be in accordance with IS 4082 "Recommendation on stacking and storage of construction materials on site" and as per IS 7969 "Safety code for handling and storage of building materials".

The materials shall be stored in a proper manner at places at site agreed by the Engineer. Should the place, where material is stored by the Contractor, be required by the Employer for any other purpose, the Contractor shall forthwith remove the material from that place at his own cost and clear the place for the use of the Employer within the time as communicated by the Engineer.

Materials:

All materials shall be of best quality and shall conform to manufacturer's specification.

Wherever, no specific code of practice of IRS/IRC/BIS is applicable, the decision of Engineer shall be final and binding.

Workmanship

(1) All works shall be true to level, plumb and square and the corners, edges and rises in all cases shall be unbroken and neat.

(2) Any work not to the satisfaction of the Employer or Engineer will be rejected and the same shall be rectified, or removed and replaced with work of the required standard of workmanship by the Contractor at no extra cost to the Employer.

Load testing on Completed Structures

During the period of construction or within the defect liability period, the Engineer may at his discretion order the load testing of any completed structure or any part thereof if he has reasonable doubts about the adequacy of the strength of such structure for any of the following reasons.

(a) Results of compressive strength on concrete test cubes falling below the specified strength.
(b) Premature removal of formwork.
(c) Inadequate curing of concrete.
(d) Overloading during the construction of the structure or part thereof.
(e) Carrying out concreting of any portion without the prior notice to the Engineer.
(f) Honey combed or damaged concrete which will affect the stability of the structure to carry the design load, more so in important or critical areas of the structure.
(g) Any other circumstances attributable to the Contractor which may result in the structure or any part thereof being of less than the strength or performance required under the EPC Agreement.

All the loading tests shall be carried out by the Contractor in accordance with the agreed methods and Standards. Such tests shall be carried out only after expiry of minimum 28 days or such longer period as may be decided by the Engineer. The structure shall be subjected to a superimposed load equal to the specified superimposed load assumed in the design. This load shall be maintained for a period of 24 hours before removal. During the test, struts strong enough to take the whole load shall be placed in position leaving a gap under the members. The deflection due to the superimposed load shall be recorded by sufficient number of agreed deflect-o-meters capable of reading to an accuracy of 0.02mm and suitably located under the structure. The structure shall be deemed to have passed the test if the maximum deflection at the end of 24 hours of loading does not exceed the deflection given by the following expressions:

D = 0.001 L2/25 T, where,

D = max deflection due to imposed load

L = span of the member under load test (the shorter span in case of slabs). The span is the distance between centers of the supports or the clear distance between the supports plus the depth of the member, whichever is smaller. In case of cantilever, this shall be taken as twice the distance from the support to the end and deflection shall be adjusted for movement of the support.

T = Depth of the member

If within 24 hours of the removal of the superimposed load, the structure does not recover at least 75% of the deflection under the superimposed load, the test loading shall be repeated after a lapse of 72 hours. If the recovery after the second test is less than 80% of the maximum

deflection shown during the second test, the structure shall be considered to have failed to pass the test and shall be deemed to be unacceptable.

In such cases the portion of the Work concerned shall be taken down or cut out and reconstructed to comply with the specifications. Other remedial measures may be taken to make the structure secure at the discretion of the Engineer. However, such remedial measures shall be carried out to the complete satisfaction of the Engineer.

All costs involved in carrying out the tests defined in Clause 1.1.6 above, (including load and integrity test for piles) and other incidental expense thereto shall be borne by the Contractor regardless of the result of the tests. In case of failure the Contractor shall take down or cut out and reconstruct the defective work or shall take the remedial measures, as instructed, at his own cost.

In addition to the above load tests, non-destructive tests on various elements such as core test and ultrasonic pulse velocity test etc. shall be carried out by the Contractor at his own expense. Such tests shall be carried out by an agency agreed with the Engineer. The acceptance criteria for these tests shall be as specified by the testing agency or good Engineering practice subject to the Notice of No Objection by the Engineer.

Structural Work

Unless otherwise specified, only controlled concrete with design mix and weigh batching is to be used for the Works.

Minimum cement content for various grades/ elements of concrete shall be as agreed by the Engineer as part of the Contractor's keeping in view the durability and other requirements. However, larger content of cement shall be provided if demanded by mix design or as per the requirement of relevant codes.

Mix design using smaller aggregates of 10 mm and below shall also be done in advance for the use at the junctions, where reinforcement is congested.

Procedure of mixing the admixtures shall be strictly as per the manufacturer's recommendations.

All the water tanks and other liquid retaining concrete structures shall undergo hydro-testing.

Special benches shall be provided at site for stacking reinforcement bars of different sizes.

Formwork for beams of Reinforced Cement Concrete works shall be designed in such a way that the formwork of the adjacent slabs can be removed without disturbing the props/supports to the beams.

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 be kept in place until such time as the upper level supporting members have achieved the required minimum strength.

The Contractor shall incorporate seismic considerations of anchoring and isolation in the design and detailing of the finishes. The element to be anchored shall have its motion suitably restrained and isolated so as not to be affected by the deformations/vibrations of the building during Construction.

Formwork shall be provided for full height at all locations. Special precautions for such tall formwork shall be taken to ensure its safety and stability.

Applicable Codes, Standards & Publications for Structural & Architectural Work

The important Codes, Standards and Publications to Contract are listed here under:

A	**General**
IS:875 (Part 3)	Code of practice for design loads (other than earthquake) for buildings and structures
IS:1322	Bitumen felts for water proofing and damp-proofing
IS:1893	Criteria for earthquake resistant design of structures
IS:2572	Code of Practice for construction of hollow concrete block masonry
IS:2974(Part 1)	Code of Practice for Design & Construction of machine Foundation
IS:3414 IS:3764	Code of practice for design and installation of joints in buildings Excavation Work- Code of Safety
IS:6408 (Parts 1,2)	Recommendations for modular co-ordination in building industry – tolerances
IS:10958	General check list of functions of joints in building
IS:11817	Classification of joints in buildings for accommodation of dimensional deviations during construction
IS:11818	Method of test for laboratory determination of air permeability of joints in buildings
IS:12440	Precast concrete stone masonry blocks
CPWD	Specifications 2009.
BS:476 (Part 7)	Method for classification of the surface spread of flame of products
BS:476 (Part 20)	Method of determination of the fire resistance of elements of construction (general principles)
BS:476 (Part 22)	Methods for determination of the fire resistance of non-load bearing elements of construction
BS:5215	Specification for one-part gun grade polysulphide-based sealants
BS:5606	Guide to accuracy in building
BS:6093	Code of practice for the design of joints and jointing in building construction
BS:8200	Code of practice for the design of non-load bearing external vertical enclosure of building
ASTM C 332	Specification for light weight aggregate for insulating concrete

SP 7	National Building Code of India
SP 23 (S&T)	Hand Book on Concrete Mixes
B	**Bitumen**
IS:702	Industrial Bitumen
IS:3384	Specification for bitumen primer for use in waterproofing and damp-proofing
C	**Building Construction Practices**
IS:1838 Parts I and II.	Specifications for preformed fillers for expansion joint in concrete pavements and structures.
IS:1946	Code of Practice for use of fixing devices in walls, ceilings, and floors of solid construction.
IS:6509	Code of Practice for installation of joints in concrete pavements.
IS:11134	Code of Practice for setting out of buildings.
IS:11433	Parts I and II. Specifications for one part Gun grade polysulphide based joint sealant.
IS:12200	Code of Practice for provision of water stops at transverse contraction joints in masonry and concrete dams
D	**Cement**
IS:269	33 grade ordinary Portland cement
IS:455	Portland Slag Cement
IS:650	Specification for standard sand for testing cement.
IS:1489 (Part 1)	Portland pozzolana cement: Flyash based
IS:1489 (Part 2)	Portland pozzolana cement: Calcined clay based
IS:3535	Method of Sampling Hydraulic Cements
IS:4031	(Parts 1 to 13) Methods of physical tests for hydraulic cement.
IS:4032	Method of chemical analysis of hydraulic cement.
IS:6925	Methods of test for determination of water soluble chlorides in concrete admixtures.

IS:8042	White Portland Cement
IS:8112	Specification for 43 grade ordinary Portland cement.
IS:12269	Specification for 53 grade ordinary Portland cement.
IS:12330	Specification for sulphate resistant Portland cement.
E	Concrete
IS:456	Code of practice for plain and reinforced concrete.
IS:457	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.
IS:460 (Parts I to II)	Specification for Test Sieves
IS:516	Methods of test for strength of concrete.
IS:1199	Methods of sampling & analysis of concrete.
IS:1200	Method of measurement of building and civil Engineering
IS:1343	Code of practice for prestressed concrete
IS:1607	Method of Test Sieving
IS:2386	Parts I-VIII. Methods of tests for aggregates for concrete.
IS:2430	Methods of Sampling of Aggregates of Concrete
IS:2438	Specification for roller pan mixer
IS:2514	Specification for concrete vibrating tables
IS:2571	Code of practice for laying in-situ cement concrete flooring
IS:2645	Specifications for integral cement water proofing compounds
IS:2722	Specifications for portable swing batchers for concrete (double bucket type)
IS:2770	Methods of testing bond in reinforced concrete part I pull out Test

IS:3025	Methods of sampling and test (physical and chemical) for water & waste water
IS:3370	Code of practice for concrete structures for storage of liquids
IS:3935.	Code of practice for composite construction
IS:4326	Code of practice for earthquake resistant construction of Building
IS:6925.	Methods of test for determination of water soluble chlorides in concrete Admixtures
IS:7242	Specifications for concrete spreaders
IS:7251	Specifications for concrete finishers
IS:7861	Parts I & II. Code of practice for extreme weather concreting.
IS:7969	Safety code for handling and storage of building materials
IS:8989	Safety code for erection of concrete framed structures
IS:8142	Methods of test for determining setting time of concrete by penetration resistance
IS:9103	Specifications for admixtures for concrete
IS:9013	Method of making, curing and determining compressive strengths of accelerated cured concrete test specimens
IS:9284	Method of test for abrasion resistance of concrete
IS:10262	Recommended guidelines for concrete mix design.
MORTH	Specifications for Road and Bridge Works, Ministry of Road Transport and Highways (Roads Wing)
IRS : CBC	Concrete Bridge Code
IRC 21	Standard Specifications and Code of Practice for Road Bridges Section III – Cement Concrete (Plain & Reinforced)
IRC:18	Design criteria for Prestressed Concrete Road Bridges (Post – Tensioned Concete)

ASTM - C - 94	Ready Mix Concrete
IS 4926	Ready Mixed Concrete – Code of Practice
ASTM – C - 1240	Specifications for Silica Fume for use in Hydraulic Cement and Mortar
F	Construction Plant and Machinery.
IS:1791	Specification for batch type concrete mixers.
IS:2505	General requirements for concrete vibrators: Immersion type.
IS:2506	General requirements for screed board concrete vibrators.
IS:3366	Specification for pan vibrators.
IS:3558	Code of Practice for use of immersion vibrators for consolidating concrete.
IS:4656	Specifications for form vibrators for concrete.
IS:4925	Specification for concrete batching and mixing plant.
IS:11993	Code of Practice for use of screed board concrete vibrators.
G	Formwork
IS:4990	Specifications for plywood for concrete shuttering work.
IRC:87	Guidelines for the design and erection of false work for road bridges.
IS:806	Code of practice for use of steel tubes in general building construction.
IS:1161	Specification of steel tubes for structural purposes.
IS:1239	Specification for mild steel tubes. Tubulars and other wrought steel fittings.
H	Gypsum and Gypsum Board
IS:2095	Gypsum plaster boards

IS:2542 (Part 1/Sec 1 to 12)	Methods of test for gypsum plaster, concrete and products: plaster and concrete
IS:2542 (Part 2/Sec 1 to 8)	Methods of test for gypsum plaster, concrete and products: Gypsum products
IS:2547 (Part 1)	Gypsum building plaster: Excluding premixed lightweight plaster
IS:2547 (Part 2)	Gypsum building plaster: Premixed lightweight plaster
I	Handling and Storage
IS:4082	Recommendation of Stacking and Storage of construction materials
IS:8348	Code of practice for stacking and packing of stone slabs for transportation
J	Instruments For Testing Cement and Concrete
IS:5513	Specification for vicat apparatus.
IS:5514	Specification for apparatus used in Le-Chaterlier test.
IS:5515	Specification for compaction factor apparatus.
IS:7320	Specification for concrete slump test apparatus.
IS:7325	Specification for apparatus to determine constituents of fresh concrete.
IS:10080	Specification for vibration machine.
IS:10086	Specification for moulds for use in tests of cement and concrete.
IS:10510	Specification for vee-bee consistometer.
K	Joint Fillers
IS:1838 (Part 1)	Preformed fillers for expansion joint in concrete pavements and structures (non extruding and resilient type): Bitumen impregnated fibre
L	Paints and Coatings

IS:102	Ready mixed paint, brushing, red lead, non-setting, priming
IS:109	Ready mixed paint, brushing, priming, plaster, to Indian Standard Colour No. 361 and 631 white and off white.
IS:347	Varnish, shellac, for general purpose.
IS:2074	Ready mixed paint, air drying, red oxide-zinc chrome, priming
BS:6496	Specification for powder organic coatings for application and stoving to aluminum alloy extrusions, sheet and preformed sections for external architectural purposes, and for the finish on aluminum alloy extrusions, sheet and preformed sections coated with powder organic coatings
BS:EN:10152	Specification for electrolytically zinc coated cold rolled steel flat products. Technical delivery conditions
ASTM A 164-71	Specification for electrodeposited coatings of zinc on steel
M	Pigment for Cement
BS:1014	Specification for pigments for Portland cement and Portland cement products
N	Reinforcement & Structural Steel
IS:280	Mild steel wire for general Engineering purposes
IS:432	Part I. Mild steel and medium tensile steel bars. Part II Hard- drawn steel wire.
IS:814	Parts I & II. Electrodes for metal arc welding of structural steel.
IS:815	Classification coding of covered electrodes for metal arc welding of structural steels
IS:816	Code of Practice for use of metal arc welding for general construction in mild steel.
IS:1566	(Part I) Specifications for hard-drawn steel wire fabric for concrete reinforcement.
IS:1786	Specification for high strength deformed steel bars and wires for concrete reinforcement.

IS:2502	Code of Practice for bending and fixing of bars for concrete reinforcement.
IS:2629	Recommended practice for hot-dip galvanising of iron and steel.
IS:2751	Code of Practice for welding of mild steel plain and deformed bars for reinforced concrete construction.
IS:4759	Hot-dip zinc coating on structural steel and other allied products.
IS:5525	Recommendations for detailing of reinforcement in reinforced concrete works
IS:9417	Recommendations for welding cold-worked steel bars for reinforced concrete construction.
IS:14268	Uncoated stress relieved low relaxation steel class 2 for Pre-stressed concrete
IS:226	Structural steel (Standard Quality)
IS:800	Code of practice for use of structural steel in general building construction.
IS:813	Scheme of symbols for welding.
IS:814	Covered electrodes for metal arc welding of structural steel. (Part I & Part II)
IS:816	Code of practice for use of metal arc welding for general construction in mild steel.
IS:822	Code of practice for inspection of welds.
IS:961	Structural steel (High Tensile)
IS:1024	Code of practice for use of welding in bridges and structures subject to dynamic loading.
IS:1161	Steel tubes for structural purposes.
IS:1182	Recommended practice for radiographic examination of fusion welded butt joints in steel plates.
IS:2062	Structural steel (Fusion welding quality)

IS:3757	Specification for high tensile friction grip bolts.
IS:5624	Specification for foundation bolts.
IS:3600	Code of practice for testing of fusion welded (Part I) joints and weld metal in steel.
IS:4923	Hollow steel sections for structural use.
IS:6227	Code of practice for use of metal arc welding in tubular structure.
IS:801	Code of practice for use of cold formed light gauge steel structural members in general building construction.
IS:811	Specifications for cold formed light gauge structural steel sections.
IS:8500	Structural Steel Micro alloyed (Medium and high strength qualities)
IS:8910	General requirements of supply of weldable structural steel
IS:9595	Recommendations for metal arc welding of carbon & carbon-Mangnese steels
IS:7205	Safety Code for erection of Structural Steel Works
O	**Aggregates**
IS:383	Coarse and fine aggregates from natural sources for concrete.
P	**Scaffolding**
IS:2750	Specification for steel scaffoldings
IS:3696 (Part 1)	Safety Code of scaffolds and ladders: Scaffolds
IS:3696 (Part 2)	Safety Code of scaffolds and ladders: Ladders
IS:4014 (Part 1)	Code of practice for steel tubular scaffolding: Definition and materials
IS:4014 (Part 2)	Code of practice for steel tubular scaffolding: Safety regulations for scaffolding
IRC:87	Guidelines for the design and erection of falsework for road bridges

Q	Sealants
IS:10959	Glossary of terms for sealants for building purposes
IS:11433 (Part 1)	One part grade polysulphide base joint sealant: General requirements
IS:11433 (Part 2)	One part grade polysulphide base joint sealant: Methods of test
IS:13055	Methods of sampling and test for anaerobic adhesives and sealants
BS:5889	Specification for one part gun grade silicone-based sealants.
R	Wood
IS:303	Plywood for General Purposes
IS:848	Synthetic resin adhesives for plywood (phenolic and aminoplastic)
IS:1141	Seasoning of Timber - Code of Practice
IS:1328	Veneered decorative plywood
IS:1659	Block Boards
IS:2046	Decorative thermosetting synthetic resin bonded laminated sheets
IS:2202 (Part 1)	Wooden flush door shutters (solid core type): Plywood face panels
IS:2202 (Part 2)	Wooden flush door shutters (solid core (type): Particle face panels and hardboard face panels
S	UPVC Pipe For Drainage
IS 4985	Unplasticized PVC Pipes for portable water supplies
T	PILING
IS :2911 PART-I	Bored Cast in-situ Concrete Piles

SCHEDULE - E

(See Clauses 2.1 and 14.2)

MAINTENANCE REQUIREMENTS

Maintenance for Project shall be 24 months from the date of successfull handing over and issue of virtual completion certificate with proper staff deployed at site.

1 Maintenance Requirements

1.1 The Contractor shall, at all times maintain the Project in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.

1.2 The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph 2 of this Schedule-E within the time limit specified therein and any failure in this behalf shall constitute non-fulfillment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 14.6 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.

1.3 All Materials, works and construction operations shall conform to the MORTH/ CPWD/ Assam PWD Specifications for Building & Infrastructure Works, and the relevant IRC publications. Where the specifications for a work are not given, Good Industry Practice shall be adopted.

2 Repair/rectification of Defects and deficiencies

The obligations of the Contractor in respect of Maintenance Requirements shall include repair and rectification of the Defects and deficiencies specified in Annex - I of this Schedule-E within the time limit set forth therein.

3 Other Defects and deficiencies

In respect of any Defect or deficiency not specified in Annex - I of this Schedule-E, the Authority's Engineer may, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards, and any deviation or deterioration beyond the permissible limit shall be repaired or rectified by the Contractor within the time limit specified by the Authority's Engineer.

4Extension of time limit

Notwithstanding anything to the contrary specified in this Schedule-E, if the nature and extent of any Defect or deficiency justifies more time for its repair or rectification than the time specified herein, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority with reasons thereof.

5 Emergency repairs/restoration

Notwithstanding anything to the contrary contained in this Schedule-E, if any Defect, deficiency or deterioration in the Project Highway poses a hazard to safety or risk of damage to property, the Contractor shall promptly take all reasonable measures for eliminating or minimizing such danger.

6 Daily inspection by the Contractor

The Contractor shall, through its engineer, undertake a daily visual inspection of the Project Highway and maintain a record thereof in a register to be kept in such form and manner as the Authority's Engineer may specify. Such record shall be kept in safe custody of the Contractor and shall be open to inspection by the Authority and the Authority's Engineer at any time during office hours.

7. Pre-monsoon inspection / Post-monsoon inspection

The Contractor shall carry out a detailed pre-monsoon inspection of all bridges, culverts and drainage system before [1st June] every year in accordance with the guidelines contained in IRC: SP35. Report of this inspection together with details of proposed maintenance works as required on the basis of this inspection shall be sent to the Authority's Engineer before the [10th June] every year. The Contractor shall complete the required repairs before the onset of the monsoon and send to the Authority's Engineer a compliance report. Post monsoon inspection shall be done by the [30th September] and the inspection report together with details of any damages observed and proposed action to remedy the same shall be sent to the Authority's Engineer.

8. Repairs on account of natural calamities

All damages occurring to the Project on account of a Force Majeure Event or default or neglect of the Authority shall be undertaken by the Authority at its own cost. The Authority may instruct the Contractor to undertake the repairs at the rates agreed between the Parties.

Annex - I
(Schedule-E)

Repair/rectification of Defects and deficiencies

The Contractor shall repair and rectify the Defects and deficiencies specified in this Annex-I of Schedule-E within the time limit set forth in the table below.

Nature of Defect or deficiency		**Time limit for repair/rectification**
Boundary wall		
(i)	Plaster & Paints	7 days
(ii)	Weighbridge	24 hours
(iii)	Gates	24 hours
(iv)	Security Block utilities	24 hours
(v)	Sign Boards	48 hours
(vi)	Concertina Wire	7 Days
(vi)	Cleaning of toilets	Every 4 hours
(vii)	RCC /masonry wall	7 (seven) days
(viii)	Landslides requiring clearance	7 (seven) days
(ix)	Defects in electrical, water and sanitary installations	24 hours
Site Levelling & Grading		
(i)	Soil Sink	7 days
(ii)	Weeding clearance	15 days
Admin Building		
(i)	Plaster & Paints	7 days
(ii)	Glazing & ACP	7 days
(iii)	Door, Window & Gates	48 hours
(iv)	Flooring	7 days
(v)	Any cracks in internal road surface	48 hours
(vi)	All Utilities Works	48 hours
(i)	Cleaning of toilets	Every 4 hours

(ii)	Defects in electrical, water and sanitary installations	24 hours
Custom Service Building		
(i)	Plaster & Paints	7 days
(ii)	Glazing & ACP	7 days
(iii)	Door, Window & Gates	48 hours
(iv)	Flooring	7 days
(v)	Any cracks in road surface	48 hours
(vi)	All Utilities Works	48 hours
(vii)	Cleaning of toilets	Every 4 hours
(viii)	Defects in electrical, water and sanitary installations	24 hours
Trees and plantation		
(i)	Obstruction in a minimum head-room of 5 m above carriageway or obstruction in visibility of road signs	24 hours
(ii)	Removal of fallen trees	4 hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(iv)	Trees and bushes requiring replacement	15 days
(v)	Removal of vegetation affecting sight line and road structures	15 days
Electrical Sub Stations		
(i)	Maintenance of Major Electrical Equipment	24 hours
(ii)	Major faults / Breakdown	24 hours
Water & Sewage Treatment Plant		
(i)	Maintenance of Major Water & Sewage Treatment Plant Equipment	24 hours
(ii)	Major faults / Breakdown	24 hours

Note: Where necessary, the Authority may modify the time limit for repair/rectification, or add to the nature of Defect or deficiency before issuing the bidding document, with the approval of the competent authority.

The Contractor shall submit a warranty for all equipments, material and accessories supplied by him against manufacturing defects, mafunctioning or under capacity functioning.

The form of warranty shall be as approved by Project Manager.

The warranty shall expressly include replacement of all defective or under capacity equipment/material. Project Manager may allow repair of certain equipment if the same is found to meet he requirement for efficient functioning of the system.

The warranty include replacement of any equipment found to have capacity lesser that the rated capacity as accepted in the contract. The replacement equipmnet shall be approved by the Project Manager.

SCHEDULE - F
(See Clause 3.1.7(a))

APPLICABLE PERMITS

1 Applicable Permits

1.1 The Contractor shall obtain, as required under the Applicable Laws, the following Applicable Permits:

(a) Permission of the State Government for extraction of boulders from quarry;

(b) Permission of Village Panchayats and Pollution Control Board for installation of crushers;

(c) License for use of explosives;

(d) Permission of the State Government for drawing water from river/reservoir;

(e) License from inspector of factories or other competent Authority for setting up batching plant;

(f) Clearance of Pollution Control Board for setting up batching plant;

(g) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;

(h) Permission of Village Panchayats and State Government for borrow earth; and

(i) Any other permits or clearances required under Applicable Laws.

1.2 Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.

SCHEDULE - G

(See Clauses 7.1.1, 7.5.3 and 19.2)

FORM OF BANK GUARANTEE

Annex-I

Performance Security

The ……
……..
……..
……

WHEREAS:

(A) _____ [name and address of contractor] (hereinafter called the "**Contractor**") and [name and address of the authority], (hereinafter called the **"Authority"**) have entered into an agreement (hereinafter called the "**Agreement**") for the Development of Multimodal logistic Park Jogighopha, Package-II on Engineering, Procurement and Construction (the "**EPC**") basis, subject to and in accordance with the provisions of the Agreement

(B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the {Construction Period/ Defects Liability Period and Maintenance Period} (as defined in the Agreement) in a sum of Rs….. cr. (Rupees ……..….. crore) (the "**Guarantee Amount**").

(C) We, …….. through our branch at ……. (the "**Bank**") have agreed to furnish this bank guarantee (*hereinafter called the* **"Guarantee**") by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during the {Construction Period/ Defects Liability Period and Maintenance Period} under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the

Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of Chief Engineer in Raipur, Chhattisgarh, that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Guarantee shall cease to be in force and effect on ****[$]. Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

12. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

13. This guarantee shall also be operatable at our…….. Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment there under

claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation. 14. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

Sl. No	Particulars	Details
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ……. day of ……., 20…… at …….

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

APPENDIX - II

Bid Securing Declaration

(Refer Clauses 2.20)

I hereby submit a declaration that the bid submitted by the undersigned, on behalf of the bidder, (Name of the bidder), wither sole or in JV, shall not be withdrawn or modified during period of validity i.e. not less than 180 (one hundred eighty) days from the bid due date.

I, on behalf of the bidder, (Name of the bidder), also accept the fact that in case the bid is withdrawn or modified during the period of it validity or if we fail to sign the contract in case the work is awarded to us or we fail to submit a performance security before the deadline defined in clause 7 of the request of proposal (RFP), then (Name of bidder) will be suspended for participating in the tendering process for the work of MoRTH/NHAI/NHIDCL and works under other Centrally Sponsored Scheme, for a period of one year from the bid due date of this work.

(Signature of the Authorised Signatory)
(Official-Seal)

Annex – II
(Schedule - G)
(See Clause 7.5.3)

Form for Guarantee for Withdrawal of Retention Money

……..
…….
……..
……

WHEREAS:

(A) [name and address of contractor] (hereinafter called the "**Contractor**") has executed an agreement (hereinafter called the "Agreement") with the [name and address of the authority], (hereinafter called the "**Authority**") for the for Development of Multimodal logistic Park Jogighopha, Package-II on Engineering, Procurement and Construction (the "**EPC**") basis, subject to and in accordance with the provisions of the Agreement.

(B) In accordance with Clause 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called the "**Retention Money**") after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.

(C) We, …….. through our branch at ……. (the "**Bank**") have agreed to furnish this bank guarantee (hereinafter called the "**Guarantee**") for the amount of Rs. --------- cr. (Rs.----------crore) (the "**Guarantee Amount**").

NOW, THEREFORE, the Bank hereby unconditionally and irrevocably guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank

of Chief Engineer in Raipur, Chhattisgarh, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Retention Money and any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Retention Money.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the

Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Guarantee shall cease to be in force and effect 90 (ninety) days after the date of the Completion Certificate specified in Clause 12.4 of the Agreement.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

12. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

13. This guarantee shall also be operatable at our…….. Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment there under claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation. 14. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

Sl. No	**Particulars**	**Details**
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited

2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ……. day of ……., 20…… at …….

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

APPENDIX - II

Bid Securing Declaration

(Refer Clauses 2.20)

I hereby submit a declaration that the bid submitted by the undersigned, on behalf of the bidder, (Name of the bidder), wither sole or in JV, shall not be withdrawn or modified during period of validity i.e. not less than 180 (one hundred eighty) days from the bid due date.

I, on behalf of the bidder, (Name of the bidder), also accept the fact that in case the bid is withdrawn or modified during the period of it validity or if we fail to sign the contract in case the work is awarded to us or we fail to submit a performance security before the deadline defined in clause 7 of the request of proposal (RFP), then (Name of bidder) will be suspended for participating in the tendering process for the work of MoRTH/NHAI/NHIDCL and works under other Centrally Sponsored Scheme, for a period of one year from the bid due date of this work.

(Signature of the Authorised Signatory)
(Official-Seal)

Annex – III
(Schedule - G)
(See Clause 19.2)

Form for Guarantee for Advance Payment

……..
……..
……..
……..

WHEREAS:

(A) [name and address of contractor] (hereinafter called the "**Contractor**") has executed an agreement (hereinafter called the "**Agreement**") with the [name and address of the authority], (hereinafter called the "**Authority**") for Development of Multimodal logistic Park Jogighopha, Package-II on Engineering, Procurement and Construction (the "**EPC**") basis, subject to and in accordance with the provisions of the Agreement

(B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest free advance payment (herein after called "**Advance Payment**") equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in three installments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a scheduled bank for an amount equivalent to 110% (one hundred and ten percent) of such installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second/third} installment of the Advance Payment is Rs. ------ cr. (Rupees ------ crore) and the amount of this Guarantee is Rs. ------- cr. (Rupees ------ crore) (the **"Guarantee Amount")**[$]**.**

(C) We, …….. through our branch at ……. (the "**Bank"**) have agreed to furnish this bank guarantee (*hereinafter called the* **"Guarantee"**) for the Guarantee Amount.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid installment of the Advance Payment under and in accordance with the Agreement, and agrees and

undertakes to pay to the Authority, upon its mere first written demand, and

[$] The Guarantee Amount should be equivalent to 110% of the value of the applicable installment.

without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of Chief Engineer in Raipur, Chhattisgarh, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the installment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Guarantee shall cease to be in force and effect on ****.[$] Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

12. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

13. This guarantee shall also be operatable at our…….. Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment there under claimed, the said branch

shall accept such invocation letter and make payment of amounts so demanded under the said invocation. 14. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

Sl. No	**Particulars**	**Details**
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ……. day of ……., 20…… at …….

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

APPENDIX - II

Bid Securing Declaration

(Refer Clauses 2.20)

I hereby submit a declaration that the bid submitted by the undersigned, on behalf of the bidder, (Name of the bidder), wither sole or in JV, shall not be withdrawn or modified during period of validity i.e. not less than 180 (one hundred eighty) days from the bid due date.

I, on behalf of the bidder, (Name of the bidder), also accept the fact that in case the bid is withdrawn or modified during the period of it validity or if we fail to sign the contract in case the work is awarded to us or we fail to submit a performance security before the deadline defined in clause 7 of the request of proposal (RFP), then (Name of bidder) will be suspended for participating in the tendering process for the work of MoRTH/NHAI/NHIDCL and works under other Centrally Sponsored Scheme, for a period of one year from the bid due date of this work.

(Signature of the Authorised Signatory)
(Official-Seal)

SCHEDULE - H

(See Clauses10.1.4 and 19.3)

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs……

1.2 Proportions of the Contract Price for different stages of Construction of the entire works shall be as specified below:

Sl. No.	Item	Weightage in percentage to the Contract Price	Stage of Payment	Percentage Weightage
1.	Outer Boundary wall for 190 Acres land including two gates.	10.90%	Surveys, Design, Drafting and submission of drawing for Boundary wall and obtaining its approval complete,	2.00%
			Completion of foundation works	25.00%
			Completion of Civil works	45.00%
			Completion of Concertina wire	10.00%
			Completion of two Security Blocks.	9.00%
			Completion of Gate works.	7.00%
			Completion of Weighbridges.	1.00%
			Completion of Sign Boards.	1.00%
2	Site Leveling, Grading including compaction at design dry density .	35.79%	Surveys, Drafting and submission of drawing for Site Levelling & Grading Area and obtaining its approval complete.	2.00%
			Clearing & grubbing, Dismentalling of existing structure and site clearance	5.00%
			Completion of cutting & filling work with proper compaction as per desired level.	93.00%

3	Plot Boundary Demarcation.	8.66%	Surveys, Design, Drafting and submission of drawing for Toe wall / Plot Demarcation and obtaining its approval complete.	2.00%
			Completion of foundation as per drawing and RCC wall above Finish ground filling level upto 600 mm.	98.00%
4	Admin Building	17.03%	Surveys, Design, Drafting and submission of drawing for Admin Building including structural, façade, all utilities (MEP) and obtaining its approval complete,	2.00%
			Completion of foundatio works	10.00%
			Construction of frame work structure including slabs	22.50%
			Completion of Masanry works & successful testing of waterproofing treatment works	10.50%
			Completion of Plaster works	3.00%
			Completion of Paints works	3.00%
			Complation of flooring works	5.00%
			Completion of false ceiling works	1.00%
			Completion of Door, window, ventilators & façade glazing.	7.00%
			Completion of Plumbing, fire fighting works, & PA system.	5.00%
			Completion of Electrical works	8.00%
			Completion of HVAC works	7.00%
			Completion of external development work	8.00%
			Completion of lifts	3.00%
			Completion of Solor panel for self sestinace of electricity of entire building including AC & lift.	5.00%

5	Custom Service Building	3.36%	Surveys, Design, Drafting and submission of drawing for Custon Service Building including PEB, all utilities (MEP) and obtaining its approval complete,	2.00%
			Completion of foundation to receive steel frame of the building including waterprofing.	20.00%
			Construction of office space of 210 sqm as per drawing.	10.00%
			Supply & Erection of PEB Building frame work including purlins.	30.00%
			Supply & fixing Roof sheeting incluing insulation, Turbo vent.	7.00%
			Supply & fixing and construction of outer wall.	8.00%
			Completion of Rolling Shutters,Door, window & ventilators.	4.00%
			Complation of flooring works	4.00%
			Completion of Plumbing, fire fighting works, & PA system.	2.00%
			Completion of Electrical works	4.00%
			Completion of HVAC works for mezzanine area.	1.00%
			Completion of external development work	8.00%
6	Electrical Sub Stations	15.72%	Surveys, Design, Drafting and submission of drawing for electrical Substaions including structural of building, all utilities and obtaining its approval complete,	2.00%
			Completion of Building works	10.00%
			Supply of all equipments	40.00%
			Installation of all equipments	35.00%
			Successful testing of all equipments	4.00%

			Successful commissioning of all equipments	9.00%
7	Landscaping works	4.87%	Surveys, Design, Drafting and submission of drawing for Landscaping works and obtaining its approval complete,	2.00%
			Plantation and Development works in consultation with cleint.	60.00%
			Maintenance for Ist years	25.00%
			Maintenance for 2nd years	13.00%
8	Water & Sewage Treatment Plant	3.68%	Surveys, Design, Drafting and submission of drawing for Water & Sewage Treatment Plant including of building, all utilities and obtaining its approval complete,	2.00%
			Completion of Building works	10.00%
			Supply of all equipments	40.00%
			Installation of all equipments	35.00%
			Successful testing of all equipments	4.00%
			Successful commissioning of all equipments	9.00%

1.3 Procedure of estimating the value of work done

Procedure for estimating the value of road work done shall be as per Table 1.3.1.

Table 1.3.1

Sl. No.	Item	Stage of Payment	Percentage Weightage	Payment Procedure
1.	Outer Boundary wall for 190 Acres land including two gates.	Surveys, Design, Drafting and submission of drawing for Boundary wall and obtaining its approval complete,	2.00%	Lump sum onetime payment on Approval
		Completion of foundation works	25.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 50 m.
		Completion of Civil works	45.00%	
		Completion of Concertina wire	10.00%	
		Completion of two Security Blocks.	9.00%	50 % of completion of one and 50% of completion of other.
		Completion of Gate works.	7.00%	
		Completion of Weighbridges.	1.00%	
		Completion of Sign Boards.	1.00%	
2	Site Leveling, Grading including compaction at design dry density .	Surveys, Drafting and submission of drawing for Site Levelling & Grading Area and obtaining its approval complete.	2.00%	Lump sum onetime payment on Approval
		Clearing & grubbing, Dismentalling of existing structure and site clearance	5.00%	Unit of measurement is linear area. Payment of each stage shall be made on pro rata basis on completion of a stage in a

		Completion of cutting & filling work with proper compaction as per desired level.	93.00%	area of not less than 10 (ten) percent of the total area.
3	Plot Boundary Demarcation.	Surveys, Design, Drafting and submission of drawing for Toe wall / Plot Demarcation and obtaining its approval complete.	2.00%	Lump sum onetime payment on Approval
		Completion of foundation as per drawing and RCC wall above Finish ground filling level upto 600 mm.	98.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 50 m.
4	Admin Building	Surveys, Design, Drafting and submission of drawing for Admin Building including structural, façade, all utilities (MEP) and obtaining its approval complete,	2.00%	Lump sum onetime payment on Approval
		Completion of foundatio works	10.00%	Unit of measurement is linear area. Payment of each stage shall be made on pro rata basis on completion of a stage in a area of not less than 10 (ten) percent of the total area.
		Construction of frame work structure including slabs	22.50%	
		Completion of Masanry works & successful testing of waterproofing treatment works	10.50%	
		Completion of Plaster works	3.00%	
		Completion of Paints works	3.00%	
		Complation of flooring works	5.00%	
		Completion of false ceiling works	1.00%	

		Completion of Door, window, ventilators & façade glazing.	7.00%	
		Completion of Plumbing, fire fighting works, & PA system.	5.00%	
		Completion of Electrical works	8.00%	
		Completion of HVAC works	7.00%	
		Completion of external development work	8.00%	
		Completion of lifts	3.00%	70 % on procurement & supply & 30% on commissioning of the lift.
		Completion of Solor panel for self sestinace of electricity of entire building including AC & lift.	5.00%	50 % on procurement & supply, 30% on installation & 20% on commissioning of the complete system.
5	Custom Service Building	Surveys, Design, Drafting and submission of drawing for Custon Service Building including PEB, all utilities (MEP) and obtaining its approval complete,	2.00%	Lump sum onetime payment on Approval
		Completion of foundation to receive steel frame of the building including waterprofing.	20.00%	Unit of measurement is linear area. Payment of each stage shall be made on pro rata basis on completion of a stage in a area of not less than 10 (ten) percent of the total area.
		Construction of office space of 210 sqm as per drawing.	10.00%	
		Supply & Erection of PEB Building frame work including purlins.	30.00%	

		Supply & fixing Roof sheeting incluing insulation, Turbo vent.	7.00%	
		Supply & fixing and construction of outer wall.	8.00%	
		Completion of Rolling Shutters,Door, window & ventilators.	4.00%	
		Complation of flooring works	4.00%	
		Completion of Plumbing, fire fighting works, & PA system.	2.00%	
		Completion of Electrical works	4.00%	
		Completion of HVAC works for mezzanine area.	1.00%	
		Completion of external development work	8.00%	
6	Electrical Sub Stations	Surveys, Design, Drafting and submission of drawing for electrical Substaions including structural of building, all utilities and obtaining its approval complete,	2.00%	Lump sum onetime payment on Approval
		Completion of Building works	10.00%	20% on foundation, 30% on civil work of building, 20% on completion of all fitting and 30 % of completion of all works.

		Supply of all equipments	40.00%	Unit of measurement is cost. Payment of each stage shall be made on pro rata basis on completion of a stage in a supply of equipments / installation/ testing/commissioning of cost not less than 20 (ten) percent of the total cost.
		Installation of all equipments	35.00%	
		Successful testing of all equipments	4.00%	
		Successful commissioning of all equipments	9.00%	
7	Landscaping works	Surveys, Design, Drafting and submission of drawing for Landscaping works and obtaining its approval complete,	2.00%	Lump sum onetime payment on Approval
		Plantation and Development works in consultation with cleint.	60.00%	Unit of measurement is linear area. Payment of each stage shall be made on pro rata basis on completion of a stage in a area of not less than 10 (ten) percent of the total area.
		Maintenance for Ist years	25.00%	Unit of measurement is monthly maintenance. Payment of each stage shall be made on pro rata basis only if 90% of the developed area maintained as

		Maintenance for 2nd years	13.00%	per original planned development on completion of a stage in not less than one month.
8	Water & Sewage Treatment Plant	Surveys, Design, Drafting and submission of drawing for Water & Sewage Treatment Plant including of building, all utilities and obtaining its approval complete,	2.00%	on Approval
		Completion of Building works	10.00%	Lump sum 20% of foundation, 30% on civil work of building, 20% on completion of all fitting and 30 % of completion of all works.
		Supply of all equipments	40.00%	Unit of measurement is cost. Payment of each stage shall be made on pro rata basis on completion of a stage in a supply of equipments / installation/ testing/commissioning of cost not less than 20 (ten) percent of the total cost.
		Installation of all equipments	35.00%	
		Successful testing of all equipments	4.00%	
		Successful commissioning of all equipments	9.00%	

SCHEDULE - I

(See Clause 10.2.4)

DRAWINGS

1 Drawings

In compliance of the obligations set forth in Clause 10.2 of this Agreement, the Contractor shall furnish to the Authority's Engineer, free of cost, all Drawings listed in Annex-I of this Schedule-I.

2 Additional Drawings

If the Authority's Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex-I, it may by notice require the Contractor to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect, the Contractor shall promptly prepare and furnish such drawings to the Authority's Engineer, as if such drawings formed part of Annex-I of this Schedule-I.

Annex - I
(Schedule - I)

List of Drawings

Note: The Authority shall describe in this Annex-I, all the Drawings that the Contractor is required to furnish under Clause 10.2.

INDEX				
Sheet No.	**Drawing Title**	**Drawing No.**	**Revision**	**Date**
01.	Final Master Plan	VSPL/IPD/1819_030/IPD/FMPA-04/01	R0	17-02-2020
02.	Boundary Wall	VSPL/IPD/1819_030/IPD/FMP/BW-01	R0	17-02-2020
03.	Toe Wall / Plot Demarcation Layout	VSPL/IPD/1819_030/IPD/FMP/BW-02	R0	17-02-2020
04.	Boundary Wall Detail	VSPL/IPD/1819_030/IPD/FMP/BW-03	R0	17-02-2020
05.	Entrance Gate Plan	VSPL/IPD/1819_030/IPD/FMP/BW-04	R0	17-02-2020
06.	Entrance Gate Front Elevation	VSPL/IPD/1819_030/IPD/FMP/BW-05	R0	17-02-2020
07.	Building Plot Demarcation	VSPL/IPD/1819_030/IPD/FMPA/BP/4A	R0	17-02-2020
08.	Contour Plan	VSPL/IPD/1819_030/IPD/FMP/CP-01	R0	17-02-2020
09.	Proposed Level	VSPL/IPD/1819_030/IPD/FMP/PL-01	R0	17-02-2020
10.	Ground Floor- Admin Block	VSPL/IPD/1819_030/IPD/FMP/AB-01	R0	17-02-2020
11.	Typical 1st,2nd.3rd Floors-Admin Block	VSPL/IPD/1819_030/IPD/FMP/AB-02	R0	17-02-2020
12.	Elevation & Sections-Admin Block	VSPL/IPD/1819_030/IPD/FMP/AB-03	R0	17-02-2020
13.	Custom Services Block-Ground Floor Plan	VSPL/IPD/1819_030/IPD/FMP/CSB-01	R0	17-02-2020
14.	Custom Services Block-Mezzanine Floor Plan	VSPL/IPD/1819_030/IPD/FMP/CSB-02	R0	17-02-2020
15.	Custom Services Block-Roof Plan	VSPL/IPD/1819_030/IPD/FMP/CSB-03	R0	17-02-2020
16.	Custom Services Block-Elevation & Section	VSPL/IPD/1819_030/IPD/FMP/CSB-04	R0	17-02-2020
17.	ESS & D.G Location Phase-1	MMLP/ED/1920-01/JP/EL-109	R0	17-02-2020
18.	Green & Landscape Area	VSPL/IPD/1819_030/IPD/LS-01	R0	17-02-2020

SCHEDULE - J

(See Clause 10.3.2)

PROJECT COMPLETION SCHEDULE

1 Project Completion Schedule

During Construction period, the Contractor shall comply with the requirements set forth in this Schedule-J for each of the Project Milestones and the **Scheduled Completion Date**. Within 15 (fifteen) days of the date of each Project Milestone, the Contractor shall notify the Authority of such compliance along with necessary particulars thereof.

2 Project Milestone-I

2.1 Project Milestone-I shall occur on the date falling on the 137th (One hundred and Thirty Seven) day from the Appointed Date (the "**Project Milestone-I**").

2.2 Prior to the occurrence of Project Milestone-I, the Contractor shall have commenced construction of the Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 10% (ten per cent) of the Contract Price.

3 Project Milestone-II

3.1 Project Milestone-II shall occur on the date falling on the 275th (Two hundred and Seventy Five) day from the Appointed Date (the "**Project Milestone-II**").

3.2 Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with construction of the Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 30% (thirty per cent) of the Contract Price.

4 Project Milestone-III

4.1 Project Milestone-III shall occur on the date falling on the 412th (Four hundred and Twelve) day from the Appointed Date (the "**Project Milestone-III**").

4.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 60% (sixty per cent) of the Contract Price.

5 Scheduled Completion Date

5.1 The Scheduled Completion Date shall occur on the 550th (Five hundred and Fifty) day from the Appointed Date.

5.2 On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

6 Extension of time

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Completion Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

SCHEDULE - K
(See Clause 12.1.2)

Tests on Completion

1 Schedule for Tests

1.1 The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority's Engineer and the Authority of its intent to subject the Project to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority's Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.

1.2 The Contractor shall notify the Authority's Engineer of its readiness to subject the Project Highway to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority's Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority's Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-K.

2 Tests

2.1 Other tests: The Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Project with Specifications and Standards.

2.2 Environmental audit: The Authority's Engineer shall carry out a check to determine conformity of the Project with the environmental requirements set forth in Applicable Laws and Applicable Permits.

2.3 Safety Audit: The Authority's Engineer shall carry out, or cause to be carried out, a safety audit to determine conformity of the Project with the safety requirements and Good Industry Practice.

3 Agency for conducting Tests

All Tests set forth in this Schedule-K shall be conducted by the Authority's Engineer or such other agency or person as it may specify in consultation with the Authority.

4 Completion Certificate

Upon successful completion of Tests, the Authority's Engineer shall issue the Completion Certificate in accordance with the provisions of Article 12.

SCHEDULE - L

(See Clause 12.2 and 12.4)

PROVISIONAL CERTIFICATE

1 I, ……. (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated ……. (the **"Agreement"**), for Development of Multimodal Logistics Park, (Package –II : Building & Infrastructure Work) at Jogighopa at on Engineering, Procurement and Construction (EPC) basis through …… (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been undertaken to determine compliance of the Project Highway with the provisions of the Agreement.

2 Works that are incomplete on account of Time Extension have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement. In addition, certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Project Building & Instructure work or affect their safety. The Contractor has agreed and accepted that as a condition of this Provisional Certificate, it shall complete such minor works within 30 (thirty) days hereof. These minor works have also been specified in the aforesaid Punch List.

3 In view of the foregoing, I am satisfied that the Project for Building & Infrastructure work can be safely and reliably placed in service of the Users thereof, and in terms of the Agreement, the Project Building & Instructure work is hereby provisionally declared fit for entry into operation on this the …… day of …….. 20…...

ACCEPTED, SIGNED, SEALED	SIGNED, SEALED AND
AND DELIVERED	DELIVERED
For and on behalf of	For and on behalf of
CONTRACTOR by:	AUTHORITY's ENGINEER b
(Signature)	(Signature)

COMPLETION CERTIFICATE

1 I, ……. (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated …… (the "**Agreement**"), for Development of Multimodal Logistics Park, (Package –II : Building & Infrastructure Work) at Jogighopa, Site on Engineering, Procurement and Construction (EPC) basis through ……. (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Building & Instructure work with the provisions of the Agreement, and I am satisfied that the Project Building & Instructure work can be safely and reliably placed in service of the Users thereof.

2 It is certified that, in terms of the aforesaid Agreement, all works forming part of Project Highway have been completed, and the Project Highway is hereby declared fit for entry into operation on this the …… day of …… 20…..

SIGNED, SEALED AND DELIVERED

For and on behalf of

the Authority's Engineer by:

(Signature)

(Name)

(Designation)

(Address)

SCHEDULE - M

(See Clauses 14.6, 15.2 and 19.7)

PAYMENT REDUCTION FOR NON-COMPLIANCE

1. Payment reduction for non-compliance with the Maintenance Requirements

1.1 Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-E.

1.2 Any deduction made on account of non-compliance with the Maintenance Requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.

1.3 The Authority's Engineer shall calculate the amount of payment reduction on the basis of weightage in percentage assigned to non-conforming items as given in Paragraph 2.

1.4

2. Percentage reductions in lump sum payments

2.1 The following percentages shall govern the payment reduction:

2.2 The amount to be deducted from monthly lump-sum payment for noncompliance of particular item shall be calculated as under:

R=P/IOO x M x L1/L

Where P = Percentage of particular item/Defect/deficiency for deduction

M = Monthly lump-sum payment in accordance with the Bid

L1 = Non-complying length

L = Total length of the road,

R = Reduction (the amount to be deducted for non compliance for a particular item/Defect/deficiency

The total amount of reduction shall be arrived at by summation of reductions for such items/Defects/deficiency or non compliance.

For any Defect in a part of one kilometer, the non-conforming length shall be taken as one kilometer.

SCHEDULE - N

(See Clause 18.1.1)

SELECTION OF AUTHORITY'S ENGINEER

1 Selection of Authority's Engineer

- The provisions of the Model Request for Proposal for Selection of Technical Consultants, issued by the Ministry of Finance in May 2009, or any substitute thereof shall apply for selection of an experienced firm to discharge the functions and duties of an Authority's Engineer.

1.2 In the event of termination of the Technical Consultants appointed in accordance with the provisions of Paragraph 1.1, the Authority shall appoint another firm of Technical Consultants forthwith and may engage a government-owned entity in accordance with the provisions of Paragraph 3 of this Schedule-N.

2 Terms of Reference

The Terms of Reference for the Authority's Engineer (the "**TOR**") shall substantially conform with Annex 1 to this Schedule N.

3 Appointment of Government entity as Authority's Engineer

Notwithstanding anything to the contrary contained in this Schedule, the Authority may in its discretion appoint a government-owned entity as the Authority's Engineer; provided that such entity shall be a body corporate having as one of its primary functions the provision of consulting, advisory and supervisory services for engineering projects; provided further that a government-owned entity which is owned or controlled by the Authority shall not be eligible for appointment as Authority's Engineer.

Annex – I
(Schedule - N)

TERMS OF REFERENCE FOR AUTHORITY'S ENGINEER

1 Scope

1.1 These Terms of Reference (the "**TOR**") for the Authority's Engineer are being specified pursuant to the EPC Agreement dated ..... (the "**Agreement**), which has been entered into between the [name and address of the Authority] (the "**Authority**") and ..... (the "**Contractor**") for Development of multimodal logistic park, package-II on Engineering, Procurement, Construction (EPC) basis, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

1.2 The TOR shall apply to construction and maintenance of the Project Highway.

2 Definitions and interpretation

2.1 The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.

2.2 References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.

2.3 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, *mutatis mutandis*, to this TOR.

3. General

3.1 The Authority's Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.

3.2 The Authority's Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, but subject to obtaining prior written approval of the Authority before determining:

(a) any Time Extension;

(b) any additional cost to be paid by the Authority to the Contractor;

(c) the Termination Payment; or

(d) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a sum exceeding Rs. 5,000,000 (Rs. fifty lakh).

3.3 The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Authority's Engineer within 10 (ten) days of the beginning of every month.

3.4 The Authority's Engineer shall inform the Contractor of any delegation of its duties and responsibilities to its suitably qualified and experienced personnel; provided, however, that it shall not delegate the authority to refer any matter for the Authority's prior approval in accordance with the provisions of Clause 18.2.

3.5 The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.

3.6 In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

4 Construction Period

4.1 During the Construction Period, the Authority's Engineer shall review the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1.6. The Authority's Engineer shall complete such review and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Bridge or Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.

4.2 The Authority's Engineer shall review any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.

4.3 Authority's Engineer shall review the Quality Assurance Plan submitted by

the Contractor and shall convey its comments to the Contractor within a period of 21 (twenty-one) days stating the modifications, if any, required thereto.

4.4 The Authority's Engineer shall complete the review of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor.

4.5 The Authority's Engineer shall grant written approval to the Contractor, where necessary, for interruption and diversion of the flow of traffic in the existing lane(s) of the Project Building & Instructure work for purposes of maintenance during the Construction Period in accordance with the provisions of Clause 10.4.

4.6 The Authority's Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.

4.7 The Authority's Engineer shall inspect the Construction Works and the Project Building & Instructure work and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.

4.8 The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.

4.9 For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4.9, the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "Quality Control Manuals") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.

4.10 The Authority's Engineer shall test check at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for

quality control by the Contractor.

4.11 timing of tests referred to in Paragraph 4.9, and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.

4.12 In the event that results of any tests conducted under Clause 11.10 establish any Defects or deficiencies in the Works, the Authority's Engineer shall require the Contractor to carry out remedial measures.

4.13 The Authority's Engineer may instruct the Contractor to execute any work which is urgently required for the safety of the Project Highway, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 21.6 shall apply.

4.14 In the event that the Contractor fails to achieve any of the Project Milestones, the Authority's Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority's Engineer shall determine that completion of the Project Highway is not feasible within the time specified in the Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority's Engineer shall review the same and send its comments to the Authority and the Contractor forthwith.

4.15 The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.4.

4.16 Authority's Engineer may recommend to the Authority suspension of the whole or part of the Works if the work threatens the safety of the Users and pedestrians. After the Contractor has carried out remedial measure, the Authority's Engineer shall inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked.

4.17 In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's

Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.

4.18 TheAuthority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Maintenance Period

5.1 The Authority's Engineer shall aid and advise the Contractor in the preparation of its monthly Maintenance Programme and for this purpose carry out a joint monthly inspection with the Contractor.

5.2 The Authority's Engineer shall undertake regular inspections, at least once every month, to evaluate compliance with the Maintenance Requirements and submit a Maintenance Inspection Report to the Authority and the Contractor.

5.3 The Authority's Engineer shall specify the tests, if any, that the Contractor shall carry out, or cause to be carried out, for the purpose of determining that the Project Highway is in conformity with the Maintenance Requirements. It shall monitor and review the results of such tests and the remedial measures, if any, taken by the Contractor in this behalf.

5.4 In respect of any defect or deficiency referred to in Paragraph 3 of Schedule-E, the Authority's Engineer shall, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.

5.5 The Authority's Engineer shall examine the request of the Contractor for closure of any lane(s) of the Project Highway for undertaking maintenance/repair thereof, and shall grant permission with such modifications, as it may deem necessary, within 5 (five) days of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such lane(s), and in case of delay, determine the Damages payable by the Contractor to the Authority under Clause 14.5.

6 Determination of costs and time

6.1 The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.

6.2 The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.

6.3 The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

7. Payments

7.1 The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2.4 (d).

7.2 Authority's Engineer shall -

(a) within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 19.4, determine the amount due to the Contractor and recommend the release of 90 (ninety) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and

(b) within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 19.4, deliver to the Authority and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor, after adjustments in accordance with the provisions of Clause 19.10.

7.3 The Authority's Engineer shall, within 15 (fifteen) days of receipt of the Monthly Maintenance Statement from the Contractor pursuant to Clause 19.6, verify the Contractor's monthly statement and certify the amount to be paid to the Contractor in accordance with the provisions of the Agreement.

7.4 The Authority's Engineer shall certify final payment within 30 (thirty) days of the receipt of the final payment statement of Maintenance in accordance with the provisions of Clause 19.16.

8. Other duties and functions

The Authority's Engineer shall perform all other duties and functions as specified in the Agreement.

9 Miscellaneous

9.1 A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority's Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Authority forthwith.

9.2 The Authority's Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.

9.3 Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Project Highway as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project Highway and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.

9.4 The Authority's Engineer, if called upon by the Authority or the Contractor or both, shall mediate and assist the Parties in arriving at an amicable settlement of any Dispute between the Parties.

9.5 The Authority's Engineer shall inform the Authority and the Contractor of any event of Contractor's Default within one week of its occurrence.

SCHEDULE - O

(See Clauses 19.4.1, 19.6.1, and 19.8.1)

Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

(a) the estimated amount for the Works executed in accordance with Clause 19.3.1 subsequent to the last claim;

(b) amounts reflecting adjustments in price for the aforesaid claim;

(c) the estimated amount of each Change of Scope Order executed subsequent to the last claim;

(d) amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 13.2.3 (a);

(e) total of (a), (b), (c) and (d) above;

(f) Deductions:

  (i) Any amount to be deducted in accordance with the provisions of the Agreement except taxes;

  (ii) Any amount towards deduction of taxes; and

  (iii) Total of (i) and (ii) above.

(g) Net claim: (e) – (f) (iii);

(h) The amounts received by the Contractor upto the last claim:

  (i) For the Works executed (excluding Change of Scope orders);

  (ii) For Change of Scope Orders, and

  (iii) Taxes deduct

2. Monthly Maintenance Payment Statement

The monthly Statement for Maintenance Payment shall state:

(a) the monthly payment admissible in accordance with the provisions of the Agreement;

(b) the deductions for maintenance work not done;

(c) net payment for maintenance due, (a) minus (b);

(d) amounts reflecting adjustments in price under Clause 19.12; and

(e) amount towards deduction of taxes

3. Contractor's claim for Damages

Note: The Contractor shall submit its claims in a form acceptable to the Authority.

SCHEDULE - P
(See Clause 20.1)

INSURANCE

1. Insurance during Construction Period

1.1 The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the Completion Certificate, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:

(a) insurance of Works, Plant and Materials and an additional sum of [15 (fifteen)] per cent of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and

(b) insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

1.2 The insurance under paragraph 1.1 (a) and (b) above shall cover the Authority and the Contractor against all loss or damage from any cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

2. Insurance for Contractor's Defects Liability

The Contractor shall effect and maintain insurance cover for the Works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage for which the Contractor is liable and which arises from a cause occurring prior to the issue of the Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under the Applicable Laws and in accordance with Good Industry Practice.

3. Insurance against injury to persons and damage to property

3.1 The Contractor shall insure against its liability for any loss, damage, death or bodily injury, or damage to any property (except things insured under Paragraphs 1 and 2 of this Schedule or to any person (except persons insured under Clause 20.9), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount stated below with no limit on the number of occurrences.

The insurance cover shall be not less than: Rs. [*****]

3.2 The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor's performance of this Agreement excluding:

(a) the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and

(b) damage which is an unavoidable result of the Contractor's obligations to execute the Works.

4. Insurance to be in joint names

The insurance under paragraphs 1 to 3 above shall be in the joint names of the Contractor and the Authority.

END OF THE DOCUMENT