

TENDER NOTICE

Sealed Tender offers are invited for Design, Supply, installation, testing and commissioning of equipment for TMR Plant Modification & Capacity Upgradation of Block Section of TMR Plant. Technical details, scope of supply & work along with Terms & conditions of Tender are available at our Gokul Shirgaon office and also on our web site www.gokulmilk.coop. Sealed Tender offer duly marked as **TENDER FOR UPGRADATION & MODIFICATION OF TMR PLANT'** is to be submitted at our Gokul Shirgaon office on or before **04.04.2024**. Right to accept or reject any or all offers is reserved.

Managing Director Chairman
Kolhapur Zilla Sah.Dudh Utpadak Sangh Ltd.
B-1, M.I.D.C., Gokul Shirgaon, Kolhapur

GENERAL TERMS & CONDITIONS

- 1) The Kolhapur Milk Union (Purchaser) invites tender from reputed eligible bidders to carry out the works **on single responsibility basis** for Design, Supply, installation, testing and commissioning of equipment for TMR Plant Modification & Capacity Upgradation of Block Section (from existing 10 Ton Per Day to 40 Ton Per Day approx) of TMR Plant at Cattle Feed Plant, Village: Gad -Mudshinghi, Dist- Kolhapur, Maharashtra. **(Per Day means: 3 shift operation of 8 hours shift each).**

Description: Design, Supply, installation, testing and commissioning of equipment for TMR Plant Modification & Capacity Upgradation of existing Block Section (40 TPD) of TMR Plant at Cattle Feed Plant at Village:- Gad-Mudshinghi, Dist: Kolhapur, Maharashtra.

Completion Period: 08 (Eight) Months from the date of issuance of Purchase Order (PO)

Evaluation Criteria: Inclusive of GST (applicable as per Govt norms)

- 2) The bidder should submit the offer in a prescribed format on their letterhead.
- 3) Commercial bid (price details) and Technical bid (Technical details, variations if any) are to be given in separate envelopes & both envelopes are to be submitted in a sealed envelope marked as **"TENDER FOR UPGRADATION & MODIFICATION OF TMR PLANT"**.
- 4) The offer should be valid at least for 60 days from the date of submission.
- 5) The bid must be accompanied by Earnest Money Deposit of Rs. 3,20,000/- in the form of demand draft / RTGS issued in favour of Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd. Bids not accompanied with EMD will be summarily rejected. EMD amount may be forfeited if bidder withdraws its bid during period of bid validity or if successful bidder fails to sign the contract.

RTGS Details :-

Name of Project Authority	Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd., Kolhapur
Address of Project Authority	B-1, MIDC, Gokul Shirgaon, Tal Karvir, Dist. Kolhapur, State Maharashtra Pin Code 416 234
Name of Bank	Bank of Maharashtra
Bank A/c No.	60182028384
IFSC Code	MAHB0001575
Branch Name & Address	B-1, MIDC, Gokul Shirgaon, Tal Karvir, Dist. Kolhapur, State Maharashtra Pin Code 416 234

- 6) No escalation in the price will be given once the order is finalised.
- 7) Interested Bidder may visit the work place to know the exact working condition & scope of work before submitting their offer.

8) **Payment Terms-**

SUPPLY –

- a) **20%** advance of total contract value along with the purchase order after getting order acceptance and on submission of Bank Guarantee of equivalent amount.
- b) **Next 70%** payment along with GST of supply items on safe receipt of equipment / material at site on submission of progressive Invoices. However, **if advance is not availed** by supplier, **the 90%** on safe receipt of material at destination/site (supply value incl GST).
- c) **Balance 10%** of Supply, after satisfactory completion of commissioning and against a Bank Guarantee from Nationalised Bank of equivalent amount towards the performance of the equipment valid up to warranty period / 12 months from the date of satisfactory commissioning. If the supplier do not submit the Performance Bank Guarantee, the final 10% amount of 'supply portion' shall be kept held with Kolhapur Milk Union (Purchaser) till one year of successful completion of works.

INSTALLATION, TESTING & COMMISSIONING –

- d) **90% payment** after satisfactory erection of equipment. Balance 10% payment after satisfactory commissioning of equipment (No BG required)
- e) Sealed Tender offer should reach our office at B-1, MIDC, Gokul Shirgaon, Kolhapur on or before **04.04.2024**.
- f) We reserve the right to accept or reject any bid and rejection of all bids at anytime prior to award of contract.
- g) Subject to Kolhapur Jurisdiction.

Managing Director

TECHNICAL SPECIFICATIONS OF TMR PLANT MODIFICATION & CAPACITY
UPGRADATION WORK

Preamble: We proposed Design, Supply, installation, testing and commissioning of equipment for TMR Plant Modification & Capacity Upgradation of Block Section of TMR Plant. We have the pleasure to approach you for submission of offer for the design, supply, installation, testing and commissioning of the above work on **single responsibility basis** as per following Specifications.

1) Eligibility Criteria:-

1.1 The eligibility criteria is defined as under :-

The bidder in the same name & style, should have successfully executed/ completed **Design, Supply, Installation, Testing and Commissioning of TMR Feed Manufacturing Plant OR Cattle Feed Manufacturing Plant OR Bypass Feed Manufacturing Plant of minimum 50 Ton Per Day capacity in Five Years (5 years), ending last day of the month previous to the month in which bid is opened, either of the following**, on turnkey basis (single responsibility Basis) -

a. **One** Contract/work/PO of similar nature as mentioned above, costing not less than **2.25 Crore**

OR

b. **Two** Contract/work/PO of similar nature as mentioned above, costing not less than **1.65 crore**

The bidder should attach signed and sealed satisfactory work completion certificate of concerned organization/company with contact details, value of works and Description of work.

1.2 The bidder's financial in the same name & style in **any two year of last five financial years**, ending 31st March (i.e. FY 2018-19, 2019-20, 2020-21, 2021-22, 2022-23) turnover should be **not less than 1.5 crore**.

Bidder should submit CA certificates of the same.

2) Prices: Bidder to furnish prices strictly as per the break up format given. The Price quoted shall be all inclusive on FOR site basis covering below:

- GST: To be quoted separately
- Transit and Site Insurance: To be included in Price
- Freight, Packing and Forwarding: To be included in Price.
- Validity for offer & Price: **60 days**
- Completion Period: Total Eight months (Including installation, commissioning).

1.0 INTRODUCTION

1.1 This section of the bidding documents outlines the technical specifications for capacity upgradation of TMR Block Making section along with modification of intake & grinding section of TMR manufacturing plant at Cattle Feed Plant -Gadmudshinghi, Kolhapur (Maharashtra) as detailed below -

- Design, Supply, Erection, Testing and commissioning of TMR manufacturing system on crop based residue like straw from wheat, rice, sorghum, maize, mustard etc, along with modification of existing system in intake & grinding sections to increase the overall block manufacturing capacity of the plant from existing 3 MT/Shift to 13 MT/shift i.e. 40 TPD (Block) at CFP-Gadmudshinghi, Kolhapur (MH). The plant is having one additional mixing and block making section apart from existing mixing & block section so as to achieve production upto 40 TPD blocks (block size: 15 kg) of TMR.

These technical specifications are for the guidance of the bidders only and not intended to bring out all the details of design and manufacturing of the equipment or equipment components. The successful Bidder shall be fully responsible to undertake all the works involved in the design, engineering, manufacture, supplying equipment at site including the erection, testing and commissioning of all the equipment of required for the project. Bidders are to note that all the equipment / facilities being offered in this bid shall be part of the overall project and they shall be fully responsible in the overall timely implementation of the project on Turnkey basis, within the battery limits defined in this tender. The work being carried out shall confirm to high standards of engineering design & workmanship. The equipment offered shall be capable of performing in continuous commercial operation to meet agreed performance standards and acceptable to the Kolhapur Milk Union/client. No exclusions of any nature are acceptable, other than those specifically detailed in this bidding document.

Bidders are required to provide all technical data/information wherever asked for. Any bid not following the bid format structure or provided with insufficient technical data/information/documents is liable to be considered as non-responsive.

Kolhapur Milk Union (Purchaser) will interpret the meaning of various equipment specification and drawings submitted by the bidder and shall have the right to reject any material/equipment, which in their opinion is not in full accordance to tender specifications.

1.2 Project information

Name of the Project	Capacity upgradation of TMR Block Making section along with modification of intake & grinding section of TMR manufacturing plant at Cattle Feed Plant -Gadmudshinghi, Kolhapur (Maharashtra)
Project Authority	Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd, B-1, MIDC, Gokul Shirgaon, Kolhapur
Plant Capacity	Existing: 3 Ton Per Shift (Block Manufacturing section) Desired : 13 Ton Per Shift (Block Manufacturing section)
Nearest Railway Station	Kolhapur
Nearest Town/City	Kolhapur
Nearest airport	Kolhapur
Site Address	Shri Mahalaxmi Cattle Feed Plant, Village: Gad Mudshinghi, Dist.: Kolhapur, Maharashtra.
Site Elevation	560 M from MSL

Relative Humidity for performance	70 %
Wind Speed	Zone-IV (Very high probability)
Seismic Classification	As per IS 875 amended up to date
Area Classification	As per IS 1893 amended up to date
Environment	Safe & non-hazardous

- 1.3** The job shall be executed on single responsibility basis and this contract shall be covering design, supply, erection, testing & commissioning of the entire equipment required for TMR Plant's Modification and Capacity Upgradation of existing Block Making Section of the TMR Plant along with necessary repair & retrofitting works.
- 1.4** Foundations of equipment, cut-outs, pedestals & other civil works and HT electrical power shall be provided by the Kolhapur Milk Union. Sheetting & Cladding work (Removal & Re-fixing) if required in any section of existing TMR Plant shall be carried out by Purchaser (KMU). KMU shall also provide suitable aluminium enclosure to protect the electrical & automation panels from dust etc.
- 1.5** Although the conceptual layout and flow diagram has been provided in this bidding document, the bidder shall be responsible for developing the detailed layout and flow diagram further in order to provide a modern plant with minimum investment to meet all the quality standard of feed as well as to fulfil the design data and technical specification specified in the Bidding Document within the battery limits.
- 1.6** As stated earlier this project will have to be executed on a single responsibility basis and the bidder should consider the complete work in its totality. It should be understood that all minor works which may be necessary to achieve the desired capacity of the plant is included in the scope of work, though not specifically mentioned.
- 1.7** **It is suggested that the bidder visit the site & understand the requirement in totality before submitting the bid.**
- 1.8** The plant shall be designed, supplied and executed in accordance with the prevailing standards as applicable to the pack.
- Bureau of Indian Standards
 - Indian Boiler Regulations
 - Indian Electricity Rules
 - State Electricity Board (SEB) regulations where plant is located
 - Chief Electrical Inspectorate requirements of State where plant is located
 - Indian Explosives Act
 - Indian Factory Act
 - Indian Weights & Measures Act
 - And any other applicable Indian Act.

Wherever Indian Standards are not available/applicable, the bidder shall follow International Standards. In case both the above standards do not apply, DIN, British or American Standards shall be used.

The Mechanical and Electrical design, performance and function of the main equipment/parts and their accessories, including control and instrumentation panels, shall comply with the latest relevant Indian standards. Safety and other statutory regulations/requirements shall comply with that being followed in the country.

The Electrical works shall comply with the latest Indian Electricity Rules and other statutory regulations/ requirements of power supply authorities and Chief Electrical Inspectorate.

The electrical installation done by the bidder shall be got approved by Kolhapur Milk Union from the local statutory authorities. Bidder shall provide necessary electrical drawings to KMU for such approval. Any modifications or changes, if suggested by the authorities, the same shall be carried out by the bidder without any additional cost.

Kolhapur Milk Union (Purchaser) will also arrange (a) inspection and stamping of various weighing equipment provided in plant from local Weights & Measures Authority and local factory inspector to obtain approval for the same and (b) All necessary documents required to obtain the same will be provided by the bidder.

1.9 Tendering Package

The scope of works covered in this bidding document is clearly described and specified in two parts with the

Part (A) Design and Supply of Equipment, required for existing TMR Plant's Modification and Capacity Upgradation of existing Block Making Section of the TMR Plant along with necessary repair & retrofitting works.

and

Part (B) Labour job of Erection, Testing, Commissioning & establishing of performance, of various sections including Intake, Grinding, Mixing, Molassing, Mix Feed and Block Making along with associated utilities.

PART (A): Design, Manufacture and Supply of all equipment/ items covers the following works:

- a) Production equipment for the manufacture of TMR Blocks of minimum 15 Kg each at Capacity of 13 MT/Shift (approx.. 40 TPD) along with various sections like Intake, Grinding, Molassing, aspiration etc. along with the necessary conveying equipment like conveyors/elevators etc. for raw material/intermediate feed/final product.
- b) Bins, hoppers, product pipelines, aspiration ducting, flaps, sight glass etc. storage tanks for water etc.
- c) Piping distribution system for utilities such as molasses and services like compressed air including pipelines, valves and accessories required for the various feed equipment.
- d) Structure for the entire work with members consisting of channels, angles, flats etc. for plant area, platforms, Pipe bridges, ladders, cat-walks, walkways, staircase, and hand railings including chequered plates, wherever specified.
- e) Modification in existing Roof, side cladding with sheets.
- f) Necessary LT Electrical system complete starting from existing Power Control Centre upto the new Sub-MCC (Motor Control Centre), Automation with software, HMI, downstream motors and gear motors/gear boxes, power and control cables, isolators, push button stations, cable trays, earthing, capacitor bank, etc. with necessary process and equipment interlocks, control, instrumentation including necessary automation as per specifications and plant operation requirement.

PART (B): Erection, testing and commissioning all items in scope, including the establishment of performance, shall cover the following:

- a) Erection, testing and commissioning of the TMR Plant equipment, including positioning, placement of equipment on AVMs/foundation if any, bolting, grouting etc. complete as per requirement.
- b) Laying and testing of the pipelines for Raw Material/Product (Intake, Grinding, Mixing, Mixed feed, Block Section and final product etc.) molasses and services compressed air including making necessary tapping with valves and accessories with necessary supports for the various utilities and services.
- c) Erection of structure complete with platform, chequered plates, ladders, walkways, railings, side cladding, windows etc.
- d) Erection and commissioning of complete Electrical of the plant including Sub-MCC, Starters, Electric motors, Geared motors, power and control cables, isolators, junction boxes, cable trays, PB Stations, control, instrumentation with plant automation including testing of the same as per specifications and plant operation requirement.
- e) Installation of the Earthing network consisting of Earth pits, Earth conductors etc. complete for the Electrical installation and equipment provided by the bidder.

1.10 Scope of Bid

This bidding document covers all the works involved in setting up the new facilities and necessary modification in existing system to achieve all the objectives stated above.

Bidder should accept to undertake the complete work of design, supply, erection, testing and commissioning of TMR Plant's Modification and Capacity Upgradation of existing Block Making Section of the TMR Plant along with necessary repair & retrofitting works. equipment identified in this bidding document on a single responsibility basis (except the civil work) and there should not be any exclusion whatsoever of any part. All items of the bidding document should be quoted.

No bids will be accepted for part of the work and no exclusions may be claimed by any bidder from supply of any item of equipment or provision of any process or service from complying with the complete requirements of the bidding document.

1.11 Project Time Scale:

Total work from supply, installation including performance establishment shall be completed in a time period of **8 months** after placement of order.

2.0 INSTRUCTIONS TO BIDDERS:

- 2.1** This section of the bidding document defines the way that bidders are required to structure the presentation of the technical section of the bids.
All technical data are to be provided in the format given in this section.

Bids not submitted in the prescribed bid format structure or bids submitted with insufficient technical data/information are liable to be deemed as non-responsive.

2.2 Bid Structure of Technical Section

The technical section of the bid is to be structured in the same order as the main bidding document. Each statement is to be numbered with the same sub-section and paragraph number as in the bidding document. Every page of the technical section of the bid is to be numbered using the prefix of the sub-section and the suffix of the page number. The general structure is therefore to be as follows:

Sub-section	Subject
	Table of contents
1.	Introduction
2.	Nil
3.	Design data and design basis
4.	Process flow description
5.	Technical information and data to be provided by bidder.
6.	Deviations from technical requirement
7.	Optional items / Break –up price
8.	Major responsibilities of Bidder/Kolhapur Milk Union
9.	Project Management
10.	Drawings & Documentation
11.	Battery limits
12.	Performance Guarantee
13.	Criteria for technical evaluation of bid
14.	Scope of work

The bidder is to cover each requirement of the bidding documents by statements, technical data and descriptive material and in particular to detail the following:

Sub-Section 1: Introduction:

The bidder is to take note of the various points listed in the introduction and they are to describe their technical proposal and systems which they have applied in designing the plant. Also to highlight any special technical innovation that the bidder proposes to include in the plant that will improve the performance of the plant/equipment, reduce operating costs, reduce maintenance or improve product quality. The preamble should commence at the start of the process and work logically through the process. Any such highlights should be cross referenced with the Bid Sub-section and paragraph number to which they apply.

Sub-Section 2: NIL

Sub-Section 3: Design Data and Design Basis

This sub-section gives in brief the design basis to be followed and gives the basic design data like operating/storage capacities and special requirements for major equipment/system, the typical ingredient types which will be used, required type and quality parameters of the feed etc. The bidder is required to follow the basis of design given in the bidding document and indicate clearly where additional processes or alternative processes or equipment are considered to be necessary or desirable to achieve optimum plant operating efficiency, optimum product quality etc. within the standards specified and optimum plant operating convenience and maintenance. These additional items/sections and processes may be included as optional.

Sub-Section 4: Process Flow Description

The tentative process description of the proposed works required for TMR Plant's Modification and Capacity Upgradation of existing Block Making Section of the TMR Plant

along with necessary repair & retrofitting works. are detailed in this sub-section which is also diagrammatically explained in the tentative flow diagram enclosed with the bidding document. The preliminary site plan indicating the area of existing TMR plant is enclosed.

It may please be noted that these drawings are only a tentative one to give an idea about the buildings, process and equipment required. It can be developed further as per the process flow and equipment layout designed by the bidder, to improve the operating flexibility and efficiency, reducing maintenance, easier expansion in future, less investment etc. Additional or alternate process or sections must be clearly detailed if proposed.

The bidder shall submit the process flow and equipment layout as proposed by them.

Sub-Section 5: Technical Information and Data to be provided by the bidder with Bids

This sub-section specifies the various technical drawings, data and information, which each bidder has to provide along with their bid, without which the bid shall be considered incomplete and will be liable for rejection.

Sub-Section 6: Deviations from Technical Requirement

All technical deviations are to be stated. If there is no deviation, nil is to be recorded. This is mandatory and failure to comply will make the bid liable to be deemed non-responsive.

Sub-Section 7: Optional Items / Break –up price.

Optional items which the bidder proposes shall be included in this sub-section. Items that the bidder includes in this section shall be used, if considered during the evaluation to be essential for the satisfactory operation of the plant and shall be included in the overall techno commercial evaluation of the bid. All break-up prices for all such optional items to be given.

Sub-Section 8: Major responsibilities of Bidder/Kolhapur Milk Union

Responsibilities of bidder:

Bidder is required to specifically state his acceptance or non-acceptance of each clause in this Sub-section. Non-acceptance shall be deemed as a deviation from the bidding document and should be mentioned in deviations.

Responsibilities of Kolhapur Milk Union:

Bidder is required to state here any additional responsibilities that they consider to be borne by Kolhapur Milk Union (Purchaser) besides those described in the bidding document. All civil works shall be carried out by Kolhapur Milk Union (Purchaser) as per specific requirement or site condition.

Sub-Section 9.0: Project Management

9.1 Time Schedule:

Bidder shall declare in this sub-section the proposed schedule of execution from receipt of order to commencement of product trials and handing over of the project. Bar-chart or MS Project showing the time schedule of the various activities from Start to Completion is to be provided.

9.2 Management Team:

Bidder is to detail the make-up of the project management team in terms of designation, qualifications and their role/function in accordance with this section of the bidding document.

The bidder is to ensure that the following sections are fully detailed and quantify the duration and man power applied to each:

- Commissioning, Product Trials & warranty runs
- Training
- Stand-by Services post-commissioning Support

Sub-Section 10.0: Drawings and Documentation

In this section, list of drawings enclosed with the bidding documents have been indicated. Drawings and documentation to be submitted by bidders with their bid for technical evaluation of the bids are explained in the sub-section 5 (**technical information and data to be provided by the bidder**). Bidder to indicate and list out in this section the drawings, data and documents provided for technical portion of their bid. Successful bidder should submit 3 sets of hard copy of all drawings along with soft copy in Auto CAD to NDDDB and Kolhapur Milk Union (Purchaser)during execution for approval. Successful bidder should also submit 3 sets of hard copy of all as build drawings along with soft copy in Auto CAD to KMU/NDDDB after commissioning the plant.

Sub-Section 11.0: Battery Limits

The battery limits of the various utilities and Engineering services are clearly given in this sub-section and are to be confirmed by the bidder.

Sub-Section 12.0: Performance Guarantees

The bidder is to take note of the various performance tests and guarantees stated in this sub-section.

Sub-Section 13.0: Criteria for Technical Evaluation of Bids

This sub-section gives an idea to the bidder about the factors which will be considered to technically evaluate and compare the technical portion of the bids. The bidder is to take note of the same.

Sub-Section 14.0: SCOPE OF WORKS:

14.1: PART A (Design & Supply)

14.1.1 List of equipment to be supplied, installed & commissioned

In this section, a consolidated list of all major equipment to be supplied and installed as per preliminary design of the plant by Kolhapur Milk Union (Purchaser)are indicated with capacity and quantities. The bidder to provide in this section a consolidated list of all major equipment being supplied and installed as per their design and detailing along with quantity, capacity, size, length, height etc. of each item. The bidder is required to follow the sequence in their list as followed in Kolhapur Milk Union's list as far as possible to enable Kolhapur Milk Union (Purchaser)to compare the bids for evaluation. New items if required can be added, by bidder, section wise.

14.1.2 Technical Specifications for Equipment-

It provides the brief general technical specification of each important TMR Plant equipment. Lengths, heights, capacities, inlet, outlet, driving motor HP and drive parts etc. may be worked out by the bidder to meet the overall capacities of section and complete plant as specified in design data and process flow. It may be noted that specification of the equipment mentioned in this section is very brief, but the bidders should ensure that each and every equipment is designed and manufactured to ensure the best performance of the individual equipment/ system. The technical specification of equipment are generally based on a particular design but bidders can supply equipment as per their design to meet the functional requirement of equipment specified in these technical specifications.

14.2: PART (B) ERECTION, TESTING, COMMISSIONING, ESTABLISHMENT OF PERFORMANCE

14.2.1 Technical Specifications for erection, Testing, Commissioning, Establishment of Performance

The bidder is to note carefully the specifications in the scope of erection, testing and commissioning.

2.3 GENERAL TECHNICAL REQUIREMENT OF EQUIPMENT / PIPING:

- 2.3.1** Capacities of all machines as specified are based on properties of various raw materials in table below. **Design & Performance of each equipment shall be based on lowest bulk density & highest moisture level.**

S.No.	Biomass	Bulk Density (Kg/CuM)		Approximate Moisture before grinding (%)
		Before Grinding	After Grinding	
1	Maize Stalk	60 to 80	120-170	11-13
2	Chana (Herbara)	65 to 75	180-200	11-13
3	Soya	50 to 60	95 to 105	9-12
4	Tur	85 to 95	110 to 120	9-12
5	Jwar	70 to 80	105 to 115	9-12
6	Molassed Mixed TMR Feed (after mixer)		250 to 350	9-12

- 2.3.2 Electric Motors:** All electric motors must be of three phase, TEFC, squirrel cage induction type suitable for operation on 415V (+/- 10%), 50 Hz. (+/-2.5%), 3 phase, AC supply, unless otherwise specified as per design requirements. The insulation for motors should be of 'F' class and IP-55 class of protection unless specified otherwise. **Efficiency of all motors shall be IE3 minimum (Premium Efficiency).**

- 2.3.3** Generally all geared motor drives shall be preferred. Only for specific low speed requirements, where maintenance is crucial shall be with chain sprockets. Gear motor to be

provided with key in driven shaft, oil level indicator, oil filling plug, oil breather and drain plug. Suitable grade gear oil for first charge of gear motor should be filled into the gear motor.

2.3.4 Controls: The limit switches, switch gear control coils, solenoid valves etc., to be supplied against various items should be suitable for operation on 230V, 50Hz, single phase, AC supply or 24V DC supply.

2.3.5 Flange Packing: Packing required for flange joints of machines / hoppers/bins etc. should be felt or asbestos fibre or rubber or any special material depending upon particular application /requirement. Packing to be fixed with glue rather than simple grease. If equipment is being dispatched in dismantled condition, necessary packing materials along with glue to be sent separately.

2.3.6 All machines are to be provided with motor/geared motor/motor-gear box and drive parts. The term 'drive parts' indicated in the technical specifications of equipment covers the supply of item as below:

- i) Chain drive:-Driving and driven sprockets of MS and flame hardened, required length of simplex/duplex chains with closing link and key in the driven shaft. For batch mixer, duplex
- ii) 'V' belt drive:-Driving and driven pulleys, required numbers, type and length of 'V' belts of polyester reinforced type, key in the driven shaft and slide rails for motor.
- iii) Direct coupled drive:- Suitable coupling with accessories and key in driven shaft. It shall be of chain type, unless otherwise specified. For conveyor, elevators and other equipment.

Apart from above, the supply of base frame for motor/geared motor and drive guard of 2 mm thick MS sheet, is also included under drive parts.

2.3.7 Accessibility: All the machines should have suitable provisions (platform with safety railing) for inspection, lubrication and maintenance.

2.3.8 Lubricant: All the machines should be supplied with first charge of lubricant (grease/gear oil) etc. supplied loose in drums and to be filled before testing and commissioning.

2.3.9 Welding: All Stainless Steel to Stainless Steel and Stainless Steel to Mild Steel welding should be carried out by Tungsten Inert Gas (TIG) method. MS to MS welding shall be carried out by electric arc welding. All weld joints for fabricated equipment/hoppers/bins/piping etc. should be ground smooth from inside to facilitate easy and free flow of material.

2.3.10 Piping, Fittings and Connections: Piping, insulation and other erection details shall be as per guide lines as specified in the Special conditions of Contract (Mechanical)

2.3.11 Electrical installation details: Cable laying, earthing, checking the electrical installation and other electrical installation details shall be as per guide lines as specified in the Special conditions of Contract (Electrical)

2.3.12 Piping Sizing: For piping sizing of various service utility pipes, the following flow rate is to be considered:

Molasses	1.0 M/sec
Compressed air line	30.0 M/sec

2.3.13 Climatic Suitability: All the equipment offered by the bidder must be suitable for trouble free working in tropical condition as in India.

2.3.14 Stainless Steel Finish: For all stainless steel surfaces, the finish should be circle polish.

2.3.15 Makes: The bidders should mention at least two standard makes of all the bought out equipment/parts/components out of few approved makes indicated in bidding document and quote for them. Kolhapur Milk Union (Purchaser) has the right to choose any of the makes and bidder shall be contractually bound to supply the same. Wherever bidder has failed to specify the make, the make chosen by the Kolhapur Milk Union (Purchaser) shall be binding.

2.3.16 Name Plate: Every machine/equipment should have a name plate with name of the manufacturer, year of manufacture, capacity of the machine/equipment, number and other relevant information if any, written on it. Name plate shall be fixed on equipment with suitable bracket.

2.3.17 Shrouds: Drive and drive parts including coupling for motors in the plant shall be covered with safety grills/shrouds, easily removable type. All motors installed outside the building shall have shrouds, made from 2 mm thk GI sheet, duly painted having louvers for air circulation and a lifting handle.

2.3.18 Inspection: Kolhapur Milk Union (Purchaser) has the right to carry out the stage-wise inspection for all fabricated items. QAP & QIP should be prepared by successful bidder for each item and to be got approved from Kolhapur Milk Union.

2.3.19 LOT items: Wherever "lot" items has been specified by the Kolhapur Milk Union, like piping, cables and steel structures etc., the detailed list shall be provided by the bidder with unit rate. However **the bids shall be evaluated on LOT/SET basis only and also successful bidder shall have to execute these items on LOT / SET basis only.** Any surplus material including scrap materials under lot / unit rate items after satisfactory completion of works shall be taken back by the successful bidder. **If the Bidder seeks breakup payment for lot item, the bidder can be permitted for a maximum billing breakup in 3 slices.**

2.3.20 All lengths of conveyors and elevators are indicative only and meant to give an idea to the bidders of the requirement. Bidder shall supply conveyors as per site condition and as per approved drawing/ discussions post award of contract.

2.3.21 In detail specification of equipment/hoppers and accessories etc., the thicknesses of construction material have been specified where ever required. It has to be noted that these are the minimum but the supplier may provide thicknesses more than these if required by their design/detailing of the equipment.

2.3.22 Discharging angle of raw material in pipes/transition pieces/hopper bottoms etc., in general should be min. **65°** from horizontal for straw/meals /powder and min. **45°** for grains and minimum **50°** for concentrate mix.

2.3.23 All the equipment in general should be dust proof in arrangement.

2.3.24 Painting: All bought out standard manufactured equipment may be supplied as per manufacturer's standard painting practice. The painting procedure for all the fabricated equipment at the supplier's work should be as given below.

- (i) Removal of rust from the surface by using sand blasting / emery paper / chemical rust solvent etc.
- (ii) Applying one coat of suitable primer.
- (iii) Putty should not be used to hide dented surfaces and instead dents if appeared should be removed carefully.
- (iv) Applying two coats approved shade of synthetic enamel/black bituminous paint.
- (v) Supporting steel structure, transition pieces & piping etc. being fabricated at site to be applied with two coats of corrosion resistant zinc oxide primer and one coat of synthetic enamel paint before erection/installation and then final 2nd coat of synthetic enamel paint after erection / installation but before commissioning. Approved colour shades for equipment are as follow unless otherwise specified in equipment specifications or agreed during execution of contract.

Equipment	Colour (Indicative)
Machine body	Oyster white
Motors / Geared Motors	Ruby Red
Machine Platform / drive guard	Jet Black
Bins, Hopper	Oyster white
Steel structure	DA Grey
Manual/ Pneumatic flaps	Oyster white
Product Piping	Oyster white
Aspiration piping	Sky blue
Inspection Door	Azure Blue
Inside of machine/bins/hoppers	Black Bituminous
Support structure & legs of machine	DA Grey

Final colour scheme should be approved by Kolhapur Milk Union (Purchaser) before further action by the successful bidder.

2.3.25 Three sets of installation, operation and maintenance manual of all machines should be provided. One set should be packed with machine while 2 sets should be sent along with dispatch documents to consignee.

3.0 DESIGN DATA AND DESIGN BASIS OF TMR PLANT'S MODIFICATION & CAPACITY UPGRADATION OF THE BLOCK SECTION

3.1 Capacity : Minimum 13 MT/Shift (8 hour shift) of TMR Block from existing 3 MT/Shift (8 hour shift)

3.2 Size of Block : 15 Kg (minimum)

3.3 Feed Formulation :

COMPOSITION FOR BLOCK & PELLET MANUFACTURING IN TMR PLANT

Feed Name	Percentage FOR TMR Block	Percentage for TMR Pellet
DORB	15	18
R P FINE	3	7
MAIZE	3	6
MOLASSES	8	8
PRE-MIX	5	5
RAPESEED EXT	6	9
BROKEN RICE	5	7
HARBARA KUTTI	40	30
TUR KUTTI	15	10

Bidder to design & establish performance based on above formulation (Scope of work of this tender is limited to Block Section only & no modification in Pellet Section is envisaged).

PROCESS DESCRIPTION -

Storage for biomass is being done in 05 nos bunkers (small RMG) of capacity approx. 80 Sqmtr each. Biomass, mainly in chaffed form (10 to 12 inches) like Tur, Soya, Chana(Herbara) and Sorghum (Zwar) are stored in the bunkers in bags of approx.. 60 kg. The bags are transported upto the TMR plant through tractors. Bulk Density of various raw materials (Biomass) is indicated above.

Biomass is fed into the pulverizer (grinding) through a set of dumping hopper and screw conveyor. Due to stones and silica in the raw materials (which is received directly from farms), closed system consisting of air-lock, blower and dust collector has been provided in the TMR plant. This system need to be made more effective to control the dust in the system.

Biomass, after grinding in 8-10 mm size, is being stored in the storage bins (02 nos of 5 Ton each). However, due to light weight, the grinded material is not free flowing from these bins. Suitable electric/pneumatic vibrators on bottom hoppers are being envisaged in this tender.

The grinded material is conveyed through set of screw/chain conveyors to the TMR Mixer. Internals of these conveyors are to be replaced.

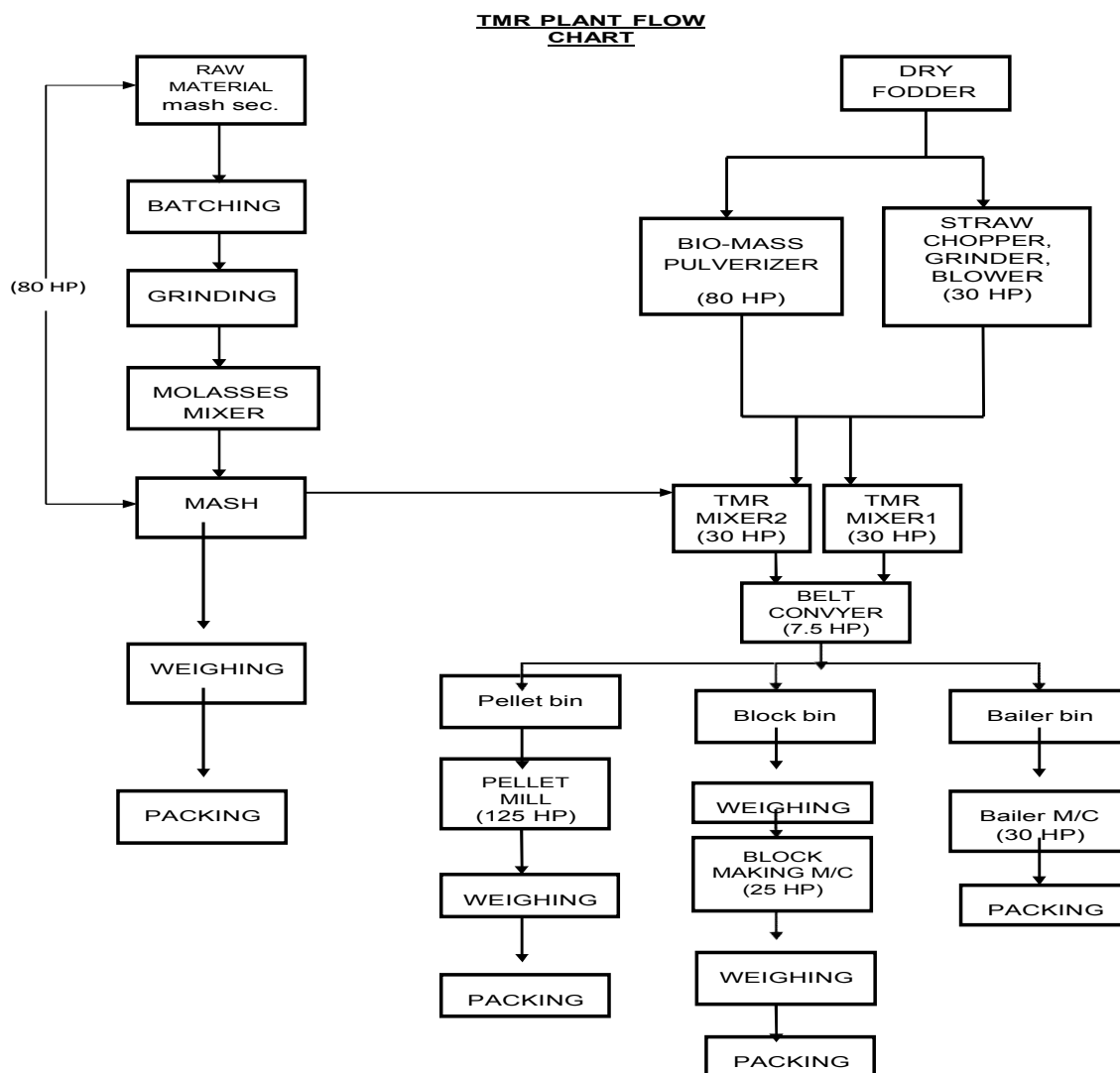
After taking approx. 50-55% of biomass in the main mixer, molasses@8% is manually taken into the mixer and remaining qty of concentrate grinded feed taken into the mixer. Mixing time approx. 15-20 mins. The concentrate feeding conveyor, biomass feeding conveyor and molasses dosing system need modifications.

The mixed feed material from mixer is unloaded into the inclined open belt conveyor.

There are 3 sets of finished feed bins of 5 MT each. The Mixed Molassed TMR feed is collected into one of the storage bin for pelleting, one for Block making system and third one for Bail Manufacturing system. However, after introduction of new block making system(as envisaged in this tender), the existing finished feed bin of Bail making section shall be treated as finished feed bin of new block making section. Suitable modification (square to round) in bottom hoppers of these three bins need to be done and pneumatic/electric vibrators to be provided to ensure free flow of material.

The chain conveyors below Pelleting bins also need suitable modifications by replacing the internals.

3.0 FLOW CHART OF EXISTING PLANT SET-UP



3.11 Electrical & Automation

- Power supply 415 volts, 50 HZ, 3 phase shall be made available in the **PCC (in TMR Plant)** by the Kolhapur Milk Union. Successful bidder shall modify this PCC Panel and provide incomer of suitable rating in the new MCC Panel to draw power for all outgoing feeder. **The existing MCC panel of intake & grinding section shall be used by**

suitable modification as per load requirement of new machines. Modification is in the scope of the bidder.

- All electric motors to be squirrel cage, 3 phase Energy Efficient type (Eff 1/IE3). For all motor feeders below 40 HP use Motor Protection Circuit Breaker with overload /SC protection, contactors in Motor control centre to be provided. Capacitor banks of suitable capacity/rating, based on the total load of new equipment motor rating shall be provided in the MCC Panel by successful bidder. Kolhapur Milk Union (Purchaser) shall maintain the unity power factor at their PCC/Sub-Station level, based on total load of CFP & TMR plant.
- For power, from MCC to motor, armoured cables with copper conductor of suitable rating shall be provided. For controls, armoured cables with copper conductor (minimum 1.5 Sq.mm). For signal, special 0.5 sq.mm copper conductor cables to be used.
- Electric geared motors either directly mounted on equipment shaft or with direct coupling preferred over motor with gear box combination. Minimum safety factor for gear motor/box to be 1.4. Main Exhaust fan shall be direct driven through a coupling by electric motor.
- Remote Control Panels (RCP) with HMI is required near dumping hoppers for conveyors operation near hammer mill for local operation.
- All flaps, slide gates pneumatically operated through either respective HMI/Remote Control Panel in plant.

3.12 Aspiration Unit

1.0 Functional requirement:

Unit when operated shall create negative pressure and reduce dusting by collecting fine dust generation from the connected equipment (Hammer mill, Dumping hopper) and during operation.

2.0 Design requirements

2.1 The construction of the unit shall be modular type air jet filter. The unit shall suck of powder laden air from connected equipment, and separate the powder through filters and finally cleaning filter bags by blasting purge air through the filters timer based operation.

2.2 **A directly coupled Exhaust Fan** on electric motor shall create necessary negative draft. **Backward curved blades** on blower wheel are preferred. Blower wheel to be statically and dynamically balanced. Fan to be provided with outlet silencer in order to reduce the air noise.

2.3 Air handling capacity of fan shall be suitable for operation with suction static pressure of 180 mm WC.

2.4 Material of construction : Mild steel IS 2062.

2.5 Operation method

Dust laden air enters in aspiration filter and then air escapes through filter bags and dust is deposited on the outside of filter bags. For removing the dust retained on the outside of filter bags, high pressure reverse air shocks are provided at regular intervals to the inside of the filter bags through an automatic electronic/pneumatic control system. Dust to be collected in a bottom cone and discharged to hopper.

Scope of supply:

- 2.6 Main body fabricated from minimum 2mm thick painted M.S. sheet, complete with bolted type inspection doors of suitable size, one on each side, for maintenance of filter bags with inlet spout and dust collecting cone.
- 2.7 Filter bags, complete with sheet steel hinged covers with integral filter-row purge system in IP-65 protection class. Filter bags to be provided with suitable GI cage and fastening system. It should be ensured that bags and cages can be easily removed for cleaning in position by special annular brush.

Purge air header, purging valve, solenoid valves (to be provided in piping manifold) and orifice for a set of filter. Automatic controller in weather proof enclosures (IP- 65) of aluminium cast housing for controlling purge air in each filter bag in a fixed sequence by 2 channel sequence timer for shaking of filter bags as required for air jet filters. All control units / purging valve / solenoid valves etc. should be suitable for 230 V AC supply. All the wiring between timer box and solenoid valves etc. should be of PVC insulated copper conductor.

Suitable size Exhaust fan with electric motor of vertically flanged mounted type to be fitted on top of the jet filter for suction of air through filter bags. The electric motor shall be of TEFC, squirrel cage induction type, degree of protection IP – 55 with class "F" insulation, suitable for 415 V (+/- 10%), 50 Hz (+/- 5%), and 3 phase AC supply.

Motor shall be Efficiency – IE3 only.

The unit to be complete with electronic/ pneumatic control apparatus having provision for adjustable bag cleaning cycle and the length of the cleaning pulses, pressure reducing station for air supply to control system, steel supporting legs, etc. as per requirement.

The housing to be complete with Filter cartridges, Flow enhancer venturis, Mounting flange with holes, Online pulse cleaning arrangement with solenoid valve, Small compressed air reservoir, Safety valve, Drain valve, DP switch, Magnehelic gauge, Digital sequential controller, Centrifugal fan with drive motor, Fan silencer, Control module with local cabling, Protection guard, Leak proof maintenance door, Bottom plenum for suction with wire mesh type sieve, FRU etc.

Essential accessories:

Fan with outlet silencer, Cabling between control module and motor + valves Protection guard for solenoid coil / pressure gauge/ safety valve Bottom suction plenum with sieve to trap lumps / bags / plastics going into aspiration unit.

PLANT BUILDING:

- Necessary civil works required for installation of all new equipment, foundations, pedestals, structural steel supports, platforms, staircase, services, otta, dumping pit, trenches for expansion of the existing plant space etc shall be carried out by Kolhapur Milk Union. Successful bidder shall be responsible to provide detailed design & load data to carry out such works by Project Authority. Existing old steel structure after dismantling of old equipment as per scope, can be re-used for support & platform requirement as per site condition.

3.17 NIL

3.18. Following shall be arranged by owner/Kolhapur Milk Union (Purchaser)directly and not included in scope of works in this tender.

- All building works for offices, godown, roads, service block etc.,
- Water upto the UG tank
- Electrical substation, LT Panel & Power upto the TMR Plant with suitable cable
- Fuel storage system.
- Fire hydrant system.
- Lighting
- Laboratory equipment.
- Steam & Molasses supply.
- Mains/bore well Water Supply, Sanitary Installation, Water Disposal.
- Internal electrification (except plant building) and street lighting
- Environmental Works, Access Roads.
- Laboratory Glassware, Chemicals & Equipment.
- Telephone & Intercom Systems
- Workshop Tools & Machines
- Over-head tank for raw water and RO/soft water.
- Furniture for engineering store and laboratory.

4.0 PROCESS FLOW DESCRIPTION

4.1 RAW MATERIAL INTAKE

Biomass packed in bags for feed production would be received at the plant by road through tractors from nearby godowns. The bags will be manually unloaded and either stacked near the dumping hopper of intake conveyor.

Concentrate feed (Grinded dry powder), containing other ingredients & pre-mix, apart from biomass, shall be prepared and mixed in separate concentrate plant which is located inside the plant premises only. A separate bin of approx. 2 MT to be provided in this plant by the bidder with necessary sensors and controls to transfer mixed feed material to the new TMR mixer for further processing.

4.2 BATCHING, GRINDING & MIXING

Biomass in chopped form (8-10 inches) is conveyed mechanically to the grinding section is being converted to 8-10 mm size.

The grinded material (biomass) is stored in PW bins, located near the hammer mill section and then transferred to the weigh hopper so as to transfer the desired qty to the TMR mixer, through conveyors.

Mixing of biomass and concentrate including molasses is done in the TMR mixer as per batch size. The existing TMR mixer is of around 8-10 Cum with one vertical impeller. Presently, total batch size is 1 ton which shall be increased suitably as per process requirement so as to achieve the production capacity of approx. 40 MT/Day (in Block only). No modification is envisaged in existing pelleting & mash manufacturing sections. KMU may wish to produce the Block, Pellet & Mash TMR feed as per requirement from time to time which may affect the desired capacity of proposed block section, if pellet & mash are produced simultaneously by Purchaser. Mixing of batch in mixer is done generally for 12 to 15 minutes. The operation from batching to mixing is to be converted in semi-automatic with suitable interlocking to ensure that no two batches are fed to mixer at a time for mixing. Batch after getting mixed in mixer is fed mechanically to the open belt conveyor (inclined). In present tender scope, the new TMR mixer would also be installed adjacent to the existing mixer and shall discharge in the same existing hopper below inclined belt conveyor. There should be minimum time delay in getting material in both the mixer simultaneously so as to optimize the plant's capacity.

4.3 MOLASSING

Molasses is received at plant through road tankers are weighed in installed Road weighbridge. Molasses is unloaded by gravity in underground concrete unloading tank/ small MS balance tank, after which it is pumped any of the 2 Molasses Storage tanks.

2 nos new dosing tanks of 500 ltr. each with required piping, valves and accessories to be provided and to be installed with suitable support structure platform near both TMR mixers (existing & new). VFD operated pumps shall be required for molasses dosing in TMR mixers, at required qty as per batch size.

4.4 PELLETING AND BLOCK MAKING SECTIONS

The mixed feed, after discharge from TMR mixer shall be stored in existing finished feed bins (3nos X 5 MT each approx), through set of new conveyors and elevator. The existing inclined belt conveyor need to be dismantled to locate the new conveyor and elevator. Necessary trench and elevator pit shall be provided by Purchaser, based on details submitted by the supplier. The chain conveyor above existing finished feed bins need suitable modification for discharge of molassed mix material into bins.

The bottom hopper of all finished feed bins shall be provided with Pneumatic/Electric vibrators to be provided (2 in each hopper) for easy discharge of material.

One finished feed bin shall provide material to the pelleting section through existing chain conveyor. The other bin material shall be discharged to the existing block making section. The third bin shall be dedicated for feeding of material to the new block making section. All the existing bottom & top chain conveyors need modification by replacing its chain with link, roller etc.

4.5 PACKING & DESPATCH

The block making section, containing one semi-automatic weighing machine, feed conveyor to the weighing machine and block manufacturing machine, shall prepare block of 15 kg each in HDPE bags. The packed bags need to be transferred to the metal detector, through new slat conveyor at suitable height & inclination, so as to minimize the labour involvement. The block are then loaded into trucks manually for dispatch.

4.6 ASPIRATION SYSTEM/DUST COLLECTOR

To minimise the generation of dust in the plant, all dust generating points are identified and dedusted with blast of compressed air. Units shall have major components like cartridge filters, exhaust fan etc. Aspiration connection is given to all major conveying equipment. Dust powder collected by aspiration unit is put back to the system, for minimising product losses.

4.7 SERVICES

To supply 3 phase electric power to all the equipment, Motor Control Centres (MCC) shall house all starters in the plant building. Connecting cables to all motors, HMI panels included in scope.

For pneumatic operation of these flaps and slide gates, compressed air shall be produced by air compressor and then stored in a in-built receiver before feeding to various consumption points via in-built air drier, piping. At usage point moisture is removed from compressed air by moisture separators. Compressed air shall also used for operation of jet filters of aspiration systems.

4.8 AUTOMATION:

The plant shall have semi-automatic operation in intake, grinding, batching & molassing. Suitable interlocking with mixing section for accurate batching & to avoid intermixing of batches and electronic load cell based weighing machine for accurate weighing of feed.

For operating the plant, the PLC based panel with HMI (**min 15" colour display**) to be provided at suitable location in plant. Plant should also be operated in manual mode in case of any malfunction in automation.

The discharge of material from weigh hopper to discharge chain conveyor and feeding of raw materials to TMR mixer, separation & discharge of iron/stone particles, spark detection & alarm system and feeding of concentrate feed material and molasses dosing shall be semi-automated. However, section wise inter locking shall be provided to avoid over flow / chocking /batch mixing.

Brief about automation requirement- The indicative control philosophy is briefed as below, however bidder to design the detailed control philosophy along with process logic & supply all automation hardware, software etc complete to meet process requirements as described in below sections-

1. STRAW INTAKE, GRINDING & STORAGE SECTION:

Fodder intake & grinding shall be done manually and fed to the existing storage bins through set of conveyors and elevators as shown in process flow diagram.

Straws shall be discharged automatically through a conveyor to the selected mixers as per recipe. Qty shall be automatically detected from load cells of both the storage bins. All required hardware/software (in PLC panel), signal cables etc all to get existing load cell data of existing storage bin is in the scope of bidder.

Solenoid Valves at inlet of both bins shall work automatically, depending upon qty inside the bins, received from load cells.

Measurement & Monitoring of material inside the bins should be through PLC-HMI Panel. All interlocks like no emptying while filling, bin engaged-not healthy etc should be considered as per operation & functional requirements.

2. **CONCENTRATE FEEDING SECTION :**

Existing Intake & Grinding in TMR Plant need to be augmented suitably as per scope/SOQ. This Concentrate shall be stored in 2 nos storage hoppers of approx. 2 MT each for feeding to the TMR mixers through conveyors as shown in process flow diagram.

Concentrate shall be discharged automatically through gates/pipes over common existing conveyor (above mixer) and transferred to the selected mixers as per recipe.

Qty shall be automatically detected from load cells of both the storage hoppers. New Chain conveyor with slide gate for feeding of concentrate into both the new storage hoppers (2X1 MT each) shall be done. A 2 way flap in existing elevator to provided to divert concentrate material either in existing hopper or over new conveyor for 2 new hoppers. Pneumatic Slide gates at inlet & outlet of both hoppers shall work automatically, depending upon qty inside the hoppers, received from load cells.

Measurement & Monitoring of material inside the hoppers should be through PLC-HMI Panel. All interlocks like no emptying while filling, hopper engaged-not healthy etc should be considered as per operation & functional requirements.

Also there is existing third hopper used for bagging application of concentrate as per KMU's requirement. Selection of this hopper for filling should be through PLC-HMI.

3. **MOLASSES SECTION:**

Molasses intake in existing Day Storage Tank is available in TMR Plant and day storage operation shall be carried out by Purchaser manually. This shall be transferred in 2 nos load cell based dosing tanks of 500 ltr each (through **new pneumatic actuated valves**) for feeding to the TMR mixers through set of VFD operated dedicated dosing pumps, piping, valves & accessories as shown in process flow diagram.

Molasses shall be dosed automatically through VFD operated pumps, piping into the selected mixers as per recipe through automatic actuated valves as shown in process flow diagram.

Qty shall be automatically detected from load cells of both the storage tanks. Auto actuated valves at inlet of both tanks shall work automatically, depending upon qty

inside the tanks, received from load cells and accordingly, the molasses qty should taken in from gravity feed day storage tank to both dosing tanks.

Measurement & Monitoring of molasses inside the dosing tanks should be through PLC-HMI Panel. All interlocks like no emptying while filling, tanks engaged-not healthy, no dosing when TMR mixer empty etc should be considered as per operation & functional requirements. **Dosing of molasse should be done in staggered way depending upon set values of weight of straw & concentrate ingredients inside** TMR mixers, having load cells.

4. MIXING SECTION :

TMR Plant has one existing load cell based TMR Mixer of around 10-12 Cum capacity which is suitable for having 2 MT per Batch. The proposed new TMR Mixer shall be installed near this existing mixer for discharge of mixed material into existing hopper (common for both mixers). Load cell signals of both mixers shall be used in PLC-HMI panel for operations. All required hardware/software (in PLC panel), signal cables etc all to get existing load cell data is in the scope of bidder.

Batch Preparation is done in one mixer at a time by adding straw, concentrate and molasses simultaneously. Provision of all required set points of weight, timing to start sequential addition, mixing timing etc shall be controlled through PLC-HMI panel.

The PLC-HMI based control system shall have totalizers (batch consumption and day consumption) to get data for consumption of ingredients based on load cells, installed in various sections.

Process logic should be worked out by bidder in detail for minimizing the batching/mixing time, using parallel operations.

In case of automation failure, plant should have provision to operate manually.

UPS with battery back-up of suitable rating to cater all critical automation loads shall be provided by supplier.

Note - Automation write-up, UPS rating and detailed process logic to be submitted for approval during detailed engineering.

5.1 FLOW DIAGRAM

Bidders shall submit the flow diagram similar to one prepared by Kolhapur Milk Union (Purchaser) and attached with tender, starting from receipt of material from godown, production and conveying of finished product.

5.2 EQUIPMENT LAYOUT

Bidders shall submit the scaled equipment layouts of the plant building in the form of plans along with sections and elevation views. This shall also have the dimensions of the equipment as well as the suggested dimensions of the plant building as recommended by the bidder.

Bidder is advised to visit the site for actual site condition, measurements before bidding.

5.3 MODULAR LAYOUT OF PRODUCTION AREA

Bidders shall provide the scaled drawing (similar to one prepared by Kolhapur Milk Union (Purchaser) and attached with bidding document), showing in the attached drawing Ref no. AN.00000.11.01.D.00.

5.4 SERVICES SCHEMATICS

Bidders shall provide schematics for all the services like electricity & air. Separate single line schematic diagram indicating piping with valves, fittings etc., up to utility points.

5.5 ELECTRICALS

5.5.1 Bidders shall submit a consolidated list of motors equipment-wise, (with drive mechanism up to shaft of machine wherever applicable), and any other electrical utility units consuming electrical power indicating KW (installed and operating), RPM of motor, RPM of gear motor/box and type of drive parts.

5.5.2 Bidders shall submit a consolidated single line power diagram of electrical installation being provided by them, including wherever applicable the details of motor control centres, control panels, remote panels and electric motors etc. This also includes suggested Capacitor banks in KVAR considered for the higher HP equipment.

5.5.3 Bidders shall provide level and details of automation considered by them for their plant.

Note: It may be noted that design data & drawings, automation which are to be submitted with the bid, are binding and mandatory in order to evaluate the bid. **Bids without the complete set of required details may be liable to be treated as incomplete bid.**

Further the successful bidder after acceptance of contract shall have to submit the final set of required drawings suitably modified/corrected if necessary as per final design requirements/site conditions and get the same approved from Kolhapur Milk Union (Purchaser) before execution.

5.6 CATALOGUES/LEAFLETS/DRAWINGS OF EQUIPMENT

The complete technical details of the various individual equipment proposed by the bidder in the form of catalogues/leaflets/ drawings, data sheets etc., are to be submitted along with the bid.

6.0 DEVIATIONS FROM TECHNICAL REQUIREMENT

This bidding document provides guidelines for the processes and equipment to be used for the plant and the 'Design data and Design basis' and 'Technical Specifications' define the qualitative parameters and frame work against which equipment will be required to perform. It is incumbent on bidders to provide the fully detailed technical specification of

the equipment and services which they intend to provide to fully execute the contract in line with the tender document.

Items which deviate from the bidding proposal shall be as per design specifications of the bidder and shall be treated as a deviation from the text of this bidding document. Deviated items should fulfil the minimum performance parameters as specified in this tender.

This bidding document does not allow bidders to make exclusions from any part of the bid and an incomplete list of equipment or an incomplete schedule of service utilities to be provided would be considered as a non-responsive bid.

7.0 TECHNICAL SPECIFICATIONS OF CRITICAL MACHINERIES :

7.1 TMR Block Making Machine

Specifications

Feeding Chamber Size	24" x 18" x 43" (H x W x L)
Block Size	12" x 18" x 5" (H x W x L)
Body	Fabricated
Motor H.P Required	25 (H.P.) Minimum or as per OEM design (IE-3)
Working Liquid OEM Scope)	Hydro/Enclø-68 (In
Production of Blocks	100 blocks / Hour
Weight of Block (Dry Fodder) (TMR) (60-40 ratio)	10 to 12 Kgs. Weight of Block 16 to 18 Kgs.
Block Ejection	Side Ejection (In Chute)
Packaging in Poly Bag	Semi Auto (Through Chute)
Feeding Hopper	To be Provided
Hard Liner Plate	To be Provided
Starter	To be Provided
Online Oil Chiller	To be Provided
Working Pressure	3300 PSI
Machine Cycle Button Mode	Auto Single Cycle / Push
Operation of the Machine	PLC Controlled
Oil Tank Capacity	600 Ltrs.
Overall Dimension	8.5' x 8.5' x 13.5' (H x W x L) -approx.

7.2 BIOMASS PULVERIZER (HAMMER MILL) WITH INTAKE & DUST COLLECTOR SYSTEM

Functional Requirement –

For crush straw (stems of Herbara, Tur Kutti, Jwar Kutti, sugar can) at an guaranteed output of **3000 kg per hour** using 8 mm screen. The system to be designed in such manner that the area should not be dusty and should be suitable for proper working area for operating & maintenance staff.

Design requirement

Pulverizer to consist of the following sub-systems

a. Hammer Mill

The hammer consist of grinding chamber, set of swinging multi edged hammers with cutting effect, a sieve classifier and electrical driving mechanism. High RPM design for shattering dry biomass by impact from high velocity multi edge hammers. The hammers be swivel mounted on a sturdy shaft which is running on heavy duty bearings. The sieve classifier is placed at the sides and bottom of the grinding chamber in pearl shape-water drop shape.

b. Pneumatic conveying

The pulverized material sucked through the bottom sieves by the pneumatic conveying system and transported to cyclone and feed screw/air lock rotary valve feeder as per schematic layout given below. The conveying blower to be separately mounted on floor with independent motor.

c. Cyclone dust collectors (Twin or Single)

The separation of the conveying air and the pulverised material is achieved in the high efficiency cyclone dust collectors- twin design. The material collected at the cyclone bottom hopper to be removed by a rotary air lock valve eliminating dust pollution at the bottom of the cyclones where the dried material would be discharged. Dust shall be put back into the system.

d. Bag filter dust collectors

Fully enclosed Bag filter type dust collector provided to trap the fines which are not collected by the cyclone. The bag filter shall be fire resistant type.

e. Intake conveyor

For controlling feeding auger type intake conveyor of **4 TPH (minimum)**, speed control by VFD control.

f. Electricals

All electrical works included motor control center provided for managing all motors from one source. The panel to include indicating ammeters and voltmeters. The main drive electric motors exceeding 10 hp to be provided with VFD and the smaller motor shall be connected through a DOL starter/Star Delta Starter as specified in detail below.

g. Supporting structures

All supports for the pneumatic conveyor, cyclone separators and bag filters, hammer mill etc would be from the ground. The foundation & civil works for all supports shall be carried out by Kolhapur Milk Union, based on receipt of details from supplier.

Detailed designs requirement for above sub-sections are give below;

1. Grinding/Chopping Capacity: Minimum **3000 kg per hour** on straw, having bulk density as specified in Design Data Basis with maximum 8 mm sieve. Sieve to be of minimum 5 mm thk.
2. Motor driven hammer mill pearl type design with strong chasis & frame
3. Directly coupled or v belt drive motor (IE-3)
4. Milling screen to be pearl/water drop design

5. Rotating heat treated hardened hammer blades/beaters (minimum 12 mm thk) to be provided. Set of beaters consist of minimum 100 beaters or as per OEM design to achieve the desired capacity.
6. Aspiration system for crushed biomass movement as per scheme given below
7. Main material to be moved by suction through cyclone and air lock discharge feeder to avoid dust free and trouble free operation
8. Matching pipes about 400 mm dia, 'B' class
9. Matching cyclone collectors twin design with blower, stand, dust bag trap, piping etc
10. Twin cyclone design preferred for lighter biomass like cotton/straw/tur kutti etc.
11. Dust free design to be ensured by air aspirator sets fitted at strategic dust points
12. Cyclone to deliver chopped biomass through suitable air lock and conveying system (as per attached process flow diagram) to the existing grinding bin
13. Support structure for cyclones, dust collector etc included.
14. Openable hinged cover doors provided around dust collectors.
15. About 64 filter bags, minimum 150 cm long each to be provided. The bags to be fire resistant type.
16. Hammer mill shall be provided with following wear parts as free supply along with the machine, apart from the spares mentioned in the list of essential spares –
 - 12 mm – 3 nos
 - 10 mm – 5 nos
 - 8 mm – 5 nos
 - Beater (hammer) Set- 10 Sets
17. Strong & sturdy intake conveyor -inclined auger type, Twin/Single screw feeder with drive motor (IE-3), **capacity: 4 TPH** in various raw materials specified in design data basis.
18. Matching geared drive motor, starter, cable, panel etc included for intake conveyor, Hammer Mill, Cyclone, Air lock etc.
19. Intake conveyor operated by VFD drive
20. Existing MCC Panel of Intake & Grinding section to be suitably modified as per load requirement of new equipment.

7.3 TMR MIXER :-

The new TMR Mixer is to be installed on existing foundation/available area of approx. 5500 mm Long, 1900 mm Wide and available height of approx. 2000 mm. The scope includes removal & shifting of existing Ribbon type mixer along with suitable modification in existing chain conveyor (from concentrate section) so as to feed the grinded concentrate material from a new hopper of suitable capacity, in new as well as existing TMR mixer. The mixer should facilitate homogenous and high-quality ration mixing that exhibit mastery of coarse and concentrate feed mixing. It should be Strong enough to overcome any obstacle, effective enough to mix homogenously with **desired capacity of 2 TPH (minimum)** per batch (Formulation: grinded straw@55%, Concentrae@37% & Molasses @8%). Single or Twin Augur type TMR mixer with drive unit, gear box, support frame, AVM pads, hydraulic discharge belt drive gate and all associated accessories, cleaning & maintenance approach platforms etc shall be provided.

8.0 MAJOR RESPONSIBILITIES OF BIDDER/KOLHAPUR MILK UNION

8.1 Major responsibilities of bidder

- 8.1.1 Developing the process design, complete engineering design supply of all equipment and systems, ensuring best performance of individual equipment/system, for which bidder shall avail the assistance of reputed specialists in their respective fields, wherever required, as per the details given in the bidding document and as per battery limits.
- 8.1.2 Performance and suitability of the total system. Performance tests should be carried out by the bidder in the presence of and to the satisfaction of Kolhapur Milk Union/Client's Representative. Bidders should confirm / mention the certain values of Key Performance Indicator of various equipment / process mentioned in attached Annexure – II.
- 8.1.3 Arranging and obtaining approvals from various statutory authorities on behalf of the Client/Kolhapur Milk Union. The statutory fees shall be reimbursed by the Client/Kolhapur Milk Union (Purchaser) on production of receipts.
- 8.1.4 Ensuring satisfactory performance, training of operating staff, stand by services after commissioning and after sales services of the complete plant/ equipment supplied and installed as mentioned in respective pack and as per battery limits.
- 8.1.5 First charge of gear oil, lubricants and consumables. "First charges" means that these items shall be replenished whenever and wherever required till the successful completion of product trials. However, supply of electricity, fuel oil, water, petrol and diesel etc. for plant operation is not covered in bidder's scope.
- 8.1.6 Test kits required for establishing performance parameters.
- 8.1.7 Necessary manpower and tools for installation, testing and commissioning
- 8.1.8 Performance guarantees with regards to the following:
 - a) Rated performance of individual equipment and complete system.
 - b) Product quality standards conforming to the prevailing Standards.
 - c) Key performance indicators of various equipment / process.

8.2 Major responsibilities of Kolhapur Milk Union

- Details of civil design & civil works, building layout and drainage and sewage details.
- Document on local site conditions related to climate and communications.
- Adequate labour force with operators/supervisors and engineers for trial, testing and commissioning at no charge.
- All buildings including roads, drainage and minor civil works during plant and pipe work installation.
- Provision of and cost of services, raw product, packaging material etc.
- Fire fighting system.
- Lighting distribution system Internal telephone system.

- Engineering personnel to liaise with the supplier, Project Manager and the execution team.
- Provision of personnel for training and on-going jobs supervision.
- Permanent water and power supply at the time of testing and commissioning of the plant, including coal, petrol and diesel etc.

9.0 PROJECT MANAGEMENT INCLUDING TESTING, COMMISSIONING , TRAINING ETC.:

- 9.1 The project execution shall be time-bound as per the mutually agreed time schedule. Supplier shall nominate an experienced project engineer who shall be responsible for activities of project in office and site. A competent execution team shall be deputed at site by supplier who shall be stationed at site and adequately experienced in Project Management of such magnitude and type. The Project Engineer shall avail assistance where ever required from reputed experts in various fields who shall be directly responsible for satisfactory execution. The Project Engineer shall be responsible for overall implementation of the entire project, from commencement to the final take-over of the plant. The services of the Project Engineer shall be ensured for the day to day operations and coordination to ensure successful and satisfactory design, procurement, manufacture, inspection, erection, testing and commissioning of all the equipment/facilities/systems within the time-bound schedule. He shall be assisted by a Site Engineer to take care of all site activities. The Project Engineer and Site Engineer shall attend all technical and review meetings between various parties involved in the project and ensure implementation of all decisions taken in the meetings. The Plant Incharge (KMU) shall be responsible for detailed material accounting at site and management of the store maintained at site.
- 9.2 The Kolhapur Milk Union (Purchaser) shall also nominate a Project In-charge with whom the supplier shall communicate/coordinate. The Kolhapur Milk Union (Purchaser) shall also post a Site Engineer at project site for supervision and coordination with Site Engineer of the supplier. Approval on technical documentation (with or without specified amendments) shall be given by Kolhapur Milk Union (Purchaser) within ten working days after submission. The amendments which are not in the original scope of work or due to changes in concept, shall be taken-up by the supplier as per mutually agreed rates (decided either before or after execution), and shall be binding on the supplier.
- 9.3 Supplier shall obtain approval for purchase of specific makes of equipment whose makes are not mentioned in his offer. If two or more makes of the same equipment are mentioned in the form of alternatives, the supplier shall seek approval for choosing one make over another.
- All the detailed design calculations regarding the selection of equipment sizes, system types, etc. shall be submitted to Kolhapur Milk Union/Client for their specific observation and record whenever asked for.
- 9.4 The supplier's Project Engineer will provide to the Kolhapur Milk Union's Project In-charge with **fortnightly** progress reports which clearly indicate the actual Vs planned progress and the new likely completion date of supply, erection and commissioning of the plant.
- 9.5 For indigenous items, the supplier shall invite Kolhapur Milk Union/Client for inspection and preliminary testing. The inspection may be required at various

stages of manufacture/assembly for some items. For imported items, the Kolhapur Milk Union (Purchaser) has right to inspect the equipment at manufacturer's works prior to despatch. However, supplier shall do the inspection and submit the necessary test certificate.

- 9.6 Details of documentation to be submitted shall be according to the overall project programme. The Project / Site Engineer of supplier shall be fully authorised to take on the spot decision with regard to:

- a) Modification in layout and execution programme to suit local conditions.
- b) To purchase essential materials from local market to avoid delays.

- 9.7 For smooth execution of the project, the supplier's team consist of Project Engineer, Site Engineer and key Personnel shall remain consistent throughout the execution period.

- 9.8 After satisfactory erection and testing, competent commissioning team shall be deputed to establish the performance parameters for a specific period.

9.9 APPROVALS

- Approval on technical documentation shall be given by NDDB/Project authority within fifteen working days from the date of submission.
- Extra items which are not in the original scope of work or due to changes in concept, shall be taken up by the supplier as per mutually agreed rates to be decided before execution, and shall be binding on the supplier.
- Supplier shall obtain approval for purchase of specific makes of equipment whose makes are not mentioned in his offer.
- All detailed design calculations regarding the selection of equipment sizes, system types, etc. shall be submitted to NDDB/Project authority for their specific observation and record.

9.10 INSPECTION

- For indigenous items, the supplier shall invite NDDB/Project authority for inspection and preliminary testing. Inspection may be required at various stages of manufacture/assembly for items.
- For imported items, the supplier shall do the inspection, if required, at his cost and submit the necessary test certificates.
- Quality Assurance (QA) including Factory acceptance testing (FAT) plan for each equipment is required to be submitted for approval before start of the equipment fabrication.

9.11 TESTING AND COMMISSIONING

After installation of all equipment and completion of product piping and connection of all utilities including electrical, each equipment shall be cleaned properly to ensure no foreign materials like jute / plastic bags/iron particles etc. inside the equipment and tested at no load after checking all alignments. On completion of satisfactory no load test, section-wise testing at no load shall be carried out. Any defect noticed during no load shall be attended to. After testing of all sections on no load, the plant as a whole shall be tested with raw

material for trial run and ultimately commissioning the complete plant to the satisfaction of Kolhapur Milk Union/project authority.

9.12 ESTABLISHING PERFORMANCE GUARANTEES

On completion of supply, erection, testing and commissioning of the plant / equipment, the same has to be operated at full capacity continuously in **2 shifts of 8 hours basis for seven days** to the satisfaction of the Kolhapur Milk Union/Project Authority, to establish performance guarantees provided by the bidder. However, if Kolhapur Milk Union/client is unable to provide operating staff / required raw materials for three shifts, number of days can be mutually decided, but not exceeding 15 days.

9.13 TRAINING

Training in the operation and maintenance of the various equipment of the plant shall form an important component of Project Management. Training shall be undertaken by the bidder **for a period of FIFTEEN days** during which the contractor should guide and train the staff of the client in operation and maintenance of the plant equipment to achieve the optimum plant efficiency and product quality. Training should commence during the testing/ commissioning period and shall include:

1. Familiarisation with all major feed milling/ service equipment of all sections of the feed plant and utilities etc. including the operation of the computer/PLC based auto batch weigher and other systems.
2. Procedure for attaining the rated output and optimum product quality.
3. Familiarisation with the basic principle of Electronic/Electrical control systems, including fault finding.
4. Familiarisation with start-up procedures, regular maintenance and operational procedures including dismantling of machine parts, replacement of spares/components, preventive maintenance etc.
5. Condition monitoring of equipment.
6. Generating production and maintenance log sheets of important equipment and systems.

Training shall be given to all the personnel required to operate the plant equipment and their immediate Supervisors/ Engineers.

The training schedule should be proposed by the bidder together with the content of training programmes, their duration etc.

10.0 LIST OF DRAWINGS AND DOCUMENTS

10.1 Following drawings are enclosed along with the tender:

- a) Overall site plan showing production plant area including Engineering stores, plant Engineers room, control room etc., indicating the tentative location of TMR manufacturing plant. Drawing ref. no. AN.000000.11.01.D.00

b) Flow diagram ref. no. AN.000000.03.01.D.00 for TMR & Concentra Plant

10.2 The bidder to provide drawing/data and technical details with their bid as specified in the **sub-section 5**.

10.3 After commissioning and during handing over of the plant by Supplier to Kolhapur Milk Union/Project Authority, the contractor to provide the following :

- As executed final drawings and technical data of the complete plant for operation, maintenance and permanent record in soft (in AUTOCAD) and 3 sets of hard copies.
- The final software and source codes of the systems.
- A consolidated operation and maintenance manual -3 sets of the complete plant along with operation and maintenance of each key equipment as provided by manufacturer.

11.0 BATTERY LIMITS

S.No.	Item/parameter	Kolhapur Milk Union (Purchaser)Scope	Bidder scope
1.	Equipment	--	From Dumping hopper to Bag despatch in TMR Block Manufacturing plant
2.	Civil works	OTTA for Intake & Grinding Sections, Elevator Pits, Conveyor Trenches, Foundations & Pedestals for equipment, Services and Structural Tower for Molasses Dosing tank platform along with concentrate feed hopper. Grouting of foundation bolts shall be done by KMU as per site condition. (to enable supplier to start installation works)	Drawings showing dimension, loading, pockets, foundation details to be submitted by bidder. Foundation bolts supply & installation. Earth-pit chambers. Roof & Side sheeting modification etc as per site condition.
3.	Structural steel	Pipe rack (if required) from substation to TMR Plant, nosing for trenches, pits, embedded steel in concrete.	Plant structure, pipe supports, cable tray supports, trench covers.
4.	Electrical	KMU shall carry out necessary modification in PCC panel at Sub-station level and also lay the cable (3.5C X 300 Sqmm) from the new feeder upto the TMR Plant.	Supplier shall carry out necessary modification in TMR PCC Panel and draw out power to the New MCC.
5.	Air	Pedestal for compressor, receiver in plant area.	Air distribution network to all consumption points as per process requirement.

6.	Molasses	Molasses in liquid form to be provided by KMU upto the day tank in TMR Plant.	Bidder shall tap from day tank and distribute upto the new dosing tanks in the TMR Plant for dosing in the Mixers.
7.	Automation	-	Supplier shall provide PLC panel with HMI, for monitoring & control of plant as mentioned in tender specifications to minimize batching/mixing time and manual intervention.
7.	Water	Water Supply upto the existing UG tank	Supplier shall provide new submersible pump in UG tank and lay piping with valves as per scheme shown in the PFD upto the TMR Plant as per scope.

Electrical

LT panel is located in electrical room along with earthing system in existing CFP Plant. Kolhapur Milk Union (Purchaser) shall modify the PCC panel at sub-station level and lay cable (3.5 C X 300 Sqmm) from new 400 Amp MCCB feeder upto the TMR Plant.

Bidder shall be responsible to modify the existing PCC panel of TMR plant and Connect with the new MCC panel of all new equipment. The existing MCC panel of Pulverizer section can be used by replacing the internal switch gears etc as per motor rating of new pulverizing section. The new MCC panel shall have feeders and switch-gears and supply & laying of LT power cable from this feeders to the respective new equipment shall be laid in good engineering practice.

Any modification, whatsoever, if required at later stage in existing MCC panels of TMR plant, shall be carried out by Kolhapur Milk Union. Kolhapur Milk Union (Purchaser) shall also be responsible to manage the power factor as per electrical load of entire CFP premises. The bidder's scope of works include all the works related to LT electrical distribution to all the equipment being installed from outgoing feeder of LT Panel up to all electrical load points through MCC for new equipment in TMR plant.

All power & control cabling, signal, instrumentation cables etc., to the various motors, drives, field devices etc, are included in the scope of bidder (power cables shall be as per technical specification under electrical, however control cables, instrumentation, automation cables etc. shall be of Cu and as per required specifications). Bidder's scope also includes earthing system includes earthing pits for MCC & lighting arrestor, earthing electrode, flats, wires etc.

Obtaining approval of LT electrical installation executed by the bidder, from the Electrical Inspectorate of the state where the plant is located, is in the scope of Kolhapur Milk Union. However, bidder shall provide necessary drawings of such new installation to KMU for enabling them to get approval.

Bidder's scopes include compressed air at required pressure, is to be produced, stored and distributed it to all consumption points in the TMR plant as per process requirement. Drain from the air compressor, receiver shall be taken outside the room by the bidder

Molasses

Dosing tanks (2 nos) of 500 Ltr each to store molasses in the TMR plant, feeding molasses to mixers by providing the molasses dosing pumps, inlet and outlet headers, isolation valves, non-return valves etc. are in the bidder's scope. As per the plant layout, space constraints & location of existing day tank, the new system of dosing tanks with pumps shall be installed on the ground floor so as to ensure gravity flow of molasses in the dosing tanks.

Lighting

Kolhapur Milk Union (Purchaser) shall ensure proper lighting & ventilation in the TMR Plant

Steam

Kolhapur Milk Union (Purchaser) shall ensure proper flowability of Molasses upto the TMR Plant.

15.0 SCOPE OF WORKS :

15.1 The scope of the work is as follows:

Design, detailed engineering, inspection at manufacturer's works, packing, forwarding, supply, unloading at site, erection, testing, commissioning, achieving rated equipment and plant capacities and handing over to Kolhapur Milk Union's satisfaction of the following as given section wise in the list below and not limited to :-

15.1. A - Design and supply of

- Production equipment for the TMR Block section including key equipment like Hammer Mill & its associated equipment, TMR Mixer, Block Making machine with its associated equipment etc. along with the necessary conveying equipment like conveyors/elevators etc. for raw material /intermediate feed/final product.
- Molasses dosing tanks with pumping system, piping, valves and its electricals & automation etc.
- Bins, hoppers, product pipelines, aspiration ducting, flaps, sight glass etc., as is required for the complete plant sections defined above.
- Piping distribution system for utilities such as services like compressed air including pipelines, valves and accessories required for the various equipment under the various plant sections defined above.
- Mild steel structure for the plant including MS channels / angles / flats etc. for plant area, maintenance platforms, Pipe Supports for air, molasses piping & cables etc., ladders, walkways, staircase and safety railings, toe guards including chequered plates, for plant & trenches with suitable supports,
- LT electrical system complete for the plant starting from the Plant Motor Control Centre, PLC-HMI panel, downstream motors and gear motors/gear boxes, power and control cables, isolators, push button stations, cable trays, earthing, capacitor bank, etc. with necessary process and equipment interlocks as per plant operation requirement.

15.1. B. Erection, testing and commissioning of:

- Plant equipment for various sections along with integration with existing system like intake, grinding, mixing and Block Making section. The scope includes positioning, placement of equipment on AVMs/foundation if any, bolting, grouting etc. complete as per requirement.
- Laying and testing of the pipelines for Raw Material/Product (mixed feed, final product etc.) and services like compressed air, molasses etc. including making necessary tapping with valves and accessories with necessary supports for the various utilities and services.
- Erection of structure complete with platform, chequered plates, ladders, walkways, railings etc.
- Erection and commissioning of complete LT electrical of the plant including MCC, Starters, Remote control panels, Electric motors, Geared motors, power and control cables, field sensors, isolators, junction boxes, cable trays, PB Stations etc. including testing of the same.
- Installation of the Earthing network consisting of Earth pits, Earth conductors etc. complete for the entire electrical installation and all the electrical equipment, lighting arrestor.

The list given below of equipment is as per preliminary design of the plant by Kolhapur Milk Union. The detail list of equipment & their individual capacity may vary as per design and detailed engineering by the bidder to achieve the capacity of Block Making Unit of **BLOCK MANUFACTURING from existing 3 MT/Shift to 14 MT/Shift i.e. 40 MT/day (with 1 existing line & 1 new line of Mixing & Block Making section) of or as specified in design data of individual sections (Section 3.0) & battery limits.** If required, the bidder can break-up an item into further detail but wherever Kolhapur Milk Union (Purchaser) has indicated quantity as one lot, no further detail is required. Bidders may add additional items section wise if these are required as per their detail engineering. **These additional / optional / alternatives items offered by the bidder will be considered during technical evaluation of the bids and would be subjected to acceptance by the Kolhapur Milk Union (Purchaser) only through addendum of the tender document.**

General -

- 15.2 All consumables like Gear oils, lubricants, packing for flanged joints etc. and commissioning spares, required if any, for installation, testing & commissioning till taking over the plant by the Kolhapur Milk Union (Purchaser) shall be provided by bidder and the same after taking over the plant shall be provided by Kolhapur Milk Union (Purchaser)/ project authority.
- 15.3 Test runs and commissioning trials including imparting training for operation and maintenance.

Important note for Bidder –

- The technical specification of equipment is generally based on a particular design but bidders can supply equipment as per their design to meet the functional requirement of equipment specified in these technical specifications.

- The list of equipment accessories & their capacities may vary as per design and detailed engineering by the bidder to achieve the minimum equipment rated capacity as specified in design data (clause 3.0 of SECTION VI) & battery limits.
- As stated above, this tender is for design, supply, installation, testing and commissioning of all the production and processing equipment and the allied service equipment. Bidder will therefore have to execute this as a turnkey project on a single responsibility basis and should consider the complete work in its totality.
- All minor works which may be necessary to achieve the rated capacity of the individual equipment being supplied and in turn to achieve the rated plant capacity, is included in the scope of work, though not specifically mentioned.
- **The length / height of conveying equipment mentioned are approximate. It may vary on either side. Successful bidder has to supply the equipment as per site requirement and as per the approved equipment layout without any extra cost.**
- The unit rates of items / equipment and its drive unit of suitable rating shall be quoted separately by the bidder and shall be on FOR site basis inclusive of packing & forwarding, insurance, freight, taxes, duties, octroi etc.
- All surplus materials under unit rate /lot items shall be taken back by the successful bidder after satisfactory completion of works under this tender.

The equipment and accessories shall be covered under the warranty/guarantee clauses specified in bidding document.

16. TECHNICAL SPECIFICATIONS OF INDIVIDUAL EQUIPMENT

This section gives the technical specifications of all equipment, some of which may not be needed for this project in the present scope.

16.1 CONVEYING & OTHER FABRICATED EQUIPMENT

16.1.1 CHAIN CONVEYORS

FUNCTIONAL REQUIREMENT

Chain conveyors are required to carry very light weight straw material in raw / chopped form like TUR KUTTI, HARBARA KUTTI, MAIZE STALK, CHANNA STALK etc like materials horizontally or at an inclination not exceeding 10 degree.

These shall be of dust proof and bolted design, having steel plate thickness as follow:

Component	Thickness
Casing Bottom	5 mm (min)
Casing side	4 mm (min)
Casing partition & top cover	3 mm (min)

CHAIN'S LINEAR SPEED NOT TO EXCEED 0.5 M/SEC.

Features	Requirement
Design	Raddler Drag Chain type, suitable size rectangular inlet & outlet, steel construction,
Essential Components	Chain-link, Main Sprockets, Rollers, bushes, pins, regulating plate, UHMW pad & drive unit
MoC	Inner, Outer Link - EN 8 Link - C 45 Sprocket - EN 8

	Bush - EN 8 Bush Pin -
Essential parts	Gear box, Sprocket, Bearing, drive chain, self- aligned ball bearing(flange type)
Exchangeable wear pads	EN 8 / TISCRAAL steel – min 8 mm
Other accessories	Chain Tensioning arrangement (screw) with limit switch
	Overflow flap with limit switch
	150 X 100 mm size - 5 mm thick Acrylic sheet sight glass (bolted) at inlet & outlet & at suitable locations in the trough.
	Cleaning brushes every trough
Drive	Foot mounted horizontal geared motor, on MS base frame with chain coupling, chain guard

16.1.2. SCREW CONVEYORS (SINGLE/TWIN)

FUNCTIONAL REQUIREMENT

Screw Conveyors are required to convey/distribute very light weight straw material in raw / chopped form like TUR KUTTI, HARBARA KUTTI, MAIZE STALK, CHANNA STALK like materials horizontally or at inclination (maximum 10 Deg.) for length not exceeding 15 M.

Features	Requirement
Design	Constant pitch, dust-proof , steel construction
Essential Components	Drive pipe, pillow block bearing with stuffing boxes, intermediate hangers (if length is > 2.5m),
MoC	MS
Essential parts	Screw or Paddle flights of steel, Screw shaft, Inlet & Outlet
Exchangeable wear pads	Self-Lubricated Nylon bushes
Other accessories	Bolted Baffle Plate of min 3 mm sheet at inlet
	Overflow flap with limit switch
	150 X 100 mm size - 5 mm thick Acrylic sheet sight glass (bolted) at inlet & outlet & at suitable locations in the trough.
Drive	Foot mounted horizontal geared motor, on MS base frame with chain coupling, chain guard

Construction detail of various major component shall be as follows.

Component	Thickness
Trough, Flight, Top cover	3 mm (min)
Saddles	5 mm (min)
End cover	8 mm (min)
Screw shaft	Heavy duty MS C Class Pipe

16.1.3. SCREW DISCHARGERS

Screw dischargers are required to extract ingredients from hoppers/bins etc. Discharge screw could be horizontal or at a maximum inclination of 10°. All screw dischargers shall have **variable pitch**.

16.1.4 BUCKET ELEVATORS

FUNCTIONAL REQUIREMENT

Bucket Elevators convey very light weight straw material in raw / chopped form like TUR KUTTI, HARBARA KUTTI, MAIZE STALK, CHANNA STALK etc in vertical direction. Materials shall be lifted in buckets mounted on belt.

Features	Requirement
Design	2 legged, bolted trough construction fabricated from MS plain sheet with steel stiffeners MS supporting frame 100 mm ht to be provided to support the elevator. Casing retention frame Leg spacer
Belt	Food & oil resistant antistatic belting of PVC lined (M-24 grade 3 ply nylon fabric) Special bolts for fixing buckets on belts Sensor for belt alignment
Main body thickness	3 mm (min)
Bucket	Pressed steel buckets (minimum 12 inch bucket size for all elevators)
Boot	Inlet with permanent magnet (Magnetic strength 2500 gauss) housed in SS 304
Belt tightening arrangement	Screw type (min. 32 mm dia. rod) belt tightening arrangement for minimum 300 mm belt adjustment with check nut with cage type pulley
Head pulley	Rubber lagged crown pulley and wear resistant guide plate.
Other accessories	Necessary slide doors at bottom for cleaning & inspection and inspection window of 5 mm thk acrylic sheet
	Pawl type nylon back stop with guard,
	Air balancing ducting between the legs
	Air breather on MS ducting at suitable location
	For belt & bucket maintenance one trough with openable flanged bolted frame with sight glass to be provided.
Drive	Foot mounted horizontal geared motor, on MS base frame with chain type direct coupling and chain guard

BELT LINEAR SPEED NOT TO EXCEED 2 M/SEC.

Construction details of materials shall be as follows:

Component	Thickness
Trough, Buckets, top Hood cover	2 mm (min)
Top Head & Bottom Head	4 mm (min)

16.1.5 HOPPERS AND STORAGE BINS

FUNCTIONAL REQUIREMENT

Hopper & bins are required for storing light weight materials as per plant design.

Features	Requirement
Body profile	Plain/ribbed MS sheet with steel stiffeners
Main body thickness	4 mm (min)
Sight glass cum inspection window	3 mm thk acrylic sheet, hinged cover, knob Location : Bottom cone/hopper

Manhole	Size : 500 X 500 mm (min) Removable grill & hinged cover
Air breather	Ø 300 mm or Ø 600 mm (as per requirement), Height – min 500 mm
Load Cell	Suitable as per requirement.

16.1.6 SLAT CONVEYOR

These are used in feed plants for transfer of filled bags from block making machine in production area with an inclination as per site condition

Features	Requirement
Design	for moving of filled block bags on number of 3mm thick MS slats (size 400 mm WIDE) linked with each other with fabricated steel chain by bolts and malleable cast steel wheels.
MoC/ body thickness	Minimum 3 mm thk steel plate body with stiffeners and steel guide plates for wheels
Pipe railing	40 mm dia MS C class pipe
Sliding sheet	MS sliding sheet of size 100mm height x 3mm thick on pipe railing
Sprockets wheels	2 Nos. hardened (EN-8) sprockets wheels with suitable sealed bearings are to be provided at feed end and discharged end.
Drive	horizontal foot mounted electric gear motor
Bag turner	Tapper roller type
Roller	Heavy duty seamless pipe
Drive	Geared motor with chain & sprockets.
Guard	Toe guard with bolted type railing pipe at both inner & outer sides of turner

16.1.7 SPOUT MAGNET

These are used in feed plant to arrest the ferrous impurities from raw materials feed flow.

Features	Requirement
Design	Mild steel plates of minimum 3 mm thick at elevator outlets
MoC/ body thickness	MS / 3 mm thk
Flanges & MoC	6 mm thk MS plate
Felt packing	5 mm thk felt for all flanged joints
Inlet direction	LHS & RHS as seen from exhaust port shall be decided as per site condition & Kolhapur Milk Union
Magnet	As per OEM design

16.1.8 DUMPING HOPPERS

These are required in godown for dumping of ingredients from bags to conveyor running below.

Construction detail of dumping hoppers shall be as follows:

Main body	-	minimum 3 mm thick MS sheet
Grill	-	40 mm x 6 mm MS flats (vertical position)
Frame-		65 x 65 x 6 mm MS angle
Grill	-	Removable M.S grill (opening on top).
Support	-	ISMC 75 x 40 mm cross members for seating grill on angle cleats and for seating aspiration unit shall be provided
Inspection window - Bolted type inspection window cum sight glass of 5 mm thick acrylic sheet at just above outlet.		

16.1.9 HOPPERS AND STORAGE BINS

These are required in the feed plant for storing materials as per the requirement of process flow.

Features	Requirement
Design	fabricated from mild steel plates /profile ribbed steel sheets
MoC/ body thickness	3 mm thk (Minimum) and bottom hopper 4 mm (minimum)
Stiffeners	Suitable channel type or angle stiffeners as per design
Accessories	Sight glass cum inspection window near outlet with 5 mm thk acrylic sheet on shell and bottom cone
Ports	Ports for inlet, outlet for powder and air
Supporting bracket	As per requirement
Pad plates	As per requirement
Felt packing	5 mm thk felt for all flanged joints
Manhole (if applicable as per process requirement)	top manhole (size 500 mm x 500 mm approx.) with removable grill & hinged type cover
Air breathers	300 mm dia. Bracket with rope ladder
Sensors (if applicable as per process requirement)	high /low level sensors with visual alarm (wherever required as indicated elsewhere)

16.1.10 ASPIRATION UNIT

This is used as Pollution control device for extraction of powdery ingredients from air before exhausting air to atmosphere. This shall be a compact self-sufficient unit consisting of MS piping/ducting, multi-tube bag filters / cyclone with air lock, blower etc.

Dust laden air enters in aspiration filter and then clean air escapes by blower mounted on the unit through filter bags and dust is deposited on the outside of filter bags. For removing the dust retained on the outside of filter bags, high pressure reverse air shocks are provided at regular intervals to the inside of the filter bags through an automatic

electronic/pneumatic control system. Compressed air for reversed air shocks will be available near the unit. Dust after reversed thrust to be fallen directly on the equipment on which aspiration unit is installed / collected in a bottom hopper /cone clamped with body of unit. The filter bags to be made of special material to resist fire/spark.

Features	Requirement
Design	To be fabricated from 3 mm thk MS sheet for housing
Filtering elements	Set of Filter cartridges made from polyester plated membrane laminated.
Cleaning arrangement of filters	Air blast of compressed air through timer based electrically operated solenoid valve to dislodge powder on the filter element. Adjustable cleaning cycle One cleaning brush(annular) for filter bag. Quick removal of cartridges should be possible
Powder recovery	Through Bag
Draft	Negative draft created by exhaust fan powered by a direct drive motor with silencer
Other requirements	Air filter regulator unit
	Manometer for pressure drop measurement

16.1.11 AIR LOCKS

These are required for air seal on pellet cooler cyclone, dust collectors etc.

Air lock on outlet of cyclone/dust collector shall have MS fabricated body. Rotor to be wane type, fabricated from MS plate. Rotor to rotate within the housing with close tolerance with self-lubricating bearings. Air locks to be have flanged type inlet/ outlet. Air lock to be run by suitable horizontal foot mounted geared motor. If function desires, adjustable UHMW or Rubber wear pads to be used in rotor.

16.1.12 NET WEIGHER

The weigher is required to automatically fill predetermined quantity (by weight) of molassed mix material for producing block of 15/25 kg as per process requirement. The weigher shall be preferably mounted on top of the block making machine.

The weigher shall be suitable to weigh 15 to 25 kg / hour feed of average bulk density 300 Kg / cu m. (depending upon skill and experience of operator) as per following details.

Machine with single gravity feeder, load cell based weigh hopper, controller capable of programming for filling weight of different capacity
The machine shall be provided with following:

Gravity Feeder (1 nos.): It should be provided for feeding material from storage hopper to weigh hopper. It is to be totally enclosed design for dust proof operation. Pneumatically operated flap is provided for feeding material.

Weigh hoppers (1 nos.) to hold maximum 30 kg. of material of bulk density 250 kg. /cu.m should be provided. The weigh hopper should have pneumatically operated discharge gate for fast discharge, mounted on 2 nos. load cells. A bolted type cleaning / inspection door to be provided on side of the hopper.

Common dump hopper and bagging chute for weigher should be provided to guide the material from the weigh hopper to discharge chute and into the block making machine for set weight. Provision for aspiration connections should be provided at the bagging chute.

Wall mounted remote control panel (RCP) for weigher operation, comprising of one start push button, indication lights for power on, overload and under load with alarm, ready signal for motors, alarm reset push button, switches required for operation of the machine in manual mode, complete with necessary cabling. Digital batch counter (five digit) including reset. RCP shall have also remote operation of slat conveyors.

Microprocessor or PLC based panel with provision to set various bag weights, fine feed quantity, in-flight correction, auto zero, + / - tolerance etc. The controller should be able to automatically optimize dribble feed quantity.

Suitable inter-locks and aspiration connections shall be part of the machine & to be provided by the bidder.

Pneumatic panel housing all the solenoids, flow control valves FRL at the inlet should be provided. Pressure switch should be provided at the inlet of FRL, if the pressure falls below the desired pressure, the weigher should be put to hold.

Independent structure to support the machine with maintenance platform, railing and ladder should be provided.

16.1.13 ON LINE METAL DETECTOR : -

This is required to detect the ferrous /non-ferrous/stainless steel impurity in finished feed filled HDPE /Gunny bags of weight 10 kg to 30 kg. The size should be min. 400 mm width and min. 450 mm height. It should have sensitivity for ferrous equal or less than 8 mm, that for non-ferrous equal or less than 10 mm and that for stainless steel equal or less than 12 mm. The detector shall be complete with belt conveyor of length 1.5 M (approx.) & its drive unit Audio visual alarm on detection, detected bag counter. The belt conveyor should be stopped on detection of metal. The main body and conveyor & its supporting legs shall be of MS powder coated. Control panel shall be of IP 65. It should be provided with digital display.

16.2 TECHNICAL SPECIFICATIONS OF PROCESS EQUIPMENT.

16.2.1 HAMMER MILL

Hammer mill called crusher machine along with drive motor and separate electrical panel shall be utilized to grind coarse biomass materials such as tur, harbara, channa etc used as one of the ingredients in dry fodder bases TMR Plant. The **capacity (3 TPH)** required to be achieved is for maximum 8 mm sieve perforation for biomass & its bulk density indicated above in Design Data basis.

Hammer mill to be air assisted, horizontal half/full circle type with bottom discharge through air-lock of suitable capacity to be provided. (Vertical hammer mills may also be offered as option). Grinding/chopping/cutting in hammer mill is to be obtained by impact of a set of rotating hammers (beaters) on individual material particle, till it is small enough to pass through the screen, along with aspiration air. The sieve is to be fitted such as to get maximum sieving area. The sieve must be designed to maintain its integrity and at the same time provide the greatest amount of open area.

Hammer Mill is a machine whose sole purpose is to crush biomass materials into smaller particles. The raw material goes through the feed hopper into the grinding chamber and crushed by the high-speed rotating hammer plates. Under the impact of centrifugal force, the materials will be extruded continuously into powder/smaller size. By the suction of the fan, the powdery material will be discharged through the screen, while those cannot go through the screen will be pulverized again until they can pass the screen holes.

It should be able to process various biomasses like Corn Cob, Corn Stalk, Ground Nutt Shell, Various Type of Grass, Soybean Husk, Harabara Kutti, Tur Kutti, Rice Husk, Wood Shavings, Cotton Stalks, Sugarcane Bagasse etc.

The machine to have the following special features which is indicative and minimum requirement. Bidder can offer model as per OEM design and capacity requirement to get minimum 3 TPH grinded material of 8 mm size, with various types of raw materials as mentioned above:-

Drive Motor Details : This is indicative and minimum requirement. Bidder can offer drive motor rating as per OEM design and capacity requirement to get minimum 3 TPH grinded material of 8 mm size, with various types of raw materials as mentioned above.

Features	Requirement
Discharge Capacity	Min 3 TPH of powder with maximum 8 mm sieve (air assisted)
Design	Full/Half circle type with bottom discharge Large hinged quick opening doors
Sieve	Fitted around the rotor for maximum sieving area. Should maintain structural integrity.
Stone Separator	Efficient & Effective system to remove stones
Features	
Pipe Length and Diameter	Minimum 400 mm Diameter or suitable as per OEM
Hammers	EN2 hardened steel or as per bidder's design Easily replaceable. (minimum 12 mm thk)
Cyclone	Minimum 3 mm thk body
Rotation	Direction reversibility should be possible
Feeding	Full width of the rotor Arrangement to guide the material
Rotor	Statically & dynamically balanced
Accessibility	Quick access to the grinding sieve & rotor
	Flexible coupling at both sides
Design safeties	Vibration damper Motor cannot run if access doors are not properly shut SS magnets to prevent entry of ferrous items
	Low noise
Motor	1440 rpm ; IE 3 efficiency, IP55, insulation Class F

- The hammers to be of hardened steel and easily replaceable. Directional reversing of rotor to be possible.
- Feed should be fed over the whole width of the rotor. Rotors shall be statically and dynamically balanced.
- Easy access to grinding sieve & rotor. Shall be able to rotate in both direction for increased life of rotor.
- Flexible connection at both inlet and outlet.
- Rotor to be balanced for low noise and vibration.
- Machine protection/safety devices and vibration dampers. Security against unintentional start of the machine (if the grinding chambers are in the open position, i.e. not closed, hammer mill motor cannot start).
- Machine to have a stone separator and spark detection system with suitable arrangement to guide the flow of material. The system should stop in case of spark detection inside the hammer mill and should also give audio-visual alarm.
- Separate Remote Control Panel (RCP) for operation of all equipment in grinding & mixing section i.e. Intake conveyor, Hammer mill, all pneumatic operations etc. and it shall also include operation safeties. Provision for manual operation, reading amps drawn of the mains motor and other useful indicators as detailed elsewhere.
- Intake Screw/Chain Conveyor, Cyclone, Stone Separator, Dust Collector Fan, Airlock are essential part of the system and to be offered by the bidder as per OEM design to get the **desired capacity/output of the hammer mill**. Bidder also to ensure that the dust should be minimized by providing efficient system of cyclone & dust collector.

16.2.2 TMR MIXER

TMR Batch mixer is required for production of homogeneous blends consisting of dry solids e.g. chopped crop residue, concentrate and molasses with average bulk density 250 kg/cum. The mixer shall be of single/double chamber, sturdy, Mild Steel plate construction adequately designed thickness, complete with top cover, refill inlets, vent sockets, liquid injection ports, side inspection doors & pneumatic or hydraulic door (on one side only) for material discharge after mixing along with safeties, flanges/counter flanges etc. Provision for injection of liquids (max 10%) directly through quick connection flat spray pipes should be available in the mixer. Vitamin dosing in the mixer shall also be considered while designing the mixer. The mixer shall be able to work efficiently from min 40% to 140% of full capacity filling. Mixing shall be perfect and independent of raw material properties or mix bulk density. The total mixing time shall not exceed 20 minutes.

The mixer is to be slow speed batch type with **minimum batch size to be 2 MT** (with Formulation: straw@55%, concentrate@40% and molasses@5%) and has to achieve gentle mixing by mechanical fluidisation in the mixing chamber without segregation and in the shortest mixing time. Shearing/tulip knives as necessary to break lumps to be included. The augur shall have removable/adjustable type clamped/fitted to shaft to give overlapping rotation in the middle interpenetrating area of the mixer, sweeping the particles up into the fluidisation zone into up, down and across in all directions so as to achieve thorough and complete mixing of the contents of the batch entire including the contents lying at the bottom of the mixer.

The Mixer is to be dust-tight, with cylindrical mixing trough of sturdy steel construction, supported by heavy duty pillow blocks mounted bearings.

Quick emptying of the mixer to be ensured through a full length side opening hydraulic operated outlet gate with in-built belt conveyor & required safeties. There should not be any product leakage through this gate when mixer is being charged/mixed. The mixer to have also pneumatic gate at inlet for quick filling of batch ingredients, through conveyors above it.

Other Features :

Batch weight 2000 kg approx. depending on biomass mix & raw material properties.

Mixing efficiency exceeding 90%

Expected mix straw 55% (maximum) + Concentrate & Molasses: 45% (maximum)

Mixing time to be below 25 minutes

Unloading doors – one (on existing dump hopper side)

Electric motor minimum : Suitable rating as per OEM design, with 4 pole motor (IE-3), 1440 RPM (VFD operated), 440V, 3 phase, 50 hz TEFC (totally enclosed fan cooled) provided with strong drive set.

Electrical starter set & cabling provided suitable to fully loaded mixer.

The discharge of the mixer shall be suitable to discharge material in the existing hopper (below mixer) and shall be conveyed to the finished feed bin, through new set of conveyor and elevators.

16.2.3 MOLASSES DOSING :

- 1.1 Bulk density – 450 Kg / cu m for mash feed and 1400 kg / cu m for liquid molasses.
- 1.2 A molasses flow meter shall be provided in piping from existing molasses - day tank, to measure total amount of molasses consumed.
- 1.3 The existing concentrate feed conveyor shall be used for transfer of concentrate feed to both the TMR Mixer (New + Existing). Suitable VFD & pneumatic slide gates to be provided for this conveyor to control the flow as per process requirement. Suitable automation also to be carried out to ensure feeding of concentrate material in the mixers, preferably one after another. The dosing of molasses in the mixers also to be controlled through suitable VFD operated dosing pumps, piping & accessories for molasses dosing in the mixers simultaneously. Molasses pumps of capacity 2000 LPH shall be run by suitable rating horizontal, TEFC, foot mounted induction motor.
- 1.4 The insulated load cell mounted molasses dosing tank shall have over flow on shell at top, air vent on top, drain valve at bottom, LP steam inlet and condensate connections with isolating valves, flexible pipe.
- 1.5 Kolhapur Milk Union (Purchaser) shall provide flowable molasses up to the existing molasses day tank in TMR Plant. Supplier shall lay piping from this day tank up to the dosing tanks with suitable control valves, flanges & accessories.
- 1.6 **Load cell mounted molasses dosing tanks (2X 500 LTR)** – The main body tank shall be made from minimum 3 mm thick Mild steel, Circular in shape with 75

mm thick hot insulation on all the sides with 0.5 mm thick Aluminium cladding, top openable cover, flanged type inlet & outlet valves, drain valves, overflow, air vent on top.

- 1.7 Load cells for molasses dosing tanks shall be completely hermitically sealed type in dust proof enclosure. The capacity of load cells to be approximately 3 times of weighing capacity digital graduation to be min. 0.05% of the weighing capacity.
- 1.8 VFD operated molasses pump of capacity 2000 LPH -2 nos (total). (separate for each mixer) to feed required quantity of molasses to the TMR mixers, with inter connecting pipes & fitting, flow meter in the main header above tanks, valves, hot insulation on pipes & valves etc.
- 1.9 Driving electric motor of suitable rating to be of horizontal foot mounted type. It should be TEFC squirrel cage induction motor, degree of protection IP- 55, with class "F" insulation, suitable for 415 v (+/- 10%), 50 hz. (+/- 5%), IE-3, 3 phase AC supply. Performance of motor, in general should conform to IS: 325 - 1996. Gear box having helical gears and minimum service factor of 1.4 to be provided with key in driven shaft, oil level indicator, oil filling plug, oil breather and drain plug. Suitable grade gear oil for 1st charge of gear box to be provided.
- 2.0 Flexible tyre type coupling for direct coupled electric motor Steel base plate with suitable fixing arrangement for motor and guard for flexible coupling from 14G MS sheets to be provided.
- 2.1 Steel frame made from MS channel , angles , flat with nuts, bolts & washers for support of hopper, tank pump its drive unit
- 2.2 Bolts, nuts, washers and packing for all internal connections.

16.3 MISCELLANEOUS

16.3.1 ASPIRATION DUCTS

FUNCTIONAL REQUIREMENT

Inter-connecting ducts from hoppers/bins/machines with aspiration systems for conveying air.

Features	Requirement
Construction	Fabricated from sheet steel/pipes as per site conditions
Min Duct size	Pipes - 270 mm ID SS duct 200 mm square
MoC, thickness	MS pipes of 3.15 mm thk (min) SS ducts of 2 mm thk(min)
Accessories	Transition pieces, bends, Y joints Pad plate to be provided where hammering is required.

16.3.2 GRAVITY SPOUTING

FUNCTIONAL REQUIREMENT

Inter-connecting pieces between hoppers/bins/machines for conveying material.

Features	Requirement
Construction	Fabricated from sheet steel based on site conditions
Min size	Pipes – 300 mm OD or 400 mm square ducts (minimum)
MoC, thickness	MS B class pipes MS sheet – 3.15 mm thk (minimum)
Accessories	Transition pieces, bends, Y joints Pad plate to be provided where hammering is required.

16.3.3 TWO/THREE WAY FLAPS

FUNCTIONAL REQUIREMENT

Flaps are used to divert material flow in a plant.

Features	Requirement
Construction	Fabricated from sheet steel & flanged end connections
Min size	Minimum 300 mm square ducts
MoC, thickness	MS sheet – 3.15 mm thk (minimum)
Type	Manual or pneumatic operated
Features	Pneumatic - Inspection window, reed/limit switches, solenoid valves, pneumatic cylinders (double acting), Manual - operating handle/ Chain pulley No leakage from close position. Open/ close position shall have visual marking on duct.

16.3.4 MANUAL / PNEUMATIC GATES

FUNCTIONAL REQUIREMENT

Slide gates have function to hold or let loose material held in hoppers/ bin.

Features	Requirement
Construction	Fabricated from sheet steel & flanged end connections
Size	As per duct size or operation requirement
MoC, thickness	MS sheet – 3.15 mm thk (minimum)
Type	Manual or pneumatic operated
Features	Pneumatic - Inspection window, reed/limit switches, solenoid valves, pneumatic cylinders (double acting), Manual - operating handle/ Chain pulley No leakage from close position. Open/ close position shall have visual marking on duct. Slide gates - 8 mm thk MS

16.4 TECHNICAL SPECIFICATIONS FOR UTILITIES/SERVICES

16.4.1 PRESSURIZED WATER SYSTEM

The system shall comprise of pipping, valves & accessories along with electric driven Submersible Pump with suitable capacity and head with all required accessories including valves, special fittings etc.

Piping header (minimum 65 mm NB) of suitable size shall be provided near the existing UG tank and shall be connected with the submersible pump. Piping (minimum 40 mm NB) with Ball Valve shall be laid above/underground as per site condition. The water supply for this pressurized system shall be by an underground tank. Hose reel (03 Nos) to be provided as per site requirements.

The scope of work for MS piping (C class) with bends, tees, reducers as required, on walls, ceilings, beams, floors with suitable clamps including installation, testing and commissioning of complete pressurized water system as per NBC norms.

Submersible Water Pump

Submersible Pump to be supplied, installed in the UG tank for the system: Electrical motor driven Submersible pump shall be single set along with all accessories with CI casing, mechanical seal standard fittings, Stainless Steel shaft, bronze impeller, suitably rated electrical driven squirrel cage induction motor with Class-F insulation, IP-55, suitable to operate 415 V +/- 10% 50 Hz +/- 3%, 3 phase AC supply.

SL. NO	PUMP DESCRIPTION	FLOW RATE AND HEAD	QTY
01	Submersible Pump	5 KLPH @ 40 MWC	1 set

HOSE REEL – 15 METER LENGTH (3 SET)

The Hose reel shall be drum type with hub wheel ties. The supply pipe shall be of aluminum alloy and be a part of the suspension assembly. The drum shall rotate freely on the assembly. The drum shall be fabricated from GI sheet of minimum 18 gauge thickness. Length of Hose Reel shall be 30 meters. The hose reel shall be directly tapped from the riser through 25 mm dia pipe, the drum and the reel being firmly held against the wall by use of dash fasteners. The hose reel shall be swinging type (180 degree) and the entire Drum, Reel etc. shall be as per and IS:884 including marking. The rubber tubing shall be of IS:444 marked and double braided. The nozzle shall be 6mm dia. ABS plastic rotating head shut off type. A Ball valve shall be used to shut off the water supply to the Hose Reel.

16.4.2 COMPRESSED AIR EQUIPMENT AND DISTRIBUTION

(i) AIR COMPRESSOR

This is required for producing compressed air required for operation of pneumatic flaps/gates and aspiration filters of equipment in TMR plant.

This shall be **reciprocating** type air compressors with inbuilt receiver & drier for generation of oil & moisture free air at suitable pressure and required free air delivery. It shall be complete with intake filters and all standard accessories such as service valve, safety valve, auto drain valve, pressure gauge and suitable drive motor & drive parts etc.

Compressor shall be provided with a pressure switch for auto operation. The capacity of receiver shall be sufficient to meet sudden large requirement of compressed air and to avoid frequent ON/OFF of compressor. For removal of moisture from receivers, automatic drain valve with solenoid etc. to be provided.

(ii) COMPRESSED AIR PIPING AND VALVES

Heavy duty, GI ERW piping (class C), welded or flanged installation, complete with ball valves with SS working parts, Solenoid valves etc as per requirement. All piping shall be internally cleaned and flushed by the contractor after erection in a manner suited to the service and as directed by the Kolhapur Milk Union.

16.4.3 ELECTRICALS:

MCC/ Electrical panel for the following shall be supplied:

1. The existing plant already have section wise electrical panels in the TMR plant for separate existing sections like Grinding Section, Block Making Section, Pellet Making Section and Bail Section. The new MCC panel for all the new requirement as per equipment & requirement specified in this tender along with spare feeders etc including suitable incoming and outgoing feeders for all new motors shall be in the scope of bidder. Power to this MCC panel is to be drawn through suitable LT power cable from existing PCC panel which is located in the TMR plant itself. The existing PCC panel to be suitably modified by extension of bus-bar through suitable cable. The existing PCC panel is available in TMR plant with 630 Amps incomer and outgoing feeders for existing equipment as shown in the SLD in Process Flow Diagram. **Bidder to confirm the power requirement of all new equipment, specified in this tender.** The rating of this existing PCC panel & Incoming cable are not sufficient to cater load of existing & proposed new equipment/facilities.

Kolhapur Milk Union (Purchaser) shall carry out necessary capacity upgradation in their existing sub-station panel (in Main PCC Panel at Sub-station level) and shall lay LT Power cable of 3.5C X 300 Sqmm up-to the proposed location of new MCC Panel in TMR Plant.

Bidder to provide new MCC cubicle with suitable capacity (minimum 400 Amps) incomer MCCB & feeder with switch-gears for all new equipment/sections/facilities as per scope of the tender, as per detailed technical specification below -

16.4.4 MOTOR CONTROL CENTRE (SHEET STEEL ENCLOSURE)

FUNCTIONAL REQUIREMENTS

To receive, control and distribute electrical power at 415 V, 50 Hz, AC in sheet steel housing.

DESIGN REQUIREMENT AND SCOPE OF SUPPLY

Statutory Requirements:

Motor Control Centre to be manufactured/ assembled as per the latest applicable Indian Standards, Indian Electricity Rules, Indian Electricity Act, Fire Insurance Regulations and comply with all currently applicable statutory requirements of concerned State Electricity Inspectorate and safety codes in the locality where the equipment will be installed and as per the detailed specifications mentioned below.

Housing Details:-

S. No.	Item	Requirement
1.	Construction	Wardrobe (non-compartmental) type, indoor Floor mounted, fully enclosed with lockable door, Lifting hooks, installed on a steel channel base-frame. Both side operation type is preferable.
2.	MOC, protection	Main panel - 14 G CRCA sheet, dust & vermin proof IP 44 with gaskets, Panel doors of 16 G CRCA sheet, Gland plate 2.5 mm thk
3.	Painting	Powder coated 60 microns thk (RAL 7032 shade) after cleaning by 7 tank process
4.	Incomer	Suitable rating, 3-Phase, 4 pole, MCCB, 50 kA, 50 Hz of suitable rating with Rotary operated mechanism mounted on door, protections, aux. contacts.
5.	Indicators & alarms (mounted on door)	R Y B, ON-OFF-TRIP LED indication lamps for incomer
		Multifunctional Digital meters with 20 mm display for incomer.
		Hooter with resettable push button
		ON-OFF-TRIP Indication for all feeders
6.	Feeders	MPCB with suitable rated relay, protection, aux. contacts & contactor for all motors, as per type 2 configuration; Suitable breaking capacity and capacitor rating as per norms.
7.	Control circuit	Control circuit shall have separate 2A DP MCB isolators for all feeders. Voltmeter, indication lamp isolation shall also have DP MCBs
8.	Control transformer	CT shall be cast resin type, 15 VA, class1 Protection, low reactance, accuracy class "SP" and an accuracy limit factor greater than "10". Instrument CTs shall be of accuracy class "1.0" and accuracy limit factor less than "5.0".
9.	Cable connections	Bottom entry and as per site condition through removable 12 G MS powder coated gland plates
10.	Earthing	Aluminium bus of minimum 25X6 connected to 2 separate earth points for body earth
		Doors shall be separately earthed with flex copper wire 2.5 mm ²
11.	Wiring	1100 V grade FR flex. Cu wire 4 mm ² for power (min), FR flex. cu wire 1.5mm ² for Control; CT wiring shall be 2.5 mm ² min
12.	Nameplate	3 ply engraved BWB anodized aluminium for all feeders, indicates rating, feeder name
		Separate nameplate of manufacture
		Danger plates on cover plate
13.	Busbars	High conductivity electrolytic Aluminium conforming to grade E91E of IS 5082 mounted on SMC/ DMC blocks
		Suitable as per incomer rating min @ 0.8 Amp/mm ²
		Coloured heat shrinkable PVC insulating Busbar sleeves for phase identification, non-flammable with min gap of 25 mm between phases & 20 mm between phase & neutral

		Bus bar alley width shall 300 mm
14.	Terminals	Heavy duty for Power: 3 nos/ feeder, Control: 3 nos/feeder. 10 % spare in power & control circuit.
15.	Push buttons	22.5 mm, 1NO-1NC with coloured LED illuminated type push buttons IP65
16.	Power socket	5 A power socket with switch to be provided – 2 nos
17	Other requirements	VFDs with built in thermistor relays with DC chokes, semiconductor fuses, communication port as per requirement for bigger motors or process requirements
		All nuts, bolts, spring washers shall be of high tensile, zinc passivated
		Min & Max height of handle / push button shall be 300 & 1200 mm respectively. Panel height shall not exceed 1600 mm. Max shipping length 1800 mm (as per design & process Requirement)
		Unity Power factor required for new installation. Heavy duty APP, Al foil, Capacitors for Hammer Mill, TMR Mixer, Exhaust fan, Block making machine to correct Power factor and will come with capacitor grade contactors with 7% detuned reactors. Each Capacitor feeder shall have MCCB isolator, ON/OFF Push button

Approximate Size of Cubicles for Starter Feeders

Motor HP	Cubicle for DOL Starter		Cubicle for Star-Delta Starter/ soft-starter/VFD	
	Width mm	Height mm	Width mm	Height mm
Up to 10 HP	400	300	400	450
12.5 to 30 HP	-	-	400	450
40 to 60 HP	-	-	400	600
70 to 90 HP	-	-	500	900
100 to 150 HP	-	-	500	1200

Approximate Size of Cubicles for SFU/MCCB Feeders

Current Rating of SFU/MCCB	Cubicle for SFU		Cubicle for MCCB	
	Width mm	Height mm	Width mm	Height mm
Up to 63 A	400	300	400	300
100 A to 250 A	400	450	400	450
400 A & above	400	600	400	600

GENERAL SPECIFICATIONS –

Painting:

All metal surfaces shall be thoroughly cleaned and degreased to remove all scales, rust, grease and dirt. Fabricated structures shall be pickled and treated to remove any trace of acid. The under-surface shall be prepared by applying a coat of phosphate paint and a coat of yellow zinc chromate primer. The under surface shall be made free from all imperfections before undertaking the final coat.

After preparation of the under surfaces, the panel shall be spray painted with final two coats of approved shade of powder coating (RAL 7032 Siemens grey). Thickness of powder coating shall not be less than 60 microns.

The finished panels shall be dried in stove ovens in dust free atmosphere. Panel finish shall be free from imperfections like pin holes, orange peels, run-off paint, etc.

All unpainted steel parts shall be cadmium plated or suitably treated to prevent rust, corrosion, etc.

Nameplates:

Nameplates for all incoming and outgoing feeders shall be provided on doors of each compartment. Nameplates shall be fixed by screws only and not by adhesives. Engraved nameplates shall preferably be of 3-ply (Black-White-Black) acrylic sheets or anodized aluminium. Special danger plates shall be provided as per requirement.

Inside the panels, stickers should be provided for all components giving identification no. as per detailed wiring diagram.

Bus bar Sizing Connection and Supports:

The bus bars shall be made from high conductivity electrolytic aluminium conforming to grade E91E of IS 5082. The bus bars and supports shall be capable of withstanding the rated and short circuit current stated in the single line diagram/feeder details. Minimum size of power bus bars shall be 200 Amps. rating. Maximum current density permissible for Aluminium bus bars shall be 0.8 Amps. /Sq. mm for bus bar area above 500 Sq. mm & 1.0 Amp/Sq. mm for bus bar area below 500 Sq. mm. Maximum current density permissible **for Copper bus bars shall be 1.2 Amps/mm²**. An earthing bus bar of minimum 150 Sq. mm section aluminium shall be provided outside panel at bottom throughout the length of the panel. Provision shall be made to connect the earthing bus bar to the plant earthing grid at two ends.

The bus bars shall be provided with heat shrinkable PVC insulating sleeves of 1100 V grade. Red, Yellow and Blue colour shall be used for phase bus bars and black colour shall be used for neutral bus bars. The sleeves should be non-inflammable and self-extinguishing type. All joints in main horizontal bus bars and all tap-off connections from the main horizontal bus bars shall be suitably shrouded. Supports for bus bars shall be made of suitable size non-hygroscopic and non-inflammable epoxy compound SMC / DMC blocks and these should be adequate in number so as to avoid any sag in the bus bars. The main bus bar should be spliced at each column level in order to achieve simplicity and flexibility in transportation, installation and maintenance. Sliding fishplates should be used to make the connection of the copper bars between columns.

- Minimum clearance between phase to phase shall be 25 mm and that between phase to neutral/earth shall be 20 mm

Power Connection:

- For power interconnection within the panel board :

- Copper stranded conductor PVC insulated cables suitable for 1100 volts, of adequate cross section shall be used. FOR CURRENT RATING ABOVE 63 AMPS ALUMINIUM BUSBAR STRIPS OF ADEQUATE RATING SHALL BE USED. MINIMUM SIZE OF COPPER CONDUCTOR TO BE USED SHALL BE 4.0 SQ.MM. Maximum flexible copper conductor size used in the panel shall be 35 sq. mm for 100 Amps feeders. Cable lugs/ sockets of suitable size and type shall be used for all interconnections wherever required.
- For all Aluminium to Copper connections: - The Copper surface will be silver plated and the aluminium surface will be properly cleaned and supplied with oxide inhibiting grease. Copper washers shall be used in these terminations.
- For all outgoing motor feeders, the suitable size terminal blocks shall be provided in cable alleys near feeder's cubicle and wiring up to these from contactors shall be done by panel supplier. These terminal blocks shall be heavy duty type to withstand high starting currents.
- For incoming and outgoing feeders of the MCC, aluminium conductor cable will be used and hence the panel is to be designed for receiving these and wherever required cable boxes with bus bar extensions for receiving more no. of cables, shall be provided in panel by supplier. Removable gland plates of 12 gauge thickness shall be provided on top/ bottom of panel, for cable entries. Supplier to check with Kolhapur Milk Union (Purchaser) whether incoming/outgoing cables are to enter MCC from bottom or top. The cable alleys shall also be totally isolated from switchgears by suitable partition plates.

To prevent accidental contacts, all interconnecting cables/bus bars and all terminals also shall be shrouded using heat shrinkable coloured PVC insulation tape.

- Standard colour code of red, yellow and blue for phases and black for Neutral to be followed for all bus bars/conductors.

Auxiliary wiring and Terminals:

- Wiring for all controls, protection, metering, signalling etc. inside the switchboard shall be done with 1100 volts grey colour PVC insulated stranded copper conductors. Minimum size of these conductors shall be 1.5 Sq.mm., however, CT circuit wiring shall be done with 2.5 Sq.mm. Control wiring to components fixed on doors shall be flexible type.
- All control wiring should be provided with necessary cable sockets/lugs at both ends.
- Conductors shall be terminated using crimping type lugs. Each termination shall be identified at both the ends by PVC ferrules. The identification termination numbers should match with those on drawings.
- Control wiring for motor feeders should be such that the "green" light of motor feeder is "ON" only when control as well as power circuit of feeders is "ON" and it shall have its own fuse.
- For all motor starter feeders, provision for control wiring to remote ON/OFF control is to be made. The auxiliary wiring for the same shall be brought up to terminal block in the feeder's cubicle.

Moulded Case Circuit Breakers (MCCB):

MCCBs shall always be provided with separate operating handle mechanism with door interlocking. The MCCBs for motor feeders shall be of triple pole construction arranged for simultaneous three pole manual closing or opening and automatic instantaneous tripping on short circuits. MCCB used for incoming feeder or for non-motor outgoing feeder, shall be of 4 pole type. MCCBs shall be provided with adjustable type tripping device with inverse time characteristics for over load protection. All motor feeders MCCBs shall be provided with neutral link complete with isolating link.

Closing mechanism shall be quick make, quick break and trip free type. Operating handle shall give a clear 'ON' 'OFF' & 'TRIP' indication. Control voltage for MCCB shall be 240 volts. The ratings shall be as specified in feeder details or approved drawings.

Minimum rated breaking capacities shall be as under:

MCCBs up to 100 Amps	25 KA at 415 V
MCCBs 100 to 200 Amps	35 KA at 415 V
MCCBs above 200 Amps	50 KA at 415 V

Motor Protection Circuit Breaker (MPCB):

All motors below 40 HP shall be protected by Motor Protection Circuit Breakers (MPCB) having suitable rating thermal overload relays. These shall be used along with contactors as specified in feeder details.

The MPCB will have motor protection tripping characteristics, current limiting and shall have low let through energy. It shall have bi-metallic overload protection and electromagnetic release for short circuit protection. MPCB shall have inbuilt single phase protection and adjustable overload settings.

In the MPCB, it shall be possible to have accessories like auxiliary contacts, trip alarm contacts, shunt release/under voltage release, as required for motor control and protection. MPCB shall give indication for 'ON'/'OFF' and tripping on fault. The breaking capacity of MPCB shall not be less than 50 KA. MPCB shall have rotary operating mechanism with door interlock and provision to lock it in 'OFF' position with a padlock.

It shall comply with latest standard and provide short circuit coordination TYPE "2" in accordance with IEC 947-4-1 with contactors. The Contractor and MPCB shall be of same make.

Switch Disconnecter fuse unit:

The load break switches shall conform to IEC-947-3 and IS 13947-3 specification. They shall be suitable for continuous maximum rating having positive isolation with positive indication of contact separation. They should have high short circuit making and withstanding capacities. Breaking capacity should correspond to AC 23 A utilisation category. Switch handle shall be provided with door interlocking arrangement. Also, 'defeat' arrangement shall be provided to open the door in switch 'Close' position for testing purpose. Live terminal of the switch shall be shrouded.

Fuses:

These shall be non-deteriorating HRC cartridge link type with operation indicator which will be visible without removing fuses for the service. These shall be complete with moulded phenolic fuse base and cover. The fuse base shall be so located in the modules to permit

insertion of fuse pullers and removal of fuse links without any problem. One set of fuse pullers to cover entire range of fuses used in the panel shall also be provided.

Contactors:

The rating of the power contactors shall be as required depending upon the feeder rating indicated in the specifications and as per the feeder details table provided in this specification below. Contactors coils shall be suitable for 240 volts, 50 Hz. unless otherwise specified. All contactors shall be supplied with minimum 2 NO + 2 NC auxiliary contacts. Additional contacts if required for interlocking etc. shall also be provided. Minimum contactor rating for power shall be 9 Amp.

All contactors of motor starters shall be suitable for AC 3 duty unless specified otherwise.

Protective Devices:

Bimetal overload relays with inbuilt single phase protection shall be adjustable and self reset type.

Heavy duty starters shall be provided with saturable type current transformer operated overload relays only, which shall be suitable for motor starting time of 15-60 seconds.

Any other relays such as digital mini motor protection relay if required for motor feeders instead of bimetallic overload relay or other special relays for incoming & outgoing feeders shall be specified in the special requirement of this project/approved drawings.

Timers:

The timers shall be continuously adjustable and electronic type, suitable for 240 V, 50 Hz. supply.

Push Buttons (PBs):

Push buttons shall be complete with actuator and contact block and shall be generally mounted on doors of the cubicles. Colours shall be as follows:

Stop/open/emergency	- Red
Start/close	- Green

It should have minimum 1 NO + 1NC contacts. Push buttons shall conform to IP-65 protection against dust and water ingress.

Indication Lamps:

All outgoing motor feeder shall be provided with 'ON' indication lamps. For all incoming and non motor outgoing feeders shall be provided "ON" indication lamps for all three phases.

Colours shall be as under:

Phases	: Red, Yellow & Blue
ON	: Red
OFF	: Green (Only for ACB Feeder)
TRIPPED	: Yellow (Only for ACB Feeder)

Indicating lamps shall be of LED (cluster of high intensity light emitting diodes) type, suitable for 240 V AC supply. These shall be provided with translucent covers of red, green and amber colours as required. These lamps shall be of minimum 22.5 mm dia. Indication lamps to be provided for all feeders.

Current Transformers (CTs):

CTs shall be cast resin insulated type. Primary and secondary terminals shall be marked indelibly. CTs shall preferably be mounted on stationery parts. These shall be capable of withstanding momentary short circuit and symmetrical short circuit current for 1 second and shall have a minimum rating of 10 VA. Neutral side of CTs shall be earthed.

Protection CTs shall be of low reactance, accuracy class "SP" and an accuracy limit factor greater than "10". Instrument CTs shall be of accuracy class "1.0" and accuracy limit factor less than "5.0".

Separate CTs to be provided for protection and metering purpose.

Measuring Instruments:

These shall be of square pattern having approximate dimensions 96 mm x 96 mm, flush mounting type. Necessary auxiliary instruments like CTs, VTs, etc. are also included in the scope of supply.

All AC meters shall be of Digital type for displaying three phases reading. Suitable selector switch shall be provided if the digital meter does not have provision for simultaneous display of three phase readings.

Voltmeter shall be suitable for direct line connection. Voltmeters shall be connected through MCBs only.

Intelligent Panel Meter shall be provided with incoming feeder of the MCC for the measurement and digital display of Multifunctional Electrical Parameters such as voltage, current, active power, reactive power, frequency, power factor, active energy, reactive energy, etc. Data port to be provided to enable communicate all these parameters to Main PLC Panel through suitable data bus/ signal communication cable if required in future.

Special Requirements for this project:

Feeder details for incoming and outgoing for this project as per battery limit to be worked out by the supplier as per the design requirements of the plant. **All motor feeders shall have either DOL starter, Star-delta starter or VFD of suitable rating as per table given below.** Variable Frequency Drive (VFD) Unit shall be provided for a motor feeder if specifically mentioned and required as per design requirements. Suitable Line Chokes shall be provided in VFD feeders. Each motor feeder shall consist of an MPCB/ MCCB, contactors (single contactor for DOL, auxiliary relay, start & stop push buttons, ON/OFF/TRIP indicating lamps.

(i) The following selection table shall be followed for motor feeders unless otherwise specified:

Sr. No.	415 V Motor HP	Contact or Rating Amps	MCCB Rating Amp.	MPCB Rating Amp.	Type of Starter
1	Up to 3 HP	9	-	9	DOL
2	5 to 10 HP	16	-	16	VFD
3	12.5 to 15 HP	25	-	25	STAR-DELTA
4	20 to 25 HP	-	-	40	STAR-DELTA
5	30 to 35 HP	-	-	50	- Do -

6	40 HP	-	63	-	- Do -
7	45 HP	-	100	-	- Do -
8	50 to 60 HP	-	125	-	VFD
9	65 to 70 HP	-	200	-	STAR DELTA
10	75 to 90 HP	-	200	-	- Do -
11	100 to 125 HP	-	250	-	- Do -
12	150 to 180 HP	-	400	-	- Do -
13	200 to 250 HP	-	400	-	- Do -
14	275 to 400 HP	-	630	-	- Do -

For capacitor, rating of contactors shall be capacity duty type.

- (ii) For incoming feeder of rating up to 630 A, 4 pole MCCB & for rating higher than 630 A, 4 pole ACB shall be provided unless otherwise stated in the feeder details.
- (iii) In addition to the connected load to each MCC, at least 15 % (KW rating) spare outgoing feeders complete with starters shall be provided. These spare feeders shall cover as far as possible more or less all sizes of starters. In addition one no. 200A, one no. 100 A and one 63 A 4P MCCB to be provided as spare and for usages such as for connecting welding sets. For air compressor & drier suitable MCCB feeder shall be provided and starter shall be local near the machine.
- (iv) All VFD provided in the panels for electrical equipment shall be interfaced to the Central PLC through Ethernet or similar type of communication cable. The VFD shall be dynamically controlled from the PLC depending on the program and feedback system from field. These VFD shall have Battery back-up and communication port.
- (v) **For High electrical loads (large motors) like Mixer, Hammer Mill, Fan, heavy duty capacitors of suitable rating shall be placed in the MCC & these shall be automatically connected to the bus, once the respective feeder is put ON so as to get power factor of unity.** Each capacitor feeder shall have MCCB for isolation, capacitor duty contactors for ON/OFF, start/stop pushbuttons, auto/manual toggle switches, SPMCBs for control circuit etc.
- (vi) Electrical interlocking shall be provided between various feeders as required by the process and specified in interlocking details. Interlocking defeat switch on MCC for bypass of interlock for testing/running of individual motors shall be provided.
- (vii) ON/OFF operation of all motor feeders shall be possible in both RCP as well as Manual mode from MCC through selector switch. Indication for ON/OFF/TRIP for all motor feeders shall be provided in MCC/RCP as specified.
- (viii) All motors shall be high efficiency motors and provided with bigger terminal box to accommodate Al. cables. Thermistor if provided in windings of 60 HP & above motors shall be of two ranges, one being for the warning and the other for tripping the motor if the fault persists.
- (ix) Supplier has to submit GA, control & power circuit drawing for approval to Kolhapur Milk Union (Purchaser) before starting manufacturing of MCC. Induction motors (above 10 KW) having 3000 RPM shall require higher rating for switches, fuses, MPCB, contactors and electronic timers due to very high starting current. MCC supplier to specially check this requirement from Kolhapur Milk Union (Purchaser) before preparing the drawings.

- (x) Bidders should specify maximum two "makes" of the following items in order of preference:

S.N.	Name of Items	Makes of Items	
		1 st Preference	2 nd Preference
1	ACB and its relays		
2	Moulded Case Circuit Breaker		
3	Motor Protection Circuit Breaker		
4	Switch Dis-connector Fuse Unit		
5	HRC Fuse Links		
6	Miniature Circuit Breaker		
7	Contactors		
8	Starter Relays		
9	Electronic Timers		
10	Push Buttons		
11	Indicating Lamps		
12	Current Transformers		
13	Measuring Instruments		
14	PVC Insulated Control wires		
15	PVC Insulated Power wires		
16	Terminal Blocks		
17	Soft Starters		
18	Variable Frequency Drive		
19	MCC Panel		

All the major components of an MCC shall be of same "Make".

- (xi) The following selection table shall be followed for cables of motors unless otherwise specified:

The following selection table typically shall be followed for cables of motors unless otherwise specified:

3 Phase 415 V Motor H.P.	Aluminium Conductor Cable Size – Sq. mm			
	DOL Starter/ VFD		Star-Delta Starter	
	Supply side	Motor side	Supply side	Motor side
Up to 7.5	4	4	4	2 X 4
10	6	6	6	2 X 4
15	10	10	10	2 X 4
20	16	16	16	2 X 6
25	25	25	25	2 X 10
30	25	25	25	2 X 10
40	35	35	35	2 X 16
50	50	50	50	2 X 25
60	70	70	70	2 X 35
75	95	95	95	2 X 50
100	120	2 X 70	120	2 X 70
125	185	2 X 95	185	2 X 95
150	240	2 X 120	240	2 X 120
180	300	2 X 150	300	2 X 150
200	2 X 150	2 X 150	2 X 150	2 X 150
250	2 X 185	2 X 185	2 X 185	2 X 185

275	2 X 240	2 X 240	2 X 240	2 X 240
300	2 X 240	2 X 240	2 X 240	2 X 240
425	2 X 400	2 X 400	2 X 400	2 X 400

Note: Suitable de-rating factor of cables as per manufacturer's guidelines to be applied where more than one cables feeding to various motors/drives are to be laid in parallel

Note: Armoured aluminium cable should be used for incomer of MCC and outgoing to motors unless otherwise specified.

- (xii) **Wherever needed as per process requirements, VFDs shall be used and these shall be clearly listed out in the offer. VFDs shall have input chokes on line side. Load side chokes wherever required are also to be included.**

16.7.6 ELECTRICAL ITEMS / ACCESSORIES:

Cable trays for power distribution inside the plant, earth pits & earth strips shall be of GI. Earthing for automation and instrumentation shall be independent of power earthing.

All Isolators, junction boxes shall be in Al. Die cast housing or thermo-plastic construction as directed by Kolhapur Milk Union. The cable drops (power, control & instrument cables) from the overhead cable trays shall be through GI conduit pipe. Necessary 11KV 12 mm thick full length rubber mats should be provided for all MCCs, sub-power panels.

(i) MOTOR ISOLATORS/EMERGENCY PBS, CABLE TRAYS, CONDUIT

The detailed specifications are provided in the Special conditions of contract- Electrical installation (Section IV PART IIIB).

(ii) LT POWER CABLES

Power cables for use on 415 V system shall be of 1100 volt grade, aluminium conductor XLPE insulated, PVC sheathed, armoured and overall PVC sheathed strictly as per IS : 7098 PART 1/1988. Unarmoured copper cable shall be used only for specifically requirements as per directions of Engineer-in-charge. The size of these cables shall be as per approved erection drawings. NO AL CABLE OF SIZE LESS THAN 4 SQ.MM SHALL BE USED.

(iii) LT CONTROL CABLES

Control cables for use on 415/230 V systems shall be of 1100 V grade, copper conductor, PVC insulated, PVC sheathed, armoured and overall PVC sheathed, strictly as per IS: 1554 (Part I) - 1988, read with latest revisions, if any. Unarmoured control cable to be used only if specifically indicated in approved drawings or specially approved by site in-charge. The size of these cables shall be as per approved erection drawings. NO CABLE OF SIZE LESS THAN 1.5 SQ.MM SHALL BE SCREENED CONTROL CABLE FOR ANALOGUE SIGNALS.

SCREENED CONTROL CABLE FOR ANALOGUE SIGNALS

These shall be used for carrying out analogue signals. Multi-standard base annealed copper conductor, PVC insulated, cores colour coded, laid up screened by braiding with ATC copper wire and finally over all PVC sheathed, complete as per **British Standard Code 5308**. Sizes of these cables shall be specified in schedule of quantities/approved drawings. As a standard practice, these cables shall be of conductor **dia 1.0 sq. mm** and number of cores as per requirement. These cable shall be with armouring unless specified otherwise in schedule of quantities/approved drawings.

(iii) EARTHING NETWORK:

EARTHING SYSTEM

Earth Pit

Plate or pipe type earth electrode with earth pit shall be provided for this work unless otherwise advised by site engineer due to typical site conditions. Earthing electrode and pit shall be as per IS: 3043-1987 the latest revision (code of practices for Earthing). Wherever soil conditions are prohibitive for normal earthing, approved galvanised (120 microns) pipe-in-pipe type earthing 3 M long & approx. 62 mm/88 mm OD filled with corrosive inhibiting compound in the annular shell & outside shall be provided. All earth electrodes shall preferably be driven to a sufficient depth to reach permanent moist soil.

PRIOR APPROVAL OF SITE ENGINEER SHALL BE TAKEN FOR SELECTING TYPE OF EARTH ELECTRODE (PIPE OR PLATE).

- Earth pit centre shall be at a minimum distance of 3 M from nearest building, unless otherwise advised. The minimum 3 M distance shall be maintained between centres of 2 earth pits.

Earth Bus, Earthing Lead & Earth Wire/Strip

- All electrical equipment is to be doubly earthed by connecting two-earth strip/ wire conductor from the frame of the equipment to an earthing pit/ main earthing ring. The earthing ring will be connected via links to several earth electrodes. The cable armoured will be earthed through the cable glands. Conductor size for connection to various equipment shall be as specified in the drawing or as instructed by the Engineer-in-charge. However, the length of the branch leads from equipment to earthing grid/ ring shall not be more than 10 to 15 meters.
- All hardware for earthing installation shall be hot dip galvanized. Spring washers shall be used for all earthing connections of equipment having vibrations.
- Size of earthing lead/ wire shall be as specified in schedule of quantities/drawings. Below Table may be considered as general guidelines.
- However, while deciding type & size of earth lead, the resistance between the earthing system and the general mass of the earth shall be as per IS code of practice. The earth loop impedance to any point in the electrical system shall not be in excess of 1.0 Ω in Contract to ensure satisfactory operation of protective devices.

- G.I. wire/ Cu wire shall be connected to the equipment by providing crimping type socket/ lug.
- Wherever earthing strip to be provided in cable tray, it shall be suitably bolted on cable tray and electrically bonded to the cable tray at regular interval.
- Excavating & refilling of earth, necessary for laying underground earth bus loops shall be the responsibility of the Supplier.
- Wherever earth leads/ strips/ wire are laid in cable trenches, these shall be firmly and suitably cleared to the walls/ supporting steel structure on which cable is clamped.
- Long runs of GI strip shall be connected at each end with lap type welding to ensure continuity and joint spray treated.

Sizing of earthing lead/wire

Sr. No.	Item	Size
1	Control switches/PB station/Isolators	6sqmm PVC insulated Cu wire
2.	Motor up to 10 HP	6sqmm PVC insulated Cu wire
3.	Motor above 10 HP up to 125 HP	GI strip 25 X 6
4.	Motor above 125 HP	GI strip 25 X 6
5.	Switch Board	GI strip 25 X 6
6.	Motor Control Centre/Main cable trays/RCPs	GI strip 40 X 6

OTHER ELECTRICAL ITEMS

- a) Control circuit junction boxes
- b) LT Control wires and cables for instrumentation, and interlock along with sensors probes, limit switches, HG switch etc
- c) Cable glands, lugs, route markers
- d) Rubber mats, fuse puller, hand gloves

The specifications of the above items are available in the **Special conditions of contract - Electrical (Section IV PART -IIIB)**.

16.7.4 CAPACITORS FOR p.f. IMPROVEMENT:

The capacitor requirement shall be calculated considering the electrical loads for new equipment. The calculation of capacitor requirement shall be shared with Kolhapur Milk Union (Purchaser) and approval of the final requirement shall be taken from Kolhapur Milk Union (Purchaser) before supply.

For each of capacitor bank one set of suitable rating MCCB, capacitor duty contactor, pair of ON/OFF push button and indication lamp shall be provided.

Selector switch and CT operated digital ammeter of size 96 mm x 96 mm.

Auto-manual switch and connected circuit to ensure that in manual mode each capacitor can be put on/off manually also.

POWER CAPACITORS BANKS:

The power capacitor banks shall be used to improve the power factor of the electrical system.

Design Requirements:

Each basic unit is to be built up with a number of elements. These elements shall be of two layer dielectric design (non-self healing) using heavy Polypropylene Film, Aluminium Foil and Capacitor Tissue Paper as required to ensure max total dielectric thickness. Capacitor element must be completely sealed with epoxy resins to provide maximum humidity protection and highest insulation. The capacitor elements are to be given adequate outside insulation and should be put in all welded surface treated containers. The outer surface shall be provided with a coat of protective primer followed by two coats of synthetic enamel paint of approved shade. These capacitors shall be impregnated with special grade of capacitor oil under high vacuum. The metal case shall be equipped with porcelain bushings to permit connection between power lines and active capacitors. The unit shall have built-in internal individual fuses. All capacitors shall be of **APP heavy duty type**.

Externally each capacitor unit shall have two separate earthing points, name plate confirming to the requirements of IS-2834 (amended up to date), discharge resistances etc. Each capacitor should be suitable for operation on 440 V, 3 Phase, 50 Hz AC power supply.

Specifications:-

1. Overvoltage: +10% (for 12h / 24h), + 15% (for 30m / 24h), + 20% (for 5m), +30% (for 1m) as per Clause 6.1 of IS 13585.
2. Peak Inrush current withstand : $500 \times I_n$
3. Total watt-losses: $< 0.35 \text{ W / kVAr}$
4. Temperature category: -25°C to 70°C

Important Notes:

- The foundation location, layout of equipment, load details on the foundations shall have to be provided to the Kolhapur Milk Union (Purchaser) to design the civil foundation of new requirement. Supply & fixing the foundation bolts with sleeve for the steel structure shall be in the scope of the bidder. However the gap between MS bolt and sleeve shall be sealed by civil agency engaged by Kolhapur Milk Union (Purchaser) by using grouting compound "ACC – Shrink-komp" or "FOSROC- GP2".
- Maximum unsupported chequered plate area is to be 1 sq.mt approx.
- Staircase shall be suitably located so that quick approach to working platforms and shall be minimum 1.1 m wide with 32 mm MS B class pipe hand railing (double braced). Treads & raisers shall be designed for operator usage considering frequent movements.
- Platforms with toe guard, railing shall be extended to all working equipment to facilitate inspection, operation and maintenance.

16.9 TECHNICAL SPECIFICATIONS FOR ERECTION, TESTING AND COMMISSIONING

- General technical specification for erection, testing and commissioning is included under **special condition of contract (Section IV PART -1, PART –II, PART- IIIA, PART-III B)** of tender.
- Erection, testing and commissioning is inclusive but not limited to the following:
 - Positioning of all the feed plant equipment in the approved locations, including grouting, anchoring etc as per requirement.
 - Laying of product, aspiration and Service pipelines inclusive of the necessary valves, fittings etc. including the necessary accessories if any.
 - Anchoring of the pipe lines on necessary supports- for all product, aspiration and Service pipelines by suitable anchor bolts.
 - Providing pipe sleeve of suitable size for laying pipes / cables through wall crossing.
 - Insulation of Steam and molasses pipe lines.
- Erection/Welding/Grouting into place necessary structural platforms, walkways, hand rails etc., as per requirement.
- Name of all important machines to be written on them after final installation but before commissioning by a painter. Necessary aero marks and other identification by painting to be provided on piping as required.
- Laying of LT Power cables in conduit pipes, cable trays, underground (including excavation etc) as per specifications or in trenches provided by the Kolhapur Milk Union, including supporting of cable trays/conduits, isolators, junction boxes, remote push button stations etc..
- Termination of Power cables on MCC and on Motor starters, Capacitors, isolators etc. with suitable cable glands, lugs etc.
- Termination of control cables/sensor wires on RCPs, control panels, limit switches, indicators, controllers etc
- Earth pit installation complete including excavation, installation, refilling etc.
- Earthing of all electrical equipment with two runs of earth electrode of appropriate size from earth pit, panel board trenches etc.
- Approval of Electrical installation executed by the bidder by the Electrical Inspectorate of the state where the plant is located.
- Testing and commissioning procedure have been detailed separately in tender in **Section VI at S.No. 9.0 (Project Management)**.

17.0 TECHNICAL DETAILS AND DRAWINGS TO BE FURNISHED ALONGWITH THE BID

Process Flow Diagram – Similar to one provided along with the tender or as per Process Requirement.

Layout drawing- The machinery and equipment layout drawing of the TMR plant showing layout of the equipment with all accessories including panels and service/utility units complete. Each equipment should have sufficient space around it for easy operation and maintenance while designing the plant and equipment layout.

19 LIST OF SUGGESTED MAKES :

The list of approved makes of items are given below. The bidder shall note and confirm the make proposed by them.

Description	Makes
Key Equipment (Hammer mills with feeder, Cyclone, dust collector, air-lock).	CREMACH/ POWER MECH / NEO-TECH/SPECTOMS/ ALFA ENGINEERS/AMBICA INDUSTRIES/ECOSTAN / PARIKH SOLIDS /HEPL/CEASPL
Conveyors & Elevators and Gates (pneumatic/manual/pyramid)	CREMACH/ POWER MECH / NEO-TECH/SPECTOMS/ALFA ENGINEERS/AMBICA INDUSTRIES/ECOSTAN/HEPL/CEASPL/ GRAINTEC/EMINENCE
Aspiration Units	TECH FLOW / PARIKH SOLIDS/ CREMACH/ POWER MECH /NEO-TECH / ALFA ENGINEERS/AMBICA INDUSTRIES /RKBFM/NEO-TECH/ ECOSTAN/SPECTOMS/ PARIKH SOLIDS /HEPL/CEASPL
Electronic Weighing Machine.	TECHNO-WEIGH / SIGMA INSTRUMENT /IIM /SHIVAM CONTROL SYSTEM/ MASS WEIGHING & BAGGING EQUIPMENT/ ADVANCE HYDROTECH/ADVANCE RECYCLING/S. WELL ENGINEERING
Centrifugal fans & Cyclone	ABB / FLAKT WOODS / AEROTECH / CREMACH/ POWER MECH / NEO-TECH/SPECTOMS/ALFA ENGINEERS/AMBICA INDUSTRIES/ HEPL/CEASPL/TECH-FLOW/PARIKH SOLIDS
BLOCK MAKING MACHINE	ADVANCE HYDRAU-TECH/ADVANCE RECYCLING/S. WELL ENGINEERING
TMR MIXER	S. WELL ENGINEERING /SHAKTIMAAN/RAMGARHIA ENGG WORKS/DEVE ENGINEERING/LEGENDER
SLAT CONVEYOR	TECHNO-WEIGH /IIM /SHIVAM CONTROL SYSTEM/ CREMACH/ POWER MECH / NEO-TECH/SPECTOMS/

	ALFA ENGINEERS/MASS WEIGHING & BAGGING/SIGMA INSTRUMENT
STITCHING MACHINE	REVO/STITCH-WELL PACKO/VIKRANT
WEIGH SCALE	AVERY/ESSAE/SARTORIOUS/METTLER- TOLEDO/ENDEAVOUR/MINEBEA-INTEC
Process Control Valve	SAMSON / ROSEMOUNT / KROHNE MARSHALL/ FESTO
Structural Steel, Plates, Sheets	SAIL / TATA/ /RINL /ESSAR/JINDAL/VIJAG
Level Transmitter & indicator	E&H / ROSEMOUNT / SIEMENS/MICROPILOT
Temperature/ Pressure Transmitter	E&H / ROSEMOUNT / SIEMENS
RTD	PYROELETRIC/ ALTOP/TOSHNIWAL / RADIX
PID Controller	YOKOGAWA / CHINO / TATA HONEYWELL / SIEMENS / ROSEMOUNT
Submersible Pump	KIRLOSKAR/WILLO/KSB/CROMPTON
Molasses Dosing Pump	AJAY/DELTA/HYDRO-POWER
Level Switch (float type for liquid)	E&H / ROSEMOUNT / HONEYWELL / SIEMENS / EMERSON
Level Switch/Sensor (for silos, bins and hoppers)	IFM /SAPCON, INDORE/ BAUMER / ALLEN BRADLEY / E&H /FESTO /EQUIVALENT.
Vortex / Magnetic Flow meter	E&H / ROSEMOUNT / YOKOGAWA / FORBES MARSHALL / MANAS MICROSYSTEMS / EMERSON.
Control Valve	DANFOSS / DEMBLA / SAMSON / AVCON / TOSHBRO / FISHER XOMOX / MASONEILAN/FESTO
Pressure switch / temp switch / Pressure transmitter / temperature transmitter / Thermostat	DANFOSS / SWITZER / PYROTECH / ALTOP / WIKA / AMERICAN SPECIALITIES, USA
Pressure & Temperature Gauge	FIEBIG / H GURU / WAREE / PRICOL
Dual type Pressure / temp gauges	FIEBIG / H GURU / WARREE / PRICOL
Temperature sensors / digital indicator / controller / recorder	YOKOGAWA / TATA HONEYWELL / RADIX / PYROTECH / E&H / EMERSON
Intelligent Motor Protection relay	ABB/ SCHNEIDER / ROCKWELL / SIEMENS.
VFD	SIEMENS / ALLEN BRADLEY / DANFOSS / ABB
Electronic Soft Starter	SIEMENS / ALLEN BRADLEY / ABB / SCHNEIDER /DANFOSS.
Load manager / Power / Energy	ALLEN BRADLEY / SIEMENS / ABB / ENERCON

Monitor	
Voltage / Current / Energy / Power factor Transducer	RISHABH / ENERCON
PC (Personal Computer)	COMPAQ/HEWLETT-PACKARD/IBM LENEVO/ DELL
PLC / DCS System	SIEMENS / ALLEN BRADLEY / SCHINEIDER/DANFOSS
Automation System	SIEMENS / ROCKWELL / TECHNOWEIGH/ IIM / SCHINEIDER/DANFOSS
TEFC Electric Motors & Motor for geared motors	BHARAT BIJLEE / SIEMENS / ABB / CROMPTON / SEW
Geared Motor / Gear Box	PBL/POWER MASTER / RADICON/ SHANTHIGEAR / BONFIGOLI / EURO DRIVES / ROTOMOTIVE/NORD
Air Circuit Breaker	L&T / SIEMENS / ABB / SCHNEIDER/DANFOSS
MCCB, MPCB	L&T / SIEMENS / ABB / SCHNEIDER/DANFOSS
Contactors	L&T / SIEMENS / ABB / SCHNEIDER/DANFOSS
Starter Overload Relays	L&T / SIEMENS / ABB / SCHNEIDER/DANFOSS
Timers Electronic	L&T / SIEMENS / ABB / SCHNEIDER/DANFOSS
Switch disconnecter Fuse	L&T / SIEMENS / ABB / SCHNEIDER/DANFOSS
MCBs	SIEMENS/ L&T-HAGER / MDS-LEGRAND / GE
Push Buttons	ESBEE / SIEMENS / GE / VAISHNO / TEKNIC
Indicating Lamps	L&T / SIEMENS / VAISHNO / TEKNIC / ESSEN
Digital Ammeter & Voltmeter	ENERCON / IMP / MECO
Analog Ammeter & Voltmeter	RISHABH / IMP / MECO / AE
Digital Energy Meter	ENERCON / L&T / CADEL / AE
Analog Energy Meter	UNIVERSAL / HAVELS / JAIPUR
Power Factor Meter	RISHABH / IMP / MECO / AE
Current Transformer	KAPPA / MECO / AE / IMP / INDCOIL
LT Power Cables	CCI / FORT GLOSTER / POLYCAB/ FINOLEX / RRKABEL
LT Copper Control Cables	CCI / RPG ASIAN / FINOLEX / FORT GLOSTER / RRKABEL/POLYCAB
Signal & Instrument cable	LAPP KABEL / RR KABEL / THERMOPAD
PVC Insulated Copper wire	FINLOEX / RRKABEL/POLYCAB
Power Capacitors	MALDE / MEHER / SIEMENS / EPCOS/ MOMAYA.
APFC Relay	L&T / BELUK / MECO
Cable Tray	INDIANA / MEK / SUNRISE / SUPER / PILCO

Isolating Switches	SIEMENS / L&T
HRC fuses	L&T / SIEMENS
IP 55 boxes for motor isolators, push buttons, junction boxes etc.	HENSEL / HANSU
Terminal Blocks	WAGO / LAPP INDIA / CONNECT WELL / ELMEX
Pipe-in-pipe earthing	FAST EARTH/EQUIVALENT
Electronic Load Manager	ENERCON / KRYKARD / L&T
Selector Switch	KAYCEE / SALZER
Cable Glands/Lugs	COMET / EX-PROTECTA / DOWELS / LAPP KABEL / BRACKO
Servo Voltage Stabilizer	SUVIK / APLAB / NEEL / KRYCARD
UPS	EMERSION / APC / HI-REL / DB ELECTRONICS / APLAB
SOFT MIMIC PANEL	PANASONIC/LG/SAMSUNG/SONY
SMF Battery	AMCO / YUASA / EXIDE/AMARON
Water Valves (Butterfly / Ball)	SAUNDERS / AUDCO / INTERVALVE / BDK / LEADER
Water Valves (Diaphragm)	SAUNDERS / BDK
Non-return Valve for water (wafer type)	AUDCO / INTERVALVE / BDK
Water Foot Valve	KIRLOSKAR / GG / LEADER
GI Pipes	TATA / MST / JINDAL/APOLLO
MS Pipes for steam & condensate	TATA / JINDAL / KALYANI / MST /APOLLO
GI "C" Pipes for air.	TATA / JINDAL / KALYANI / MST /APOLLO
NRV for Air Line	INTERVALVE / AUDCO / LEADER
Solenoid Valve for Water line	AVCON/FESTO/JANATIC/AIRMAX
Water Flow Meter	FORBES MARSHALL/DASHMESH / ANAND ASAHI / KENT / E&H / EMERSON
LP Steam / condensate Valves	AUDCO / CRESCENT / LEADER / THERMAX / BDK / FORBES MARSHAL
Steam relief valve, traps & strainers	SPIRAX / THERMAX/ FORBES
Steam Pressure Reducing Valve	SPIRAX / FORBES / THERMAX
Steam Pressure Reducing Station	FORBES MARSHALL/SPIRAX/ THERMAX
Air Compressor	INGERSOLL RAND/ ATLAS COPCO/ELGI
Refrigerated Air Dryer	GEM EQUIPMENTS/ SABROE / CHICAGO PNEUMATIC / HIRAS/ INGERSOLL RAND/ ATLAS COPCO/PURIFAIR/ELGI

Air lines accessories	FESTO / AIRMATIC / LEGRIS / NUCON/AIRMAX/JANATICS
On Line Metal Detector	MOS TECHNOLOGIES/ DAS ELECTRONICS / TECHNO- WEIGH/IIM/SHIVAM CONTROL SYSTEM
On Line Check Weigher	MOS TECHNOLOGIES/ DAS ELECTRONICS/ A & D Japan /IIM/TECHNO-WEIGH/SHIVAM CONTROL SYSTEM
Auto Drain Valve	ULTRA FILTER / ZANDER/JORC
Resin bonded mineral wool	LLOYD / UP TWIGA / MINWOOL / ROCKWOOL
Structural Steel	SAIL / TISCO /RINL /IISCO/ ESSAR /JSW
Level Switch (float type for liquid)	E&H / ROSEMOUNT / HONEYWELL / SIEMENS / EMERSON.
Radar type Level Sensors	E&H / ROSEMOUNT / HONEYWELL / SIEMENS / EMERSON.
Valves (Butterfly / Ball)	SAUNDERS / AUDCO / INTERVALVE / BDK / LEADER
Valves (Diaphragm)	SAUNDERS / BDK
Non-return Valve (wafer type)	AUDCO / INTERVALVE / BDK
MS "C" Pipes for Molasses, steam & condensate	TATA / JINDAL / KALYANI / MST
CI gate valve	L&T / INTERVALVE / BDK / LEADER /GG/KSB
Epoxy Red Oxide Primer	BURGER /ASIAN/NEROLAC
Black Epoxy Paint	BURGER /ASIAN/ NEROLAC
Black Synthetic Enamel paint	BURGER /ASIAN/ NEROLAC

Part – A

20.0 SCHEDULE OF QUANTITIES:

20.1.A DESIGN AND SUPPLY OF EQUIPMENT FOR TMR PLANT MODIFICATION AND CAPACITY UPGRADATION (FROM 10 TPD TO 40 TPD) OF BLOCK SECTION OF TMR PLANT ALONG WITH ASSOCAITED SERVICES:

S. NO	ITEM DESCRIPTION	CAPACITY	QTY.	Unit Rate	Total Amount
A	RAW MATERIAL INTAKE EQUIPMENT				
1	INTAKE SECTION				
a	INTAKE DUMPING HOPPER WITH GRILL AND WITH ELECTRIC VIBRATORS (2 NOS)	50 Kg (min)	1 Nos		

b	INTAKE SCREW CONVEYOR (SINGLE/TWIN) WITH DRIVE UNIT	4 TPH, 5 MTR	1 Nos		
2	GRINDING EQUIPMENT				
a	HAMMER MILL WITH DRIVE MOTOR, SPARK DETECTOR, STONE SEPARATOR, CYCLONE (SINGLE/TWIN), EXHAUST FAN WITH DRIVE MOTOR, AIR LOCK WITH DRIVE MOTOR & ACCESSORIES	3 TPH (minimum)	1 Unit		
b	CHAIN/SCREW CONVEYOR BELOW CYCLONE OF HAMMER MILL WITH DRIVE UNIT	4 TPH, 6 MTR APPROX	1 Set		
c	BUCKET ELEVATOR WITH DRIVE MOTOR (FOR DISCHARGE OF GRINDED MATERIAL INTO EXISTING BINS THROUGH CHAIN CONVEYOR)	4 TPH, 8 MTR APPROX	1 Set		
d	DUST COLLECTOR SYSTEM (CLOSED HOUSING TYPE) WITH FIRE RESISTANT FILTER BAGS, CYCLONE, EXHAUST FAN WITH DRIVE UNIT FOR NEW HAMMER MILL	SUITABLE	1 Set		
e	CHAIN/SCREW CONVEYOR ABOVE EXISTING STORAGE BINS WITH DRIVE UNIT	4 TPH, 8 MTR APPROX	1 Set		
3	BATCHING AND MIXING EQUIPMENT				
a	TWIN/SINGLE SCREW CONVEYOR (INCLINED) WITH DRIVE UNIT FOR BELOW EXISTING BINS FOR DISCHARGE	5 TPH, 8 MTR APPROX	1 Set		
b	INCLINED/CURVED CHAIN CONVEYOR BELOW GRINDING BIN WITH DRIVE UNIT) FOR DISCHARGE OF GRINDED STRAW INTO BOTH MIXERS	5 TPH, 14 MTR APPROX	1 Set		
c	TMR MIXER WITH DRIVE MOTOR & VFD, GEAR BOX, HYDRAULICALLY OPERATED DISCHARGE GATE WITH BELT CONVEYOR, LOAD CELLS, AUTOMATION ETC	2 TON PER BATCH (minimum)	1 Set		
d	CHAIN/SCREW CONVEYOR (INCLINED) WITH DRIVE UNIT FOR MIXER DISCHARGE	6 TPH, 18 MTR APPROX	1		
e	BUCKET ELEVATOR WITH DRIVE MOTOR FOR FEEDING OF MOLASSES MIXED MATERIAL TO EXISTING FINISH FEED BINS	6 TPH, 11 MTR APPROX	1 Set		
4	MIX FEED EQUIPMENT				
a	ELECTRIC VIBRATORS FOR ALL 3 FINISH FEED BINS (2 IN EACH BIN) WITH PANELS		3 Set		
b	PNEUMATIC SLIDE GATE ABOVE & BELOW FINISHED FEED BINS, HOPPERS & CONVEYOR'S OUTLET AS PER PROCESS REQUIREMENT	SUITABLE	10 Nos		
5	MOLASSES EQUIPMENT				
a	NEW MOLASSES DOSING SYSTEM FOR AUTOMATED DOSING OPERATION OF MOLASSES TO BOTH MIXERS BY PROVIDING NEW DOSING TANKS (500 LTR EACH), ELECTRIC/PNEUMATIC ACTUATOR VALVES, LOAD CELLS, VFD OPERATED PUMPS (2X2000 LPH)	-	1 Set		

6	BLOCK MAKING EQUIPMENT				
a	SCREW/CHAIN CONVEYOR WITH DRIVE UNIT FOR DISCHARGE FROM MIDDLE FINISHED FEED BIN	5 TPH, 10 MTR APPROX	1 Set		
b	BUCKET ELEVATOR WITH DRIVE MOTOR FOR FEEDING OF MIX FEED MATERIAL TO HOPPER ABOVE WEIGHING MACHINE	5 TPH, 7 MTR APPROX	1 Set		
c	SEMI-AUTOMATIC WEIGHING MACHINE (FOR FEEDING TO BLOCK MAKING MACHINE) WITH MINIMUM 200 KG HOPPER ABOVE WEIGHER	5 TPH	1 Set		
d	ELECTRONIC WEIGH SCALE - 300 KG	300 KG	1 Set		
e	SEMI-AUTOMATIC HYDRAULIC BLOCK MAKING MACHINE, CAPACITY: 100 BLOCK PER HOUR (BLOCK SIZE: 15 KG) WITH DRIVE UNIT AND SUITABLE PANEL	1.5 TPH	1 Set		
f	INCLINED SLAT CONVEYOR (AT THE DISCHARGE END OF BLOCK MACHINES-NEW & EXISTING) WITH STAND MOUNTED STITCHING MACHINE FOR TRANSFERING THE BLOCKS TO METAL DETECTOR, WITH DRIVE UNIT (400 MM WIDTH, 3 MTR APPROX)	2 TPH	2 Set		
g	METAL DETECTOR WITH BELT CONVEYOR, DRIVE UNITS FOR NEW BLOCK MAKING UNIT (400 MM WIDTH, 2 MTR APPROX)	2 TPH	1 Set		
7	AUTOMATION SYSTEM				
a	AUTOMATION WORKS AS PER SPECIFICATIONS AND PROCESS REQUIREMENT WITH PLC PANEL, UPS WITH BATTERY PACK FOR CRITICAL AUTOMATION LOADS (15 MIN BACK-UP), INSTRUMENTATION, SIGNAL & CONTROL CABLE, EARTHING ETC	-	1 Set		
8	HOUSING STEEL STRUCTURE				
a	STEEL STRUCTURE & CHEQUERED PLATE FOR MAINTENANCE & APPROACH PLATFORM, EQUIPMENT SUPPORTS, LADDER, RAILING, STAIR CASE, CABLE TRAY & PIPIGN SUPPORTS ETC	-	5 MT		
9	INDUSTRIAL ELECTRICAL LT				
a	LT POWER CABLES FROM ALL RESPECTIVE FEEDERS OF NEW EQUIPMENT IN MCC PANEL		1 Lot		
b	MCC PANEL WITH CAPACITOR BANK FOR ALL NEW EQUIPMENT AS PER PROCESS REQUIREMENT (EXISTING PCC PANEL WITH 630 AMPS INCOMER SHALL BE SUITABLY MODIFIED TO DRAW OUT POWER FOR NEW MCC PANEL)	-	1 Lot		
c	ELECTRICAL ACESSORIES, CABLE TRAYS ETC WITH EARTHING PITS & EARTHING CONNECTIONS		1 Lot		
10	MISCELLANEOUS EQUIPMENT				
a	RECIPROCATING TYPE AIR COMPRESSOR WITH IN-BUILT DRIER, RECEIVER, AND DRIVE UNIT (18 CUM/HR)	STD	1 Set		

b	AIR LINE PIPING, VALVES & ACCESSORIES FOR COMPLETE NEW EQUIPMENT AS PER SITE CONDITION		1 Lot		
c	PRESSURIZED WATER ARRANGEMENT CONSISTING OF SUB-MERCIBLE PUMP WITH HEADER FROM (65 NB), 3 NOS HOSE REEL (15 MTR) WITH ACCESSORIES, 3 NOS BALL VALVE (25 MM NB) WITH MS PIPING OF 40 MM NB WITH SUPPORT, CLAMP ETC (APPROX 80 MTR) FROM EXISTING UG TANK TO TMR PLANT FOR DOUSING FIRE IN TMR PLANT AREA ALONG WITH FIRE EXTINGUISHERS 4.5 KG EACH (ABC TYPE -6 NOS)		1 Lot		
d	ESSENTIAL SPARE PARTS		1 Lot		
e	MS STORAGE HOPPER WITH SUITABLE PNEUMATIC SLIDE GATE & MANUAL CHAIN GATE AND PRODUUCT PIPING ETC IN EXISTING CONCENTRATE PLANT	1 MT	2 Set		
f	CHAIN CONVEYOR WITH DRIVE UNIT FOR FEEDING OF CONCENTRATE MATERIAL INTO BOTH 2 NEW HOPPERS	8 TPH X 4 MTR APPROX	1 Set		
g	PNEUMATICALLY OPERATED 2 WAY FLAP AT THE OUTLET OF ELEVATORS	Suitable	4 Nos		
h	SMALL HOPPER AND TRANSITION PIECES FOR PLANT	Suitable	1 Lot		
i	PRODUCT PIPE AND MANUAL SPOUT MAGNETS FOR ALL NEW ELEVATORS WITH ACCESSORIES	Suitable	1 Lot		
j	MANUALLY OPERATED GATE AT OUTLET OF BINS/HOPPERS & OTHER EQUIPMENT OF COMPLETE PLANT ETC.	Suitable	5 Set		
11	MODIFICATION WORKS				
a	REPALCEMENT OF ALL DAMAGED CHAINS WITH ITS LINK ETC IN EXISTING CHAIN CONVEYORS IN TMR PLANT TO MEET THE PROCESS REQUIREMENT		1 Lot		
b	MODIFICATION OF EXISTING BOTTOM HOPPER BELOW TMR MIXER TO MAKE IT SUITABLE FOR NEW CHAIN/SCREW CONVEYOR ALONG WITH SUITABLE ENCLOSURE FOR MIXER OUTLET BELTS TO REDUCE DUSTING		1 Set		
c	REMOVAL OF EXISTING INCLINED BELT CONVEYOR WITH ITS SUPPORT SYSTEM, DRIVE ARRANGEMENT ETC (Old Structural material shall be used for platforms, supports etc as per requirement)		1 Set		
d	MODIFICATION OF EXISTING CHAIN CONVEYOR ABOVE TMR MIXER FOR TRANSFER OF CONCENTRATE INTO BOTH THE MIXERS WITH PNEUMATIC SLIDE GATES OF SUITABLE SIZE AND AUTOMATION		1 Set		
e	MODIFICATION OF EXISTING PCC PANEL IN PLANT ROOM BY EXTENSION OF BUS-BAR TO MAKE IT SUITABLE FOR POWER SUPPLY TO NEW MCC (WITH SUITABLE INCOMER) AND MODIFICATION OF EXISTING MCC PANEL OF INTAKE & GRINDING SECTION		2 Set		

f	RE-POSITIONING OF EXISTING GRINDING STORAGE BIN AND BATCHING BIN WITH MODIFICATION OF ITS BOTTOM HOPPERS TO MAKE IT SUITABLE FOR CONNECTING TO THE NEW CONVEYOR ALONG WITH LOAD CELL ARRANGEMENTS, PNEUMATIC SLIDE GATE AND ELECTRIC VIBRATORS (2 NOS IN EACH)		2 Set		
e	MODIFICATION OF EXISTING DISTRIBUTION CONVEYOR ABOVE EXISTING FINISH FEED BINS FOR DISCHARGE OF MIXED MATERIAL INTO TWO BINS WITH PNEUMATIC SLIDE GATE BETWEEN ONE BIN & CONVEYOR		1 Set		
	Total Amount Rs. Part A				
	GST				
	Total Amount Rs. (Including GST)				

Part - B

20.1. B – INSTALLATION, TESTING AND COMMISSIONING OF EQUIPMENT FOR TMR PLANT MODIFICATION AND CAPACITY UPGRADATION OF BLOCK SECTION OF TMR PLANT ALONG WITH ASSOCAITED SERVICES

S. NO	ITEM DESCRIPTION	CAPACITY	QTY.	Unit Rate	Total Amount
A	RAW MATERIAL INTAKE EQUIPMENT				
1	INTAKE SECTION				
a	INTAKE DUMPING HOPPER WITH GRILL AND WITH ELECTRIC VIBRATORS (2 NOS)	50 Kg (min)	1 Nos		
b	INTAKE SCREW CONVEYOR (SINGLE/TWIN) WITH DRIVE UNIT	4 TPH, 5 MTR	1 Nos		
2	GRINDING EQUIPMENT				
a	HAMMER MILL WITH DRIVE MOTOR, SPARK DETECTOR, STONE SEPARATOR, CYCLONE (SINGLE/TWIN), EXHAUST FAN WITH DRIVE MOTOR, AIR LOCK WITH DRIVE MOTOR & ACCESSORIES	3 TPH (minimum)	1 Unit		
b	CHAIN/SCREW CONVEYOR BELOW CYCLONE OF HAMMER MILL WITH DRIVE UNIT	4 TPH, 6 MTR APPROX	1 Set		
c	BUCKET ELEVATOR WITH DRIVE MOTOR (FOR DISCHARGE OF GRINDED MATERIAL INTO EXISTING BINS THROUGH CHAIN CONVEYOR)	4 TPH, 8 MTR APPROX	1 Set		
d	DUST COLLECTOR SYSTEM (CLOSED HOUSING TYPE) WITH FIRE RESISTANT FILTER BAGS, CYCLONE, EXHAUST FAN WITH DRIVE UNIT FOR NEW HAMMER MILL	SUITABLE	1 Set		

e	CHAIN/SCREW CONVEYOR ABOVE EXISTING STORAGE BINS WITH DRIVE UNIT	4 TPH, 8 MTR APPROX	1 Set		
3	BATCHING AND MIXING EQUIPMENT				
a	TWIN/SINGLE SCREW CONVEYOR (INCLINED) WITH DRIVE UNIT FOR BELOW EXISTING BINS FOR DISCHARGE	5 TPH, 8 MTR APPROX	1 Set		
b	INCLINED/CURVED CHAIN CONVEYOR BELOW GRINDING BIN WITH DRIVE UNIT) FOR DISCHARGE OF GRINDED STRAW INTO BOTH MIXERS	5 TPH, 14 MTR APPROX	1 Set		
c	TMR MIXER WITH DRIVE MOTOR & VFD, GEAR BOX, HYDRAULICALLY OPERATED DISCHARGE GATE WITH BELT CONVEYOR, LOAD CELLS, AUTOMATION ETC	2 TON PER BATCH (minimum)	1 Set		
d	CHAIN/SCREW CONVEYOR (INCLINED) WITH DRIVE UNIT FOR MIXER DISCHARGE	6 TPH, 18 MTR APPROX	1 Set		
e	BUCKET ELEVATOR WITH DRIVE MOTOR FOR FEEDING OF MOLASSES MIXED MATERIAL TO EXISTING FINISH FEED BINS	6 TPH, 11 MTR APPROX	1 Set		
4	MIX FEED EQUIPMENT				
a	ELECTRIC VIBRATORS FOR ALL 3 FINISH FEED BINS (2 IN EACH BIN) WITH PANELS		3 Set		
b	PNEUMATIC SLIDE GATE ABOVE & BELOW FINISHED FEED BINS, HOPPERS & CONVEYOR'S OUTLET AS PER PROCESS REQUIREMENT	SUITABLE	10 Nos		
5	MOLASSES EQUIPMENT				
a	NEW MOLASSES DOSING SYSTEM FOR AUTOMATED DOSING OPERATION OF MOLASSES TO BOTH MIXERS BY PROVIDING NEW DOSING TANKS (500 LTR EACH), ELECTRIC/PNEUMATIC ACTUATOR VALVES, LOAD CELLS, VFD OPERATED PUMPS (2X2000 LPH)	-	1 Set		
6	BLOCK MAKING EQUIPMENT				
a	SCREW/CHAIN CONVEYOR WITH DRIVE UNIT FOR DISCHARGE FROM MIDDLE FINISHED FEED BIN	5 TPH, 10 MTR APPROX	1 Set		
b	BUCKET ELEVATOR WITH DRIVE MOTOR FOR FEEDING OF MIX FEED MATERIAL TO HOPPER ABOVE WEIGHING MACHINE	5 TPH, 7 MTR APPROX	1 Set		
c	SEMI-AUTOMATIC WEIGHING MACHINE (FOR FEEDING TO BLOCK MAKING MACHINE) WITH MINIMUM 200 KG HOPPER ABOVE WEIGHER	5 TPH	1 Set		
d	ELECTRONIC WEIGH SCALE - 300 KG	300 KG	1 Set		
e	SEMI-AUTOMATIC HYDRAULIC BLOCK MAKING MACHINE, CAPACITY: 100 BLOCK PER HOUR (BLOCK SIZE: 15 KG) WITH DRIVE UNIT AND SUITABLE PANEL	1.5 TPH	1 Set		

f	INCLINED SLAT CONVEYOR (AT THE DISCHARGE END OF BLOCK MACHINES-NEW & EXISTING) WITH STAND MOUNTED STITCHING MACHINE FOR TRANSFERRING THE BLOCKS TO METAL DETECTOR, WITH DRIVE UNIT (400 MM WIDTH, 3 MTR APPROX)	2 TPH	2 Set		
g	METAL DETECTOR WITH BELT CONVEYOR, DRIVE UNITS FOR NEW BLOCK MAKING UNIT (400 MM WIDTH, 2 MTR APPROX)	2 TPH	1 Set		
7	AUTOMATION SYSTEM				
a	AUTOMATION WORKS AS PER SPECIFICATIONS AND PROCESS REQUIREMENT WITH PLC PANEL, UPS WITH BATTERY PACK FOR CRITICAL AUTOMATION LOADS (15 MIN BACK-UP), INSTRUMENTATION SIGNAL & CONTROL CABLE EARTHING ETC	-	1 Set		
8	HOUSING STEEL STRUCTURE				
a	STEEL STRUCTURE & CHEQUERED PLATE FOR MAINTENANCE & APPROACH PLATFORM, EQUIPMENT SUPPORTS, LADDER, RAILING, STAIR CASE, CABLE TRAY & PIPIGN SUPPORTS ETC	-	5 MT		
9	INDUSTRIAL ELECTRICAL LT				
a	LT POWER CABLES FROM ALL RESPECTIVE FEEDERS OF NEW EQUIPMENT IN MCC PANEL		1 Lot		
b	MCC PANEL WITH CAPACITOR BANK FOR ALL NEW EQUIPMENT AS PER PROCESS REQUIREMENT (EXISTING PCC PANEL WITH 630 AMPS INCOMER SHALL BE SUITABLY MODIFIED TO DRAW OUT POWER FOR NEW MCC PANEL)	-	1 Lot		
c	ELECTRICAL ACESSORIES, CABLE TRAYS ETC WITH EARTHING PITS & EARTHING CONNECTIONS		1 Lot		
10	MISCELLANEOUS EQUIPMENT				
a	RECIPROCATING TYPE AIR COMPRESSOR WITH IN-BUILT DRIER, RECEIVER, AND DRIVE UNIT (18 CUM/HR)	STD	1 Set		
b	AIR LINE PIPING, VALVES & ACCESSORIES FOR COMPLETE NEW EQUIPMENT AS PER SITE CONDITION		1 Lot		
c	PRESSURIZED WATER ARRANGEMENT CONSISTING OF SUB-MERCIBLE PUMP WITH HEADER FROM (65 NB), 3 NOS HOSE REEL (15 MTR) WITH ACCESSORIES, 3 NOS BALL VALVE (25 MM NB) WITH MS PIPING OF 40 MM NB WITH SUPPORT, CLAMP ETC (APPROX 80 MTR) FROM EXISTING UG TANK TO TMR PLANT FOR DOUSING FIRE IN TMR PLANT AREA ALONG WITH FIRE EXTINGUISHERS 4.5 KG EACH (ABC TYPE -6 NOS)		1 Lot		
e	MS STORAGE HOPPER WITH SUITABLE PNEUMATIC SLIDE GATE & MANUAL CHAIN GATE AND PRODUUCT PIPING ETC IN EXISTING CONCENTRATE PLANT	1 MT	2 Lot		

f	CHAIN CONVEYOR WITH DRIVE UNIT FOR FEEDING OF CONCENTRATE MATERIAL INTO BOTH 2 NEW HOPPERS	8 TPH X 4 MTR APPROX	1 Set		
g	PNEUMATICALLY OPERATED 2 WAY FLAP AT THE OUTLET OF ELEVATORS	Suitable	4 Nos		
h	SMALL HOPPER AND TRANSITION PIECES FOR PLANT	Suitable	1 Lot		
i	PRODUCT PIPE AND MANUAL SPOUT MAGNETS FOR ALL NEW ELEVATORS WITH ACCESSORIES	Suitable	1 Lot		
j	MANUALLY OPERATED GATE AT OUTLET OF BINS/HOPPERS & OTHER EQUIPMENT OF COMPLETE PLANT ETC.	Suitable	5 Nos		
11	MODIFICATION WORKS				
a	REPLACEMENT OF ALL DAMAGED CHAINS WITH ITS LINK ETC IN EXISTING CHAIN CONVEYORS IN TMR PLANT TO MEET THE PROCESS REQUIREMENT		1Lot		
b	MODIFICATION OF EXISTING BOTTOM HOPPER BELOW TMR MIXER TO MAKE IT SUITABLE FOR NEW CHAIN/SCREW CONVEYOR ALONG WITH SUITABLE ENCLOSURE FOR MIXER OUTLET BELTS TO REDUCE DUSTING		1 Set		
c	REMOVAL OF EXISTING INCLINED BELT CONVEYOR WITH ITS SUPPORT SYSTEM, DRIVE ARRANGEMENT ETC (Old Structural material shall be used for platforms, supports etc as per requirement)		1 Set		
d	MODIFICATION OF EXISTING CHAIN CONVEYOR ABOVE TMR MIXER FOR TRANSFER OF CONCENTRATE INTO BOTH THE MIXERS WITH PNEUMATIC SLIDE GATES OF SUITABLE SIZE AND AUTOMATION		1 Set		
e	MODIFICATION OF EXISTING PCC PANEL IN PLANT ROOM BY EXTENSION OF BUS-BAR TO MAKE IT SUITABLE FOR POWER SUPPLY TO NEW MCC (WITH SUITABLE INCOMER) AND MODIFICATION OF EXISTING MCC PANEL OF INTAKE & GRINDING SECTION		2 Set		
f	RE-POSITIONING OF EXISTING GRINDING STORAGE BIN AND BATCHING BIN WITH MODIFICATION OF ITS BOTTOM HOPPERS TO MAKE IT SUITABLE FOR CONNECTING TO THE NEW CONVEYOR ALONG WITH LOAD CELL ARRANGEMENTS, PNEUMATIC SLIDE GATE AND ELECTRIC VIBRATORS (2 NOS IN EACH)		2 Set		
e	MODIFICATION OF EXISTING DISTRIBUTION CONVEYOR ABOVE EXISTING FINISH FEED BINS FOR DISCHARGE OF MIXED MATERIAL INTO TWO BINS WITH PNEUMATIC SLIDE GATE BETWEEN ONE BIN & CONVEYOR		1 Set		
12	DISMANTLING WORKS				

a	DISMANTLING OF EXISTING GRINDING BIN, CYCLONE, RIBBON MIXER, BELT CONVEYOR, HAMMER MILL, BLOWER, AIR-LOCK, MOLASSES DOSING SYSTEM, PIPING, TRANSITION PIECE, CONVEYORS ETC & SHIFTING TO SUITABLE PLACE	-	1 Job		
	Total Amount Rs. Part B				
	GST				
	Total Amount Rs. (Including GST)				

List of Essential Spares**Annexure-I**

Sr. No.	Item Description	Quantity	Unit Rate	Total Amount
1	TMR MIXER			
	Bearing Set	1 Set		
2	Chain Conveyors			
	Chain with nylon wear pads	20 mtr		
	Bearings without housing for inlet & discharge end	1 set (each)		
3	Bucket Elevator			
	Buckets with fastener bolts, washers and nuts etc.	20 sets		
	Drive coupling for elevator	2 nos.		
	Belt for bucket elevator	15 mtr		
	Top & bottom bearing for elevator without housing	2 nos		
4	Two way flaps/ Pneumatic Gates			
	Solenoid Valves	2 nos.		
	Air Cylinder	2 nos.		
	Air Cylinder Seal Kit	2 Sets.		
	Limit switches/REED switches	6 nos.		
	Acrylic sheet of 5 mm thick for sight glass of bins etc.	1 sq. m.		
	Felt packing -5 mm thick 50 mm width (good quality)	10 M		
5	Hammer Mill			
	Spacer for hammers	2 sets		
	Carrying rod for hammer mill beaters	2 sets		
	Flexible coupling	1 pc		
	Bearing with sleeve, nut and lock washer	2 sets		
6	Aspiration Unit			
	Bag for Asp. Unit (as consumables) for elevators, bins	3 set		
	Solenoid valve for filter unit	5 nos.		
7	Electrical:			
	MPCB suitable for the power feeders in MCC	2 nos.		
	Push bottom with NO/NC element	10 nos.		
	Terminals for both control wiring & power wiring various sizes	10 nos.		
	Total Amount Rs.			
	GST			
	Total Amount Rs. (Including GST)			

- Note** Bidders shall quote for the items which are essentially required in their offered equipment and is requested not to quote for any of above mentioned items of any of the equipment if this is not required in the offered equipment
- 2 Bidders shall also quote for the items which are not mentioned above but essentially required in their offered equipment.

ANNEXURE II
KEY PERFORMANCE INDICATOR OF VARIOUS EQUIPMENT / PROCESS

S.N	Equipment/ Item	Key Indicator	Requirement	Bidder to confirm
1	Aspiration Unit	Suspended particles at outlet of blower	Max 60 mg/m ³	
2	Connection Joints	Product leakage	No leakage	
3	Hammer Mill	Noise level	<90 dB	
		Life of beater Set	Minimum 300 MT	
4	TMR Mixer	Capacity	2 MT Per Batch (Minimum)	
5	TMR Block M/c	Capacity	1.3 TPH (Minimum)	

ANNEXURE III
LIST OF INDIAN STANDARDS

Material and Sectional Properties

IS 801 : 1975	Code of practice for use of cold formed light gauge steel structural members in general building construction
IS 806 : 1968	Code of practice for use of steel tubes in general building construction
IS 808 : 1989	Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle Sections
IS 811 : 1987	Cold formed light gauge structural steel sections
IS 816 : 1969	Code of practice for use of metal arc welding for general construction in mild steel
IS 1149 : 1982	High tensile steel rivet bars for structural purposes
IS 1161 : 1998	Steel Tubes for Structural Purposes - Specification
IS 1239 : Part 1 : 1990	Mild Steel Tubes, Tubular and Other Wrought Steel Fittings - Specification - Part 1 : Mild Steel Tubes
IS 1239 : Part 2 : 1992	Mild steel tubes, tubular and other wrought steel fittings, Part 2 Mild steel tubular and other wrought steel pipe fittings
IS 1363 : 2002	Hexagon head bolts, screws and nuts for product grade C
IS 1364 : 2002	Hexagon head bolts, screws and nuts for product grades A & B
IS 1730	Mild steel plates, strips, flats etc
IS 1977 : 1996	Low Tensile Structural Steels - Specification
IS 3757 : 1985	Specification for high strength Structural Bolts
IS 3954	Mild steel channel sections
IS 4180 : 1967	Code of practice for corrosion protection of light gauge steel sections used in building
IS 4923 : 1997	Hollow steel sections for structural use
IS-2062 : 2006	Steel for general structural purposes specification
IS-4000 : 1992	High strength bolts in steel structures code of practice
IS-7215 : 1974	Tolerances for fabrication of steel structures
IS-7598 : 1990	Classification of steels
IS 277 : 2003	Galvanized Steel Sheets, (Plain and Corrugated) - Specification

IS 432 : Part 1 : 1982	Specification for mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement: Part I Mild steel and medium tensile steel bars
IS 432 : Part 2 : 1982	Specification for mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement: Part 2 Hard-drawn steel wire
IS 14246 : 1995	Continuously pre-painted galvanized steel sheets & coils

Loads

IS 875 : Part 1 : 1987	Code of practice for design loads (other than earthquake)for buildings and structures Part 1 Dead loads - Unit weights of building material and stored materials
IS 875 : Part 2 : 1987	Code of practice for design loads (other than earthquake) for buildings and structures: Part 2 Imposed loads
IS 875 : Part 3 : 1987	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Part 3 : Wind Loads
IS 875 : Part 4 : 1987	Code of practice for design loads (other than earthquake) for buildings and structures Part 4 Snow loads
IS 875 : Part 5 : 1987	Code of practice for design loads (other than earthquake) for buildings and structures Part 5 Special loads and load combinations
IS 1893 : 1984	Criteria for Earthquake Resistant Design of Structures
IS 1893 : Part 1 : 2002	Criteria for Earthquake Resistant Design of Structures - Part 1 : General Provisions and Buildings

Design

IS 800 : 2007	Code of practice for general construction in steel
IS 3414 : 1968	Code of Practice for Design and Installation of Joints in Buildings
IS 3935 : 1966	Code of practice for composite construction
IS 4326 : 1993	Code of practice for earthquake resistant design and construction of buildings
IS 9172 : 1979	Recommended design practice for corrosion prevention of steel structures
IS 12843 : 1989	Tolerances for erection of steel structures
IS 12457 : 1988	Code of practice for evaluation repairs and acceptance limits of surface defects in steel plates, and wide flats
IS-8081 : 1976	Specification for slotted Sections
IS 1038 :1983	Specification for steel doors, windows & ventilators

Special Publication Series

SP 1:-1967	Comparison of Indian and Overseas Standards on Aluminium Alloy Castings
SP 2 : 1982	Comparison of Indian and Overseas Basic Sizes for Sheet and Wire
SP 6 : Part 2 : 1964	Handbook for structural engineers - Structural steel sections
SP 6 : Part 3 : 1962	Handbook Structural Engineers - Part 3 : Steel Columns and Struts

SP 6: Part 4: 1969	ISI Handbook for Structural Engineers 4. Use of High Strength Friction Grip Bolts
SP 6 : Part 5 : 1980	Handbook for structural engineers - Cold-formed, light gauge steel structures
SP 6 : Part 6 : 1972	Handbook for structural engineers - Application of plastic theory in design of steel structures
SP 6 : Part 7 : 1972	ISI Handbook for Structural Engineers - Part 7 : Simple Welded Girders
SP 14 : 1976	Index to Steel Designations
SP 16 : 1980	Design Aids for Reinforced Concrete to IS 456 : 1978
SP 17 : 1979	Index to IS 1956 Glossary of Terms Relating to Iron and Steel
SP 24 (S and T) : 1983	Explanatory Handbook on Indian Standard Code of Practice for Plain and Reinforced Concrete
SP 38 (S and T) : 1987	Handbook of Typified Designs for Structures with Steel Roof Trusses (with and without Cranes) (Based on is Codes)
SP 40 (S and T) : 1987	Handbook on Structures with Steel Portal Frames
SP 47 (S and T) : 1988	Handbook on Structures with Steel Lattice Portal Frames (Without Cranes)

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Format

(Commercial offer)

Sr.N o.	Description	Total Amount	GST	Total Amount Rs. (Inclusive GST)
1	Design & Supply equipment as Part -A			
2	Installation, Testing & Commissioning of Plant as Part- B			
3	Essential spares as Annexure - I			
	Total Price Rs.			

Please attached separate price break up sheet as per part A, B, & Annexure –I in commercial bidding only.

Sign & Seal of bidder