

	PROJECTS & DEVELOPMENT INDIA LTD	EM265-PNCV-TD-101	0	
		DOCUMENT. NO.	REV	
		PAGE 1 OF 3		

PART-II: TECHNICAL

TENDER DOCUMENT

FOR

CIVIL, STRUCTURAL & OTHER ALLIED WORKS

FOR

ENERGY SAVING PROJECT (ESP-II)



FOR AMMONIA-II + CPP AREA & MP STRIPPER SYSTEM

NATIONAL FERTILIZERS LIMITED, VIJAIPUR

0	26.07.2019	ISSUED FOR TENDER	CG	CG	UPT
P	28.02.2019	ISSUED FOR REVIEW	CG	CG	UPT
REV	REV DATE	PURPOSE	PREPD	REVWD	APPD

CONTENTS

SL.NO	DESCRIPTION	DOCUMENT NO.
1	TENDER DOCUMENT FOR CIVIL STRUCTURAL & OTHER ALLIED WORKS	EM265-PNCV-TD-101 (03 PAGES)
	ANNEXURES	
2	ANNEXURE-A: GENERAL SPECIFICATION FOR CIVIL STRUCTURAL & OTHER ALLIED WORKS	EM265-PNCV-GS-101 (08 PAGES)
3	ANNEXURE-B: TECHNICAL SPECIFICATION FOR CIVIL, STRUCTURAL & OTHER ALLIED WORKS	EM265-PNCV-TSA-101 (13 PAGES)
4	ANNEXURE-C: STANDARD SPECIFICATION FOR DISMANTLING AND DEMOLISHING	EM265-PNCV-TSB-101 (08 PAGES)
5	ANNEXURE-D: PREAMBLE TO SCHEDULE OF RATES FOR CIVIL STRUCTURAL & OTHER ALLIED WORKS	EM265-PNCV-PR-101 (14 PAGES)
6	ANNEXURE-E: SCHEDULE OF RATES FOR CIVIL STRUCTURAL & OTHER ALLIED WORKS	EM265-PNCV-SR-101 (22 PAGES)
7	ANNEXURE-F: VENDOR LIST FOR CIVIL & STRUCTURAL WORK ITEMS	EM265-PNCV-VL-101 (09 PAGES)
8	ANNEXURE-G: REFERENCE DRAWINGS <ul style="list-style-type: none"> PLOT PLAN DRAWING 	(2 PAGES)

	TENDER DOCUMENT FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TD-101	0	
		DOCUMENT. NO.	REV	
		PAGE 3 OF 3		

PART-II

TECHNICAL SPECIFICATIONS

 पी डी आई एल PDIL	PROJECTS & DEVELOPMENT INDIA LTD	EM265-PNCV-GS-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV	
		PAGE A1 OF A8		

GENERAL SPECIFICATIONS FOR
CIVIL, STRUCTURAL & OTHER ALLIED WORKS
FOR
ENERGY SAVING PROJECT (ESP-II)
FOR AMMONIA-II + CPP AREA & MP STRIPPER SYSTEM
AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR

0	26.07.2019	ISSUED FOR TENDER	CG	CG	UPT
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REV	DATE	PURPOSE	PREPARED	REVIEWED	APPROVED

 <div>पी डी आई एल PDIL</div>	GENERAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-GS-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT. NO.	REV.	
		PAGE A2 OF A8		

CONTENTS

SL. NO.	DESCRIPTION	SHEET NUMBER
1.0	GENERAL	3
2.0	SCOPE OF WORK	4
2.4.1	CIVIL STRUCTURAL & OTHER ALLIED WORKS	5
3.0	PILING WORK	7
4.0	MATERIAL OF CONSTRUCTIONS	7

 पी डी आई एल PDIL	GENERAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-GS-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE A3 OF A8		

1.0 GENERAL

- 1.1 This section of the tender Documents deals mainly with the Scope and Technical Specifications needed for the execution and construction of complete Civil, Structural steel Works and other Allied Works on Item Rate basis. The work shall have to be carried out both below and above ground level and construction of all civil, structural and other allied works associated with the **“ENERGY SAVING PROJECT-II FOR AMMONIA-II + CPP AREA AND MP STRIPPER SYSTEM, AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR– INDIA”** as per the items indicated in the "Schedule of Rates".
- 1.2 In the event of conflict between the requirements of two or more clauses of the specifications/ Documents, the more stringent requirement as per the interpretation of the Owner/ Consultant shall prevail.
- 1.3 The Contractor shall inspect and examine the site and its surrounding and shall satisfy himself before submitting his bid as to the nature of the ground and subsoil, the form and nature of the site, the quantum and the nature of work and material necessary for successful completion of the works and the means of access to site and in general shall himself obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect his Tender. Under no circumstances, extra payment consequent on any misunderstandings or otherwise on the part of the Contractor shall be allowed.
- 1.4 Works covered herein below may have to be executed also in operating plant, if required. The Contractor shall have to take all safety precaution to protect all the existing equipment, structures, facilities and buildings etc. from damage. In case, any damage occurs due to the activities of the Contractor on account of negligence, ignorance, accidental or any other reasons whatsoever, the damage shall be made good by the Contractor at his own cost to the satisfaction of the Owner / Consultant. The Contractor shall have to take also all necessary safety measure, at his own cost, to avoid any harm/ injury to his workers and staff and facilities of the existing plant.

 पी डी आई एल PDIL	GENERAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-GS-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE A4 OF A8		

2.0 SCOPE OF WORK

- 2.1 The Scope of Work consists of execution/ construction/ demolition /dismantling and erection of Civil, Structural and other allied Works associated with **“ENERGY SAVING PROJECT-II FOR AMMONIA-II + CPP AREA AND MP STRIPPER SYSTEM, AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR– INDIA”** proposed within/outside the battery limits of plant.
- 2.2 The work to be performed under the Scope of Work consists of providing all labor, materials except if indicated in Schedule Of Rates, supervision, scaffolding, construction equipment, tools, tackles and plants, supplies, transportation, all incidental items though not indicated or specified, but reasonably implied or necessary for successful completion of the work including Contractor's supervision strictly in accordance with the "Good for Construction" Drawings to be supplied progressively by the Owner/ Consultant, "Technical Specifications" and "Schedule of Rates" of this Tender on Item Rate basis. Sampling & testing of material & equipment shall be done as per relevant clauses of BIS & shall not be paid extra. The contractor shall preferably establish a laboratory at site for all relevant site test as per BIS requirements. The nature of work shall generally involve earth work in grading and leveling of the site area by excavation and filling with available/ imported selected good earth under desired compaction, dewatering, shoring, strutting, etc., excavation in trenches for foundations, back-filling around completed structures and plinth filling with available excavated/ imported selected good earth/sand, cohesive non-swelling soil and sand as specified, disposal of excavated surplus earth/ materials, breaking /stripping & forming of pile heads, concreting including reinforcements and formwork, fabrication and erection of structural/ miscellaneous steel, encasing of structures, inserts, anchor bolts, construction of reinforced cement concrete columns, slabs, beams, equipment foundations, trenches and drains with covers, drainage, brick masonry, damp proofing, anti-termite treatment, ventilation, roads, pathways, any sort of water proofing/ water proof treatment works on roof, any sort of anticorrosive painting and/ or lining on P CC, RCC and steel structures ,fixing of steel structures /equipment with fasteners, trenches, tanks, etc. and erection of miscellaneous items and finishes such as plastering, flooring, painting, steel/ aluminum/wooden doors, windows and ventilators, glass & glazing, rolling shutters, transformer gates, drains, etc. The work also includes dismantling and/or demolishing of existing PCC/RCC, structural steel, flooring, plastering, brick masonry, rolling shutters, any sort of roofing with water proof treatment works including stacking separately service- able and disposal of unserviceable materials & rebuilding as per requirements. The Tender Drawings attached with this specification provides a

 पी डी आई एल PDIL	GENERAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-GS-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE A5 OF A8		

general idea about the work to be performed under the scope of this Contract. The enclosed Drawings are preliminary Drawings which are for bidding purposes only and are by no means the final Drawings or show the full range of the work under the scope.

- 2.3 The scope of work may also includes preparation of fabrication Drawings for structural steel works on the basis of the design drawings to be supplied progressively by the Owner/ Consultant and Bar Bending Schedule for the reinforcements including getting them Approved from the Owner/ Consultant.
- 2.4 The complete work associated with the proposed **“ENERGY SAVING PROJECT-II FOR AMMONIA-II + CPP AREA AND MP STRIPPER SYSTEM, AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR– INDIA”** as per the items indicated in the "Schedule of Rates". Consists of mainly but not Limited to the followings:-

2.4.1 **CIVIL STRUCTURAL AND OTHER ALLIED WORKS**

The scope of work under this includes construction/ execution, providing necessary engineering supervision through qualified and technical personnel, skilled and unskilled labor, etc. and mobilization of all relevant and adequate plants, tools and tackles, equipment, machineries, etc., to carry out all civil and structural works for successful completion of the proposed **“ENERGY SAVING PROJECT-II FOR AMMONIA-II + CPP AREA AND MP STRIPPER SYSTEM, AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR– INDIA”**.

The scope of work shall include also dismantling and/or demolishing of existing plain cement concrete and reinforced cement concrete, brick masonry work below and above ground level, structural steel, floors, plastering, rolling shutter and any sort of roofing works including stacking separately serviceable materials and disposal of unserviceable materials. The above work shall have to be carried out both below and above ground level.

All the civil & structural works shall be carried out strictly in accordance with the "Technical Specifications (EM265-PNCV-TSA/B-101), Preamble to schedule of rates (EM265-PNCV-PR-101) and "Schedule of Rates (EM265-PNCV-SR-101) enclosed with this document. The complete civil and structural Steel works associated with the different Units of the proposed Revamp project, consists of mainly but not limited to the followings.

A) New Cooling Tower Area

- Pump foundations for CW pipes

 पी डी आई एल PDIL	GENERAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-GS-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE A6 OF A8		

- Sum/Pit at New Cooling tower Cell area
- CW Return & supply pipe supports
- CW Header Support and Foundation
- Road Crossings(2nos)

B) CPP Area

- MCC Building
- LP Steam Line Pipe supports and platform
- LP Steam Line Supporting Pipe rack Steel Structure
- Structural Steel works for platforms and Staircases
- Extension of Existing equipment supporting structures
- Grating and hand railing for staircase and platforms
- Pipe rack foundations
- Electrical Cable trenches

C) AMMONIA-II

- Foundations for new equipments - Exchanger (E-3515)
- Steel Structure for Pipe Racks in New Exchanger (E-3515) area
- Foundation for Pipe Racks.
- Foundations for VAM Package
- VAM Shed structure

D) New MP Stripper System

- F-1304 - Process Condensate Stripper Foundation
- E-1321 - Process Condensate Feed / Effluent Exchanger Foundation
- B-1324 - Condensate Surge Drum Foundation
- B-1324 A - Condensate Collection Tank Foundation
- P-1324 A/B foundation
- Condensate Feed Pump To Stripper
- Motor For Condensate Feed Pump To Stripper
- P-1325 A/B foundation
- Condensate Feed Pump To Surge Drum
- Motor For Condensate Feed Pump To Surge Drum

 पी डी आई एल PDIL	GENERAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-GS-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE A7 OF A8		

- E-1331 - DMW Pre-heater Foundation
- Pipe rack Steel Structure (3m wide and 4m Height x20m long)

E) HP Steam Line Pipe

- HP Steam Line Pipe Supports on existing Pipe rack
- HP Steam Line Extension/Modification in existing platforms
- HP Steam Line supporting Pipe rack Steel Structure
- Structural Steel works for platforms and Staircases
- Extension of Existing Pipe rack & equipment supporting Steel Structures
- Grating and hand railing for staircase and platforms

F) DM water Line Pipe

- 2x10" DM Water Pipe Supports on existing Pipe rack

G) Other miscellaneous works

- Modification & strengthening of existing Structural steel members.
- Steel structure is to be painted with epoxy based protective paint from reputed manufacture.
- Modification of existing paving & new paving
- Dyke wall and Paving inside plant if any
- Modification/new Catchment drain network inside plant area
- Alkali/Acid resisting brick lining works
- dismantling and/or demolishing of existing plain cement concrete and reinforced cement concrete, brick masonry work below and above ground level, structural steel
- Modification of existing foundation/structure if any requirement
- Repair of Brick works / masonry works/concrete works in patches
- Plastering in patch works
- Painting on old & new works ,Etc
- Miscellaneous Civil works

 पी डी आई एल PDIL	GENERAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-GS-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE A8 OF A8		

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3.00 MATERIAL OF CONSTRUCTIONS

Based on recommendation provided in Geo-technical report, Plant site is located close to the coast. Hence, following special protective measures are necessary to protect subsurface concrete and reinforcement from extreme/severe corrosive exposure environment of foundation and structures.

A) FOR OPC/ PPC/ PSC GRADE-43 CEMENT

- i) LARSEN & TUBRO CEMENT
- ii) THE ASSOCIATED CEMENT COMPANIES LIMITED
- iii) JK CEMENT
- iv) VIKRAM
- v) AMBUJA CEMENT
- vi) ULTRATECH CEMENT

B) FOR REINFORCEMENT STEEL (Fe-500D)

- i) STEEL AUTHORITY OF INDIA LTD.
- ii) TATA IRON & STEEL CO. LTD.
- iii) RASTRIYA ISPAT NIGAM LIMITED (Vishakhapattanam)
- iv) JINDAL STEEL AND WORKS (JSW)

C) FOR STRUCTURAL STEEL –Fy 250 MPA as per Is-2062 of Following make:-

- i) STEEL AUTHORITY OF INDIA LTD.
- ii) TATA IRON & STEEL CO. LTD.
- iii) RASTRIYA ISPAT NIGAM LIMITED (Vishakhapattanam).
- iv) JINDAL STEEL AND WORKS (JSW)



 <div>पो डी आई एल PDIL</div>	PROJECTS & DEVELOPMENT INDIA LTD	EM265-PNCV-TSA-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT NO.	REV	
		Page 1 of 22		

TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS

 पी डी आई एल PDIL	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 एन एफ एल NFL
		DOCUMENT NO.	REV	
		PAGE 2 OF 22		

CONTENTS

1.0	GENERAL.....	3
2.0	REFERENCE CODES & STANDARDS.....	3
3.0	EARTHWORK.....	3
3.1	EXCAVATION.....	3
3.2	FILLING.....	5
4.0	PLAIN AND REINFORCED CONCRETE WORK	7
4.1	MATERIALS	7
4.2	MIXING.....	8
4.2	WATER CEMENT RATIO, LAYING & CURING.....	8
4.4	GRADES OF CONCRETE.....	9
4.5	DESIGN MIX CONCRETE.....	9
4.6	TESTING OF CONCRETE	10
4.7	PROPORTIONING	10
4.8	PRE CAST CONCRETE.....	10
5.0	STEEL REINFORCEMENT.....	10
6.0	FORM WORK	11
6.3	STRIPPING TIME.....	11
7.0	BRICK MASONRYWORK.....	11
8.0	STRUCTURAL STEEL WORK	12
8.1	STEEL	12
8.2	FABRICATION.....	12
8.3	FABRICATION DRAWINGS	13
8.4	WELDING.....	13
8.5	MS BLACK/HIGH STRENGTH BOLTS AND NUTS.....	13
9.0	PAINTING ON STRUCTURAL STEEL	14
10.0	STEEL / ALUMINIUM DOORS, WINDOWS AND VENTILATORS	16
11.0	FLOORING AND PAVING	17
11.1	SUB BASE OF FLOOR.....	17
11.2	CEMENT CONCRETE FLOOR FINISHES	17
12.0	PLASTERING	17
13.0	EXTERIOR PAINTING	18
14.0	GLAZING	18
15.	PROTECTIVE COATING AND LINING SYSTEM	19
16.0	CULVERT WORK.....	20
16.1	PIPE CULVERTS.....	20
16.2	BOX CULVERTS.....	21
17.0	STORM WATER DRAINS.....	21
18.0	METHODOLOGY FOR DERIVING ANY EXTRA ITEM RATES.....	22

 <div>पी डी आई एल PDIL</div>	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT NO.	REV	
		PAGE 3 OF 22		

1.0 GENERAL

- 1.1 This specification covers the technical requirements for the construction of foundation, structure etc. required for the completion of the work.
- 1.2 These technical Specifications shall be supplementary to the specifications contained in the CPWD specifications, wherever at variance, these Particular Specifications shall take precedence over the provisions in the CPWD Specifications.
- 1.3 Specifications of materials and workmanship shall be as described in the Central Public Works Department Specifications Vol. I & II (latest) include latest amendments, unless otherwise specified. These CPWD Specifications shall be deemed to form part of this contract. The **CONTRACTOR** shall procure and maintain copies of the latest CPWD Specifications at site for reference.

2.0 REFERENCE CODES & STANDARDS

- 2.1 Wherever reference of IS Specifications/ or IS Codes of Practice are made in the Specifications/ Schedule of Rates or Preambles, reference shall be to the latest edition of IS (Bureau of Indian Standards).

IS:456 Code of practice for plain & reinforced concrete

IS:800 Code of practice for general construction in steel

IS:875 Code of practice for design loads

IS:1893 Criteria for earth quake resistant design of structures

IS:2911 Code of practice for design and construction of pile foundations

IS:3370 Code of practice for concrete structures for storage of liquids

IS:4991 Criteria for blast resistant design of structures for explosions above ground

IS:11089 Code of practice for design and construction of ring foundation

IS:12118 Two parts polysulphide based sealant

IS:13920 Code of practice for ductile detailing of reinforced concrete structures



Subjected to seismic forces.

National Building Code
Factory Rules

3.0 EARTHWORK



3.1 EXCAVATION

- 3.1.1 Excavation shall be carried out in soil of any nature and consistency, in the presence of water or in the dry, met on the site to the lines, levels and contours shown on the detailed drawings and **CONTRACTOR** shall remove all excavated materials to soil heaps on site or transport for use in filling on the site or stack them for reuse as directed by the Engineer-in-Charge.
- 3.1.2 Black cotton soil, and other expansive or unsuitable soils excavated shall not be used for filling in foundations, and pl inths of buildings or in other structures including

 पी डी आई एल PDIL	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 एन एफ एल NFL
		DOCUMENT NO.	REV	
		PAGE 4 OF 22		

manholes, septic tanks etc. and shall be disposed off within the contract area marked on the drawings, as directed, levelled and neatly dressed.

- 3.1.3 In case of trenches exceeding 2 metres depth or where soil is soft or slushy, the sides of trenches shall be protected by timbering and shoring. The **CONTRACTOR** shall be responsible to take all necessary steps to prevent the sides of trenches from caving in or collapsing. The extent and type of timbering and shoring shall be as directed by the **Engineer-in-Charge**.
- 3.1.4 Where the excavation is to be carried out below the foundation level of adjacent structure, the precautions to be taken such as under pinning, shoring and strutting etc. shall be determined by **Engineer-in-Charge**. No excavation shall be done unless such precautionary measures are carried out as per directions of **Engineer-in-Charge**.
- 3.1.5 Specification for Earth work shall also apply to excavation in rock in general. The excavation in rock shall be done such that extra excavation beyond the required width and depth as shown in drawings is not made. If the excavation done in depth greater than required / ordered. The **CONTRACTOR** shall fill the extra excavation with concrete of mix 1:5:10 as the foundation concrete at his own cost.
- 3.1.6 **CONTRACTOR** shall make all necessary arrangements for dewatering / de-filing as required to carry out proper excavation work by bailing or pumping out water, which may accumulate in the excavation pit from any cause/ source whatsoever.
- 3.1.7 **CONTRACTOR** shall provide suitable draining arrangements at his own cost to prevent surface water entering the foundation pits from any source.
- 3.1.8 The **CONTRACTOR** is forbidden to commence the construction of structures or to carry out concreting before **Engineer-in-Charge** has inspected, accepted and permitted the excavation bottom.
- 3.1.9 Excavation in disintegrated rock means rock or Boulders including brickbats which may be quarried or split with crow bars. This will also include laterite and hard conglomerate.
- 3.1.10 Excavations in hard rock - meant excavation made in hard rock to be done manually, or and / or pneumatic hammers.
- 3.1.11 The measurements for excavations shall be restricted and limited to minimum excavation line as per drawing for payment purposes.
- 3.1.12 Adequate protective measures shall be taken to see that the excavation does not affect or damage adjoining structures. The **CONTRACTOR** shall take all measures required for ensuring stability of the excavation and safety of property and people in the vicinity. The **CONTRACTOR** shall erect and maintain during progress of work, temporary fences around dangerous excavations at no extra cost.
- 3.1.13 Excavation in ordinary soil means excavation in ordinary hard soil including stiff heavy clay, hard shale, or compact moorum, or any materials, which can be removed by the ordinary application of spades, shovels, picks and pick axes. This shall also include removal of isolated boulders each having a volume not more than 0.50m³.
- 3.1.14 Excavation in soft rock includes limestone, sandstone, laterite, hard conglomerates, etc. or other rock which can be quarried or split with crowbars or wedges. This shall

 <div>पी डी आई एल PDIL</div>	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT NO.	REV	
		PAGE 5 OF 22		

also include excavation of tarred pavements, masonry work and rock boulders each having a volume of not more than 0.25m³.

3.1.15 Excavation in hard rock includes any rock bound in ledges or masses in its original form or cement concrete for which in the opinion of the Engineer-in-Charge, requires the use of compressed air, equipment, sledge hammer and non-explosive materials viz. Acconex manufactured by A.C.C. Ltd. Specifications and instructions for use shall be as per manufacturer.

3.1.16 In case of any difficulty concerning the interpretation of type of soil as mentioned above, the Engineer-in-Charge shall decide whether the excavation in a particular material is in ordinary soil, soft rock or hard rock and his decision in this matter shall be final and binding on the CONTRACTOR and without appeal.

3.2 **FILLING**

3.2.1 Back filling of excavations in trenches, foundations and elsewhere shall consist of one of the following materials approved by **Engineer-in-Charge**.

- i) Soil
- ii) Sand
- iii) Moorum
- iv) Hard-core
- v) Stone/gravel

All back filling material shall be approved by the **Engineer-in-Charge**.

3.2.2 Soil filling - Soil material shall be free from rubbish, roots, hard lumps and any other foreign organic material. Filling shall be done in regular horizontal layers each not exceeding 20 cm. depth.

3.2.3 Back filling around completed foundations, structures, trenches and in plinth shall be done to the lines and levels shown on the drawings.



3.2.4 Back filling around pipes in the trench shall be done after hydro testing is done.

3.2.5 Back filling around liquid retaining structures shall be done only after leakage testing is completed and approval of **Engineer-in-Charge** is obtained.

3.2.6 Sand used for filling under foundation concrete, around foundation and in plinth etc. shall be fine/ coarse, strong, clean, free from dust, organic and deleterious matter. The sand filling under foundation shall be rammed with Mech. compactor. Sand material shall be approved by **Engineer-in-Charge**.

3.2.7 Moorum for filling, where ordered, shall be obtained from approved pits and quarries which contain siliceous material and natural mixture of clay. Moorum shall not contain any admixture of ordinary earth. Size of moorum shall vary from dust to 10 mm.

3.2.8 Hard-core shall be of broken stone of 90 mm to 10 mm size suitable for providing a dense and compact sub grade. Stones shall be sound, free from flakes, dust and other impurities. Hard core filling shall be spread and levelled in layers, 15 cm thick, watered and well compacted with ramming or with mechanical / hand compacts including hand packing wherever required.

 पी डी आई एल PDIL	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 एन एफ एल NFL
		DOCUMENT NO.	REV	
		PAGE 6 OF 22		

- 3.2.9 If any selected fill material is required to be borrowed, **CONTRACTOR** shall make arrangements and procure such material from outside borrow pits. The material of source shall be subject to prior approval of **Engineer-in-Charge**. **CONTRACTOR** shall make necessary access roads to borrow areas and maintain the same, if such access roads do not exist at no extra cost.
- 3.2.10 Plinth filling shall be carried out with approved material as described earlier, in layers not exceeding 150mm, watered and compacted with mechanical compaction machines. **Engineer-in-Charge** may however permit manual compaction by hand tampers in case he is satisfied that mechanical compaction is not possible. When filling reaches the finished level, the surface shall be flooded with water, unless otherwise directed, for at least 24 hours, allowed to dry and then the surface again compacted as specified above to avoid settlements at later stage. The finished level of the filling shall be trimmed to the level specified. Compacted surface shall have at least 95% of laboratory maximum dry density. A minimum of one test per 250 sq. meters of compacted area shall be done.
- 3.2.11 Whenever the fill material (earth or soil) is purchased, **CONTRACTOR** shall get the approval of Engineer-in-Charge. The **CONTRACTOR** shall arrange to determine the following properties of the soil and shall get the approval of **Engineer-in-Charge**.
- i) Clay content : 15% to 20%
 - ii) Laboratory dry density : Not less than 1800 kg/m³
 - iii) Plasticity Index : Not more than 20
- 3.2.12 The fill shall be compacted using a vibrating compactor of not less than 1.5 tonne. The fill shall be thoroughly compacted in layers as directed but not more than 200 mm thick. Adequate water shall be used for compaction and the density after compaction shall be not less than maximum dry density obtained in test of IS: 2720 Part-8. Compacted surface shall have at least 90% of laboratory maximum dry density. A minimum of one test per 250 sq. meters of compacted area shall be done.
- 3.2.13 The Gravel fill shall be non plastic granular material, well graded, strong, with maximum particle size of 50 mm, with not more than 15% passing a 4.75 mm IS sieve, free of all debris, vegetable matter and chemical impurities.
- 3.2.14 All clods, lumps etc. shall be broken before compaction.
- 3.2.15 Surface dressing shall be carried out on the entire area occupied by the buildings including plinth protection as directed without any extra cost. The depths of excavation shown on the drawings are the depths after surface dressing.
- 3.2.16 The site around all buildings and structures to a width of 3 metres beyond the edge of plinth protection, ramps, steps, etc. shall be dressed and sloped away from the buildings.
- 3.2.17 In case of grading/banking successive layers of filling shall not be placed, until the layer below has been thoroughly compacted to satisfy the requirements laid down in this specification.

- i) Prior to rolling, the moisture content of material shall be brought to within +/- 2% of the optimum moisture content as described in IS 2720 Part-7. The moisture content shall preferably be on the wet side for potentially expansive soil.
- ii) After adjusting the moisture content as described, the layers shall be thoroughly compacted by means approved by Engineer-in-Charge, till the specified maximum laboratory dry density is obtained.
- iii) General, fill shall be placed in layers not exceeding 300 mm thickness and shall be thoroughly compacted to achieve a compaction of at least 90% of laboratory maximum dry density up to a depth of 600 mm below finished grade. Final fill of 600 mm thickness shall consist of preferably natural material in, as dug condition except that stones larger than 100 mm shall be removed. It shall be placed in layers not exceeding 150 mm thickness and compacted to achieve of at least 95% of laboratory maximum dry density. Each layer shall be tested in field for density and accepted by Engineer-in-Charge, subject to achieving the required density before laying the next layer. A minimum of one test per 250 sq meters for each layer shall be conducted.
- iv) If the layer fails to meet the required density, it shall be reworked or the material shall be replaced and method of construction altered as directed by Engineer-in-Charge to obtain the required density.
- v) The filling shall be finished in conformity with the alignment, levels, cross-section and dimensions as shown in the drawing.
- vi) Extra material shall be removed and disposed off as directed by the **Engineer-in-Charge**.

4.0 PLAIN AND REINFORCED CONCRETE WORK



This specifications deals with cement concrete, plain or reinforced, for general use, and covers the requirements for concrete materials, their storage, grading, mix design, strength & quality requirements, pouring at all levels, reinforcements, protection, curing, form work, finishing, painting, admixtures, inserts and other miscellaneous works.

4.1 MATERIALS

- 4.1.1 **Cement:** Any of the following cements may be used as required in foundation/plinth & super structure with the prior approval of NFL/PDIL.

IS - 12269	53 Grade Ordinary Port Land Cement
IS - 8112	43 Grade Ordinary Port Land Cement
IS - 1489	Portland Pozzolana Cement (PPC)
IS - 455	Portland Slag Cement (PSC)

- 4.1.2 **Water:** Water used for mixing and curing concrete and mortar shall conform to the requirements as laid down in IS: 456. Sea water shall not be used for concrete work.

 <div>पी डी आई एल PDIL</div>	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT NO.	REV	
		PAGE 8 OF 22		

4.1.3 Aggregate

4.1.3.1 General

- a) Coarse and Fine aggregates for Civil and Structural Works (for cement concrete plain and reinforced) shall conform in all respects to IS: 383 (Specification for Coarse and Fine Aggregates from Natural Sources for Concrete). Aggregates shall be obtained from an approved source known to produce the same satisfactorily. Aggregates shall consist of naturally occurring (crushed or uncrushed) stones, gravel and sand or a combination thereof. These shall be chemically inert, hard, strong, dense, durable, clean and free from veins, adherent coatings, injurious amounts of alkalis, vegetable matter and other deleterious substances such as iron pyrites, coal, lignite, mica, shale, sea shells etc.
- b) Aggregates which may chemically react with alkalis of cement or might cause corrosion of the reinforcement shall not be used.
- c) The maximum quantities of deleterious materials in the aggregates as determined in accordance with IS: 2386 Part II (Methods of Test for Aggregates for Concrete), shall not exceed the limits defined in IS: 383.

4.1.3.2 Coarse Aggregates

- a) Coarse aggregates are the aggregates, which are retained on 4.75 mm IS Sieve. It shall have a specific gravity not less than 2.6 (saturated surface dry basis).
- b) These may be obtained from crushed or uncrushed gravel or stone and may be supplied as single sized or graded. The grading of the aggregates shall be as per IS:383 or as required by the mix design, to obtain densest possible concrete.

4.1.3.3 Fine Aggregates

- a) Fine aggregates are the aggregates which pass through 4.75 mm IS sieve but not more than ten percent (10%) pass through 150 micron IS sieve. These shall comply with the requirements of grading zones I, II and III of IS: 383. Fine aggregates conforming to grade zone IV shall not be used for reinforced concrete works.
- b) Fine aggregates shall consist of material resulting from natural disintegration of rock and which has been deposited by streams or glacial agencies, or crushed stone sand or gravel sand conforming to BIS 383 and confirming to test as per BIS 2386 part 1 to VI). Sand from sea shores, creeks or river banks affected by tides, shall not be used for filling or concrete works.

- 4.1.3.4 If required the aggregates (both fine and coarse) shall have to be thoroughly washed and graded as per direction of Engineer-in-Charge.

4.2 MIXING

All cement concrete plain or reinforced shall be machine mixed. Mixing by hand may be employed where quantity of concrete involved is small, with the specific prior permission of the **Engineer-in-Charge**. 10% extra cement shall be added in case of hand mixing as stipulated in IS-456.

For large and medium project sites the concrete shall be sourced from ready- mixed concrete plants or from on site or off site batching and mixing plants (IS 4926)

4.2 WATER CEMENT RATIO, LAYING & CURING

Water Cement Ratio, Laying & Curing shall be done as per IS: 456.

4.4 GRADES OF CONCRETE

- 4.4.1 Grades lower than M-25 shall not be used in reinforced concrete.
- 4.4.2 A sieve analysis test of aggregates shall be carried out as and when the source of supply is changed without extra charge notwithstanding the mandatory test required to be carried out as per CPWD specification.
- 4.4.3 All tests in support of mix design shall be maintained as a part of records of the contract. Test cubes for mix design shall be prepared by the CONTRACTOR under his own arrangements and at his costs, but under the supervision of the **Engineer-in-Charge**.

4.5 DESIGN MIX CONCRETE

- 4.5.1 Design mix shall be allowed for major works where it is contemplated to be used by installing weigh batch mixing plant as per IS 4925. At the time of tendering, the CONTRACTOR, after taking into account the type of aggregates, plant and method of laying he intends to use, shall allow in his tender for the design mix i.e., aggregate/cement/admixtures and water/cement ratios which he considers will achieve the strength requirements specified, and workability for concrete to be properly finished.
- 4.5.2 Before commencement of concreting, **CONTRACTOR** shall carry out preliminary tests for design mix on trial mixes proposed by him in design of mix to satisfy the **Engineer-in-Charge** that the characteristic strength is obtained. In this regard, CONTRACTOR may consult govt. approved lab /reputed institute to get design mix done as per IS 10262 at his own cost. The concrete mix to be actually used shall be approved by the **Engineer-in-Charge**.
- 4.5.3 Notwithstanding the above, the following shall be the maximum combined weight of coarse and fine aggregate per 50 kg of cement.

Grade of Concrete	Maximum weight of fine & coarse aggregates together per 50 kg of cement (for nominal mix only)
1. M - 10	480 kg
2. M - 15	350 kg
3. M - 20	250 kg

- 4.5.4 The workability of concrete produced shall be adequate, so that the concrete can be properly placed and compacted. The slump shall be as per IS 456.
- 4.5.5 The minimum consumption of the cement irrespective of design mix shall not be less than the following:

M 7.5 (1:4:8)	170 kg/cu m
M 10 (1:3:6)	240 kg/cu m
M 15	300 kg/cu m
M 20	330 kg/cu m
M 25	350 kg/cu m

M 30	400 kg/cu m
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4.6 TESTING OF CONCRETE

- 4.6.1 Testing of concrete, sampling and acceptance criteria shall be in accordance with IS 456.

4.7 PROPORTIONING

Mixes of cement concrete shall be as ordered. Where the concrete is specified by grade, it shall be prepared by mixing cement, sand and coarse aggregate by weight as per mix design. In case the concrete is specified as volumetric mix, then dry volume batching shall be done, making proper allowances for dampness in aggregates and bulking in sand. Equivalent volume batching for concrete specified by grade may however be allowed by the **Engineer-in-Charge** at his discretion.



4.8 PRE CAST CONCRETE

- The specifications for pre cast concrete will be similar as for the cast in situ concrete. All pre cast work shall be carried out in a yard made for the purpose. This yard shall be dry, properly levelled and having a hard and even surface. If the ground is to be used as a soft former of the units, shall be paved with concrete or masonry and provided with a layer of plaster (1:2 proportion) with smooth neat cement finish or a layer of MS sheeting. The casting shall be over suitable vibrating tables or by using form vibrators as per directions of **Engineer-in-Charge**.
- The yard, lifting equipment, curing tank, finished material storage space etc. shall be designed such that the units are not lifted from the mould before 7 (seven) days of curing and can be removed for erection after 28 (Twenty Eight) days of curing. The moulds shall preferably be of steel or of timber lined with G.I. sheet metal. The yard shall preferably be fenced.
- Lifting hooks, wherever necessary or as directed by **Engineer-in-Charge** shall be embedded in correct position of the units to facilitate erection, even though they may not be shown on the drawings and shall be burnt off and finished after erection.
- Pre cast concrete units, when ready shall be transported to site by suitable means approved by **Engineer-in-Charge**. Care shall be taken to ensure that no damage occurs during transportation. All adjustments, levelling and plumbing shall be done as per the instructions of the **Engineer-in-Charge**. The CONTRACTOR shall render all help with instruments, materials and staff to the **Engineer-in-Charge** for checking the proper erection of the pre cast units.
- After erection and alignment the joints shall be filled with grout or concrete as directed by **Engineer-in-Charge**. If shuttering has to be used for supporting the pre cast unit they shall not be removed until the joints has attained sufficient strength and in no case before 14 (fourteen) days. The joint between pre cast roof planks shall be pointed with 1:2 (1 cement: 2 sand) mortar where called for in the drawings.

5.0 STEEL REINFORCEMENT

- 5.1 Steel reinforcement shall comprise:

- Mild steel bars conforming to IS: 432 Part-I.
- Cold twisted bars conforming to IS: 1786

 <div>पी डी आई एल PDIL</div>	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT NO.	REV	
		PAGE 11 OF 22		

- 3) CRS bars
- 4) TMT bars
- 5) Hard drawn steel wire fabric conforming to IS: 1566

5.2 All joints in reinforcement shall be lapped adequately to develop the full strength of the reinforcement as per provision of IS: 456 or as per instruction of **Engineer-in-Charge**.

6.0 FORM WORK

6.1 The shuttering or form work shall conform to the shape, lines and dimensions as shown on the drawings and be so constructed as to remain sufficiently rigid during placing and compacting of the concrete and shall be sufficiently tight to prevent loss of liquid from the concrete. The surface that becomes exposed on the removal of forms shall be examined by **Engineer-in-Charge** or his authorized representative before any defects are made good. Work that has sagged or bulged out, or contains honey combing, shall be rejected. All shuttering shall be plywood or steel shuttering.

6.2 The **CONTRACTOR** shall be responsible for sufficiency and adequacy of all form work. Centering and form work shall be designed & detailed in accordance with IS 14687 and approved by the **Engineer-in-Charge**, before placing of reinforcement and concreting.

6.3 STRIPPING TIME

Forms shall not be struck until the concrete has reached strength at least twice the stress to which the concrete may be subjected at the time of removal of form work. The strength referred to shall be that of concrete using the same cement and aggregates, with the same proportions and cured under conditions of temperature and moisture similar to those existing on the work. Where possible, the form work shall be left longer as it would assist the curing.

Note: The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slab, beam or arch as the case may be together with any live load likely to occur during curing or further construction.

7.0 BRICK MASONRYWORK

This specification covers the construction of brick masonry in foundations, arches, walls, etc. at all elevations. The provision of BIS: 2212 shall be complied with unless permitted otherwise.



7.1 BRICKS

All bricks shall conform to minimum class designation 5(50) as designated in CPWD Specifications unless specified otherwise.

7.2 MORTAR

7.2.1 Cement and water shall conform to the requirements laid down for cement concrete work.

7.2.2 Sand for masonry mortar shall be coarse sand conforming to BIS: 2116. Maximum quantities of clay, fine dust shall not be more than 5% by weight. Organic impurities shall not exceed the limits laid down in BIS: 2116.

 <div>पी डी आई एल PDIL</div>	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT NO.	REV	
		PAGE 12 OF 22		

7.2.3 Mix of mortar for building brick work shall be as specified in the item of work.

7.2.4 Mixing of mortar shall be done in a mechanical mixer. When quantity involved is small, hand mixing may be permitted by the **Engineer-in-Charge**. Any mortar remaining unused for more than 30 minutes after mixing shall be rejected.

7.3 BRICK MASONRY

Brick work shall be built in English bond, unless otherwise specified. The thickness of joints shall be 10 mm \pm 3 mm. Thickness of joints shall be kept uniform. In case of foundations and manholes etc. Joints up to 15 mm may be accepted.

7.4 HALF BRICK MASONRY

All courses shall be laid with stretchers. Reinforcement comprising 2 Nos. 6 mm dia MS bars shall be provided over the top of the first course and thereafter at every third course.

7.5 FIXTURES

All iron fixtures, pipe spouts, hold fasts of doors and windows, which are required to be built into the wall shall be embedded in cement concrete blocks 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) of size indicated in the item.

7.6 CURING

Brick work shall be protected from rain by suitable covering when the mortar is green. Masonry work shall be kept constantly moist on all faces for a minimum period of seven days.

8.0 STRUCTURAL STEEL WORK

This specification covers the technical requirements for the preparation of shop drawings, supply, fabrication, protective coating, painting and erection of all structural steel rolled sections, built up sections, plates and miscellaneous steel required for the completion of the work.

8.1 STEEL

All structural steel used in construction within the purview of this contract shall, comply with one of the following Bureau of Indian Standard Specifications, whichever, is appropriate or as specified.

IS – 2062 Hot rolled sections and plates



IS – 1079 Cold formed light gauge sections

IS – 1161 Tubular sections (circular)

IS – 4923 Hollow sections (rectangular or square)

8.2 FABRICATION

Fabrication of steel structure shall be carried out in conformity with the best modern practices and with due regard to speed with economy in fabrication and erection and shall conform to IS-800. All members shall be so fabricated as to assemble the members' accurately on site and erect them in correct positions. Before dispatch to site the components shall be assembled at shop and any defect found rectified. All

 <div>पी डी आई एल PDIL</div>	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT NO.	REV	
		PAGE 13 OF 22		

members shall be free from kink, twist, buckle, bend, open joints etc. and shall be rectified before erecting in position. Failure in this respect will subject the defective members to rejection.

8.3 **FABRICATION DRAWINGS**

8.3.1 Fabrication and erection drawings shall be prepared by the **CONTRACTOR** on the basis of design issued to the **CONTRACTOR** in stages. These drawings shall be prepared by the **CONTRACTOR** or by an agency approved by the **Engineer-in-Charge**.

8.3.2 The **CONTRACTOR** shall however ensure accuracy of the following and shall be solely responsible for the same:

1. Provision for erection and erection clearance.
2. Marking of members.
3. Cut length of members.
4. Matching of joints and holes.
5. Provision kept in the members for other interconnected members.
6. Bill of materials.

8.3.3 Connections, splices and other details where not shown on the design drawings shall be suitably designed and shown on the fabrication drawings based on good Engineering practice, developing full member strength.

8.3.4 The **CONTRACTOR** shall incorporate all the revisions in his fabrication drawings resulting from revision in design drawings during the course of execution of work at no extra cost.

8.3.5 The **CONTRACTOR** shall supply three (3) prints of each fabrication drawing submitted for checking to **Engineer-in-Charge**. After approval of fabrication drawings **CONTRACTOR** shall supply six (6) prints and two (2) reproducible of each approved fabrication drawing to **Engineer-in-Charge**. The rates quoted by the **CONTRACTOR** shall include the same.



8.4 **WELDING**

Welding shall be adopted in most of the cases for fabrication of steel structure. Welding work shall be carried out as shown in relevant drawings as per IS-816 or as required and approved by the **Engineer-in-Charge**. Welding of joints shall be so arranged that the resulting tensile and compressive stresses produced by each part of weld tend to balance each other.

8.5 **MS BLACK/HIGH STRENGTH BOLTS AND NUTS**

M.S.Black or high strength bolts, nuts and washers etc. shall be as per IS-800, IS-1363 and IS-1367. Manufacturer's test certificate shall be made available to the **Engineer-in-Charge**. For bolted joints, shanks and threaded bolts are to be used to ensure that threaded length do not encroach within the thickness of connected members of dimension beyond the following limit:-

1. 1.5 mm for connected members of thickness below 12 mm and

 पी डी आई एल PDIL	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 एन एफ एल NFL
		DOCUMENT NO.	REV	
		PAGE 14 OF 22		

2. 2.5 mm for connected member of thickness 12 mm and above and that adequate shearing and bearing values required as per design are achieved.

9.0 PAINTING ON STRUCTURAL STEEL

The following specification shall be used for painting of structural steel work.

9.1 SCOPE

This specification shall be used in non coastal area & coastal area.

i) Surface Preparation

The surfaces to be painted shall be metal slagblasted to Sa - 2.5 as per Swedish Standard SIS 05-59-00. Air used for Shot blasting must be dry and oil free. Sand used for Shot blasting shall be good quality river sand suitable for achieving the required surface finish. For optimum results pressure of Shot blasting gun should be maintained at around 7 kg/cm² and maximum height of profile should be kept around 50 microns. Sand blasted surfaces must be coated with primer within 4 hrs in dry climate. Moreover it is not advisable to carry out Shot blasting when humidity exceeds 85% (RH).

ii) Painting systems to be used are indicated below:

a) Epoxy Painting:

Primer P1-2 coats + finish paint FP1 (2 coats) where P1 is epoxy polyamide cured zinc chromate primer having DFT of 35 micron per coat and FP1 is epoxy polyamide cured finish paint having DFT (Dry Film Thickness) of 35 micron per coat.

Equivalent product chart for approved paint manufactures for primer P1 finish paint FP1 indicated above is enclosed.

b) For PU painting:



- i) P1 - One coat of Ethyl silicate inorganic zinc primer having DFT of 70 microns per coat.
- ii) IP1 - One coat of Epoxy MIO having DFT of 70 microns per coat.
- iii) FP1 - One coat of finish epoxy paint using two pack Polyamide cured epoxy having DFT of 40 microns per coat.
- iv) FP2 - One coat of Aliphatic Acrylic Polyurethane paint having DFT of 40 microns per coat.

Equivalent product chart for approved paint manufactures for P1, IP1, FP1 & FP2 indicated above is enclosed.

- 9.1.2 All the surfaces must be metal slag blasted and 2 coats of primer plus 1 coat of finish paint applied in the shop before the same are shifted to site for erection. All the members must be suitably match marked for facilitating proper assembly.

After erection is over all surfaces shall be washed up as follows:

1. Washing with clean water (pressure 7 kg/cm²) using suitable nozzles. During washing broom corn brushes shall be used to remove foreign matters.
2. Solvent washing if required to remove traces of oil grease etc.

 पी डी आई एल PDIL	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 एन एफ एल NFL
		DOCUMENT NO.	REV	
		PAGE 15 OF 22		

3. After washing the surface as indicated above, the surfaces shall be suitably touched up to the extent required so that all the damages to the primed surfaces caused during erection are done up.

The surfaces affected by welding and / or gas cutting during erection shall also be suitably touched up. Before touch up is taken up surfaces shall be prepared by mechanical means such as grinding, power brushing etc. to achieve surface finish to ST-3.

After touch up work is over as indicated above, all the surfaces shall be given one coat of finish paint to the required specification.

9.1.3 The following points must be observed for painting work:

1. Primer and paint shall be compatible to each other and should be from the same manufacturer.
2. The recommendation of the paint manufacturer regarding mixing, matching and application must be followed meticulously.
3. Technical representative of paint manufacturer should be available at site as and when required by **Engineer-in-Charge** for their expert advice as well as to ensure that the painting work is executed as per the instruction of paint manufacturer.

Paints and primers shall be supplied at site in original container with factory seal otherwise such paints and primers shall not be allowed to be used. Mode of application i.e. by spray, brush or roller shall be strictly as per recommendation of paint manufacturer.

Painting materials must be used before the expiry date indicated on the containers.

Number of coats and DFT per coat must be strictly followed as indicated above. If the desired DFT is not achieved for primer and finish paints in two coats (each), **CONTRACTOR** shall be required to apply extra coat (s) to achieve the desired DFT without any extra cost to **Engineer-in-Charge**.

Colour shade for each coat of primer and finish paint must be different to identify the coats without any ambiguity.

Shade for the final finish coat shall be decided by **Engineer-in-Charge** at site.

All painting materials must be accompanied by manufacturers test certificates. However, **Engineer-in-Charge** has any doubt regarding quality of materials, he shall have the right to direct **CONTRACTOR** to get the doubtful material tested or and provided (by **CONTRACTOR**) testing agencies for which no extra payment shall be made to the **CONTRACTOR** and the charges shall be deemed to be covered in the unit rates quoted for fabrication and erection of structural work.

DFT for paint shall be measured at least 20 points and mean DFT shall not vary by more than 10% than specified in DFT.

Instrument for measurement of DFT shall be arranged and provided by **CONTRACTOR** at his cost.

Thickness of each coat shall also be checked regularly to ensure uniformity in DFT.

9.1.4 Shot blasting and painting works, being a specialized job must be carried out through the approved agencies only.

9.1.5 Equivalent Chart for Various Paint Manufacturers for Epoxy paint



	ASIAN	G & N	SHALIMAR	J & N	BERGER	BOMBAY
P1	APCODUR - Epoxy Zinc Chrome Primer	AMERCO AT-71	EPIGARD-4 Zinc Chromate Primer	EPILAC Zinc Chromate Primer	EPILUX-4 Zinc Chromate Primer	PENTADUR PRIMER 1532
FP1	APCODUR CF 692	NEROLAC TWO COMP EPOXY	EPIGARD XL FINISH	EPILAC 974 ENAMEL	EPILUX-4 ENAMEL	PENTADUR ENAMEL 5534 GRAY

9.1.6 EQUIVALENT CHART FOR VARIOUS PAINT MANUFACTURERS FOR PU PAINT

CODE	ITEM	DFT PER COAT (MICRO NS)	ASIAN	G & N	SHALIMAR	J & N	BERGER	BOMBAY
P1	ETHYL SILICATE INORGANIC ZINC PRIMER	70	APCOSIL 601	DYMET - COTE - 9	TUFFKOTE ZILICATE	J&N INORGANIC ZINC SILICATE PRIMER	ZINC ANODE 304	HEAPELS GALVO-SIL 1570
IP1	EPOXY MIO	70	APCODUR MIO	AMERCOAT 385	EPIGUARD HB MIO	EPILAC HB MIO	EPILUX-4 HB MIO	PENTADUR HB MIO 4567
FP1	TWO PACK POLYAMIDE CURED EPOXY	40	APCODUR CF-692	NEROLAC TWO COMP EPOXY	EPIGUARD XL	EPILAC 974	EPILUX-4 ENAMEL	PENTADUR ENAMEL 5534
FP2	ALIPHATIC ACRYLIC POLYURETHANE PAINT	40	APCOTHANE 674	AMERCOAT 450 GL	SHALITHANE	JN 992 PU FINISH PAINT	BERGATHANE ENAMEL	PENTOTHANE 4513

10.0 STEEL / ALUMINIUM DOORS, WINDOWS AND VENTILATORS

10.1 The Steel doors, windows and ventilators shall be of the size and type as per IS-1361 and IS-1038. Fixing and glazing shall be done as per IS-1081 and as per

 पी डी आई एल PDIL	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 एन एफ एल NFL
		DOCUMENT NO.	REV	
		PAGE 17 OF 22		

manufacturer's instructions. The putty of approved make such as special gold size or equivalent conforming to IS-419 shall be used.

- 10.2 Aluminium doors, windows and ventilators shall be manufactured from wrought aluminium and aluminium alloy extruded round tube and / or hollow rectangular / square sections conforming to IS: 1285 & IS : 6477 or equivalent as approved by **Engineer-in-Charge**.

11.0 FLOORING AND PAVING

11.1 SUB BASE OF FLOOR

- 11.1.1 The area to be paved shall be divided into suitable panels. Form work shall be provided. The boarding / battens shall be fixed in position with their toe at proper level, giving slope where required. Alternatively base concrete may be deposited in the whole area at a stretch.



- 11.1.2 Before placing the base concrete the sub-base shall be properly wetted and rammed. The concrete of the specified mix shall then be deposited between the forms where provided, thoroughly tamped and the surface finished level with the top edge of the forms. The surface of base concrete shall be spreader uniformly. The surface shall be finished rough to provide adequate bond for the topping. Two or three hours after concrete has been laid the surface shall be brushed with wire brush to remove any scum or Latinate and swept clean so that coarse aggregate is exposed.

11.2 CEMENT CONCRETE FLOOR FINISHES

- 11.2.1 The surface of base concrete shall be thoroughly cleaned by scrubbing with coir or steel wire brush. Before laying the toping, the surface shall be soaked with water at least for 12 hours and surplus water mopped up immediately before the toping is laid.
- 11.2.2 The forms shall be fixed over the base concrete dividing into suitable panels. Where glass dividing strips are provided, thickness of glass dividing strips shall be 4 or as indicated. Before placing the concrete toping, neat cement slurry at the rate of 2 kg/sq.m shall be then thoroughly brushed into the base concrete just ahead of the finish. The topping shall then be laid, thoroughly compacted by using screed board/plate vibrator. The surface floated with a wooden float to a fair and even surface shall be left for some time till moisture disappears from it. Junctions with skirting / dado or wall surfaces shall be rounded off using cement mortar 1:2 curing shall be carried out for a minimum of 7 days.

12.0 PLASTERING

- 12.1 Sand for plastering shall be 50% fine sand and 50% coarse sand from approved sources.
- 12.2 Preparation of surface shall be done as per CPWD specifications.
- 12.3 Cement mortar shall be of the mix as indicated in the items and shall be mixed as specified in the CPWD specifications.
- 12.4 Joints in walls etc. shall be raked to a depth of 12 mm, brushed clean with wire brushes dusted and thoroughly washed before starting the plaster work.
- 12.5 The surface shall be thoroughly washed with water cleaned and kept wet to saturation point before plastering is commenced.

 पी डी आई एल PDIL	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 एन एफ एल NFL
		DOCUMENT NO.	REV	
		PAGE 18 OF 22		

12.6 Cement mortar as indicated, shall be firmly applied to the masonry walls in a uniform layer to the thickness specified and will be pressed into the joints. On concrete surfaces rendering shall be dashed to the roughened surface to ensure adequate bond. The surface shall be finished even and smooth. Hectoring wherever required shall be done as per directions of **Engineer-in-Charge**. Nothing extra shall be paid on this account.

12.7 All plaster work shall be cured for at least 7 days.

12.8 Integral water proofing compound shall be mixed with cement in the proportion recommended by the manufacturer. Care shall be taken to ensure that the water proofing material gets well and integrally mixed with cement. All other operations are the same as for general plaster work.

12.9 For sand face plaster undercoat of cement plaster 1:4 (1 cement : 4 sand) of thickness not less than 12 mm shall be applied similar to one coat plaster work. Before the under coat hardens the surface shall be scared to provide for the top coat. The top coat also of cement mortar 1:4 shall be applied to a thickness not less than 8 mm and brought to an even surface with a wooden float. The surface shall then be tapped gently with a wooden float lined with cork to retain a coarse surface texture, care being taken that the tapping is even and uniform.

13.0 EXTERIOR PAINTING

13.1 Finishing walls with smooth water-based, Premium Acrylic Smooth exterior paint with Silicone additives of required shade.

13.2 Where shown on drawings for external surfaces of sand faced plaster, or any other surface, two coats of cement paint shall be applied of tint and shade as approved by the **Engineer-in-Charge**.



13.3 The surfaces shall be prepared as specified for white washing. Before applying cement paint the surface shall be thoroughly wetted to control surface suction. The surface shall be moist but not dripping wet, when the paint is applied. Not less than 24 hours shall be allowed between the two coats. In hot weather the first coat shall be slightly moistened before applying the second coat.

13.4 On external plastered surfaces (one coat primer + minimum 3 coat of paints), sand faced or plain plastered and concrete surfaces, apex weather proof paint shall be vigorously scrubbed on to work the paint into the voids and provide a continuous paint film free from pin holes and other openings.

14.0 GLAZING

14.1 Sheet glass glazing of doors, windows etc. shall be of selected quality glass conforming to IS: 2835. Toughened splinter proof industrial safety glass shall confirm to IS: 2553. No cracked chipped or disfigured glass shall be accepted Glass shall be in one piece for each pan.

14.2 Glazing shall be fixed with timber or steel / aluminium beading as called for. Glass shall be back puttied and fixed with beading for a water tight and rattle free installation. Sizes of timber/ steel / aluminium beading shall be as directed.

 <div>पी डी आई एल PDIL</div>	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT NO.	REV	
		PAGE 19 OF 22		

15. PROTECTIVE COATING AND LINING SYSTEM

15.1 ACID RESISTANT BRICK LINING

i) MATERIAL

These bricks are made of raw materials such as clay or shale of suitable composition with low lime and iron content, feldspar, flint or sand and vitrified at high temperature in ceramic kilns. Bricks shall not absorb more than 2% of their own wt. when soaked in water. Compression strength: > 700 Kg/cm². Bricks shall not lose more than 1.5% at their own weight when tested for acid resistance.

Chemical compositions of bricks are

- | | | |
|----|--------------------------------|----------|
| a) | Al ₂ O ₃ | 22-24% |
| b) | SiO ₂ | 60-65% |
| c) | Fe ₂ O ₃ | 1.0-2.0% |
| d) | Alkalies | 10-12% |

a) K-BASED SILICATE MORTAR

Acid Proof cement KSC is a potassium silicate based corrosion cement. Acid brick linings carried out with KSC cement are not subject to crystal formation in the pores of cement. Besides Bitumastic surface is joint-less, hence there is no danger of Acids percolating through the surface.

Characteristics of K-based Silicate mortar:

- Colour : White
- Density (lbs/Cub. ft.) : 130
- Water Absorption : 2-5 %
- Tensile Strength (Psi) : 400
- Compressive strength (Psi) : 2800
- Bond Strength (Psi) : 180
- Coefficient of thermal expansion : 6.0 x 10⁻⁶

b) BITUMASTIC MORTAR

It shall consist of an acid proof inorganic filler and blended bitumen. It shall be trowelled to concrete having total thickness of 10 mm.

Characteristics of Bituminous compounds:

- Density (Kg/m³) : 2200
- Water content by mass percent (max) : 0.5
- Flash point °C ,min. : 35
- Consistency

a)	Before setting (test after 1 hr) min.	: 100
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b) After setting (test after 24 hr) min. : 80

Mastic shall be heated to 150-300°C and shall be applied in 5 mm layers after surface is cleaned & dried.

c) **BITUMINOUS PAINT(PRIMER)**

This is generally of heavy grade bituminous corrosion resisting paint. 2 coats of the paint shall be given, and drying time between the 2 coats shall not be less than 5 hours. Also, its drying time after second coat shall not be more than 8 hours. Its finish shall be smooth, glossy and elastic.

The primer shall confirm to the following requirements:

- Viscosity by standard tar viscometer, 4mm orifice at 25°C:4 to 24
- Penetration at 25°C, 100g, 5sec in 1/100 cm : 20 to 50
- Water content percent (max) :0.2

ii) **APPLICATION**

Sl.no.	Description	Item or area
1.	Bituminous Paint (Primer)	Concrete surface
2.	10mm Bitumastic Laying in two layers each shall not be more than 5 mm thick	Over Bituminous Paint
3.	One layer, 5mm Acid, K-based Silicate Type mortar	#
4.	One layer, 40mm Acid resistant Brick lining	Over K-based Silicate

#:- K-based Silicate mortar should be buttered on all sides of acid-resistant brick except the side facing the surface to be exposed to corrosives

15.4 **FIRE PROOFING BY IN-SITU CONCRETE (ENCASING)**

Concrete for fire proofing shall be M20 grade. Mixing and placing shall be same as for concrete work



Minimum thickness of concrete coating over the steel shall be 50 mm.

Concrete shall be poured into forms properly oiled and made to correct dimensions. Concrete shall be vibrated as necessary to ensure smooth surface, free from voids and irregularities. Any defects, honey comb etc. shall be rectified by CONTRACTOR at his own cost.

16.0 **CULVERT WORK**

16.1 **PIPE CULVERTS**

16.1.1 Reinforced concrete pipes shall be provided between the drain pits of storm water drains to cross the roads. These pipes shall be non-pressure type conforming to IS: 458 and class as specified in the nomenclature of the item. The pipes shall be laid between the drain pits with a uniform slope and with proper bedding, if required, as

 <div>पी डी आई एल PDIL</div>	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT NO.	REV	
		PAGE 21 OF 22		

per approved drawings. The reinforced concrete pipes shall be manufactured by centrifugal process. All pipes shall be true to shape, perfectly straight, sound and free from cracks. The pipes shall be free from defects resulting from imperfect grading of the aggregate mixing or moulding.



- 16.1.2 Reinforced concrete pipes shall be laid, jointed and tested as per IS: 783. Pipes shall be laid true to alignment and gradients over cement concrete bed of 1:2:4 mix and / or encased, if required, as per approved drawings or as directed by Engineer-in-Charge. No deviations from the lines, depths of cuttings or gradients shall be permitted without approval in writing by Engineer-in-Charge. The joint between concrete drain pit wall and concrete pipe shall be done properly to make it water-tight. The pipe joints shall be spigot and socket joint (rigid type) for pipes of 600 mm. diameter and below and collar joint (rigid type) for pipes over 600 mm. diameter. For both types of joints, the annular space shall be filled up with cement and sand mortar 1:2 mix which shall be rammed with caulking tools. After the day's work, any extraneous matter shall be removed from inside of the pipes. Joints shall be cured properly as per IS: 783. Reinforced concrete pipes shall be tested hydraulically as per IS: 783. Refilling of trenches shall not be commenced until the entire length of the pipe has been tested and approved. The excavation of earth in trenches for laying the concrete pipes and refilling shall be done as per IS: 783.

16.2 BOX CULVERTS

- 16.2.1 The box-culverts are to be provided across the roads joining the storm water drains on both sides of the road. These box-culverts shall be of either complete reinforced cement concrete construction or brick masonry and reinforced cement concrete construction as specified in the schedule of items. The box-culvert construction shall be carried out as per the approved drawings.

17.0 STORM WATER DRAINS

- 17.1 The covered precast slab storm water drains shall be of the size and laid to such gradients and in such locations as may be shown in the approved drawings or as directed by the Engineer-in-Charge. The sides and bottom of the drain or the sides and top of embankment, as the case may be, shall be brought to the required profile, slope and gradient and shall be compacted to a firm and even surface. If the situation demands, and where so required by the Engineer-in-Charge in consideration of the nature of the surface, the necessary back filling may be done with small broken stone, moorum, gravel or ballast well consolidated to proper profile. In case the soil is unreliable and if the nature of the work requires it a 75 mm. thick layer of gravel or ballast may be provided over the prepared surface and well consolidated. In the case of embankments of large heights, suitable design of pitching etc., should be worked out and special specifications framed in each case.
- 17.2 Bricks shall be of M75 class designation bricks conforming to BIS: 1077 as described in nomenclature of the item. Pitching shall be half brick in depth or in multiples of half bricks, as specified. Profiles shall be put up by means of pegs and strings or by placing bricks at intervals not more than 15 metres. Bricks shall then be laid on bed width in parallel rows breaking bond and on sides in either parallel rows breaking bond or herring-bone bond pattern as directed. At the top, at the toe and at every 3 metres intervals, brick courses shall be laid with bricks on ends. All bricks shall be

 पी डी आई एल PDIL	TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-TSA-101	0	 एन एफ एल NFL
		DOCUMENT NO.	REV	
		PAGE 22 OF 22		

laid closely in position and firmly embedded, true to line, gradient and in uniform slope throughout.

18.0 METHODOLOGY FOR DERIVING ANY EXTRA ITEM RATES

(For Items Not included in SOR, but may be required during Execution)

In case of executing of items of work not included in the rate schedule, the rates for such items shall be fixed / derived on the following basis after prior written approval of Engineer, following the order of basis as under.

- Similar item-rate basis or otherwise.
- On basis of latest Fair Market Schedule of Rates of PWD Madhya Pradesh State or otherwise.
- On prevailing market rate basis for deployment of work force and requisite materials in the work with an addition of 15% thereon for profit and overhead charges.

 पो डी आई एल PDIL	PROJECTS & DEVELOPMENT INDIA LTD	EM265-PNCV-TSB-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		SHEET C1 OF C8		

TECHNICAL SPECIFICATION FOR DISMANTLING AND DEMOLISHING WORKS

	TECHNICAL SPECIFICATION FOR DISMANTLING AND DEMOLISHING	EM265-PNCV-TSB-101	0	
		DOCUMENT NO	REV	
		SHEET C2 OF C8		

1.0 SCOPE

This specification covers the technical and precautionary requirements for the dismantling & demolition of foundation, RCC / steel structure, brick works etc.

These technical Specifications shall be supplementary to the specifications contained in the CPWD specifications, wherever at variance, these Particular Specifications shall take precedence over the provisions in the CPWD Specifications.

All the measurements shall be as per IS 1200 (relevant part with latest revision) and precautions should be taken as per guidelines mentioned in IS 4130 (latest)

2.0 TERMINOLOGY

- (i) Dismantling: The term 'Dismantling' implies carefully separating the parts without damage and removing. This may consist of dismantling one or more parts of the building as specified or shown on the drawings.
- (ii) Demolition : The term 'Demolition' implies breaking up. This shall consist of demolishing whole or part of work including all relevant items as specified or shown on the drawings.

3.0 PRECAUTIONS

- (i) The demolition shall always be well planned before hand and shall generally be done in reverse order of the one in which the structure was constructed. The operations shall be got approved from the Engineer-in-Charge before starting the work.
- (ii) Due care shall be taken to maintain the safety measures prescribed in IS 4130.
- (iii) Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions and necessary scaffolding with suitable double scaffolding and proper cloth covering shall also be provided, as directed by the Engineer-in-Charge.
- (iv) Necessary precautions shall be taken to keep noise and dust nuisance to the minimum. All work needs to be done under the direction of Engineer-in-Charge. Helmets, goggle, safety belts etc. should be used whenever required and as directed by the Engineer-in-Charge.

The demolition work shall be proceeded with in such a way that it causes the least damage and nuisance to the adjoining building and the public.

- (v) Dismantling shall be done in a systematic manner. All materials which are likely to be damaged by dropping from a height or by demolishing roofs, masonry etc. shall be carefully removed first. Chisels and cutters may be used carefully as directed. The dismantled articles shall be removed manually or otherwise, lowered to the ground (and not thrown) and then properly stacked as directed by the Engineer-in-Charge.

	TECHNICAL SPECIFICATION FOR DISMANTLING AND DEMOLISHING	EM265-PNCV-TSB-101	0	
		DOCUMENT NO	REV	
		SHEET C3 OF C8		

- (vi) Where existing fixing is done by nails, screws, bolts, rivets, etc., dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.
- (vii) Any serviceable material, obtained during dismantling or demolition, shall be separated out and stacked properly as directed by the Engineer-in-Charge within a lead of 50 metres. All unserviceable materials, rubbish etc. shall be disposed off as directed by the Engineer-in-Charge.
- (viii) The contractor shall maintain/disconnect existing services, whether temporary or permanent, where required by the Engineer-in-Charge.
- (ix) No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.
- (x) Screens shall be placed where necessary to prevent injuries due to falling pieces.
- (xi) Water may be used to reduce dust while tearing down plaster from brick work.
- (xii) Safety belts shall be used by labourers while working at higher level to prevent falling from the structure.
- (xiii) First-aid equipment shall be got available at all demolition works of any magnitude.

4.0 **RECOMMENDATIONS FOR DEMOLITION OF CERTAIN SPECIAL TYPES AND ELEMENTS OF STRUCTURES**

- (i) **Roof Trusses** If a building has a pitched roof, the roof structure should be removed to wall plate level by hand method. Sufficient purlins and bracing should be retained to ensure stability of the remaining roof trusses while each individual truss is removed progressively.
- (ii) Temporary bracing should be added, where necessary, to maintain stability. The end frame opposite to the end where dismantling is commenced, or a convenient intermediate frame should be independently and securely guyed in both directions before work starts.
- (iii) On no account should the bottom tie of roof trusses be cut until the principal rafters are prevented from making outward movement.

(iv) **Heavy Floor Beams**

Heavy bulks of timber and steel beams should be supported before cutting at the extremities and should then be lowered to a safe working place.

(v) **Brick Work**

- 1 Expert advice should be obtained and at all stages of the demolition, the closest supervision should be given by persons fully experienced and conversant in the type of work to ensure that the structure is stable at all times.
- 2 As much dead load as possible may be removed provided it does not interfere with the stability of the main structure.

 पी डी आई एल PDIL	TECHNICAL SPECIFICATION FOR DISMANTLING AND DEMOLISHING	EM265-PNCV-TSB-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		SHEET C4 OF C8		

- 3 Where it is impossible to allow debris to fall to the ground below, centering designed to carry the load should be erected and the arch demolished progressively. The design of the centering should make appropriate allowance for impact.
- 4 Collapse of the structure can be effected in one action by the use of explosives. Charges should be inserted into boreholes drilled in brick work. This method is the most effective for demolition of tall viaducts.
- 5 Where explosives are used it is preferable to ensure the collapse of the whole structure in one operation to obviate the chance of leaving unstable portions standing. Cantilevers (Not part of a Framed Structure) A cantilever type of construction depends for its stability on the super imposed structure. Canopies, cornices, staircases and balconies should be demolished or supported before the tailing down load is removed.

(vi) Cantilevers (Not part of a Framed Structure)

A cantilever type of construction depends for its stability on the super imposed structure. Canopies, cornices, staircases and balconies should be demolished or supported before the tailing down load is removed.

(vii) In-situ Reinforced Concrete

- 1 Before commencing demolition, the nature and condition of the concrete, the condition and position of reinforcement, and the possibility of lack of continuity of reinforcement should be ascertained.
- 2 Attention should be paid to the principles of the structural design to determine which parts of the structure depend on each other to maintain overall stability.
- 3 Demolition should be commenced by removing partitions and external non-load bearing cladding. It should be noted that in some buildings the frame may rely on the panel walls for stability.

(viii) Where hard demolition methods are to be used, the following procedures should be used.

(a) *Reinforced Concrete Beams*

For beams, a supporting rope should be attached to the beam. Then the concrete should be removed from both ends by pneumatic drill and the reinforcement exposed. The reinforcement should then be cut in such a way as to allow the beam to be lowered under control to the floor.

(b) *Reinforced Concrete Columns*

For columns, the reinforcement should be exposed at the base after restraining wire guy ropes have been placed round the member at the top. The reinforcement should then be cut in such a way as to allow the column to be pulled down to the floor under control.

 पी डी आई एल PDIL	TECHNICAL SPECIFICATION FOR DISMANTLING AND DEMOLISHING	EM265-PNCV-TSB-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		SHEET C5 OF C8		

(c) *Reinforced Concrete Walls*

Reinforced concrete walls should be cut into strips and demolished as for columns.

5.0 MEASUREMENTS

- (i) All work shall be measured net in the decimal system, as fixed in its place, subject to the following limits, unless otherwise stated hereinafter.
 - (a) Dimensions shall be measured correct to a cm.
 - (b) Areas shall be worked out in sqm correct to two places of decimal.
 - (c) Cubical contents shall be worked out to the nearest 0.01 cum.
- (ii) Parts of work required to be dismantled and those required to be demolished shall be measured separately.
- (iii) Measurements of all work except hidden work shall be taken before demolition or dismantling and no allowance for increase in bulk shall be allowed.
- (iv) Specifications for deduction for voids, openings etc. shall be on the same basis as that adopted for new construction of the work.
- (v) Work executed in the following conditions shall be measured separately.
 - (a) Work in or under water and/or liquid mud
 - (b) Work in or under foul position.
- (vi) Roofs
 - a. Roof coverings generally including battens boarding, mats, bamboo jaffari or other subsidiary supports shall be measured in square metres except lead sheet roof covering which shall be measured in quintals (15.2.3) and stone slab roof covering which shall be measured in cubic metres.
 - b. Ridges, hips and valleys shall be girthed and included with the roof area. Corrugated or semi corrugated surfaces shall be measured flat and not girthed.
 - c. Mud phuska on roofs shall be measured in cubic metres.
 - d. Lead sheets in roofs shall be measured in quintals and hips, valleys, flashings, lining to gutter etc. shall be included in this weight.
 - e. R.B. or R.C.C. roofs shall be measured as specified in 15.3.11.
 - f. Supporting members, such as rafters, purlins, beams joists, trusses etc. of wood shall be measured in cubic metres and steel or iron sections, in quintals.

	TECHNICAL SPECIFICATION FOR DISMANTLING AND DEMOLISHING	EM265-PNCV-TSB-101	0	
		DOCUMENT NO	REV	
		SHEET C6 OF C8		

(vii) Ceiling

- a) The stripping of ceilings shall be measured in square metres.
- b) Dismantling of supporting joists, beams, etc. shall be measured in cubic metres or in quintals.
- c) Height above floor level, if it exceeds 3.5 m shall be paid for separately.

(viii) Flooring and Pavings

- a. Dismantling of floors (except concrete and brick floors) shall be measured in square metres.
- b. Supports such as joints, beams etc. if any shall be measured in quintal.
- c. Concrete and Brick Roofs and Suspended Floors
- d. Demolition of floors and roofs of concrete or brick shall be measured in cubic metres. Beams cantilevers or other subsidiary supports of similar materials, shall be included in the item. In measuring thickness of roofs provide with water proofing treatments with bitumen felts, the thickness of water proofing treatment shall be ignored.

(ix) Walls and Piers

- a) Taking down walls and independent piers or columns of brick, stone or concrete shall be measured, in cubic metres. All copings, corbels, cornices and other projections shall be included with the wall measurements.
- b) In measuring thickness of plastered walls, the thickness of plaster shall be ignored.
- c) Ashlar face stones, dressed stone work, pre-cast concrete articles, etc. if required to be taken down intact shall be so stated and measured separately in cubic metres.
- d) Cleaning bricks stacking for measurements including all extra handling and removal and disposing off the rubbish as stated shall be enumerated in thousand of cleaned bricks.
- e) Cleaning stone obtained from demolished/dismantling stone masonry of any description including ashlar facing dressed stone work, stone slabs or flagging and pre-cast concrete blocks including all extra handling and disposing off the rubbish as stated shall be measured in cubic metres of cleaned stone.
- f) Honey comb works or cavity walls of bricks stone or concrete shall be measured as solid.

(x) Reinforced Concrete and Brick Work

- a. Reinforced concrete structures and reinforced brick roofs and walls shall be measured in cubic metres and if reinforcement is required to be salvaged, it shall be so stated.

	TECHNICAL SPECIFICATION FOR DISMANTLING AND DEMOLISHING	EM265-PNCV-TSB-101	0	
		DOCUMENT NO	REV	
		SHEET C7 OF C8		

- b. Where reinforcement is required to be separated, scraped and cleaned, the work shall be measured separately in quintal of salvaged steel.
- c. Partitions, Trellis Work etc.
- d. Partitions or light walls, of lath and plaster, trellis work, expanded metal, thin concrete or terracotta slabs and other similar materials including frame work if any shall be measured in square metres stating the over all thickness.

(xi) Wood Work

All wood work including karries average 40 sq cm or over in section, shall be measured in cubic metres, while that under 40 sq cm in section, in running metres.

Ballies shall be measured in running metres.

Boarding including wooden chajjas and sun shades along with supports shall be measured in square metres in its plane.

Steel and Iron Work

- a. All steel and iron work shall be measured in quintals. The weight shall be computed from standard tables unless the actual weight can readily be determined.
- b. Riveted work, where rivets are required to be cut, shall be measured separately.
- c. Marking of structural steel required to be re-erected shall be measured separately.
- d. In framed steel items, the weight or any covering material or filling such as iron sheets and expanded metal shall be included in the weight of the main article unless such covering is not ordered to be taken out separately.

(xii) Doors and Windows

Dismantling of doors, windows, clerestory windows, ventilators etc. (wood or metal) whether done separately or along with removal of wall by making recess in the wall shall be enumerated. Those exceeding 3 sqm each in area shall be measured separately. The item shall include removal of chowkhats architraves, holdfasts and other attachments. If only shutters are to be taken out it shall be measured separately.

(xiii) Pipes and Sewer Lines

- a) Water pipe lines including rain water pipes with clamps and specials, sewer lines (salt glazed ware or concrete) etc. shall be described by their diameter and length measured in running metres inclusive of joints.
- b) If the joints, special and fittings etc. are required to be separated, it shall be so stated and enumerated.

 पी डी आई एल PDIL	TECHNICAL SPECIFICATION FOR DISMANTLING AND DEMOLISHING	EM265-PNCV-TSB-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		SHEET C8 OF C8		

- c) Pucca drains shall be measured under relevant items.
- d) Valve cistern, public fountain platform, fire hydrants, etc. shall be enumerated.
- e) Manholes and inspection chambers shall be enumerated stating the size and depth of manhole/inspection chamber. They shall be classified into different groups depending upon the depth, in unit of half and one metre depth. The depth of the manhole shall be the distance between the top of manhole cover and invert level of the drain.
- f) Ventilating shafts, gully traps, flushing cisterns and other appurtenant items of work shall be enumerated.

(xiv) Posts or Struts

Posts or struts (wood, steel or RCC) section including taking out embedded portion shall be measured in running metres.

(xv) Fencing Wire Mesh

Wire mesh fencing of any type with frame shall be measured in square metres.

(xvi) Glazing



Taking out any portion of serviceable glass except polished plate, from old sashes, skylights, etc. (any thickness, weight or size) raking out old putty, etc. shall be measured in square metres. Irregular circular panes shall be measured as rectangle or square enveloping the same. The width and height being measured correct to the nearest 0.5 cm.

(xvii) Road Work

- a. Different types of road surfaces shall be measured separately.
- b. Road surfaces metalling or soling (base) shall be measured in square metres.
- c. Concrete paving shall be measured as in 15.3.8 or 15.3.9 as the case may be.

6.0 RATES



The rate shall include the cost of all labour involved and tools used in demolishing and dismantling including scaffolding. The rate shall also include the charges for separating out and stacking the serviceable material properly and disposing off unserviceable material within a distance of 50 metres. The rate shall also include for temporary shoring for the safety of portions not required to be pulled down, or of adjoining property, and providing temporary enclosures or partitions, where considered necessary.

 पी डी आई एल PDIL	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 एन एफ एल NFL
		DOCUMENT NO.	REV	
		PAGE D1 OF D14		

PREAMBLE TO SCHEDULE OF RATES



FOR

CIVIL, STRUCTURAL AND OTHER ALLIED WORKS

 पो डी आई एल PDIL	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE D2 OF D14		



CONTENTS

1.00	GENERAL.....	3
2.00	DEFINITION OF PLINTH.....	6
3.00	MATERIALS	6
4.00	TESTS.....	7
5.00	EXECUTION OF WORK.....	7
5.03	REINFORCEMENT AND EMBEDMENTS	10
5.04	SHUTTERING.....	10
5.05	MASONRY WORKS	11
5.06	WOOD WORK AND JOINERY	11
5.07	STRUCTURAL STEEL WORK	12
5.08	STEEL AND ALUMINIUM DOORS, WINDOWS & VENTILATORS.....	13
5.09	FLOORS AND BASES	13
5.10	MISCELLANEOUS.....	14



 <div>पी डी आई एल PDIL</div>	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT. NO.	REV.	
		PAGE D3 OF D14		

1.00 GENERAL

- 1.01 The plans have been evolved tentatively based on information available with Owner / Consultant but the dimensions and details etc. are liable to changes. The Tenderers shall not be entitled to claim any higher rate or compensation on this account. The tender drawings are intended mainly to give an indication of the probable type of construction. The successful Tenderers will, however, be required to execute the work as per detailed approved drawings issued to them from time to time. Steel structures can be changed to R.C.C. or vice versa. Owner reserves the right to add / delete any of the building works mentioned in the N.I.T., during the currency of the contract.
- 1.02 The Tenderers shall note that the quantities of the different Items, as given in the "Schedule of Rates" are tentative based on tentative tender drawings and are subject to variation and they shall not be entitled to claim any higher rate or compensation on this account. Owner / Consultant reserves the right to change / modify the size and type of sections at any time. Owner / Consultant does not guarantee work under each item of the Schedule of Quantities. The total quantum of work may vary up to $\pm 25\%$ on either side and nothing extra will be paid on this account. Quantum of individual item may vary to any extent.
- 1.03 The Tenderers shall be fully responsible for the correct setting out and execution of the work in accordance with approved drawings which will be supplied to them progressively. All tools, tackles, construction equipments etc., required for the successful execution / construction of the complete work shall be responsibility of the Tenderers.
- 1.04 The quantities given in the "Schedule of Rates" are approximate and are given only for the guidance for quoting rates. Payments on bills shall, however, be made on actual measurements of quantities of work done as per approved drawings. Unless otherwise specified, measurements of quantities shall be taken as per Indian Standards IS: 1200.
- 1.05 The rates to be inserted in the "Schedule of Rates" are to be inclusive of the value of the work described under several items including all costs and expenses which may be required for the construction of the work described together with all taxes, general risks, liabilities and obligations such as temporary buildings / hutments, fencing, watching, lighting, insurance, labour regulations, indemnity, maintenance and the like. The prices shall be inclusive of all labours, materials, tools, plants, equipment, hoists, tackles, scaffoldings, the sundries, etc., as may be necessary for the completion of the work in all respects.
- 1.06 No work shall be undertaken at site until detailed approved drawings have been issued by the Owner / Consultant in writing. Subsequent revision in the drawings which become necessary shall be incorporated and revised drawings issued to the Contractor who shall execute the work as per the latest revised drawings. Nothing extra will be paid on this account and no claim whatsoever will be entertained on this account. The Owner / Consultant reserves to themselves the right to modify / revise / alter etc. in any drawing supplied to the Contractor.

 <div>पी डी आई एल PDIL</div>	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT. NO.	REV.	
		PAGE D4 OF D14		

- 1.07 Any fabrication / construction done before final approval of the drawings shall be the Contractor's responsibility.
- 1.08 In case of any discrepancy between the description of items given in the "Schedule of Rates" and Specifications, drawings and other documents, the decision of the Owner / Consultant in writing shall be final, binding and conclusive for the purpose of this contract.
- 1.09 The term "Design and drawings" mentioned in the description of Items in the "Schedule of Rates" means the detailed approved design drawings marked "Good for Construction".
- 1.10 The work "As described", "As shown", "As directed" or "As approved", "As mentioned" in the description of Items shall mean as directed in design or detailed drawings and as directed by the Engineer-in-Charge.
- 1.11 The Owner shall furnish the Contractor with only reference points of the job site and a level bench mark, and the Contractor shall at his own cost and initiative, set out the works to the satisfaction of the Engineer-in-Charge but shall solely be responsible for the accuracy of such setting up notwithstanding satisfaction as aforesaid of the Engineer-in-Charge or any other assistance rendered by the Engineer-in-Charge for the purpose.
- 1.12 The Contractor shall provide, fix and be responsible for the maintenance of all stakes, templates, level marks, profiles and the like and shall take all precautions necessary to prevent their removal or disturbance, and shall be responsible for the consequence of such removal or disturbance and for their efficient and timely reinstatement. The Contractor shall also be responsible for the maintenance of all survey marks, boundary marks, distance marks and centre line marks, whether existing or supplied / fixed by the Contractor.
- 1.13 Before commencing the work, the Contractor shall at his own cost and initiative provide all necessary references, level posts, pegs, bamboos, flags, ranging rods, strings and other materials for proper layout of the work in accordance with the scheme for fixing bench marks acceptable to the Engineer-in-Charge. The centre of longitudinal or face line and cross line shall be marked by means of small masonry pillars. Each pillar shall have distinct mark at the center to enable a TOTAL STATION to be set over it. No work shall be started until all these points are approved by the Engineer-in-Charge in writing.
- But such approval shall not relieve the Contractor of any of his responsibilities in respect of the adequacy or accuracy, thereof. The Contractor shall also provide all labour, material and other facilities necessary for the proper checking of layout and inspection of the points during construction.
- 1.14 Pillars bearing geodetic marks located at the site / unit of works under construction should be protected and fenced by the Contractor.
- 1.15 On completion of works, the Contractor must submit to the Engineer-in-Charge the geodetic documents according to which the work was carried out.

 <div>पी डी आई एल PDIL</div>	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT. NO.	REV.	
		PAGE D5 OF D14		

- 1.16 The Contractor shall be exclusively responsible for the provision and maintenance of horizontal and vertical alignments and levels and for the correctness of every part of the work in accordance there with and shall at his own cost rectify any errors or imperfections therein.
- 1.17 The Contractor shall at all times during the progress and continuance of the works be responsible for and effectively maintain and uphold in good, substantial, sound and perfect condition of all / and every part of works and shall make good from time to time and at all times as often as the Engineer-in-Charge shall require any damage or defect that may during the above period arise in or be any way connected with works.
- 1.18 The portion which is under HOLD shown in the approved drawing or the portion which would be brought under HOLD during execution on account of coordinating different activities of other working agencies shall be taken up by the Contractor to execution only after the said HOLD is withdrawn. The Contractor on this account shall not be entitled to claim for any compensation.
- 1.19 The Contractor shall maintain adequate drainage facilities at the work site at all times during the execution of the work.
- 1.20 No compensation shall be made by the Owner / Consultant for any damage done by rain or traffic during the execution of the work.
- 1.21 The Contractor shall afford all reasonable facilities such as scaffolding etc., and cooperation to the various other agencies and Contractors, for services not included in this contract, who may be working on the site simultaneously so that entire work can proceed smoothly and simultaneously to a successful completion. The Tenderer must take all the aforesaid factors into consideration while quoting his rates. Nothing extra shall be paid on any ground out of or relating to the aforesaid factors.
- 1.22 For details of works, materials and workmanship, attention is invited to the "Schedule of Rates", Scope Drawings, Special Conditions of Contract, Materials and Job Specifications, this section, etc. and the Tenderers must quote the rates keeping in full view the requirement of the said documents.
- 1.23 Except otherwise clearly stated, CPWD Specifications with Correction Slips (latest) shall be followed in all Civil, Structural and other allied Works and in absence of CPWD Specifications for any work, relevant Indian Standard codes of practices (latest) shall be followed. Where there are no Specifications available for any work either in CPWD Specifications or in IS Codes of practices, the work shall be carried out as per the direction of Engineer-in-Charge.
- 1.24 The following notations have been used throughout the "Schedule of Rates" and Materials and job Specifications:

1.	Cu.M	Cubic Metre
2.	Sq.M	Square Metre
3.	m.	Metre
4.	mm	Millimeter

5.	Cm. / Cms.	Centimeter / Centimeters
6.	No. / Nos.	Number / Numbers
7.	Tonne / Te.	Metric Tonne
8.	Kg.	Kilogram
9.	RCC	Reinforced Cement Concrete
10.	PCC	Plain Cement Concrete



- 1.25 The quoted rates shall be applicable for all heights, depths etc. except otherwise clearly stated in the description of items and nothing extra shall be paid to the contractor on this account.
- 1.26 Description of items and mode of measurement for payment indicated herein shall override those given elsewhere if these are at variance.
- 1.27 Any materials / accessories / fittings etc. which may not be specifically mentioned in the description of items but which are normally used or necessary are to be provided by the contractor without any extra cost to Owner / Consultant and the work must be completed in all respects.

2.00 DEFINITION OF PLINTH

- 2.01 The portion of a structure between the surface of the finished ground and the surface of the floor immediately above the ground will be considered as plinth, which is generally 300 mm to 600 mm above finished ground level of the site area.
- 2.02 Plinth Level as shown in the drawing shall be treated as plinth level for the purpose of payment.

3.00 MATERIALS

- 3.01 The supply / procurement of all materials, required for the job, shall be the responsibility of the Contractor unless otherwise stated in the "Schedule of Rates" and elsewhere in the tender documents. The quality of the materials procured by the Contractor shall be subject to the approval of Engineer-in-Charge or his authorized representative before the materials are allowed to be used in the works. All the materials to be procured by the Contractor shall be in conformity with the CPWD Specifications with correction slips (latest) and in absence of which as laid down in the relevant Indian Standard Codes of practices (latest).
- 3.02 Transport of all materials shall be the Contractor's responsibility and it shall be at their own risk and cost.
- 3.03 The Engineer-in-Charge shall determine the suitability of materials to be used on the job and the Contractor shall get all materials approved by the Engineer-in-Charge. Any material procured and brought to site by the Contractor, found not to conform to the specifications and does not meet the approval of the Engineer-in-Charge, for use, will be rejected, and the Contractor shall remove and dispose off the same at his own cost and he shall not have any claim for compensation in this regard.

 पी डी आई एल PDIL	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE D7 OF D14		



4.00 TESTS

- 4.01 According to the nature and importance of works, Owner / Consultant will demand the conduct of tests on concrete and other building materials etc., in which case the Contractor shall get the same done at his own cost in a laboratory to be approved by the Owner / Consultant.
- 4.02 Providing and operating necessary measurements and testing devices, materials and consumables are included in the scope of work and the rates quoted shall be deemed to include the cost of such tests which are required to ensure achievement of specified quality of work.

5.00 EXECUTION OF WORK

5.01 EARTH WORK

- i) The prices for all excavations shall include for removing and clearing away all shrubs, bushes, roots etc.
- ii) The prices for all excavations shall also include for all leveling and ramming foundation beds, trimming of sides and bottom, grading to proper level as required.
- iii) Removal and carrying shall include for all loading, unloading and handling as may be necessary and also all necessary means of transport (Mechanical or animal or manual) as required.
- iv) The prices are also to include removal of water caused by rain, seepage, spring due to water table or any other cause, either by pumping or by bailing, that may accumulate in the trenches, foundations, pits, etc. It is likely that the subsoil water may encounter during excavation. The Contractor shall be responsible to remove all water accumulated in trenches, foundations, pits, etc. due to subsoil seepage, rainwater or from any other sources. For the above reasons, if the Contractor is required to install some special type of dewatering system, the same shall be arranged by the Contractor at his own cost and nothing extra shall be payable. The Contractor shall be fully responsible for removal of all water from the working area including necessary shoring and strutting, etc., wherever required, in order to maintain safe working condition and good engineering practice at his own cost and nothing extra shall be paid on this account.
- v) Where excavations are made in excess of the depth required the Contractor shall, at his own expenses, fill up to the desired level with lean concrete of nominal mix. 1:5:10 (1 cement: 5 coarse sand: 10 graded stone aggregate 40 mm nominal size).
- vi) In case of hard / dense soil, the last 150 mm depth of such depth specified in the drawing or decided by the Owner shall be excavated just prior to the laying of plain cement concrete bed.
- vii) In case surplus excavated materials are to be disposed off at different leads as per items in the "Schedule of Rates" the distance for such disposal shall be measured over the shortest practicable route as decided by Engineer-in-Charge and not necessarily the route actually taken by the Contractor for disposal. For the purpose



 पी डी आई एल PDIL	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE D8 OF D14		

of measurement of lead, the area excavated shall be divided into blocks (mutually agreed) and for each block the distance from center of the block to center of disposed material pertaining to this block shall be taken.



- viii) For payment of Earthwork in foundations / pits / trenches, etc., the mode of measurement of excavation, backfilling and disposal of surplus excavated material shall be over the mat concrete dimensions and for the depth as per drawing plus working space as required as per IS 1200. Extra excavation carried out by the Contractor with sloping sides or with larger base area or with extra deepening of trenches / pits / foundations, etc. in excess to working space required as per IS 1200 for working convenience shall not be measured and paid for. However, for the cases where waterproofing / acid proofing is indicated as per drawings on outer sides, the mode of measurement shall be as per IS: 1200.
- ix) Nothing extra shall be paid for sorting / screening of the excavated materials to obtain good earth for filling.
- x) Nothing extra shall be paid on account of any lift for disposal of excavated materials.
- xi) Proper precautions shall be taken during the excavations to prevent any damage to the existing structures, pipes, sewer lines etc. If such damage occurs, it shall be rectified by the Contractor at his own expense.

5.02 PLAIN AND REINFORCED CEMENT CONCRETE WORKS

- a. The prices for concrete beds and slabs are to include for laying on any type of subgrade, laying to falls or camber and for preparing surface to receive concrete.
- b. All concrete surfaces shall be finished to a fair face to give smooth and even surfaces and nothing extra shall be paid on this account.
- c. The prices are to include leaving pockets, cutouts and holes and to provide wooden boxes or any other suitable arrangement in R.C.C for providing pockets for bolts as per approved working drawings and nothing extra shall be paid on this account.
- d. All pockets / holes are to be properly covered by suitable means, so that dirt, rain water etc., should not enter the pockets / holes etc. No deduction in R.C.C quantity shall be made for pockets and nothing extra shall be paid for providing pockets as mentioned in para 5.02c above.
- e. For measurement of openings in plain concrete / R.C.C work, refer clause No. 4.13 of IS: 1200 (Part-3).
- f. Threads of bolts etc., which have already been fixed in the pockets, are to be greased and properly covered with gunny bags or polythene sheet to protect it from damage from all sources and nothing extra shall be paid on this account.
- g. The prices shall include for all rebating, throating, chamfering, weathering, moulding etc. to accord with the details shown in the approved working drawings.

 <div>पी डी आई एल PDIL</div>	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT. NO.	REV.	
		PAGE D9 OF D14		

- h. Nothing extra shall be paid for any intricate work for foundation of equipments and machinery (Static / Dynamic) in R.C.C walls and other superstructure work or in concreting in small and thin sections in P.C.C or R.C.C work.
- i. The prices for concrete are to include for hoisting and / or lowering to any heights and / or depth required and in any type of form work, packing around reinforcement wherever required and finishing the surfaces to fair and even surfaces.
- j. The prices shall include for working up or hacking of concrete surface for providing keys for further concrete work and shall also include all plane, rebated or grooved construction and other joints.
- k. All reinforced cement concrete used shall be of controlled concrete with designed mix and weigh batched conforming to IS : 456 unless otherwise specified. In all concrete and R.C.C work, broken graded coarse aggregate shall be used. The design mixes of concrete of different grades shall be established at the beginning of the work considering the required workability. However, if batching plant facility is not available, only nominal mix concrete is permissible.
- l. Concrete admixtures for workability, if necessary, may be used in R.C.C., if decided by the Engineer-in-Charge. No extra payment for material or mixing etc. shall be made on this account.
- m. Machine and equipment foundations shall mean all foundations including pedestals of vessels, towers, pumps, compressors, motors or any other equipment or machinery (both static and dynamic), pipe supports etc., and / or the like.
- n. The prices shall include applying cement slurry on reinforced cement concrete surfaces, keys of construction joints etc. @ 2.75 Kg/Sq.m of surface area of receiving cement concrete including roughening and proper cleaning etc., complete as directed by Engineer-in-Charge.
- o. The prices shall include for performing water tightness for all water retaining R.C.C structure as stipulated in IS: 3370 (Part-I), wherever specified in the drawing.
- p. Cement to be used for plain & reinforced cement concrete and other works shall be of Ordinary Portland Cement conforming to IS : 269 unless otherwise stated in the "Schedule of Rates" and elsewhere in this Section of NIT.
- q. Any concrete having honeycomb is not acceptable and shall be rejected and redone at contractor's cost.



 <div>पी डी आई एल PDIL</div>	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT. NO.	REV.	
		PAGE D10 OF D14		

5.03 REINFORCEMENT AND EMBEDMENTS

- a) Wastage in cutting will not be paid for. Steel actually fixed in position only will be paid by the linear measurement including hooks and laps. Lapping of bars will be allowed only where the required bar length exceeds the standard lengths available. All other laps provided, unless otherwise specified in the drawings, shall not be measured and paid for. Weight of binding wire shall not be measured for payment.
- b) Bars shall be issued in lengths and in forms as available in the stores. Nothing extra shall be paid for decoiling and straightening of the bars.
- c) Reinforcement are to be tack welded in addition to binding by 18 S.W.G annealed wire wherever necessary to improve efficiency of the joint. Bars of 28 mm diameter and above shall be provided with stitch weld in addition to binding with 18 SWG annealed wire and nothing extra shall be paid for stitch welding. Welding of mild steel plain and deformed reinforcements shall conform to IS: 2751, 'Code of practice for welding of mild steel plain and deformed bars for reinforced concrete construction'.
- d) The Contractor shall prepare the bar bending schedule for all reinforced cement concrete work as per the approved / "good for construction" drawings furnished by the Owner / Consultant and nothing extra shall be paid on this account.

5.04 SHUTTERING

- a. The prices for shuttering shall include for providing splayed edges, notching, chamfering, allowances for overlaps and passing at angles, battens, strutting bolting, wedging, easing, striking and removing.
- b. The concrete work should have ply wood / steel shuttering as not to require any plastering, after striking out the shuttering. Any concrete having honeycomb is not acceptable and is liable to be rejected and redone at Contractor's cost.
- c. The prices are also to include for all necessary supports, struts, braces, etc., dressing with shuttering compound and / or other approved method to prevent adhesion between concrete and form work and all raking for circular cutting and waste.
- d. The prices shall also include for all labour and materials necessary for providing form work at all heights and depths and including striking, dismantling the form work assembly etc. after the necessary stripping period of concreting is over and also making all the joints in shuttering fully leak-proof providing low density polythene sheets / bitumen paper.
- e. The prices shall also include for forming detailed design required for the form work and / or all other sundry labour.
- f. All shuttering shall be either plywood or steel shuttering to produce plain, smooth and even surfaces, which will thus be integrally finished. If any impressions of the shuttering joints are noticed after the striking of the

 पी डी आई एल PDIL	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE D11 OF D14		

shuttering, the same should be treated by rubbing with Carborundum stones and nothing extra shall be paid on this account.

- g. In case of dowel bars projecting out from R.C.C works such as columns, beams etc. nothing extra shall be paid for any special provision like making holes that may be required to be left in the form work.



5.05 MASONRY WORKS

The prices for brick work shall include the following:

- a. Fair face of brick work with selected brick with class designation 75 or as specified in the description of relevant Items in the "Schedule of Rates" from the lot.
- b. Raking out joints for plastering and pointing done as separate process of finishing joints, flush as the work proceeds.
- c. All rough and / or fair cutting and waste unless specifically stated otherwise.
- d. Plumbing to angles.
- e. Providing holes left or formed for fixing pipes etc.
- f. Forming reveals to the jambs, where fair cutting on exposed face is not involved.
- g. All masonry work shall be done using mortar with coarse sand.

5.06 WOOD WORK AND JOINERY

- a. All joiner's work shall include necessary nails and screws, and all other necessary materials.
- b. The description includes all necessary keys, wedges, dowels, hard or bamboo pins, pined tenon joints and cleaning of nail heads.
- c. Nothing extra will be paid for rebated and / or splayed meeting stiles of doors and Windows.



 पी डी आई एल PDIL	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 एन एफ एल NFL
		DOCUMENT. NO.	REV.	
		PAGE D12 OF D14		

5.07 STRUCTURAL STEEL WORK

- a. The weight of structural steel work for the sake of payment shall be calculated by linear measurements and unit weight taken from the relevant IS codes based on approved fabrication drawings assuming all members to be cut square without making any deduction for bolts, bevel ends or edges, beveling of plates. Gusset plates shall be paid for minimum rectangle enveloping their actual periphery.
- b. Welds, black-bolts, high tensile bolts, nuts, plain and tapered washers etc. shall not be measured and paid for. Rate for the structural steel work shall be deemed to include the same. Nothing extra shall be paid on this account.
- c. Nothing extra shall be paid over the unit rates for structural members to be built up by butt or fillet welding as indicated in the approved fabrication drawings or as per the instruction of Engineer-in-Charge, from either:
 - i. Plates.
 - ii. Two or more rolled steel sections.
 - iii. One or more rolled steel sections and plates.
- d. Nothing extra shall be paid over the unit rates for sealing the joints of box sections made out of channels or joists by continuous butt welding.
- e. All paints and primers specified in various Items in the "Schedule of Rates" shall be best quality of approved brand and manufacturer such as M/s. Asian Paints, M/s. Berger Paints (India) Ltd., M/s. Johnson & Nicholson and / or other equivalent paint approved by the Engineer-in-Charge.
- f. On box / compound sections, the painting shall be done before fabrication on all those surfaces which become inaccessible after fabrication.
- g. Prior approval of the Engineer-in-Charge shall have to be obtained for changing the sections due to non-availability of certain sections and using built-up sections / compound sections and nothing extra shall be paid on this account.
- h. The word "Fabrication" wherever used for the description of work herein shall include:

Straightening, cutting, notching, beveling, drilling or cutting holes, necessary welding, fastening, etc. to prepare the structural member as per fabrication drawings.
- i. The word "Erection" wherever used for description of work shall include:

Hoisting, putting in position at all required heights, aligning and fixing with necessary welding, bolting and / or other fasteners as per approved drawings and technical specifications with all safety standards.

 <div>पी डी आई एल PDIL</div>	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT. NO.	REV.	
		PAGE D13 OF D14		



- j. Preparation of "AS-BUILT" construction drawings incorporating all approved changes at site shall be in Contractor's scope of work and it shall be considered included in relevant Items of the "Schedule of Rates".
- k. For sand blasting / painting by the specialised agency other than indicated in the NIT, if proposed by the Contractor, the same shall be got approved from the Engineer-in-Charge at site.
- l. The Contractor shall prepare design of joints and detailed fabrication and erection drawings in sequence of erection on the basis of detailed design drawings supplied by the Owner / Consultant from time to time. Nothing shall be paid extra on this account. The above fabrication drawings must show clearly all shop and site joints and connection with erection marks on each loose parts.
- m. The Contractor shall submit his design calculations for the design of joints. All joints shall be designed for full strength of the members or otherwise as indicated in the design drawings.
- n. The design calculations of joints and fabrication drawings will be checked and approved by the Owner / Consultant as per mutually agreed time schedule and the Contractor should strictly adhere to these approved drawings and specifications. Fabrication work shall be taken up only with the approved fabrication drawings.

5.08 STEEL AND ALUMINIUM DOORS, WINDOWS & VENTILATORS

- a. The prices are to include for necessary hardware fittings and fixtures as specified and fixing to frames with necessary lugs etc., all necessary chases, holes, etc., grouting of holes and making good to match after doors, windows and ventilators, etc. are fixed. The price of steel doors / windows / ventilators is also to include application of required primer and paint of approved shade, make and manufacturer.
- b. The prices shall also to include for providing good quality glass panes of required thickness as indicated in the "Schedule of Rates".

5.09 FLOORS AND BASES

- a. The price for hard core shall include for all labour in laying to falls or camber, hand packing, edges of haunches forming splayed edges, watering and rolling with power driven roller and ramming wherever required to solid compaction.
- b. The prices shall include also for works at all heights and depths.

 <div>पी डी आई एल PDIL</div>	PREAMBLE TO SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-PR-101	0	 <div>एन एफ एल NFL</div>
		DOCUMENT. NO.	REV.	
		PAGE D14 OF D14		

5.10 MISCELLANEOUS



- i) The Contractor may have to splice shorter length of structural steel members to obtain required length at site. If extra pieces of materials are required for splicing (say for lap jointing) then the same will be measured and paid for in the relevant structural steel items and nothing extra on any other account shall be paid to the Contractor for such splicing.
 - ii) The Contractor should note that steel wedges, packing plates, shim plates, etc. used by them for leveling and alignment of structural members are to be considered erection devices and these should be taken out after proper alignment is over to the satisfaction of Engineer-in-Charge. Such erection devices shall neither be measured nor paid for.
- a) FLOORS AND BASES
- i) The price for hard core shall include for all labour in laying to falls or camber, hand packing, edges of haunches forming splayed edges, watering and rolling with power driven roller and ramming wherever required to solid compaction.
 - ii) The prices shall include also for works at all heights and depths.
- b) FINISHING WORKS
- i) The prices shall include for work at any height / depth and for all necessary scaffolding etc. as required.
 - ii) The prices shall include for providing and laying of materials for all the items of plaster and also raking to form key for plaster and for all work in narrow width, formed angles, chamfered external angles and for making good the faces.
 - iii) The Contractor may have to splice shorter length of structural steel members to obtain required length at site. If extra pieces of materials are required for splicing (say for lap jointing) then the same will be measured and paid for in the relevant structural steel items and nothing extra on any other account shall be paid to the Contractor for such splicing.
 - iv) The Contractor should note that steel wedges, packing plates, shim plates, etc. used by them for leveling and alignment of structural members are to be considered erection devices and these should be taken out after proper alignment is over to the satisfaction of Engineer-in-Charge. Such erection devices shall neither be measured nor paid for.
 - v) Contractor shall install mini batching plant of suitable capacity within the plant premises at their own cost. The place for mini batching plant shall be provided by client.

 पी डी आई एल PDIL	PROJECTS & DEVELOPMENT INDIA LTD	EM265-PNCV-SR-101	0	 एन एफ एल NFL
		DOC. NO.	REV.	
		PAGE E1 OF E27		

SCHEDULE OF RATES
FOR
CIVIL, STRUCTURAL AND OTHER ALLIED WORKS
FOR
FOR AMMONIA-II + CPP AREA AND MP STRIPPER SYSTEM
FOR ESP-II PROJECT, AT
NATIONAL FERTILIZERS LIMITED, VIJAIPUR– INDIA



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

	EARTH WORKS:					
i)	The prices for all excavations are to include for removing and clearing away all shrubs, bushes, roots, removal of staked material & disposing the same from the site etc, as per direction of owner /consultant.					
ii)	The prices are also to include for all levelling and ramming foundation beds, trimming of sides and bottom grading to proper level as required mechanically or manually.					
iii)	Removal and carrying shall include for all loading, unloading and handling as may be necessary and also all necessary means of transport (Mechanical or animal or manual as required).					
iv)	The prices are also to include removal of water from all kinds of sources, either by pumping or by bailing, that may accumulate in the trenches, foundations, pits etc. The contractor shall be responsible to remove all water accumulated in foundations/pits / trenches etc, due to subsoil seepage, rainwater or from any other source. The water table is generally 0.15 m to 0.9m below GL. Even if the contractor is required to install some special type of dewatering system such as well point system for lowering water table, the same shall be arranged by contractor and no extra payment shall be made to contractor for it. The contractor shall be fully responsible for removal of all water from its working area.					

	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E2 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

	However, in cases where any items or materials indicated in drawings or elsewhere in N.I.T, or required to complete work should be included.					
v)	Nothing extra shall be paid on account of any lift for disposal of excavated materials.					
vi)	Where excavation are made in excess of the depth required, the contractor shall at his own expense fill up to the desired level with lean concrete of mix 1.5.10 as suitable in consultation with owner/consultant					
vii)	The prices are also to include for the removal of water caused by rains/seepage etc. either by pumping or by bailing out that may accumulate in the trenches and foundation pits etc. The proper cleaning of trenches mechanically and manually as required.					
viii)	The tentative quantity of major item of civil work has been considered, all other items required to be executed but not covered here has to be envisaged by Bidder to complete the work in all respect and to make it functional shall to include in price. Nothing extra will be entertained. The item and quantity are indicative and may vary on either side while actual execution at site .Bidder to envisage and include while pricing/quoting.					



	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E3 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

A	EXCAVATION AND BACKFILLING					
A-01	<p>Excavation to required side slopes below ground level in all kinds of soils as defined in IS: 1200 for foundations of buildings, footings, columns, plinth beams, walls, machine/ equipment foundations, isolated pits, pavements, trenches for pipelines /cables, pipe sleepers, drains, etc., to the required levels and grades in both dry and wet conditions, including dressing of sides and ramming of bottoms, getting out excavated earth with lift upto 1.50 M and disposal of surplus excavated materials within a lead of 50 M including stacking, levelling and dressing etc., including providing temporary supports to all service lines such as overhead and underground water, sewage and drain pipes, cables etc. and shoring and strutting including dewatering wherever necessary, complete in all respects as per direction of Engineer-in-Charge.</p> <p>Note: As the work is to be done in running plant and close to existing equipment, Excavation within battery limit of Plant, manual excavation is preferred. Use of JCB / excavation Machinery shall be permitted depending on the site Specific conditions at the discretion of Engineer In Charge.</p>	Cu.M	1000			
A-02	Same as Item No. A-01, but lift from 1.5 M to 3.0 M.	Cu.M	100			



	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E4 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	
A-03	Same as Item No. A-01, but In Ordinary Rock (not requiring blasting, wedging or similar means) as defined in IS: 1200 including disintegrated rock (Copra).	Cu.M	500			
A-04	Same as Item No. A-03, but lift from 1.5 M to 3.0 M.	Cu.M	50			
A-05	Same as Item No. A-01, but in hard rock (Blasting prohibited) as defined in IS: 1200.	Cu.M	100			
A-06	Same as Item No. A-05, but lift from 1.5 M to 3.0 M.	Cu.M	50			
A-07	Disposal: Removal and carriage of surplus excavated earth, debris, etc., from the site of work to other areas anywhere within the factory/plant battery limits beyond the initial lead of 50 M and spreading and levelling the same in layers not exceeding 20 cm thickness including loading and unloading as per the direction of Engineer-in-Charge.	Cu.M	600			
A-08	Backfilling: Filling with available excavated good earth (excluding rocks / boulders), as approved and directed by Engineer-in-Charge, in trenches, plinth, under floors, sides of foundation etc., at all depths in layers not exceeding 20cm. in thickness including consolidating and dressing each deposited layer by ramming and watering with lead upto 50 metres, complete in all respects.	Cu.M	750			



	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E5 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	



A-09	Backfilling: Supplying and filling with selected good earth brought from source approved by the Engineer -in-Charge(Rate shall include Royalty, Taxes, Octoroi, etc., levied by the local authorities, all transportation, loading and unloading, etc., and nothing extra will be paid on this account).	Cu.M	50			
	CONCRETE WORKS					
B.	PLAIN CEMENT CONCRETE :					
B-01	Providing and Laying Plain Cement Concrete (PCC) of 1:4:8 (1 cement: 4 coarse sand: 8 graded stone aggregate 20 mm nominal size), machine mixed and mechanically vibrated in foundations and plinth beams, for rafts, footings, bases of pedestals, trenches and pits, machine and equipment foundations, pile caps, pipe supports, etc., including all necessary cost of centring and shuttering, complete in all respects as per direction of Engineer-in- Charge.	Cu.M	75			
B-02	Supplying & Laying Plinth Protection with 100mm thick Plain Cement Concrete of nominal mix 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size).with minimum cement content as per specification, 20 mm downgraded coarse aggregate laid over base formed with broken bricks or rubble compacted to a thickness of 150mm and well compacted soil to desired slopes as indicated on drawing including scaffolding, shuttering, vibrating, curing, finishing etc. complete as per specification and as directed by the Engineer. (Shuttering shall be deemed to be included in the rate).	Sq.M	50			

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E6 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	
B-03	Providing, mixing, laying Screed Concrete of grade M-15 with 12.5mm downgraded coarse aggregate over RCC roof including curing, laying to slope, finishing top surface to receive water proofing treatment complete as per specifications/drawings and as directed by the Engineer.	Cu.M	5			
C	REINFORCED CEMENT CONCRETE (RCC): FOR FOUNDATION AND PLINTH					
C-01	Providing and laying reinforced cement concrete of grade M-30 (using 20 m m. nominal gauge graded stone aggregate) with minimum cement content of 400 Kg/Cu.m of concrete machine mixed and mechanically vibrated and finished to a fair face but excluding the cost of centring, shuttering and reinforcement in foundation and plinth, for rafts, footings, bases of columns, pedestals, beams, walls, columns, slabs, machine and equipment foundations, pile caps, box sections, pipe supports, etc., complete in all respects as per direction of Engineer-in-Charge. Note: For Pump / Compressor foundation and water retaining structure only	Cu.M	50			
C-02	Same as Item No. C-01, but in walls of any thickness, shape or size including attached buttresses, pilasters and their caps and bases.	Cu.M	20			



	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E7 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	
C-03	Providing and laying reinforced cement concrete of grade M-25 (using 20 m m. nominal gauge graded stone aggregate) with minimum cement content of 350 Kg/Cu.m of concrete machine mixed and mechanically vibrated and finished to a fair face but excluding the cost of centring, shuttering and reinforcement in foundation and plinth, for rafts, footings, bases of columns, pedestals, beams, walls, columns, slabs, machine and equipment foundations, pile caps, box sections, pipe supports, etc., complete in all respects as per direction of Engineer-in-Charge.	Cu.M	450			
C-04	Same as Item No. C-03, but in walls of any thickness, shape or size including attached buttresses, pilasters and their caps and bases.	Cu.M	50			
C-05	Providing and laying reinforced cement concrete of grade M-20 in pavement floors/grade slab (using 20mm. nominal gauge graded stone aggregate) machine mixed and mechanically vibrated and finished to a fair face but excluding the cost of centring, shuttering and reinforcement in slabs at ground floor level. Floors are to be cast in the panel of 3 metre x 3 metre with vroom finish complete in all respects as per direction of Engineer-in-Charge.	Cu.M	50			

	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E8 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

	FOR SUPERSTRUCTURE:					
C-06	Providing and laying reinforced cement concrete of grade M-25 (using 20 mm. nominal gauge graded stone aggregate), with minimum cement content of 350 Kg/Cu.M of concrete, machine mixed, mechanically vibrated and finished to a fair face but excluding the cost of centering, shuttering and reinforcement in superstructure at all heights for columns, pillars, posts, attached pilasters, portals, struts, inclined posts, pedestals for equipments and similar vertical members, etc., complete in all respects as per direction of Engineer-in-Charge.	Cu.M	200			
C-07	Same as Item No. C-06, but in walls of any thickness, shape or size including attached buttresses, pilasters and their caps and bases.	Cu.M	30			
C-08	Providing and fixing in position precast reinforced cement concrete of grade M-25 (using 12.5 mm. nominal gauge graded stone aggregate) trench/ drain covers, in foundation and plinth, machine mixed, mechanically vibrated and finished to a fair face including centering, curing, shuttering etc. at all levels for all type of works including all pockets, slits, slots, etc. for lifting hook or surface drainage etc. including cost of all labour, material, equipment, transportation, loading, unloading, etc. with pre-fabrication moulds for manufacture of pre-cast units, MS erection fixtures etc. for laying at any elevation but excluding the cost of steel, reinforcing bars and their binding etc. all complete as per specification and as directed by the Engineer. (Fixing steel reinforcement and embedded steel if any will be paid separately under relevant items).	Cu.M	5			

	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E9 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

	GROUTING					
C-09	Providing and laying " SHRINKKOMP- 10 " or any other approved equivalent anti-shrinkage grouting in pockets, under base plates of light static equipments, structural steel columns, etc., and as specified in the drawing, complete in all respects as per direction of Engineer-in-Charge.	Cu.M	3			
C-10	Providing and laying " SHRINKKOMP- 20 " or any other approved equivalent anti-shrinkage grouting in pockets, under base plates of pumps etc., and as specified in the drawing, complete in all respects as per direction of Engineer-in-Charge.	Cu.M	2			
C-11	Providing and laying " SHRINKKOMP- 30 " or any other approved equivalent anti-shrinkage grouting in pockets, under base plates of Compressor equipments and as specified in the drawing, complete in all respects as per direction of Engineer-in-Charge.	Cu.M	1			
C-12	Providing and fixing in position shalitex board in expansion joints or around machine foundations or in floors with necessary shalitex sealing compound, complete in all respects as per direction of Engineer-in-Charge :					
a)	25 mm thick.	Sq.M	10			
b)	50 mm thick.	Sq.M	10			



	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E10 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	



D	REINFORCEMENT AND EMBEDMENTS :					
D-01	Supplying, cutting, bending, hoisting, placing in position and binding with 18 S WG annealed wire, high yield strength deformed reinforcements as per IS: 1786 for all R.C.C. works including all necessary handling at all heights and depths complete in all respects and as per direction of the Engineer-in Charge. (Fe 500D of only TATA/SAIL/JSW/RINL make steel to be used)	MT	100			
D-02	Anchor Bolts: Supplying, fabricating and fixing in position M.S. holding down bolts assembly consisting anchor bolts, heads, nuts, washers etc., and the like including embedding in cement concrete/R.C.C. works as per approved drawings complete in all respects including one coat of approved quality anti-corrosive paint over a coat of approved quality primer. (All material supply is in contractor's scope.)	Kg.	3000			
D-03	Insert Plates: Supplying, fabricating, erecting and fixing in position to line and level all M.S Inserts such as anchor plates, angles, tees, channels, plates with lugs, hooks, sleeves etc. embedding in cement concrete /R.C.C. works at all levels including welding, bolting, drilling, cutting, scaffolding, holding in position, providing one coat of approved anti-corrosive paint and / or Bituminous paint on exposed surfaces, etc. all complete in all respects and as per specifications, drawing and as per direction of Engineer-in-Charge.(Templates if any required for fixing the inserts will not be paid for).	Kg	4000			

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E11 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	
D-04	Pipe Sleeves : Supplying, fabricating and fixing pipe sleeves made out of 20 gauge black M.S. Sheet in all R.C.C. works with necessary anchor plates etc. complete in all respects and as per direction of Engineer-in-Charge.(all material supply is in Contractor's scope of work)	Kg	100			
D-05	Fixing in position and embedding in cement concrete/R.C.C. works M.S. holding down bolts with nuts and washers, fixtures, anchor plates, insert plates, pipe sleeves and the like as per approved drawings complete in all respects including providing one coat of approved quality anti-corrosive paint over a coat of approved quality primer. (M.S. holding down bolts inserts plate, fixtures etc. shall be supplied by Owner/vendor free of cost at their stores at site).	Kg.	500			
E	STRUCTURAL STEEL :					
E-01	Supplying, de-rusting by shot blasting fabricating, erecting, hoisting and fixing in position structural steel work in rolled steel joints, channels, angles tees, flats, plates, lattice members built up / compound sections in columns, portals, girders, beams, bracings, trusses, Purlins, rafters, staircase, steps, hand-railings, walkway, toe plates, side walling, trestles, Conveyor gantries etc. including gusset plates, anchor plates etc., including site and shop fasteners, riveting, bolting, welding at shop or work site at all heights etc. & epoxy painting complete as per drawing and direction of Owner / Consultant. (All material supply is in contractor's scope including paints (As per TS). (only TATA/SAIL/JSW/RINL make steel to be used)					

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E12 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	
a)	With providing and applying two coats of epoxy zinc chromate primer of approved quality on structural steel work after the preparation of surfaces including providing and applying finished coats epoxy base paint of approved make in 3 coats at a dry film thickness of minimum 200 microns(for three coats) on structural steel work complete in all respects as per specifications and di rection of E ngineer-in-Charge. (1 kg. of epoxy base paint of approved make covers average 8 to 9 Sq.M. per coat, including surface preparation by Shot blasting / power driven brushes.	MT	60			
E-02	Supplying, transporting, de-rusting, and fabricating s tructural steel work in cat ladders and cages at all heights including brackets, cleats, plates, rungs, chain, pins, hinges, etc., framed, bolted and/or welded together and f ixed in position including necessary plugs and plugging and preparing surface, applying one coat of red oxide zinc chromate primer and one c oat of Synthetic Enamel paint after fabrication and second coat of synthetic enamel paint after erection, with approved colour, shade and brand etc. complete in all respects and as per direction of Engineer-in-Charge.	MT	5			
E-03	Supplying of bolts (from 12 mm. to 52 mm. dia.), nuts, plain and tapper washers for fixing equipments on s tructures, as per drawings and di rection of Engineer-in-Charge. Bolts shall conform to property class 8.8 of IS: 1367.	Kg	300			



	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E13 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	
E-04	Supplying, transporting, fabricating as per approved fabrication drawings 30 mm. thick hot dip Galvanised (86 microns thick) M.S. grating made out of M.S flats as main members and Tor Steel bars as secondary members, all welded together to form a perfect mesh including getting those grating planks inspected and approved by Client/ Consultant, transporting to site, erecting and fixing in position these grating planks at all heights with necessary G.I. clips/ G.I. clamps tack welded for making floors, platforms, stair steps, etc., as required at site as per direction of Engineer-in-Charge (The rates shall include cost of G.I. clips/ clamps. The Contractor may procure gratings from grating manufacturer approved by Engineer-in-Charge. The rates shall also include all charges incurred during inspection and testing).	MT	15			
E-05	Providing and fixing M.S.Pipe hand railing (medium grade) conforming to IS-1239 consisting of top and middle horizontal rails of 32 mm dia. and 25mm dia. nominal bore respectively, 1050 mm high upright members of 32 mm dia. nominal bore at 2000 mm maximum distance centre to centre of each member including all joints, bends, elbows, and specials as required and upright members welded or bolted to structural steel work/toe plates or welded to M.S. insert plates with M.S. lugs embedded in R.C.C. works, complete in all respects and the cost includes preparing surface, applying one coat of red oxide zinc chromate primer and one coat of Synthetic Enamel paint after fabrication and second coat of synthetic enamel paint after erection, with approved colour, shade and brand etc. complete as directed by Engineer In Charge. (Toe plate and Insert plate shall be paid under separate respective items)	MT	20			

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E14 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

F	SHUTTERING :					
F-01	Providing, fabricating, erecting and fixing in position with bolts and nuts, nails and ties, etc., centring and shuttering materials true to line and level, including strutting, propping, staging etc. with necessary bracing in all axes to give a stable assembly including chamfering the corners of columns and beams etc., wherever required including making joints in the shuttering fully leak-proof, including striking, dismantling and removing the aforesaid assembly after concreting is over, including all labour and materials complete in all respects and as per direction of Engineer-in-Charge :					
a.	FOR FOUNDATION AND PLINTH					
(i)	Foundation and plinth in rafts, footings, columns, pedestals, beams, walls, slabs, machine and equipment foundations, pile caps and pipe support foundations, etc.	Sq.M	1400			
b.	FOR SUPERSTRUCTURE:					
(i)	Columns, beam wall, roof, pillars, posts, struts, inclined posts, attached pilasters, portals and similar vertical members.	Sq.M	600			
(ii)	Walls of any thickness, height and shape including attached buttresses, pilasters, and their caps and bases, etc.	Sq.M	250			

	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E15 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

G	FLOORS AND BASES					
G-01	Providing and laying of hard core /crushed stone of approved quality and size below grade slabs, foundations at any depth and to any thickness carried out in layers not exceeding 150 mm. in thickness with interstices between the stones wedged in with smaller stones of suitable size, coarse aggregate of size 90mm to 40 m m and down and filled in interstices including cost of sand and coarse aggregates, its transportation, loading, unloading, watering, ramming, blinding and well consolidating, compacting, all labour, equipment, etc. complete in all respects as per direction of Engineer-in-Charge.(Payment shall be made for finished thickness of hard core)					
(a).	Consolidation by hand/ mechanical rammers	Cu.M	80			
G-02	Providing and laying 50mm thick cement concrete flooring with metallic concrete hardener topping (ironite), in workshop & warehouse building at various elevations, consisting of under layer 28mm average thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 10mm nominal size) and top layer 12mm thick metallic cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 stone aggregate 6mm nominal size) by volume (Ironite shall be added in mix @ 1.5 kg / m ²) including finishing of joints at maximum two (2) metres interval, or any surface, and including 40mm wide and 4mm thick glass strip placed between the panels including labour, materials and equipment and curing including scouring of surface providing necessary shape etc. complete in all respects and in accordance with specifications and direction of the Engineer.	Sq.M	200			

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E16 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

H	BRICK, PLASTERING, PAINTING AND FINISHING WORKS					
H-01	Providing and laying in position Brick wall 230mm thick with locally available best quality burnt brick work using bricks of class designation 7.5 in cement mortar 1 : 6 (1 cement: 6 coarse sand) for all kinds of works, including all labour, material, equipment, handling, transportation, etc., mixing mortar, laying bricks, raking out joints, scaffolding, staging, curing, dressing, forming expansion joint (without filling), including making holes / openings upto 0.1 m2 etc., all complete, as per specifications, drawings and instruction of the Engineer.					
	a) Upto foundation and plinth level.	Cu.M	10			
	b) Superstructure at all heights.	Cu.M	70			
H-02	Providing and laying in position half brick masonry / 115mm thick with locally available best quality burnt brick work using bricks of class designation 7.5 in cement mortar 1 : 4 (1 cement: 4 coarse sand) with two numbers 8 millimetre diameter M.S. reinforcement at every third course embedded in superstructure at all heights for all kinds of works, including all labour, material, equipment, handling, transportation, etc., mixing mortar, laying bricks, raking out joints, scaffolding, staging, curing, dressing, forming expansion joint (without filling), including making holes / openings upto 0.1 m2 etc., all complete, as per specifications, drawings and instruction of the Engineer. (The rate shall include the cost of reinforcement).	Sq.M	10			

	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E17 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

	PLASTERING					
H-03	Providing 15mm (9mm thick in CM 1:5 + 6mm thick in CM 1:6 with approved water proofing compound) cement plaster on exterior surfaces in two layers vertical, horizontal or curved upto any elevation and heights including the cost of all materials, equipment, labour, scaffolding, curing, as per specification and the direction of Engineer-in-charge.	Sq.M	500			
H-04	Providing 12mm thick cement plaster on interior surfaces vertical, horizontal or curved upto any elevation and heights in cement mortar 1:6 including the cost of all materials, equipment, labour, scaffolding, curing, chicken wire mesh etc. as per specification and the direction of Engineer-in-charge.	Sq.M	550			
H-05	Providing 6mm thick cement plaster on ceiling wherever directed by the Engineer in 1:3 (cement: sand) mortar including the cost of all materials, equipment, scaffolding, chicken wire mesh etc. complete.	Sq.M	250			
H-06	Repairs to plaster of thickness 12 mm to 20 mm in patches of area 2.5 sq. meters and under, including cutting the patch in proper shape, raking out joints and preparing and plastering the surface of the walls complete, including disposal of rubbish to the dumping ground, all complete as per directions of Engineer-In-Charge.					
	a) With cement mortar 1:4 (1 cement : 4 fine sand)	Sq.M	10			

	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E18 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

	PAINTING					
	Note: The prices for painting are to include all preparatory work required for the treatment described, finishing to approved tints touching up all defective portions and leaving all clean and perfect complete, with 1st quality paint.					
H-07	Providing and applying two (2) coats of water proof cement paint over walls(external surfaces) of plastered surfaces as per IS 5410 of approved brand and manufacturer (Snowcem or equivalent approved by the Engineer-in-charge) and in approved shades to plastered surfaces at all elevation and heights including cleaning and preparing the wall surface, scaffolding, curing, Cleaning stain from floors, walls, glass panes etc. all complete as per specifications, drawings, and instructions of the Engineer.	Sq.M	520			
H-08	Providing and applying two (2) coats of Oil bound washable distemper paint over walls(Inside) of plastered surfaces as per IS 161, of approved manufacturer and in approved shades, including cleaning and preparing the wall surface, one layer of primer with distemper primer, curing, labour, material, scaffolding, equipment, handling, transportation etc. Cleaning stain from floors, walls, glass panes etc. all complete as per specifications, drawings, and instructions of the Engineer. etc. at all elevations.	Sq.M	770			

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E19 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

H-09	Providing, supplying and Painting of two coats of 85/25 as per IS: 702, mixed with 1% of antistripping compound meeting the requirement of IS: 6241 industrial grade Hot Bitumen at the rate of 1.7 kg/sq.m/layer in foundation and plinth over dry RCC / Cement Concrete Surfaces (both horizontal and vertical surfaces) such as all equipment foundations, column footings, columns, beams, pedestals, etc after cleaning with brushes and finally with cloth soaked in kerosene oil. Including necessary preparation of surfaces such as scraping removal of loose particles, dust thorough cleaning, etc., complete in all respects and as per direction of Engineer-in-Charge.	Sq.M	100			
I	ACID AND ALKALI RESISTANT TILES :					
I-01	Supplying and laying of acid and alkali resistant tiles including one coat of Bitument primer followed by 12 mm thick bitumastic layer,set in potassium silicate bedding mortar and jointed with epoxy based material (overall 50 mm thick) including all labour, materials, equipment, scaffolding, handling, transportation ,cleaning etc. complete in all respects and as per direction of Engineer-in-Charge.					
a)	10 mm thick acid and alkali resistant tiles for skirting/dado	Sq.M	250			
b)	25 mm thick acid and alkali resistant tiles for flooring	Sq.M	400			

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E20 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

J	ROOFING					
J-01	Providing & fixing 6 mm. thick non asbestos corrugated cement sheets/ridges/corners with necessary J/L hooks at all heights including scaffolding etc. complete as directed	Sq.M	20			
J-02	Providing & applying two coats of synthetic enamel painting over one coat of primer of approved manufactured as directed to steel surface.	Sq.M	20			
J-03	Dismantling of roofing at any height including ridges, hips, valleys and gutters etc., and stacking the material within 50 metres lead.	Sq.M	10			
K	DISMANTLING AND DEMOLISHING					
K-01	<p>Dismantling of existing Plain Cement Concrete paved area including under-layers and floor finish for new construction including disposal of materials within 50 m lead and making good the same after new construction is over and complete as directed by Engineer-in-Charge.</p> <p>Note: Measurement of surface area of floor shall be taken Plain Cement Concrete (PCC) size of new foundation as per drawing plus working space as required as per IS 1200. Breaking of Floor in excess to working space required as per IS 1200 shall not be measured and paid. Further rectification of excess broken floor shall be at the cost of contractor and nothing shall be paid for excess breaking of floor”.</p>	Sq.M	60			



	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E21 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

K-02	Demolishing of existing reinforced cement concrete work at all heights/ depths including cutting and stacking of steel reinforcements and disposal of unserviceable materials within a lead of 50 metre and handing over reinforcements to the Owner's/Consultant's store at site, complete as directed by Engineer-in-Charge.	Cu.m	170			
K-03	Demolishing existing brick work in cement mortar (any proportion) at any heights/depths including stacking of serviceable materials and disposal of unserviceable within a lead of 50 metres, complete as directed by Engineer-in-Charge.	Cu.M	5			
K-04	Dismantling existing RCC/Cement concrete storm water drain completely, stacking out of serviceable materials and disposal of unserviceable materials within 50 m lead or as directed by Engineer-in-Charge.	M	10			
K-05	Renewing existing RCC/Cement concrete storm water drain, after new construction of culvert over drain is over, for the dismantled area (excluding the culvert position) and making good the same as the existing shape. (culvert construction shall be paid separately) :	M	10			
K-06	Dismantling the existing structural steel works in columns, portals, beams, girders, bracings, trusses, rafters, Purlins, staircases, steps, gantries, trestles, walkways, railing, side runners, louvers, etc., in single section / built up or compound section in	MT	5			



	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E22 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	
	R.S. joists, channels, angles, tees, plates, base plates, lacings, bolts, nuts, cutting rivets / welding at all heights including stacking separately the serviceable, handing over the same to the Owner's/Consultant's store at site and disposal and stacking of unserviceable materials at scrap yard within plant premises, complete in all respects and as directed by Engineer-in-Charge.					
K-07	Dismantling of existing M.S. Grating upto the area of floor to be dismantled including stacking of materials at scrap yard within plant premises and making good the remaining portion upto the area as shown in the drawing or as directed by Engineer-in-Charge	Kg.	100			
K-08	Chipping of R.C.C/ P.C.C. and making good as directed by Engineer-in-charge	Cu.M	5			
K-09	Repairing & Renewing existing RCC/Cement concrete works in patches including chipping / dismantling the damaged portion to required depth/thickness and re-doing the same with rich cement concrete/ cement mortar and making good the same as the existing shape. Including scaffolding, centering, shuttering and disposal of unserviceable material within 50 metres leads.etc. Complete in all respects as per direction of Engineer-in- Charge.	Cu.M	5			

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E23 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

L	DOORS, WINDOWS, VENTILATORS, ROLLING SHUTTERS (Rate shall be inclusive of cost of all required hardware)					
L-01	Providing, erecting and fixing in position at all heights steel glazed windows and ventilators conforming to IS: 1038 and IS: 7452 of standard rolled steel sections, joints mitred and welded with 15 X 3 m m. lugs, 10 c m. long, embedded in cement concrete block 15X10X10 cm. of 1: 3: 6 (1 cement: 3 coarse sand: 6 graded stone aggregate 20 mm. nominal size) or with wooden plugs and screws, or with rawl plugs and screws, or with fixing clips, or with bolts and nuts, or frames welded to adjoining structural steel members as required, including providing and f ixing 4 m m. thick good quality glass panes with glazing clips and special metal sash putty of approved make, necessary hinges or pivots, peg stays, pressed steel handles, etc., including providing and applying painting (Rate shall be inclusive of cement concrete blocks) :					
a)	With two coats of synthetic enamel paint of approved quality over two coats of red oxide zinc chromate primer conforming to IS-2074 :					
	i) Openable windows and ventilators (top hung or centre hung).	Sq.M	100			
	ii) Partially fixed and partially openable windows and ventilators (top or centre hung).	Sq.M	100			
	iii) Fixed type windows and ventilators.	Sq.M	50			

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E24 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	



SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

L-02	Providing, fabricating, erecting and fixing in position at all heights M.S. sheet steel door shutter with frames and diagonal braces of M.S. channel, angle, gusset plates at junctions and corners including M.S. lugs, pivotal arrangement, hinges, tower bolts, locking arrangements, handles and welded with 15 x 3 mm lugs 10 cm. long with steel lugs embedded in cement concrete block 15 x 10 x 10 cm. size of cement concrete 1: 3: 6 (1 cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) or with bolts and nuts or frame welded to adjoining structural steel members as required including providing and applying painting complete in all respects as per drawings and direction of Engineer-in-Charge (Rate shall be inclusive of cement concrete block) :					
	a) With two coats of synthetic enamel paint of approved quality over two coats of red oxide zinc chromate primer conforming to IS-2074.	Sq.M	10			
L-03	Providing, erecting and fixing best quality glazed powder coated Aluminum doors with Glazed aluminum partition on the sides from approved manufacturer's using structural frame with handles, hinges, latches, fittings, hold fast and locking arrangements etc. and with prelaminated MDF board exterior grade flush shutters of approved make and directions including supplying and fixing heavy duty morticed cylinder lock to single and double leaf doors with duplicate set of keys and master key openable from one side only and other side by handle or Knob including labour, material, equipment, scaffolding etc. complete.					
	a) Single leaf shutters	Sq.M	10			
	b) Double leaf shutters	Sq.M	5			

	SCHEDULE OF RATES FOR CIVIL, STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E25 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

L-04	Providing and fixing in position at all heights 100 mm dia. UPVC rain water pipes confirming to BIS :13592 Type A on masonry walls using wall plugs and standard holder bat clamps comprising of two semi-circular halves of flat iron and cast iron base screwed on wooden plugs or using clamps welded to structural steel members or M.S. insert plates where pipes are to be fixed on A.C. side cladding/ R.C.C. members including all necessary fittings, such as tees, shoes, off-sets, branches, swan necks, elbows, bends, heads, etc., including jointing with spun yarn soaked in bitumen and cement mortar 1:2 (1 cement: 2 coarse sand) complete. (plate inserts, if any, to be embedded in R.C.C shall be paid separately) :	RM	20			
L-05	Providing, supplying and laying at specified elevation and slope R.C.C. pipes of the following classes and diameter with collars conforming to IS:-458 including grouting the joints with 1:2 cement sand mortar, testing of joints, curing etc. all complete as per drawing, specification and direction of the Engineer including various types of pipe bedding as specified herein below : (Excavation, backfilling bedding if required will be paid separately as per respective item of work)					
	a) NP-2 Class					
	i) 300 mm inside diameter	RM	10			
	ii) 400 mm inside diameter	RM	10			
	iii) 450 mm inside diameter	RM	10			

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E26 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

SL. NO.	DESCRIPTION OF ITEMS	UNIT	QTY	RATE		AMOUNT (IN Rs.)
				(In Figure)	(In Words)	

	iv) 500 mm inside diameter	RM	10			
	b) NP- 3 Class					
	i) 600 mm inside diameter	RM	10			
	ii) 800 mm inside diameter	RM	10			
	iii) 1000 mm inside diameter	RM	10			

TOTAL:-

Amount in Figure : Rs.....

Amount in Words : Rs.....

Discount, if any : Rs.....



Total Amount in figure : Rs.....



Total Amount in words : Rs.....

Signature of Tenderer :

Name & seal of Tenderer :

Place / Date :

	SCHEDULE OF RATES FOR CIVIL,STRUCTURAL AND OTHER ALLIED WORKS	EM265-PNCV-SR-101	0	26.07.19	GC	GC	UPT	E27 OF E27	
		DOCUMENT NO	REV	REV DT	PREPD	REVWD	APPD	PAGE NO	

 पी डी आई एल PDIL	ENERGY SAVING PROJECT (ESP-II) AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR CIVIL & STRUCTURAL WORKS – VENDOR LIST	EM265-PNCV-VL-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE F1 OF F9		



SECTION-II

SUB-SECTION: F

TECHNICAL SPECIFICATIONS



CIVIL & STRUCTURAL WORKS

VENDOR LIST



 पी डी आई एल PDIL	ENERGY SAVING PROJECT (ESP-II) AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR CIVIL & STRUCTURAL WORKS – VENDOR LIST	EM265-PNCV-VL-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE F2 OF F9		

1.0 CIVIL VENDOR LIST



SL. NO.	ITEM	NAME	LOCATION	BRAND NAME
1.0	FLOOR FINISHING			
1.1	CEMENT TILES (FLOOR/WALL)	a) EUROCON b) ALTRA TILE PVT. LTD. c) DAZZLE		
1.2	TERRAZZO TILES	a) NITCO b) HINDUSTAN TILES	DELHI DELHI	NITCO HINDUSTAN TILES
1.3	CERAMIC TILES	a) SPARTEK CERAMICS b) BELL CERAMICS c) SOMANY CERAMICS d) H&R JOHNSON CERAMICS e) KAJARIA CERAMICS f) ORIENT CERAMICS	CHENNAI BARODA NEW DELHI MUMBAI DELHI DELHI	SPARTEK BELL CERAMICS JOHNSON KAJARIA ORIENT
1.4	HEAVY DUTY FLOOR TILES	a) BHARAT TILES b) RESTILE CERAMICS c) PELICAN CERAMIC INDUS. d) DIAMOND REGINA e) SONA TILES	MUMBAI DELHI DELHI AHMEDABAD BARODA	STILAN RANAMITE PELICAN DIAMOND REGINA SONA TUFF
1.5	INDUSTRIAL FLOOR HARDENER ADMIXTURE	a) SAMKOCK CHEMICALS (P) LTD. b) STRUCTURAL WATER PROOFING CO. (P) LTD.	AHMEDABAD KOLKATA DELHI	SAMHARD STD DURONITE CICOSURFACE HARDNER
1.6	PVC ROLLS	a) PREMIER VINYL b) ARMSRONG INARCO c) PREMIER POLYFILM	DELHI MUMBAI DELHI	ROBUST ARMADA POLYFLOOR
1.7	PVC TILES	a) BHOR INDUSTRIES b) ARMSTRONG c) SHYAM VINYLES	DELHI MUMBAI CHENNAI	MARBLEX CARARA/SPECTRA SHYAM VINYLES
1.8	PVC TILES/ROLL ANTISTATIC	a) PREMIER VINYL b) PREMIER POLYFILM c) ARMSTRONG	DELHI DELHI MUMBAI	ANSTAT POLYFLOOR ANTISTATIC ARMSTRONG ANTISTATIC
1.9	ACID RESISTANT TILES(BATTERY ROOM)	a) H&R JOHNSON OR APPROVED EQUIV.	NEW DELHI	

 पी डी आई एल PDIL	ENERGY SAVING PROJECT (ESP-II) AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR CIVIL & STRUCTURAL WORKS – VENDOR LIST	EM265-PNCV-VL-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE F3 OF F9		



1.10	MOSSAIC TILE	a) ITALIA b) SPECIFIC GLASS MUSSAIC INDIA LTD.		
2.0	WOOD WORK			
2.1	FLUSH DOOR	a) SITAPUR PLYWOOD b) WOODCRAFT PRODUCTS c) KITPLY PRODUCTS	SITAPUR(UP) CALCUTTA CALCUTTA	SITAPUR WOODCRAFT KITPLY
2.2	PLY WOOD/BLOCK BOARD	a) WOODCRAFT PRODUCTS b) KITPLY PRODUCTS c) GREEN PLY	CULCUTTA CALCUTTA KOLKATA	WOODCRAFT KITPLY
2.3	PARTICLE BOARD (EXTRA GRADE)	a) BHUTAN BOARD b) BEST BOARD c) NOVAPAN INDIA LTD. d) THE BOMBAY BURMAN TRACING CORPN. LTD.	BHUTAN DELHI HYDERABAD DELHI	BHUTAN BOARD HIBOND NOVAPAN NOVATEAK EASYLAM
2.4	MDF BOARD/MD PARTICLE BOARD (EXTRA GRADE) VENEEREED/LAMINATED	a) NUCHEM LTD. b) MANGALAM TIMBER PRODUCTS LTD. c) WESTERN BIO SYSTEMS LTD.	DELHI DELHI PUNE	NUWUD MDF DURATUFF ECOBOARD
2.5	DECORATIVE LAMINATES	a) THE BOMBAY BURMAN TRADING CORPN. LTD. b) GREENPLY INDUS. LTD. c) BAKELITE HYLAM LTD. d) RAMMICA INDUSTRIES	DELHI DELHI DELHI DELHI	FORMICA/LUCKY GREENLAM DECOLAME/DEC OLITE RAMMICA
2.6	MARINE PLYWOOD	a) INDIAN PLYWOOD MFG. CO. LTD. b) SWASTIC PLYWOOD	DELHI DELHI	ANCHOR SWASTIK
2.7.0	DOORS & WINDOWS FITTINGS			
2.7.1	MORTICE LOCKS WITH HANDLES	a) GODREJ & BOYCE b) EVERITE AGENCIES (P) LTD. c) GOLDEN INDUSTRIES	MUMBAI DELHI DELHI	GODREJ EVERITE GOLDEN
2.7.2	CYLINDRICAL PIN TUMBLER LOCK WITH KNOBS	a) SECURE INDUSTRIES b) GOLDEN INDUSTRIES c) GODREJ & BOYCE	DELHI DELHI MUMBAI	SECUR GOLDEN GODREJ
2.7.3	HYDRAULIC DOOR CLOSER (OVER HEAD/ FLOOR)	a) DOORKING INDUSTRIES b) EVERRITE AGENCIES (P) LTD.	DELHI DELHI DELHI	DOORKING EVERITE HARDWIN

 पी डी आई एल PDIL	ENERGY SAVING PROJECT (ESP-II) AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR CIVIL & STRUCTURAL WORKS – VENDOR LIST	EM265-PNCV-VL-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE F4 OF F9		



		c) HARDWYN		
2.7.4	MISC. DOOR FITTINGS HINGES, TOWER BOLTS, LATCHES, SOPPER, STAYS, ALDROPS ETC.	a) EVERITE AGENCIES (P) LTD. b) EBCO DINSUTRIES c) ECIE (P) LTD. d) NU-LITE INDUSTRIES e) HARDWYN	DELHI DELHI MUMBAI DELHI DELHI	EVERITE e.g. EBCO ECIE NU-LITE HARDWYN
2.7.5	THREE WAY BOLTING LOCKING DEVICE HANDLE	a) SRIMA SALES & SERVICES b) DHIMAN INDUSTRIES	MUMBAI DELHI	SRIMA SALES CUM- DHIMAN STEEL WITH
2.7.6	PANIC BAR LATCH (FOR EMERGENCY DOOR)	a) SRIMA SALES & SERVICES OR APPROVED EQUIV.	MUMBAI	SRIMA SALES
2.7.7	UPVC WINDOWS	a) FENESTA b) ENCRAFT c) WINDOW MAGIC		
2.7.8	FASTENERS	a) HILTI INDIA PVT. LTD. b) FISCHER	NEW DELHI	
3.0	STEEL/ ALUMINIUM DOORS, WINDOWS & VENTILATOR			
3.1	PRESSED STEEL DOORS WINDOWS & SECTION DOORS WINDOWS/ROLLING SHUTTER	a) RAYMUS ENGINEERS b) DHIMAN STEEL c) RDG ENGINEERING d) SUPER STEEL WINDOW CO. e) SKS STEEL INDUS.	GURGOAN/ DELHI MUMBAI DELHI DELHI	
3.2	ALMUNIU / DOORS/ WINDOWS SECTIONS	a) JINDAL ALUMINIUM LTD. b) HINDALCO INDUSTRIES c) INDAL		
3.3	FIRE-PROOF DOORS(APPROVED)	a) NAVAIR INTERNATIONAL b) RDG ENGINEERING	DELHI MUMBAI	VIPER(TAC) RADIANT
3.4	PVC DOORS / WINDOWS	a) SINTEX Or APPVD EQUIV.	DELHI	SINTEX
3.5	PVC WATER TANKS	a) SINTEX Or APPVD EQUIV.	DELHI	SINTEX
4.0	PLASTERING			
4.1	WATERPROOFING/ COMPOUND IN CEMENT PLASTER	a) STRUCTURAL WATER PROOFING CO. (P) LTD. b) PIDILITE INDUSTRIES	DELHI MUMBAI	CICO NO.1 PIDIPROOF LW

 पी डी आई एल PDIL	ENERGY SAVING PROJECT (ESP-II) AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR CIVIL & STRUCTURAL WORKS – VENDOR LIST	EM265-PNCV-VL-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE F5 OF F9		



5.0	ROOF TREATMENT (WATER PROOFING)			
5.1	BRICK BAT COBA	a) INDIA WATER PROOFING CO. b) OVERSEAS WATERPROOFING CORPN.	MUMBAI DELHI	
5.2	ACRYLIC BASED CEMENTATIOUS PRIMER COATING FOR ROOF WATERPROOFING	a) STRUCTURAL WATER PROOFING CO. (P) LTD. b) SIKA QUALCRETE LTD.	DELHI DELHI	TAPCRETE SEALOCFLEX
5.3	APP MODIFIED POLYMERIC WASTER PROOFING MEMBRANE	a) PIDILITE INDUSTRIES LTD. b) STP TEXAS LTD. c) BITUMET CO. LTD.	MUMBAI GURGOAN BANGALOR E	
6.0	PAINTING WORKS			
6.1	PLASTIC EMULSION (INTERIOR/EXTERIOR)	a) ICI INDIA LTD. b) BERGER PAINTS LTD. c) ASIAN PAINTS LTD. d) SHALIMAR PAINTS e) KANSAI NEROLAC PAINTS LTD.		DULUX BERGER ASIAN PAINTS SHALIMAR NEROLAC
6.2	DRY OILBOUND DISTEMBER	a) ASIAN PAINTS LTD. b) KANSAI NEROLAC PAINTS LTD.		ASIAN PAINTS NEROLAC
6.3	INDUSTRIAL / EXPOXY/ SYNTHETIC ENAMEL PAINTS	a) ICI/AKZO NOBEL INDIA b) BERGER PAINTS LTD. c) ASIAN PAINTS LTD. d) SHALIMAR PAINTS e) INTERNATIONAL MARINE COATINGS PVT. LTD. f) KANSAI NEROLAC PAINTS LTD. g) BOMBAY PAINT		
6.4	WATERPROOF CEMENT PAINT	a) KILLICK NIXON LTD. b) RAJDoot PAINTS	MUMBAI DELHI	SNOWCEM PLUS ACROCEM
6.5	WOOD MELAMINE POLISH	a) ASIAN PAINTS b) SHALIMAR PAINTS		ASIAN PAINTS MELLAC
6.6	WASTERPROOFING TRANSPARENT EXTERIOR WALL COATING (OVER PAINTED SURFACE)	a) PIDILITE INDUSTRIES b) INDUSTRIAL PROD. MFG c) STRUCTURAL WATER-PROOFING CO.(P) LTD.	DELHI PUNE DELHI	REPELLIN S-101 WALL GUARD EWITEX PERFECT CICO-

 पी डी आई एल PDIL	ENERGY SAVING PROJECT (ESP-II) AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR CIVIL & STRUCTURAL WORKS – VENDOR LIST	EM265-PNCV-VL-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE F6 OF F9		



				SEALCOTE
6.7	FIRE PROOF COATING	a) NAVAIR INTERNATIONAL OR APPVD. EQUIV.	DELHI	VIPER
7.0	ROOFING SHEETS & ACCESSORIES			
7.1	ASBESTOS SHEETS	a) ETERNIT EVEREST LTD. b) CHARMINAR INDUSTRIES	DELHI HYDERABAD	EVEREST CHARMINAR
7.2	C.G.I. SHEETS	a) ISPAT INDUSTRIES LTD. b) STEEL AUTHORITY OF INDIA c) TATA STEEL	DELHI	NIPPON DENRO SAIL TISCO
7.3	PRECOATED G.I. PROFILE SHEETS FOR ROOFING & WALL CLADDING	a) ISPAT INDUSTRIES LTD. b) SHREE PRECOATED STEELS LTD. c) INTERARCH BUILDING PRODUCTS (P) LTD. d) HARDCASTLE & WAUD MFG. CO. LTD. e) LLOYD INSULATION (I) LTD.	DELHI DELHI NOIDA MUMBAI DELHI	NIPPON DENRO META COLOR TRACDEK FERO COLOR LLOYDECK
7.4	ALUMINIUM SHEET (PLAIN/PROFILE)	a) INDIAN ALUMINIUM CO. LTD. Or APPROVED EQUIVALENT	CALCUTTA	INDAL
7.5	FIBRE GLASS SHEETS & PANELS (MACHINE MOULDED)	a) SIMBA FRP (P) LTD. b) GE INDIA	DELHI	SIMCRYL
7.6	PROOFING J/L HOOKS, BOLTS & OTHER ACCESSORIES (POLYMER COATED)	a) KATALIST CONSULTANT (P) LTD. b) ADVANCED MACHINE	PUNE BANGALORE	 DRIPGRIP
8.0	SANITARY PLUMBING FITTINGS & FIXTURES			
8.1	SANITARY FITTINGS (W.C. WASH BASIN, URINAL ETC.)	a) HINDUSTAN SANITARY WARE & INDUS. LTD. b) PARRYWARE SANITARY WARE c) MADHUSUDAN CERAMICS d) NYCER CERAMICS	CALCUTTA CHENNAI DELHI CHENNAI	HINDUSTAN PARRYWARE CERA NYCER
8.2	PLUMBING FITTINGS & FIXTURES	a) GEM b) PARKO c) KINGSTON		

 पी डी आई एल PDIL	ENERGY SAVING PROJECT (ESP-II) AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR CIVIL & STRUCTURAL WORKS – VENDOR LIST	EM265-PNCV-VL-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE F7 OF F9		

8.3	GLASS/MIRROR (SHEET/ FLOAT/ TOUGHENED/ LAMINATION)	a) GUJARAT GUARDIAN LTD. b) SAINT GOBAIN c) ASAHI FLOAT	DELHI CHENNAI NEW DELHI	MODIGUARD
8.4	GI PIPES	a) JINDAL b) SURYA c) PRAKASH d) SWASTIK		
9.0	FLASE CEILING, FLASE FLOORING & UNDERDECK INSULATION			
9.1	FLASE CEILING / WALL CLADDING (ALUMINIUM STRIP/ TRAY TYPE)	a) INTERARCH BUILDING PRODUCTS (P) LTD. b) HUNTER DOUGLAS c) MASCOT OVERSEAS	NOIDA MUMBAI DELHI	TRAC LUXALON TRULON
9.2	FALSE FLOORING	a) MULTI INTERIORS PVT. LTD. b) BESTLOCK SYSTEM & CONCEPTS c) LLOYD INDUSULATION (I) LTD. d) UNITED INSULATION e) A.R. & BROTHERS	DELHI MUMBAI DELHI MUMBAI CHENNAI	
9.3	UNDERDECK/WALL HEAT INSULATION	a) BAKELITE HYLAM LTD. b) U.P. TWIGA F.G. LTD. c) LLOYD INDULATION (I) LTD.	DELHI DELHI DELHI	PHENOTHERM TWIGA ROCKLOYD SLAB
9.4	OVERDECK HEAT INSULATION	a) LLOYD INSULATION (I) LTD. b) BEST PLASTRONICS LTD.	DELHI DELHI	LLOYD SPRAY FAOM BESTPLASTRONICS
9.5	GYPSUM BOARD TILES (FIBRE GLASS REINFORCED)	a) INTERARCH BUILDING PRODUCTS (P) LTD. b) INDIA GYPSUM LTD.	NOIDA DELHI	TRAC GRG GYPBOARD
10.0	SPECIALITY PRODUCTS (CEMENT ADDITIVES/ ADMIXTURES/CORROSION INHIBITORS/ SURFACE TREATMENT/ GROUT & ANCHORS/SEALING/ COASTING)	a) FOSROC b) SIKA	NOIDA DELHI	

 पी डी आई एल PDIL	ENERGY SAVING PROJECT (ESP-II) AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR CIVIL & STRUCTURAL WORKS – VENDOR LIST	EM265-PNCV-VL-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE F8 OF F9		

10.1	EPOXY FLOOR COATING (BATTERY ROOM)	a) FOSROC b) SIKA c) FAIRMATE	NOIDA DELHI	
11.0	MISCELLANEOUS ITEMS			
11.1	WOOD PRESERVATIVE	a) ASCU HICKSON LTD.	CALCUTTA	ASCU
11.2	WALL SURFACE TEXTURED COATING	a) UNITILE b) SPECTRUM PAINTS c) BAKELITE HYLAM	DELHI DELHI DELHI	UNITILE SPECTRUM HERITAGE
11.3	PVC PLUMBING FITTINGS	a) PRAYAG POLYMERS (P) LTD.	DELHI	SYMET
11.4	REINFORCED FIBRE GLASS WATERPROOFING FELT	a) FGP LTD. b) U.P. TWIGA F.G. LTD.	DELHI DELHI	FGP
11.5	ANTI TERMITE TREATMENT	a) PCI Or APPRVD EQUIV.		
11.6	MATERIAL TEST HOUSE	a) SHRIRAM TEST HOUSE b) SPECTRO ANALYTICAL LABS c) BHARAT TEST HOUSE	DELHI DELHI DELHI	
12.0	CEMENT	a) ACC b) J K CEMENT c) BINANI CEMENT d) JP CEMENT e) GUJARAT AMBUJA f) ALTRA TECH CEMENT g) BIRLA CORPN. LTD. h) GRASIM i) SHREE	MUMBAI KOLKATTA MUMBAI MUMBAI KOLKATTA MP RAJUSTHAN	
12.1	SULPHUR RESISTANT CEMENT	a) SAURASHTRA CEMENT LTD. b) SHREE DIGVIJAY CEMENT		
13.0	RCC DESIGN MIX	a) IIT DELHI b) SHRIRAM TEST HOUSE		
14.0	WRAPPING COATING (I/C TAPE & PRIMER)	a) IWL OR APPROVED EQUIVALENT	NEW DELHI	PYPKOTECH
15.0	FIRE PROOFING	a) CAFCO		

 पी डी आई एल PDIL	ENERGY SAVING PROJECT (ESP-II) AT NATIONAL FERTILIZERS LIMITED, VIJAIPUR CIVIL & STRUCTURAL WORKS – VENDOR LIST	EM265-PNCV-VL-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE F9 OF F9		

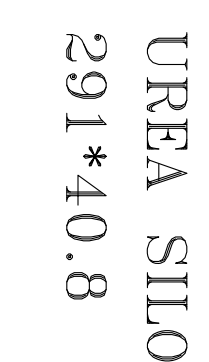
	MATERIAL	b) CARBOLINE		
16.0	STRUCTURAL STEEL / CS PLATE	a) SAIL b) TATA STEEL c) RINL d) JINDAL e) ESSAR f) ISPAT INDUSTRIES		
16.1	MS PIPES (HAND RAIL APPLICATION)	a) HITEX b) ASHWANI STEELS c) SURYA d) PRAKASH e) VIKRANT ISPAT UDYOG		
17.0	TIMT BAR / REBAR	a) SAIL b) TATA STEEL c) RINL d) JSW		
18.0	GRATINGS / HANDRAILS	a) INDIANA GRATINGS b) WESTCOAST ENGINEERING c) GREATWELD GRATING d) KANADE ANAND UDYOG		
19.0	WELDING ELECTRODE	a) ADOR b) ESAB c) D & H d) HANOVAR		

GENERAL NOTES:

- i. Only 'First' Quality materials shall be used
- ii. OWNER / CONSULTANT reserve the right to choose any of the approved make / vendor as per this list. Make of the item not indicated and any other make for the specified item shall be subject to owner's / consultant's approval.
- iii. Specifications of manufacturer's items shall be checked against tender item / specifications before selecting any product or brand name. In case of any discrepancy, tender item / specifications shall prevail, and any such brand of item shall not be used which is not conforming to tender specifications even if it is listed in this vendor list.
- iv. In case of non-availability of any material among approved vendors / makes in a particular site / region, alternate vendor / make conforming to IS / BS etc. Shall be used subject to approval by OWNER / CONSULTANT.



 पी डी आई एल PDIL	TENDER DOCUMENT FOR CIVIL, STRUCTURAL & OTHER ALLIED WORKS	EM265-PNCV-TD-101	0	 एन एफ एल NFL
		DOCUMENT NO	REV	
		PAGE1 OF 5		

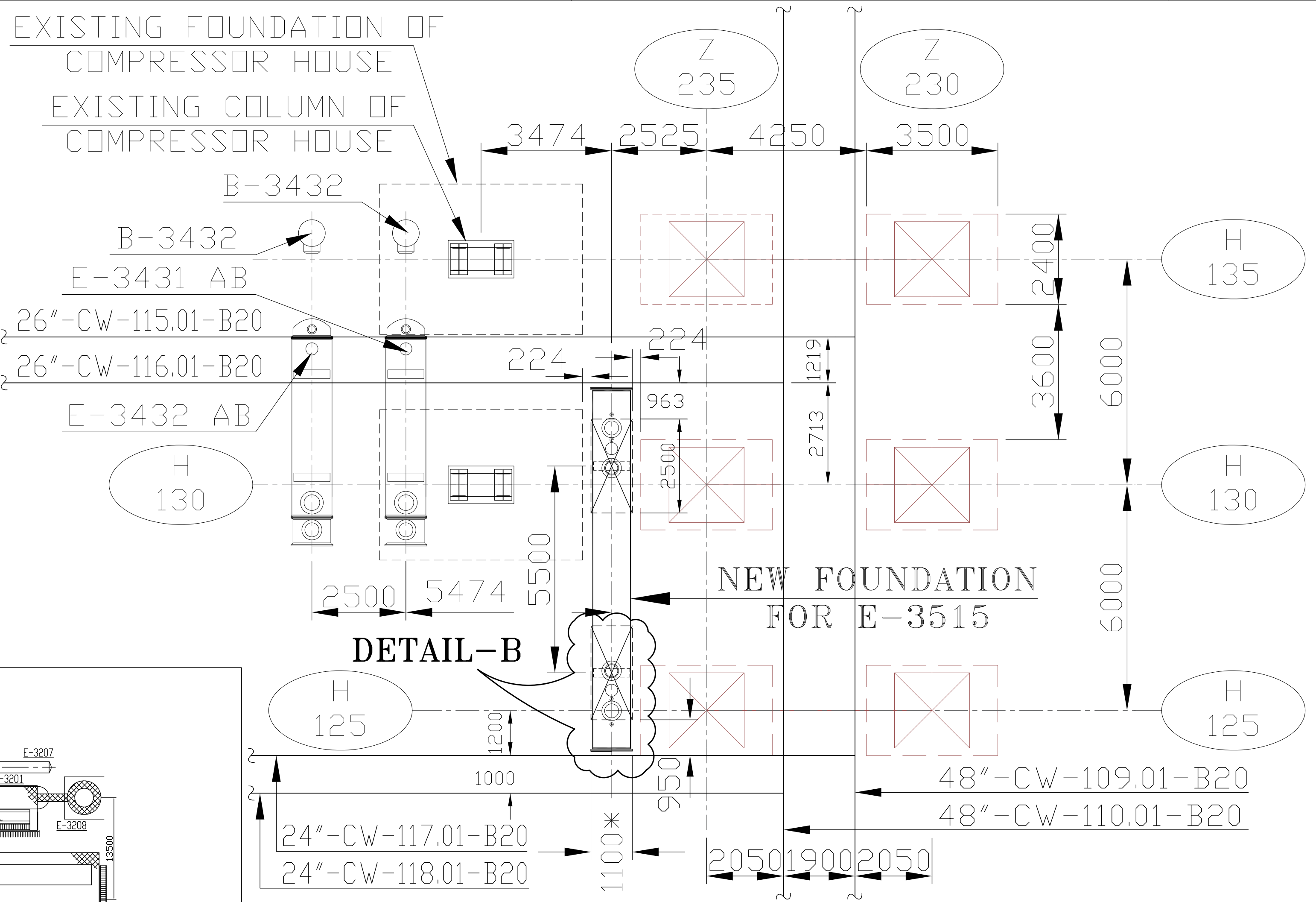
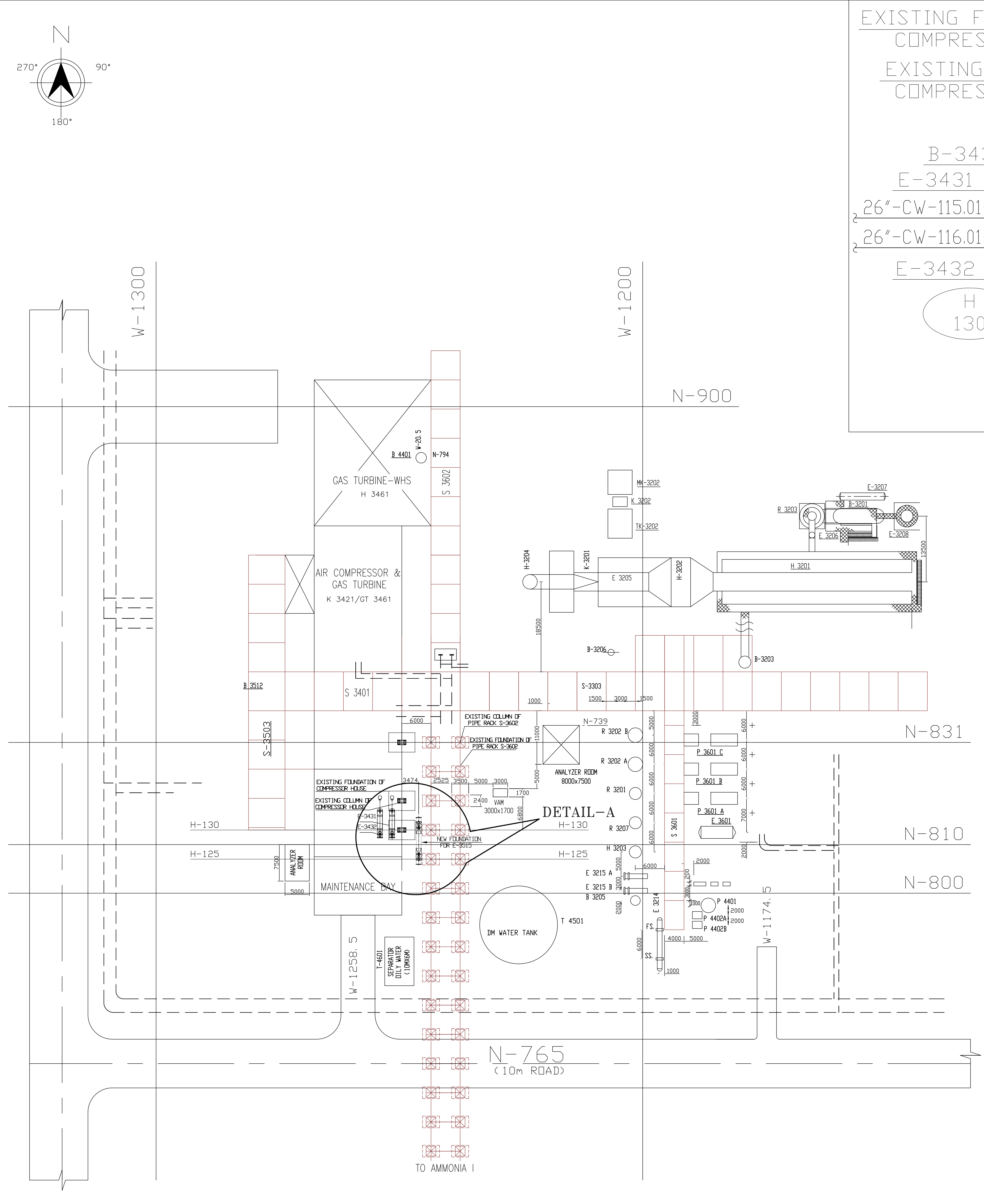
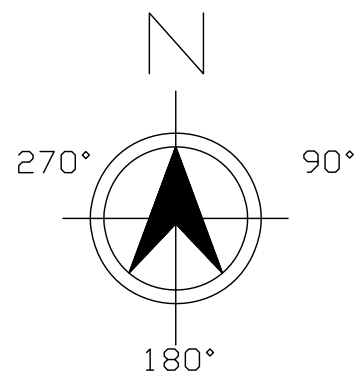
REFERENCE DRAWINGS



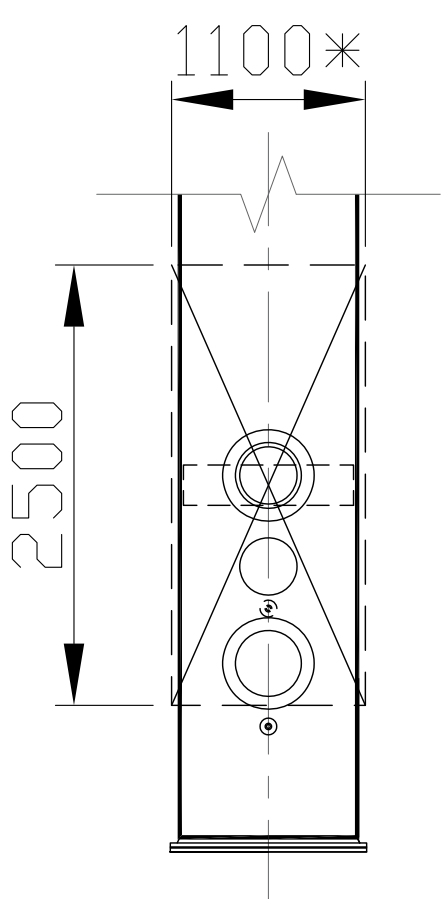
1. NFL TO CHECK & CONFIRM LOCATION OF NEW COOLING TOWER FOR NEW VAM.
2. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
3. EQUIPMENT SIZES AND LOCATIONS ARE TENTATIVE.
4. BLOCK SIZE OF FACILITIES ARE TO BE FINALIZED AFTER GETTING VENDORS INFO.
5. ALL LEVELS ARE EXPRESSED IN MILLIMETERS.
EL. +- = 99.70(424,500 MSL) TO BE CONFIRMED BY NFL.

EXISTING EQUIPMENT LAYOUT PLAN FOR ESP-1 AMMONIA-1
(DOCUMENT NO. - 1074-1000-001_R7)

R0	31-01-19	ISSUED FOR COMMENTS	ANIL	SM/SK	
P0	11-10-18	PRELIMINARY ISSUED	SHIVA	SM/SK	-
REV.	DATE	DESCRIPTION	PPD.	CKD	APPD.
<div></div> <div>CLIENT : VIJAIKUR FERTILIZER LIMITED VIJAIKUR FERTILIZER PROJECT</div>			SCALE : -		
			DWG. NO : EM-265-1000-0002_R0		
			REV. R0		
<div></div> <div>PROJECTS AND DEVELOPMENT INDIA LTD. NOIDA</div>			SHEET : 1 OF 1		
TITLE : CAPTIVE POWER PLANT NEW COOLING TOWER FOR NEW VAM					



ENLARGE VIEW
DETAIL - A





ENLARGE VIEW
DETAIL - B

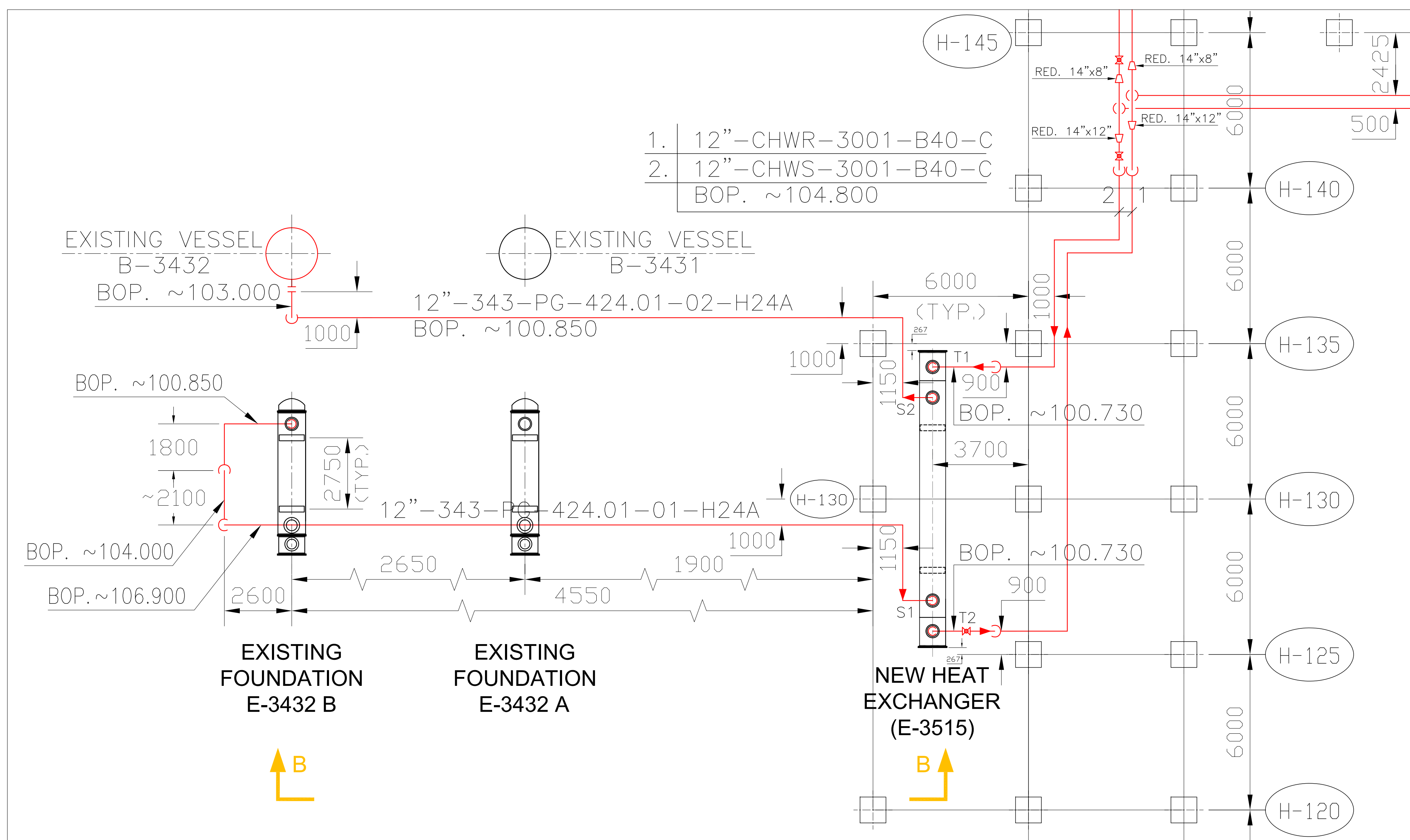
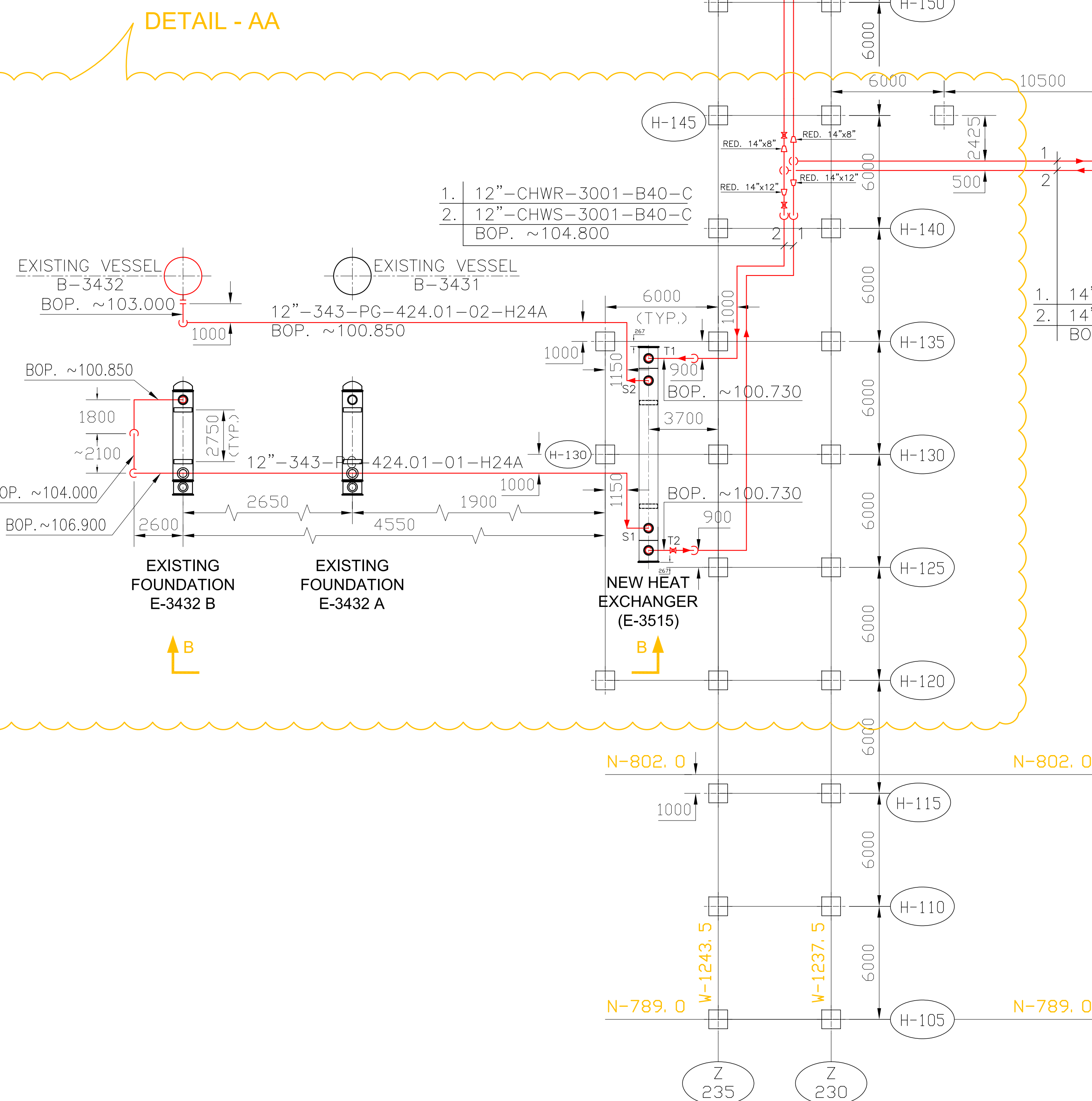
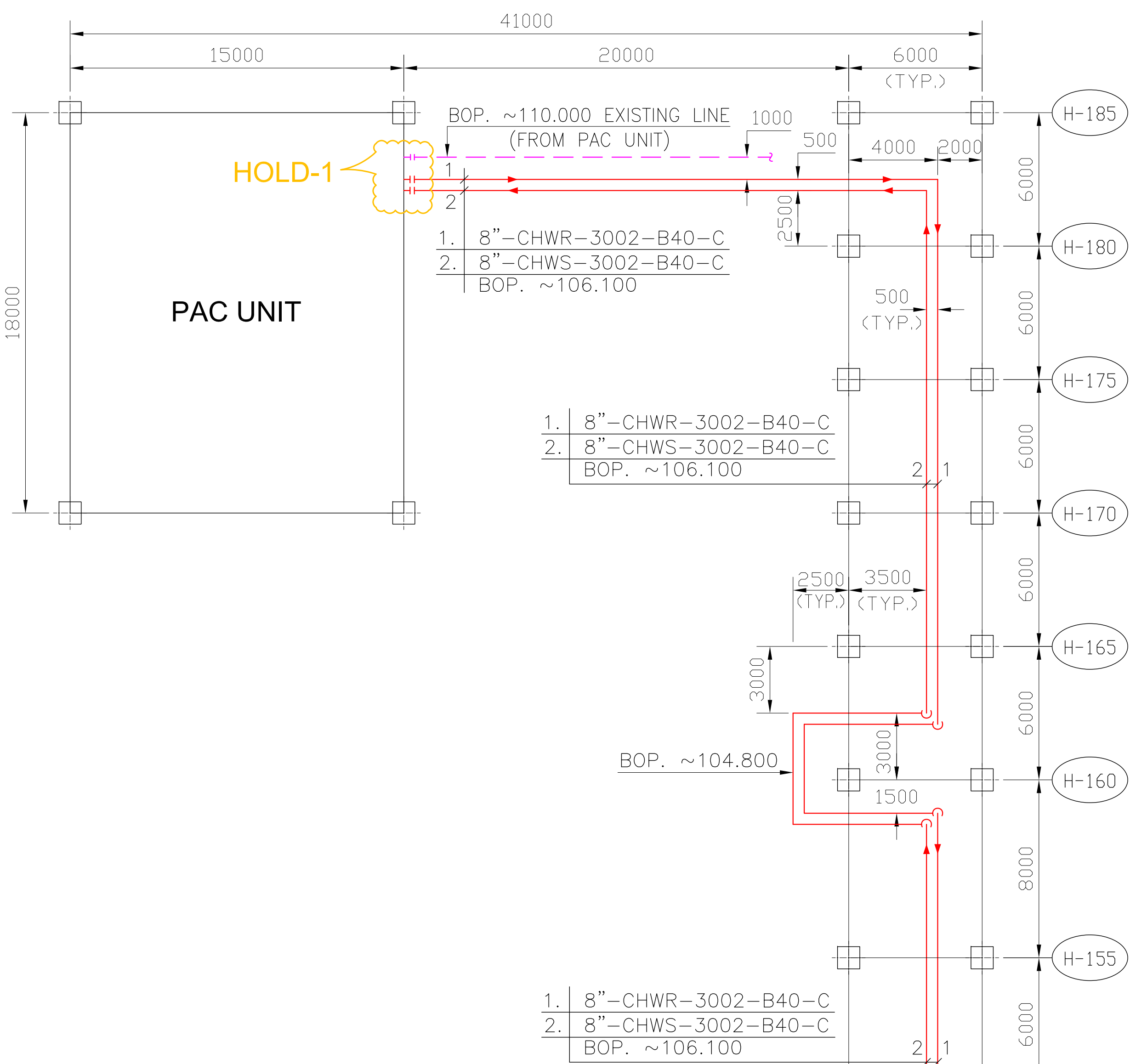
- NOTES :-**
- 100 000M LEVEL CORRESPONDS TO 162.100M REDUCED LEVEL (R.L.) ABOVE MEAN SEA LEVEL (M.S.L.) FINISHED FLOOR LEVEL=100,000 AND GRADE LEVEL= 92,900 M
 - ALL COORDINATES ARE IN METER & ALL DIMENSIONS ARE IN MM.
 - NORMAL PIPE RACK SPAN IS SIX METER UNLESS OTHERWISE MENTIONED.
 - REFERENCE DRAWING LIST-
i.DRAWING No:-E95P005
ii.DRAWING No:-E95P003
iii.DRAWING No:-1054-34-0203_R5
 - CO-ORDINATES/DIMENSIONS OF EXISTING EQUIPMENTS/ROADS/UNDERGROUND PIPES TO BE VERIFIED BY NFL
 - SIZE OF EQUIPMENTS AND ITS FOUNDATIONS TO BE FINALIZED AFTER GETTING VENDOR DRAWING.
 - FOR OVERALL PLOT PLAN REFER DRAWING. 1053-00-0001_R7
 - * INDICATES HOLD

HOLD LIST

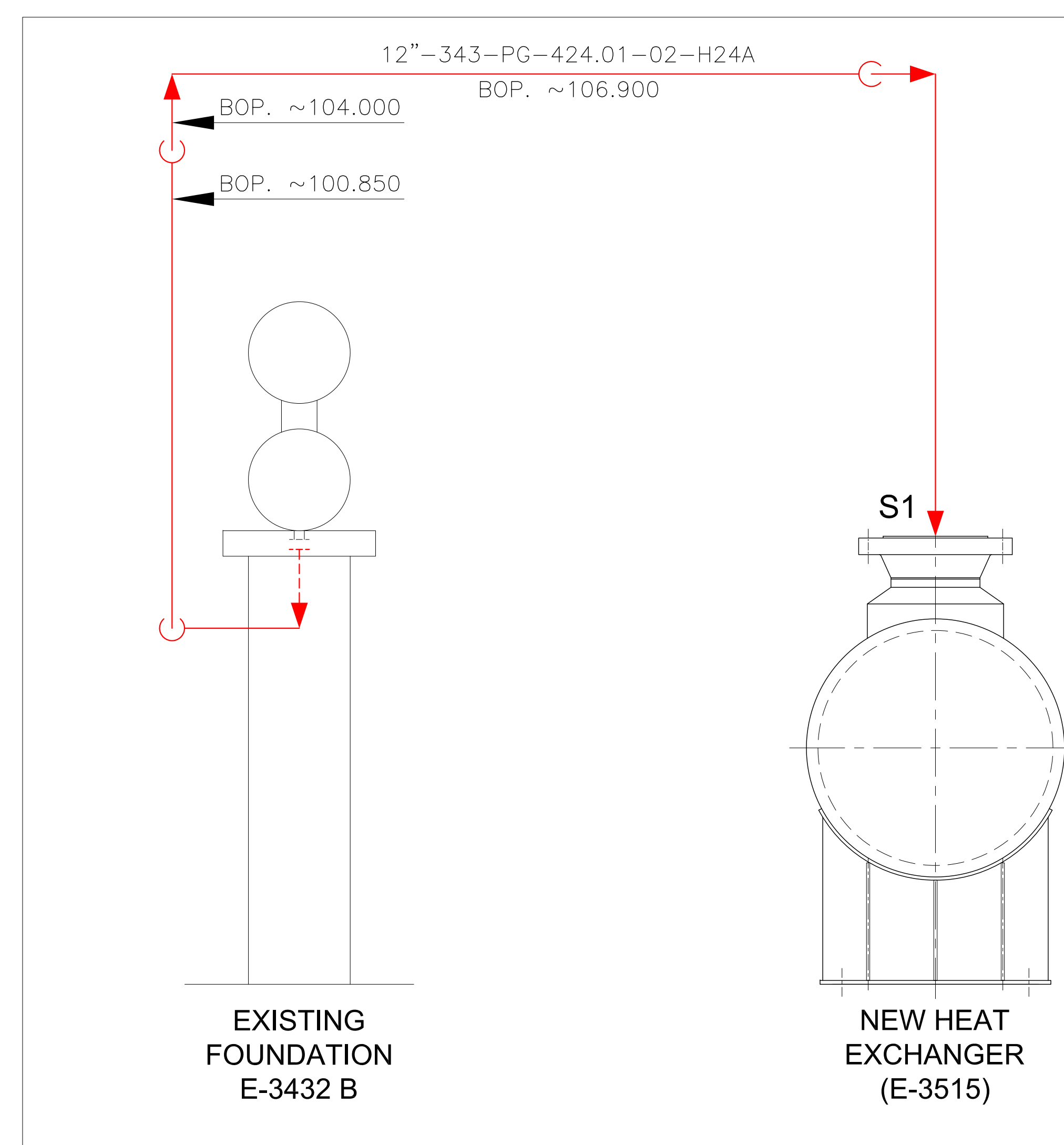
i. ALL EQUIPMENT DETAILS.
ii. ELECTRICAL/INSTRUMENT CABLE TRAY WIDTH.
iii. FOUNDATION DETAILS

LEGENDS	
TOS	TOP OF STEEL
TOF	TOP OF FOUNDATION
PLTF	PLATFORM
	GRATING
FFL	FINISH FLOOR LEVEL
	BATTERY LIMIT
	PAVEMENT
	CABLE TRAY
	SAFETY SHOWER

R0	28-01-19	ISSUED FOR COMMENTS	ANIL	SM/SK	
P1	04-11-18	PRELIMINARY ISSUED (WITH ENLARGED VIEW)	SHIVA	SM/SK	
P0	20-11-18	PRELIMINARY ISSUED	SHIVA	SM/SK	-
REV.	DATE	DESCRIPTION	PPD.	CKD	APPD
<div><p>एन एफ एल NFL</p></div> <div>CLIENT : NATIONAL FERTILIZER LIMITED VIJAIKUR FERTILIZER PROJECT</div>			SCALE : 1 :300		
			DWG. NO : EM-265-1000-003_R0		
<div><p>पी डी आई एल PDIL</p></div> <div>PROJECTS AND DEVELOPMENT INDIA LTD. NOIDA</div>			REV.	R0	
			SHEET : 1 OF 1		
TITLE : NEW HEAT EXCHANGER E-3515 (AMMONIA PLANT-I)					



ENLARGE VIEW
DETAIL - AA



VIEW - BB

NOTES :-

1. ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE STATED.
2. NORMAL PIPE RACK SPAN IS SIX METER UNLESS OTHERWISE MENTIONED.
3. ALL COORDINATES ARE IN METER & ALL DIMENSIONS ARE IN MM.

REFERENCE DRAWING :-

1. DRAWING NO. 1054-00-0001, (GENERAL PLOT PLAN), REV.-8.
2. DRAWING NO. 1054-00-0002, (STRUCTURE LOCATION PLAN), REV.-2.
3. DRAWING NO. 1054-39-0605, (PIPING LAYOUT PLAN), REV.-03.
4. DRAWING NO. 1054-39-0607, (PIPING LAYOUT PLAN), REV.-04.


HOLD LIST :-

1. NOZZLE HOLD DUE TO UNAVAILABILITY OF EQUIPMENT DRAWING.
2. NOZZLE HOLD DUE TO UNAVAILABILITY OF EQUIPMENT DRAWING.

LEGEND :-

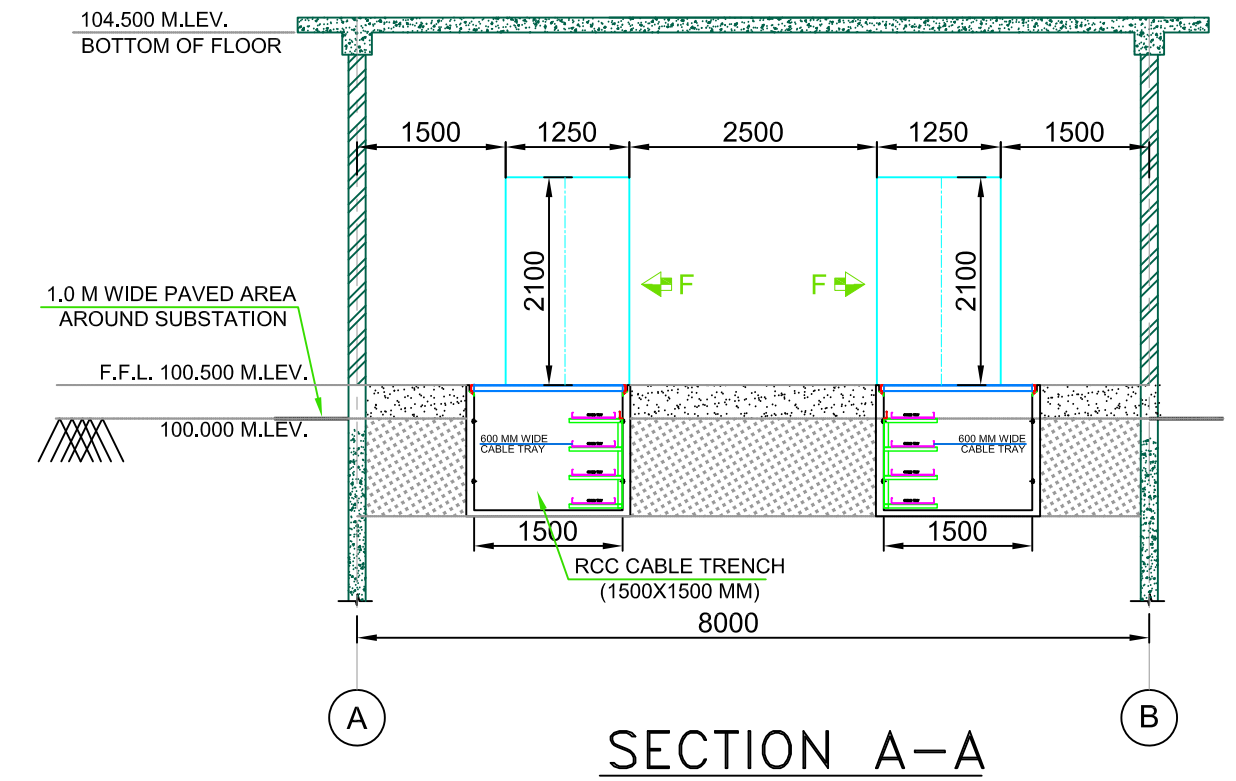
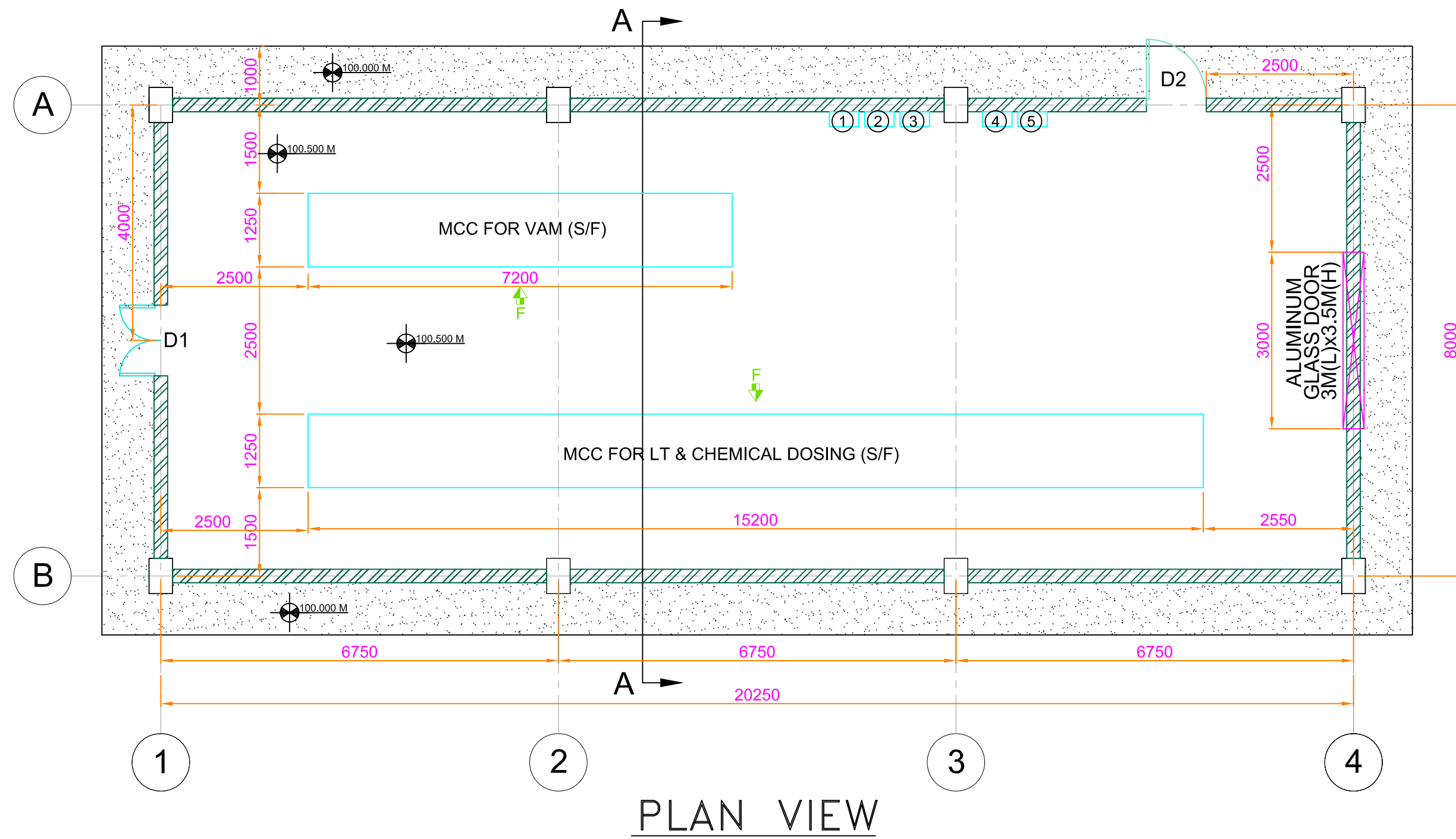
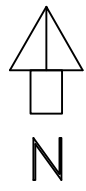
- | | | |
|-------------------|---|---|
| 1. EXISTING LINE | = | |
| 2. NEW LINE | = | |
| 3. BOTTOM OF PIPE | = | BOP |

OPTION - 1

P0	09/04/19	ISSUED FOR REVIEW AND APPROVAL	ANIL	SOHIT	PK	
REV.	DATE	DESCRIPTION	PPD.	CHKD.	APPD.	
<div>CLIENT :-</div> <div></div> <div>NATIONAL FERTILIZER LIMITED</div> <div>VIJAIPUR</div> <div>TITLE :-</div> <div>PIPING GENERAL ARRANGMENT DRAWING</div> <div>NEW HEAT EXCHANGER E-3515</div> <div>(AMMONIA PLANT-II)</div>			REV.	P0		
			SHEET 1 of 1			
			SCALE : 1:230			
			DWG. NO. : EM-265-1000-004			
			FILE :- EM-265-1000-004_P0			

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PARTIES WITHOUT THE WRITTEN PERMISSION FROM P.D.I.L.


PROJECTS & DEVELOPMENT INDIA LTD.
NOIDA



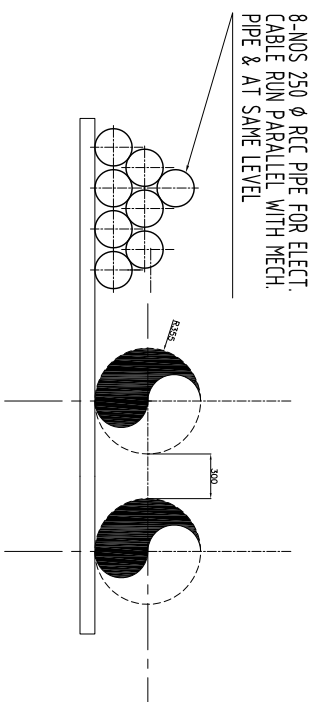
EQUIPMENTS LIST

EQUIP. NO.	EQUIPMENT TAG NO.	DESCRIPTION
1.	----	LSDB-1No.
2.	----	DCDB-1No.
3.	----	WSDB-1No.
4.	----	WALL MOUNTED BOARD (FUTURE PROVISION)
5.	----	WALL MOUNTED BOARD (FUTURE PROVISION)

NOTE :

1. THE DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONS OF EQUIPMENTS ARE TENTATIVE, IT SHALL BE CHANGED AS PER RESPECTIVE VENDORS REQUIREMENTS.
3. D1=1500x2100 MM DOUBLE LEAF & D2=1200x2100 MM SINGLE LEAF LEAF GLAZED ALUMINUM DOOR .

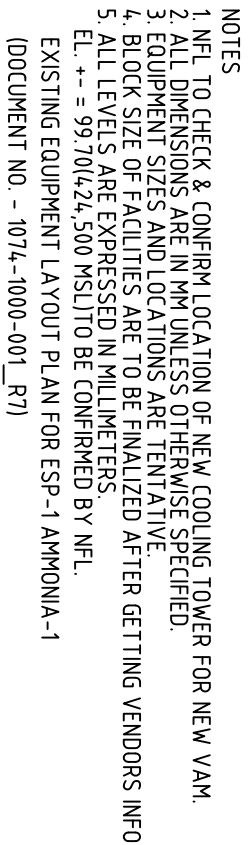
P	18.06.19	PRELIMINARY ISSUED	SS	SSM	SKB
REV.	DATE	DESCRIPTION	PPD	CKD	APPD
CLIENT: NFL-VIJAIPUR FERTILIZER PROJECT AMMONIA PLANT			REV	P	
			SHEET 1 OF 1		
			SCALE: --		-
TITLE: MCC ROOM LAYOUT			DWG. NO : EM265-0000-0805		
			FILE		
			PROJECTS & DEVELOPMENT INDIA LTD		



The technical drawing illustrates a cable tray assembly. The top view shows four rectangular trays arranged horizontally, each labeled "760". Above them are dimension lines indicating a center-to-center spacing of 300 units between the first three trays, and a total width of 100 units for the entire set. A vertical dimension line on the right indicates a height of 100 units. The side view shows two semi-circular cross-sections of the trays, with a radius dimensioned as R62.5. A horizontal dimension line below the side view indicates a distance of 300 units between the centers of the two sections.

[illegible]

A cross-sectional diagram of a floor level. The layers from top to bottom are: SAND, BRICK WALL, BRICK, POWER CABLE, and BRICK WALL. The diagram shows a central brick layer with a power cable embedded within it. The width of the brick wall is dimensioned as 400, and the total width of the assembly is dimensioned as 700. A label 'FLOOR LEVEL' is at the top, and 'PLASTER' is on the right side.



P	17/07/2019	PRELIMINARY ISSUED			AK	SS	RVV
REV	DATE	DESCRIPTION			PPD	CKD	APPD
CLIENT					REV	P	
NPL-VIAPUR					SHEET 1 OF 1		
					SCALE: 1:500		
					A0		

CAPTIVE POWER PLANT
NEW COOLING TOWER FOR NEW VAM
CABLE RACK AND TRENCH LAYOUT

DWG. NO :
EM-265-1000-0002_P0

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