

REF : 88-08-6003

PRE TENDER TIE UP
TECHNICAL SPECIFICATION
FOR
CIVIL WORKS
FOR
RAW MATERIAL HANDLING SYSTEM
OF
BOKARO STEEL PLANT



भारत हेवी इलेक्ट्रिकल्स लिमिटेड

(भारत सरकार का उपक्रम)

Bharat Heavy Electricals Limited

(A Government of India Undertaking)

इण्डस्ट्रियल सिस्टम्स ग्रुप

INDUSTRIAL SYSTEMS GROUP



CONTENT

Clause No.	Description	Page No.
1	GENERAL	2
1.1	SITE CONDITIONS	2
1.2	BRIEF SYSTEM DESCRIPTION.....	3
2	DESIGN CONSIDERATIONS	3
2.1	SIZE OF RAW MATERIAL	3
2.2	NO OF DAYS OF WORKING PER YEAR: 330 DAYS	4
3	SAFETY	6
3.1	SAFETY REGULATIONS	6
3.2	SAFETY WHILE WORKING WITH EXPLOSIVES.....	7
3.3	SAFETY APPLIANCES	7
3.4	SAFETY DURING CONSTRUCTION/EXECUTION.....	7
3.5	SAFETY IN DESIGNING OF EQUIPMENT	8
4	SCOPE OF WORK	8
4.1	SCOPE OF CIVIL WORK	8
4.2	DESIGN BASIS	10
4.3	MATERIAL & WORKMANSHIP	12
4.4	OBLIGATION OF PURCHASER	13
5	DEVIATIONS (TO BE FILLED BY THE TENDERER)	15
6	EXCLUSIONS (TO BE FILLED BY THE TENDERER)	16
7	LIST OF DRAWINGS ENCLOSED	17
8	PROJECT SCHEDULE	18



1 General

1.1 Site Conditions

1.1.1 Location

Bokaro Steel Plant (BSL), SAIL is located at Bokaro Steel City in the state of Jharkhand in the eastern region of India. The site lies between 23.290 North latitude and 86.090 East longitude.

The location of Bokaro Steel City is as follows:

From New Delhi, the national capital	- 1209 kms
From Kolkata	- 220 kms
From Chennai	- 1900 kms
From Mumbai	- 1782 kms

The distance from State Capital Ranchi to Bokaro Steel City is 140 kms. The Steel Plant is well connected by rail and road network. The nearest railway station is Bokaro Steel City Station of the SE Railway.

1.1.2 Meteorological Data

The meteorological details are given below:

1.1.3 Ambient Temperature

Absolute maximum	: 46.1 ⁰ C
Absolute minimum	: 1.8 ⁰ C
Highest of mean monthly	: 43.8 ⁰ C
Ambient Air	
Ambient air quality	: Industrial
Relative Humidity	
Maximum	: 100%

Climate : Tropical Humid

Rainfall

Heaviest rainfall in 24 hours	: 272 mm
Annual Average	: 1197.3 mm

Wind

Predominant wind direction	: NW to SE
Mean wind speed	: 7.8 kmph
Maximum wind speed	: 108 kmph

Altitude

Average altitude of the land is 210 m above MSL

Temperature inside shop premises is generally taken as 5⁰ C above ambient, unless otherwise specified.

1.1.4 General Rules and Regulations

All plant units with respect to their location, layout, general arrangement and design of equipment, structural design, etc. shall be safe to the personnel and conform to the relevant statutory requirements issued by Jharkhand Government and the Government of India but not limited to the following.

- Jharkhand State Factory Rules/Acts.
- Indian Electricity Rules/Acts



- Electricity Regulatory Commission Act
- Indian Petroleum Regulations/Acts
- Indian Boiler Regulations/Acts
- Indian Explosives Acts
- Gas Cylinders Rules/Acts
- Carbide of Calcium Rules/Acts
- Static and mobile Pressure Vessels Codes (unifired) Rules/Acts
- Fire Protection Manual issued by Tariff Advisory Committee (India)
- Pollution Control Regulations/Acts

Pollution control measures shall be provided considering the latest norms and international standards. These should satisfy the stipulations of Central Pollution Control Board and Department of Environment and Forest, Government of India.

In the event the requirements of this specification exceeds the requirement stipulated in the corresponding standards, regulation, safety code, the specification shall govern.
In the event of conflict between the standard, regulations and codes, the most stringent one shall govern and the decision of the Purchaser shall be final.

1.2 Brief System Description

The Expansion of Raw Material Handling System comprises of the following sub-systems:

- Preparation of six nos. new beds for storing iron ore fines and flux materials
- Material receipt at Wagon Tippler WT # 5 and onward transport to the six(6) nos. new Ore fines and flux material storage bed for Stacking.
- Interconnectivity with WT #1,2,3 &4 to the new beds.
- Reclaiming from new beds & transportation to existing conveyor system for onward transmission to Sinter Plant ,Blast Furnace.
- Reclaiming flux material from new beds & transportation to new Lime/Dolo Plant of SMS-III.
- Receiving Lump Iron Ore from conv. KD1-3 and store in Intermediate Storage Bunker Building and feed back to conv KD1-3 near BF Stock House.
- Provision of DRI shed and iron ore storage near Lime/Dolo plant for feeding to SMS-III.

The raw material to be handled by the proposed system are mainly, Iron Ore Lump, Iron Ore Fines, Lime Stone (BF grade), Lime Stone (SMS grade), Dolomite (BF grade), Dolomite (SMS grade), Quartzite, DRI and Ferro-alloys. These raw materials are mainly required for Blast Furnace, Sinter Plant, Lime-Dolomite Plant and Steel Melting Shop etc. All the raw materials will be received at the plant boundary by rail. The type of Wagon will be BOX,BOXN,BOXN MARK-II, BOXNHA, BOY,BOBX,BOBS,BKC,BOBRN, BOST, which will transport the raw materials depending upon the location of loading and type of raw materials.

2 Design Considerations

The Raw Material Handling System (RMHS) systems have been planned based on the following assumption:

2.1 Size of Raw Material

- | | |
|-----------------------------|-----------------------|
| 1. Lump Iron Ore | : (+) 8 to (-) 30 mm |
| 3. Iron ore fines | : (-) 8 mm |
| 4. Lime Stone (BF/SP grade) | : (+) 15 to (-) 50 mm |
| 5. Dolomite (BF/SP grade) | : (+) 25 to (-) 50 mm |



- 6. Quartzite : (+) 25 to (-) 50 mm
- 7. Lime Stone (SMS grade) : (+) 25 to (-) 50 mm
- 8. Dolomite (SMS grade) : (+) 10 to (-) 25 mm
- 9. Pellets : (+)9 to (-) 16mm
- 10.DRI (By Truck to SMS-III) : (+)4 to (-) 20mm

2.2 No of Days of Working per year: 330 days

To handle raw materials required for 7.4 MT expansion of BSL, Bokaro from its present production capacity, additional wagon tippler for receipt of raw material and 6 nos additional beds in the preparation plant have been envisaged. This plant shall deal with receipt, storage, handling of raw materials required to process / consumer plants like Blast furnace, Lime and Dolomite plant, Steel Melting Shop, etc.

The Raw materials requirement for I for 7.4 Mt expansion is shown in Table-05.01 with daily consumption, number of stock piles and storage capacities etc. including handling losses as envisaged.

Sl.	Material	Bulk Density, t/m ³	Annual requirement with % losses, t	Daily consumption t	Selected Stock Pile	Storage Capacity	
						m ³	Days
	I/O (Lump) (8-25mm) BF Plant	2.2	4,84,330	1384	1	18000	28
	Coke (BF Plant)	0.5	3,169,320	9055	-	-	-
	I/O (Fines) Sinter Plant	2.4	7,649,070	23179	10	230000	23
	Sinter BF Plant	1.7	9,791,430	27976	-	-	-
	Quartz BF Plant	1.5	1,24,520	356	1	23000	97
	Lime Stone for Sinter Plant	1.5	1,304,270	3952	2	46000	17
	Dolomite for Sinter Plant	1.6	6,080,80	1843	1	23000	19
	Lime Stone for Lime Plant (SMS)	1.5	4,61,120	1317	1	23000	26
	Dolomite for Lime Plant (SMS)	1.6	2,03,610	582	1	23000	63
	L/D Slag, Mn Ore etc.	-	As required	-	1	-	-
	Pellet	2.2	4,325,530	12359	6	123000	21
	Coke breeze	0.8	6,25,680	1896	-	-	-
TOTAL			2,93,49,760	85,668	24		

The estimation of stockpile/storage capacities have been made based on the following assumption.

- A. Iron Ore Lump, Iron Ore Fines, Fluxes, Pellets :**
 - Stock pile length available = 230m
 - Stock pile width = 25m
 - Height of stock pile = 8.5m
 - Each stock pile volume = 23,000m³
- B. No. of Days of working per year :**



For Blast Furnace = 350 days

For Sinter Plant = 330 days

Material carrying capacity of each wagon shall be 70t (considering high sided wagon) with gross weight of wagon 100t. All material will be received in Wagon Tippers. Wagon tippler with pusher car has been considered for unloading the materials received in BOXN/BOST/ BOXNHA/BOY wagons. DRI, Iron ore for SMS-III will be transported by road.

The facilities required for achieving the targeted productions additional handling facilities has been envisaged. The scheme has been described hereunder.

2.2.1 UNLOADING AND STACKING OF IRON ORE AND FLUX

- One number Wagon tippler WT no.5 along with a Pusher Car in addition to 4 numbers existing Wagon Tipplers has been envisaged for unloading Iron ore (lump and fines), Limestone & Dolomite (both SMS grade and Sinter Plant grade), Mn-ore, Quartzite etc.
- The Wagon Tipplers shall be of Rotaside Type capable of unloading BOXN and proposed BOXNHA and BOY wagons upto a gross weight of 120t and an axle load of 23 t. The rated unloading capacity shall be 20 Tips/hour.
- The placement of rakes shall be done by 7000t Wagon Pusher Car capable of handling a full rake BOXN, BOXNHA and BOY wagons.
- Two belt feeders below each Wagon Tippler shall convey the raw material on conveyor P1C1 upto Jn House JNA1. From Jn House JNA1, which has been connected to Jn House JNA2, JNA3 and JNA4 by a conveyor P2C1 & P2C2 to stack material in the new six numbers beds through conveyor P3C1, P4C1, P5C1 and twin boom stacker ST1, ST2, ST3. It shall be possible (in the case of exigency) to stack material in new beds after unloading material in WT no.1, 2, 3 & 4 and transfer the same in Junction House JNB1 & JNB2, to conveyor P2C1, P2C2.
- In the Raw material handling yard, 6 nos. of additional stock pile of length 230m and 25m width each have been considered to accommodate additional requirement of Iron Ore Fines, flux (LDP), Pellet and Iron ore Lump along with transfer car, stacker and barrel reclaimers adjacent to existing LDP (Flux) storage area. The new stockpile arrangements have been shown in the Layout drawing. For 7.0Mt expansion in the existing yard no. of beds for Pellets to be increased to 6 nos and Iron Ore lump and Flux beds has been reduced. Brief descriptions of the various sub-systems are given below and are also reflected in the drawings enclosed. However the Tenderer shall consider the Tender drawings only as indicative and for tender purpose only and any changes for completeness and improvement shall be finalized during submission of basic engineering document for approval by the successful tenderer.

2.2.2 RECLAIMING AND TRANSPORTATION OF IRON ORE AND FLUX

- Iron ores after reclaiming from this yard with the help of 3 nos. Barrel Reclaimer and through yard conveyors P6C1, P7C1, P8C1, P9C1, P10C1, P11C1/C2C3, JNA8A, PC12C2/C3 to 4th series conveyor in JNA10 and to the existing conveyors KP11-1/KP11-2/KP11-3 through 2 nos. new shuttle conveyor RSC10-1 & RSC10-2 in JNA11 has been envisaged to accommodate additional capacity of Raw Material Handling to the existing consuming units.
- Pellet will be stored in the stock pile as shown in the layout drawing and will be reclaimed through the existing conveyors to the Blast Furnace high lines.

2.2.3 Raw Material feeding for LIME/ DOLO Calcination plant & SMS -III

- Out of new 6 beds 5 beds are for iron ore fines and one bed has been envisaged for feed materials of LDP plant for SMS-III. Flux material also reclaimed with the help of Barrel Reclaimer and transported through yard conveyors P5C2, JNA8, conveyor PC12C1, JNA8A, conveyor P12C1 and to conveyor L1C1 in JNA9. From JNA9 flux material reached to raw material bunkers of Lime & Dolo Plant of SMS-III through



conveyors L1C1,L2C1,L3C1,L3AC1,L4C1,L5C1 and LCPC1. Calcined lime/dolo is transported to the feed junction house beside converter building (SMS-III) by conveyors LC6 and SMSC1. The conveyor SMSC1 shall also carry limestone, DRI, iron ore fines. Iron ore fines and DRI is fed to conveyor SMSC1 in the Junc House L6 through conveyor L6C2 and two nos. fixed hopper and vibro feeder. Iron Ore fines and DRI will be stored on both side of Fixed Hopper. DRI shall be stored under covered shed .

- Any other material e.g. limestone/ bauxite can also be transported under emergency conditions.
- 6 nos. shuttle conveyors JNA5RSC1, JNA6RSC1/C2, JNA7RSC1/C2, JNA8RSC1 has been envisaged in Junction House JNA5, JNA6, JNA7, JNA8.
- 1 no. transfer car has been envisaged for these beds for transfer of barrel reclaimer from one bed to another. One no. bucket wheel reclaimer has been envisaged over existing conv KP13-4 for transportation of flux to the existing system.

2.2.4 Intermediate storage of lump ore

- One no intermediate storage building for storing of lump ore has been envisaged near Lab building of BF because of inadequate space for lump ore storage in the Stock House. Lump ore will be received from conv.KD1-3 with the help of fixed tripper to conv. SBC1 to Storage bldg. and sent back lump ore to the conv. K1-3 through vibro feeder and conv. SBC2 onward transport to stock house as per requirement. Total Capacity of these 4 nos. bunkers shall be 15000t. Level indicator also envisaged for these bunkers. Suitable number of electrically operated Under-Slung Cranes, Hoists etc. shall be provided in all floors of Junction Houses and building for maintenance of equipment Belt- Weigh-Scales, Air-Blasters/ Bin Vibrators shall be provided to make the system complete and the operation/ maintenance smooth.

2.2.5 One no area repair shop and electrical store has been considered beside Conv gallery KP16-2 as mentioned in chapter 06.05

3 Safety

3.1 Safety Regulations

- The Contractor shall comply with the, relevant Safety Rules and Regulations but not limited to the following:
 - Jharkhand State Factory Rules/Acts.
 - Indian Electricity Rules/Acts
 - Electricity Regulatory Commission Acts
 - Indian Petroleum Regulations/Acts
 - Indian Boiler Regulations/Acts.
 - Indian Explosive Acts
 - Gas Cylinder Rules/Acts
 - Carbide of calcium Rules/Acts.
 - Static and Mobile Pressure Vessels codes(Unfired) Rules/Acts
 - Fire protection manual issued by Tariff advisory committee (India)
 - Pollution Control Regulations/Acts
- Strict attention shall be paid to all statutory regulations and safety rules for prevention of accidents.
- The safety posters/regulations for prevention of accidents shall be displayed by the Contractor at appropriate places. Notices and warning signs shall be displayed for all sources of dangers.
- The Contractor is not permitted to construct any temporary road crossing on the rail tracks for the sake of their convenience at work site.



- When the work is carried out at night or in the obscure day light, adequate arrangements for flood lighting in the working area shall be made by the Contractor at his own cost and got approved by the Purchaser.
- All handling/transport and rigging equipment including lifting tools and tackles shall be checked at regular intervals and kept in good and safe working condition. A register is to be maintained regarding the results of periodical tests/checks and other particulars in respect of each and every such equipment.
- The Contractor must take sufficient care in moving his construction plant and equipment from one place to another, so that those do not cause any damage to the property of the Purchaser or obstruct construction activities of other Contractors.
- 05.01.08 The Contractor shall depute a full time safety engineer who will exclusively look after all the jobs pertaining to safety at site and keep close liaison with Purchaser/Consultant. He will be responsible for maintaining safe working conditions at site, promoting safety consciousness among the workmen and reporting to concerned authorities in case of accident/dangerous occurrences.
- Before execution of work in hazardous area like
 - Gas contamination
 - Working at height.
 - Storage of inflammable materials
 - Danger of electric shocks
 - Explosion risks
 - Excavations more than 2 m deep, etc.

A protocol should be prepared in association with the concerned agencies of the Purchaser/Consultant.

3.2 Safety while Working with Explosives.

- Explosives shall not be used on the work site by the Contractor without the written permission of the Purchaser and that too only in the manner and to the extent to which it has been prescribed.
- Explosives shall be stored in special premises approved by the Purchaser and at the cost of the Contractor who shall be liable for all damages, loss or injury to any person or property and shall be responsible for complying with all statutory obligations in these respects.

3.3 Safety Appliances

- The Contractor shall provide the safety appliances conforming to the relevant Indian standards to all their workmen and supervisors engaged by them as well as by the sub contractors.
- The Contractor shall ensure that all the workmen and supervisors, are using the safety appliances regularly during work at site.
- Any form of compensation in lieu of safety appliances shall not be permitted. Any violation in safety provisions or failure to maintain safe working conditions will lead to serious penalty on the Contractor and finally may lead to termination of the Contract.
- The workmen of the Contractor deployed for construction and erection in hazardous areas shall be provided with personnel protective safety appliances of special nature suitable for hazardous working conditions.

3.4 Safety during Construction/Execution

- The Contractor shall be responsible for the safety of his workmen and employees. The Contractor shall ensure that safety practices are followed so as to prevent personal injury to his workmen and also to other persons working/passing by in that area.
- The Contractor shall ensure that in case of any accidents, the same are reported without delay to the Purchaser/Statutory Authorities as per Rules. In case of any injury/accident



- the Contractor shall bear all the expenditure for medical treatment and shall pay the compensation in case of permanent disability or death.
- The Contractor shall ensure that all personnel employed do not stray into other areas. Any injury caused due to this shall be the sole responsibility of the Contractor.
 - The Contractor shall ensure that skilled labours required for specific works have necessary trade certificates and adequate experience of the job. This is likely to be checked by the Purchaser. The concerned operator, mechanics, electricians, fitters, riggers, etc. must be fully conversant with the hazards associated in operation/maintenance of their relevant equipment.
 - Safer Working Platforms
 - Contractor shall use strong and secured planks and boards of the right sizes.
 - These planks shall be painted at the edges brightly to warn the workers for any misuse (usually zebra paint)
 - Barricades should be put-up to prevent them from falling.
 - Contractors shall make sure that scaffolds are erected by trained scaffolders.
 - Supervisors must inspect scaffolds once every week.
 - Falling Objects and Debris
 - No loose materials which can fall down should be kept on the working platforms.
 - Overhead shelters should be provided to minimize damage from falling objects.
 - Strong nets to be provided to catch these objects or debris.
 - Nets must envelop all sides of the building.
 - Personal Safety Equipment
 - Workers must wear approved safety helmets and shoes.
 - For those working in high places safety belts shall be provided.
 - The safety belts must be attached to strong anchorage points.
 - Operating Construction Machine
 - Contractors shall make sure that those operating the construction machinery are well trained for their jobs.
 - The keys of such machinery shall be kept with the authorized persons.
 - The keys shall be removed after use of the machine.
 - Safer Electrical Installations
 - Contractor shall use approved types of electrical sockets and plugs.
 - Proper insulators for all electrical wirings shall be provided.
 - Wiring should not be allowed to lie on the floor or on the ground.

3.5 Safety in Designing of Equipment

- All machinery and equipment must be equipped with safety devices. The safety provisions shall conform to the recognised standards, safety codes and statutes.
- All safety measures as required to be adopted as per the statutory regulations and the safety rules of the plant shall be strictly followed by the Contractor during the execution of the Contract.

4 Scope of Work

4.1 Scope of Civil Work

4.1.1 Scope of Work for Raw Material Handling System

The Tenderer's scope shall include complete engineering and construction on a turnkey basis inclusive of detail design, basic engineering, detailed engineering, supply of all materials, construction and testing in respect of all facilities required for completion and handing over of the work as per technical specification. Board scope of civil work will include.



BHEL ISG REF:IS.1.07.999022
ENQUIRY SPECS FOR CIVIL WORKS FOR SAIL-BSL RAW MATERIAL HANDLING SYSTEM (Package 066)

- a) Hard Stand for Raw material storage yard (6 nos.).
- b) Trench / pit for transfer car
- c) Wagon Tippler Building.
- d) Foundation and flooring for Junction House Building.
- e) Pent House Buildings.
- f) Foundation for Trestles of Conveyor Galleries.
- g) Iron ore storage bunker building
- h) Area Repair shop (9x18 m)
- i) Substores (15x40m)
- j) Fire Water Pump House (20x7 m)
- k) HT/LT Substation (35x20 m), 2 nos 2MVA Transformers in GroundFloor, Cable Trench
- l) 1 no LT Substation (15x15m), 2 nos 2MVA Transformers in Ground Floor, Cable Trench
- m) 1 No LT Substation (15x15m), control Room in first floor with false flooring and false roofing, 2 nos, 2 MVA transformers in Ground Floor, Cable Trench.
- n) Construction of other miscellaneous units like gravity take-up, pits, drains, trenches, paved areas, flooring, relocation and diversions of services, if necessary.



4.1.2 Scope of Work for 4th Series Conveyors

- 4.1.2.1 The scope of work shall be as follows and shall be studied in conjunction with drawings attached with this document. The scope covers the entire job for the civil works for the installation of 4th series of Conveyors including design, Engineering, construction / dismantling and any other activity as necessary for the execution of project on turnkey basis
- 4.1.2.2 The existing conveyor KP11 – 1 shall also be extended up to JH-3. For this, the foundations for short posts shall also be provided.
- 4.1.2.3 For providing the shuttle conveyor additional supports shall be provided by the side of axis 28 of JH-12. The foundations shall be of RCC Construction and the columns shall be of Structural Steel.
- 4.1.2.4 The walkways by the side of new conveyors shall be of chequered plate.
- 4.1.2.5 A substation building shall be constructed by the side of the existing JH-11 to house the equipment for the substation along with transformer foundations. The building shall have requisite cable trenches which shall be covered with chequered plates. The building may have basement / cable cellar as required. Oil pits also is to be provided in RCC. The building shall have drains all round with adequate plinth protection. The peripheral drains has to be connected to the nearest storm water drain. The transformer part of the building shall have ironite floor and the panel room shall have IPS flooring, office rooms is any shall have terrazzo tile floor. The substation shall be provided with toilet. The transformer building shall have rolling shutters and the panel rooms shall have steel doors. Internal surfaces shall be whitewashed and all external surfaces shall have cement paint.
- 4.1.2.6 For supporting the new junction house JH-12A , foundation shall be constructed suitably to clear the existing conveyor (KD-1 & KD-5) supporting columns.
- 4.1.2.7 Civil work of any other facilities as per the Technological requirement not mentioned above but necessary for the successful completion of the work shall form part of the scope of work.

4.2 Design Basis

4.2.1 General

- a) This specification covers the design criteria for Civil Engineering Works. The term 'Design Criteria' includes loading standards, permissible stresses, functional requirements and quality standards to be adopted as a basis for preparation of design and drawings by the Contractor.
- b) The design prepared by the Contractor shall not only provide for the requirements indicated in this specification but also consider the overall process requirements, service conditions. The design shall be compatible with the operating conditions in the plant and the atmospheric conditions prevalent at Bokaro Steel City.
- c) Standards and unification shall be carried out to the maximum extent possible and in the interest of standardisation, BSL reserves the right of selecting a particular make of materials and components. The Contractor shall supply materials / components of that particular make, if so required.

4.2.2 Standards

- a) The design criteria for civil engineering work shall be in accordance with this specification. Detailed instructions on such aspects as are not indicated herein shall be as per the latest standards, codes and recommendations of the Bureau of Indian Standards. In the absence of



suitable Indian Standard specification and Codes of Practices other recognized international standards and codes may be followed with the prior approval of Purchaser.

- b) In case anything mentioned in this specification is at variance with Indian Standard (IS) specification or other codes of specification mentioned herein, the provisions of this specification shall prevail.

4.2.3 Soil Conditions

The tenderer shall visit the site and ascertain for himself the existing ground conditions, requirement of site leveling, etc. The tenderer shall conduct soil investigation and proceed with designs on the findings from the exploration. Requirement of piles or open foundations shall also be established from the soil exploration.

4.2.4 Plain Concrete and Reinforced Concrete for Structures and Foundations

- a) Concrete shall be dense, homogenous, smooth mass including required finishes, possessing required strength and resistance to weathering and abrasion for the structures and foundations.
- b) Apart from the operating loads indicated by the equipment manufacturers, the design of buildings and structures shall be based on dead and imposed loads calculated according to IS:875 Part 1 to Part 3-1987 and load combination shall be as per IS:875 Part 5.
- c) Supporting structures and foundations for equipment which may cause vibration shall be designed for the dynamic effect of equipment together with the direct loads. The dynamic loads and other relevant data required for analyzing the dynamic effect shall be taken as per manufacturer's recommendations. Adequate care shall be taken to ensure that the natural frequency of the supporting structure shall not be in resonance with the forced frequency.
- d) The design of buildings and structures shall take into account the loadings due to future extension of units and installation of additional equipment, where necessary in future in the units.
- e) Foundations
 - i) The foundation or structures and equipment shall be proportioned to resist the worst conditions of loadings.
 - ii) Equipment requiring special foundations as a result of dynamic, unbalanced forces, shall be designed as per relevant codes of practice.

4.2.5 Design Calculations, Drawings And Documents

- a) Design Calculations,

The design calculations along with design drawings shall be submitted by Contractor for approval, prior to submission of construction drawings which shall include but not be limited to the following

 - i) Super structure and foundation design

The design calculation for all the foundations and superstructures for various units and all equipment foundations etc. The design calculations shall include static design calculations for all structures and foundations, dynamic analysis for all important structures and foundation subjected to impact vibrations etc induced by equipment and other external forces.
 - ii) Drawings

The Contractor shall prepare general layout drawings giving salient levels and dimensions of the whole area showing all over ground and underground services and facilities, buildings, roadways, railways etc. provided for coordination with the other areas of the steel plant. Detailed working drawings shall be prepared on the basis of the general layout drawings considering overall foundation layout for the equipment, building, services, etc. space requirement and clearances as necessary. The contractor shall ensure that no further drawing shall be required to be prepared by any other agency for successful implementation of the project. The Contractor shall submit a comprehensive and complete unit wise classified list of drawings in reproducible form.
- b) The Contractor shall submit for approval of the Purchaser Consultant, general arrangement and detailed working drawings for all concrete, reinforced concrete and other civil work as follows.



- Excavation drawings
 - Foundation plans and sections.
 - Loading drawings indicating superstructure loading, equipment loading, floor loadings, etc.
 - Comprehensive anchor hole plan along with complete details of anchor bolts and anchor pockets for foundation for building columns and equipment etc. including schedule for bolts and anchor plates.
 - Reinforcement details with bar bending schedules for all reinforced concrete works.
 - Drawings or all types of bolts, inserts, embedments, covers, miscellaneous steel works etc. All drawings for masonry work, flooring, floor finishes, trenches, false flooring, false ceiling, partitions, etc.
 - Drawings for paved areas, drains etc. as required.
- c) Design Features
- All civil designs shall be based on IS: 456-2000 for moderate exposure conditions and latest revisions of other relevant IS codes.

4.2.6 Construction Features

- All materials and workmanship shall be as per relevant IS codes and MECON'S General Specification for Civil works CIVIL-GS-07.
- All RCC work is envisaged of M25 grade concrete.
- Brickwork shall be with grade M5 bricks in cement mortar 1:6 • PCC apron and RCC drain shall be provided all around the building
- Grouting below column bases shall be of M30 concrete
- The hard stand in the yard shall be so constructed as to withstand the load of overburden. SMS slag (-150mm downgraded) may be used in the base course. Existing yard is at an elevated level. The adjoining edge shall be protected with toe-wall / protection wall / retaining wall of suitable strength.
- Wagon Tippler pit shall be of RCC construction and made leak proof and water tight. Integral water proofing with non shrink polymer modified cementitious grout shall be done. Suitable inserts shall be provided in the walls and raft for fixing of connections.
- The motor room shall be a framed structure. Inside and outside surfaces to brick masonry wall shall be plastered smooth and finished with paints / colour wash. Steel door and glazed steel windows shall be provided.
- Track for stacker and reclaimers shall be laid over RCC strip foundation with cross beam connections between the tracks at every 3m interval.

4.3 Material & Workmanship

4.3.1 Local Conditions

The Contractor, before submitting his tender, shall visit the site and ascertain the local conditions, labour rules, availability of construction material, traffic restrictions, all obstructions and shall allow for any extras likely to be incurred due to all such conditions in his quoted prices. After the award of work no additional claims will be entertained on these accounts under any circumstances, whatsoever, from the Successful Contractor.

4.3.2 Setting out and leveling

The Successful Contractor shall set out and level the work and will be responsible for the accuracy of the same. He is to provide all instruments and proper qualified staff with labour for getting his work checked by Engineer, if so desired by the Engineer. Such checking, if any, shall not, however, relieve the Successful Contractor in any way, of his responsibility for correct setting out.



4.3.3 Rubbish

The Contractor shall keep the site clear on a continuous basis of all rubbish etc. which may arise out of the work executed him and dispose them suitably in allotted areas within a lead of 8 km.

4.3.4 Bench Marks, Reference Pillars etc

The Contractor shall protect all benchmark, and reference pillars / lines including ground water gauges from damage or movement during working. In case of any damage, the Contractor shall have to restore the same to its original condition at his own cost.

4.3.5 Standards

Unless otherwise mentioned in the specifications, all applicable codes / standards as published by the Bureau of Indian Standards on the date of award of contract shall govern the work in respect of design, workmanship, quality and properties of materials, method of testing and other pertinent features. In case of variance between this specifications and IS Codes / Standards, the provisions of this specification shall prevail upto the extent of such variance.

4.3.6 Nearby Existing Structure

Quite a few unit are coming close to existing structures. Adequate protection shall be provided to the existing structures to ensure their safety during construction. If any structure / utility is damaged during construction, it shall be made good by the contractor at their own cost.

If any utility or service line, over-ground or under-ground is found infringing with the new construction, it shall be suitable diverted / strengthened / modified with the prior approval of the Purchaser. Cost of such diversion / strengthening / modification shall be bourn by the successful Tenderer.

4.3.7 Drawings

Work shall be carried out as per drawings prepared by the Successful Contractor and approved by the Purchaser. The drawings shall include General Arrangement, shuttering, excavation, anchorage plans, bolt plans, insert plan and details, conduit plans, etc required for execution of the job. Also the design calculations shall be submitted in requisite number of copies (as mentioned elsewhere) for the approval by the Purchaser / Consultant. Bar bending schedule shall be submitted for information and record.

4.4 Obligation of Purchaser

Purchaser shall allot leveled land with an undulation of about +500mm from the predetermined level as per the layout drawing for installation of the Raw Material Handling System.

Purchaser shall provide construction power, drinking water during construction and space for storage and site office as per GTS. The Tenderer shall indicate the details required by them in the prescribed format.



ANNEXURE-I

Estimated Quantities for Civil Works (To be filled up by the tenderer and submitted along with the offer.)

- 1) Excavation
- 2) Piling
- 3) RCC
- 4) PCC
- 5) Shuttering
- 6) Reinforcement Steel
- 7) PCC Flooring
- 8) Finishing
- 9) Inserts/ Bolts
- 10) Any miscellaneous items deemed necessary for successful completion of civil works of the proposed plant.



BHEL ISG REF:IS.1.07.999022
ENQUIRY SPECS FOR CIVIL WORKS FOR SAIL-BSL RAW MATERIAL HANDLING SYSTEM (Package 066)

5 Deviations (To be filled by the tenderer)

Tenderer shall clearly indicate the deviation from the tender specification

Sl. No.	Deviations	Clause reference & Details	Remarks



BHEL ISG REF:IS.1.07.999022
ENQUIRY SPECS FOR CIVIL WORKS FOR SAIL-BSL RAW MATERIAL HANDLING SYSTEM (Package 066)

6 Exclusions (To be filled by the tenderer)

Tenderer shall clearly indicate the exclusions from the tender specification

Sl. No.	Deviations	Clause reference & Details	Remarks



7 List of Drawings enclosed

Sl.	TS Drawing Number	REV	Description of Drawing
A	RMHS		
1	MEC/S/E24F/11/17/K/01/55/02101	0	RMHS Layout
2	MEC/S/E24F/11/17/K/01/55/02102	0	RMHS Flow Diagram
3			BSL General Layout
4	MEC/11/E1/E24F/RMHS/TS/02	0	RMHS Cable Route Layout
5	MEC/S/E24F/11/17/K/01/55/02103, sh 1 of 7	0	RMHS Conv Profile P1C1
6	MEC/S/E24F/11/17/K/01/55/02103, sh 2 of 7	0	RMHS Conv Profile P2C1 / P2C2
7	MEC/S/E24F/11/17/K/01/55/02103, sh 3 of 7	0	RMHS Conv Profile P11C1/C2/C3
8	MEC/S/E24F/11/17/K/01/55/02103, sh 4 of 7	0	RMHS Conv Profile P12C1/C2/C3
9	MEC/S/E24F/11/17/K/01/55/02103, sh 5 of 7	0	RMHS Conv Profile L1C1 & L2C1
10	MEC/S/E24F/11/17/K/01/55/02103, sh 6 of 7	0	RMHS Conv Profile L3C1 & L3AC1
11	MEC/S/E24F/11/17/K/01/55/02103, sh 7 of 7	0	RMHS Conv Profile L4C1 & L5C1
B	4 th SERIES CONVEYORS		
1	CET RN 2433 RM1 00 001	0	RMHS Layout
2	CET RN 2433 ME1 01 010	0	Flow Sheet
3	CET RN 2433 ME1 01 011	0	Layout of Conv KP11-0, KP12-0, KP11A-0
4	CET RN 2433 ME1 01 012	0	Conveyor KP11-0
5	CET RN 2433 ME1 01 013	0	GA of Conv KP12-0, KP11A-0
6	CET RN 2433 ME1 01 014	0	Layout of proposed Conv W-4 & Existing hv KD1-4 & KD1-5
7	CET RN 2433 ME1 01 015, sheet 1 & 2	0	Modification of Junction House 12

