

**Technical Specifications for PEB Hatchery Building.**

## 1.0 PURPOSE OF SPECIFICATION

This specification covers the requirements for material, storage, preparation of fabrication drawings, fabrication, assembly, tests/examinations, transportation, erection, measurement and painting of bolted and/or welded structural steel works for PEB warehouse.

The specification mentioned in this document are basic minimum requirement for the completion of PEB for the warehouse with the defined EHS (Environment Health and safety), and quality criteria indicated in the document.

## 2.0 PROJECT DESCRIPTION

### 2.1 INTRODUCTION

Crawfish Himalaya Limited (CHL) intends to construct a Pre-Engineered Building (PEB) at PTDP Phase – II, Phuentsholing Township, Chhukha.

### 2.2 SCOPE OF WORK.

2.2.1 The scope of work covers the following:

- A. Design, Engineering, Supply, Transportation and Erection of Pre-Engineered Building.

The building shall be designed with:

- i. Pre Painted Galvalume Roofing Sheet (PPGL) - with Sheeting on roofs and walls claddings.
- ii. Turbo Ventilators.
- iii. Sky lighting system on walls & roof.
- iv. Mezzanine Floor as shown in the drawing.

- B. Foundation for Pre-Engineered Building.

- C. Electricity Supply system, plumbing and sewerage system.

2.2.2 Successful bidder shall submit soft and hard (3 nos.) copies of operation and maintenance manuals of different units.

2.2.3 The bidder shall mention the make of equipment/material in their quotes as per the schedule given in the Technical Specification under section 2.11 Preferred Make list.

2.2.4 If during the execution of works, it is found that there is interference with other facilities/ structures, the Bidder shall revise his design/ detailed drawings to clear the interference and shall provide all necessary measures for the safety of structures under construction. No claim in terms of cost or relaxation in time shall be entertained for any redesign, rework and for the safety measures provided.

2.2.5 If at any stage of work, any dismantling or modification or relocation of any facilities is required to be done to complete the work, the same would be in the bidder's scope, which should be done

by the bidder at no extra cost or time implication to the CHL. All such changes will be executed only after the proposed drawings and work plan are approved by the Engineer In-charge from CHL.

- 2.2.6 Any specific hardware/ item/ etc. required as indicated for completion of building but not listed elsewhere in this specification or its enclosures, shall be deemed to be included in the basic price quoted by the bidder. Also, all mounting hardware/ accessories/ fittings etc. required for above and the Erection & Commissioning of the PEBs shall be deemed to be included in the basic price quoted by the bidder. Bidder, at no point of time, shall be eligible to raise any extra claim in this regard.

### 2.3 ENVIRONMENTAL CONDITIONS AND DESIGN CRITERIA.

The environmental conditions and design criteria shall include following parameters.

#### **Meteorology:**

Altitude - < 1000 m, Humidity:  $\leq 98\%$ ,

Temperature minimum = 15 °C, Temperature maximum = 45 °C

#### **Wind Data:**

Standard for wind load calculation = IS: 875 (Part III).

Basic Wind Speed ( $V_b$ ) = 47 m/ sec.

**Seismic Data:** Standard for Seismic load calculation = IS: 1893-2002.

Seismic Zone- V, Zone Factor = 0.36.

### 2.4 SUBMISSION AND VETTING OF DESIGN AND DRAWING.

- (i) The bidder must submit the design of the hatchery building, General Arrangement and electrical design supported with related calculations, and computer aided design models in Staad Pro for the building. The general layout drawings have been provided for reference only. The bidder can suggest design improvements if any without any cost implication to CHL.
- (ii) The bidder shall give the minimum guaranteed weight of the overall structure along with Bill of materials. Any changes to the structure due to change in the design by CHL will be paid according to the provisions in the contract. However, any changes to the structure after the submission of bid, due to changes in the design methodology or during design & drawing approval or any other reason will be borne by the contractor.
- (iii) All the drawings indicated at (a) and technical data sheet of major purchase items shall be vetted by CHL prior to manufacture /fabrication and procurement respectively. Three copies of each of these documents are to be provided. All the drawings as submitted by the Vendor needs to be approved by the technical team from CHL.
- (iv) As-built drawings of approved drawings are to be provided in soft and hardcopies (3 copies each).

## 2.5 GENERAL SPECIFICATION FOR THE PEB BUILDING.

<b>General Specifications for Hatchery Building</b>		
<b>Sl#</b>	<b>Description</b>	<b>General Specifications</b>
1	Structure	Tapered steel sections/ Rolled Steel sections for columns as per drawing. Cold form steel for purlin and girts.
2	Doors & Windows	UPVC Door & Window – with double glazing glass panes (6+12+6)mm for window of size (5m x 0.8m) and glass panes of (6+10+6)mm for the rest.
3	False Ceiling	6mm Armstrong ceiling with support system for the office portion.
4	Internal Partition for office.	100 mm thick PUF Insulated Cement Sheet Wall Panel with cam lock type and male female tongue and groove joint or continuous line panel joint with double glazed window.
5	Flooring	RCC flooring for ground floor & mezzanine flooring (composite deck flooring) for other floors (as per design) with railings.
6	Toilet & Kitchen	Antiskid Tile Flooring (300x300) & wall Tiles, with all bath and toilet fittings inside as shown in the drawings.
7	Wall & Roof cladding	0.5mm thick PPGL sheets. Wall shall be Grey and Roof shall be Dark Green colour
8	Plumbing Pipes - Indoor	CPVC Pipes
9	Sanitary - Soil waste & Vents	UPVC pipes
10	Painting Indoor for Office	Acrylic washable distemper, two coats on new work, including cement primer coat
11	Indoor Lighting	Complete indoor LED lighting system including all lighting panels & complete accessories with concealed wiring for offices & high bay lights for the warehouse portion as per the electrical drawing.
12	Indoor Power fittings	Complete indoor power fittings including all power switches, socket as per requirement, with complete accessories and concealed wiring. as per the electrical drawing.
13	Inverter type Split Air Conditioning (5 star rating)	To be provided as per the electrical drawing
14	Rolling Shutter	Aluminum rolling shutter of sizes as mentioned in the drawing.

## 2.6 TECHNICAL SPECIFICATION OF MATERIAL.

Sl#	Descriptions	General Specifications	Minimum Yield Strength	Make	Remarks
1 General Specifications for Steel Structure					
1.1	Primary Members Portal Frames/Built-up Frames (Columns & Rafters)	Shop-fabricated from hot-rolled steel plates conforming to ASTM A 572M Grade 50 (or equivalent). These plates are joined together on one side of the web by a continuous automatic submerged arc welding process to produce the section required. Rolled Steel sections.	345 MPa	TATA Steel, Essar, Jindal, SAIL or Equivalent.	
1.2	Secondary Members Cold Formed HR Steel Galvanized - 1.5mm To 2.5mm Thick (As per design)	Conforming to ASTM A 570 or IS 811	250 or 345 MPa	ESSAR, JSW, POSCO, UTTAM or Equivalent.	
1.3	Roof Sheeting and Panels Bare and Colored Coated	ASTM A 792 M Grade D AZM150. 0.5mm Thick Color Coated [Tentative colors considered – Walls – Grey, Roof – Dark Green]	550 MPa		
1.4	Valley Gutter Galvanized Steel	IS 513 Grade O or D	240 MPa		
1.5	Mezzanine Deck Panels Galvanized Steel	ASTM A 653 SS Grade 55, Zinc Coating 180 gsm	550 MPa		As per the design
1.6	Diagonal Bracing Members Rods round bar	ASTM A 36M / IS 2062 or Equivalent	250 MPa		
1.7	High Strength Bolts (Rafter)	ASTM A 325M/ IS 1367 Grade 8.8, or equivalent	UTS 830 MPa		

1.8	Anchor Bolts	ASTM A 36M / IS 2062 Grade A or Equivalent	250 MPa		
1.9	Galvanized MS Bolts	ASTM A 307/IS1367 or Equivalent, Grade 4.6 Hot dip, Galvanized/Plating yellow color.	245 MPa		
2 General Specifications for PEB Accessories and associated works.					
2.1	Windows	UPVC windows with Double Glazed toughed glass			
2.2	Turbo Ventilator	22" Dia SS Turbo Ventilator with base plate. Capacity: 1800 CFM.			
2.3	Sheeting Fasteners:	Self-tapping sheet metal screws with metal and neoprene washers. All screws shall have hexagonal heads and made of zinc plated steel.			
2.4	Connections	1. All field connections shall be bolted (Unless otherwise noted).			
		2. Primary bolted connections shall be furnished with high strength GI bolts conforming to the physical specifications of Gr. 8.8 (or equivalent).			
		3. Secondary bolted connections shall be furnished with GI bolts conforming to the physical specifications of Gr. 4.6 (or equivalent).			
2.5	Anchor Bolts & Templates	To be provided immediately after the design has been approved for civil works at site			
2.6	Paint on Structural Members	One shop coat of red oxide primer. One coats of synthetic enamel paint of approved shade will be provided over the primer.		Asian/Berger/ Equivalent	
2.7	Rolling Shutter.	2 Nos. Aluminum Rolling Shutter 3mX4m ht (motor operated)			

## 2.7 TRANSPORTATION

- All the members shall be factory painted with red oxide zinc chromate primer to an average of 25-micron thickness for protection during transportation.

## 2.8 PAYMENT

The payment terms will be as per the following terms and as per the Preamble to Price schedule.

- (i) Payment for super structure shall be made on floor area basis (outer wall to wall dimension of the wall). In case of change in overall size of the warehouse, contractor shall be paid on higher/lower side on pro rata basis of floor area.
- (ii) No extra payment shall be made for first floor for the office.
- (iii) The foundation of the PEB building shall be RCC & the concrete, PCC, R/f steel etc. in foundation shall be paid separately as per the related items in the schedule on per unit basis.
- (iv) The floor finishing shall be as per specification & shall be inclusive in the floor area.
- (v) Stone masonry upto plinth protection shall be as per specification & shall be paid separately as per the related items in the price schedule.
- (vi) Drains shall be as per specification & shall be paid separately as per the related items in the price schedule.
- (vii) Welds, bolts, nuts, washers, shims, pack plates, wedges, grout and painting shall be deemed to be included in the quoted floor area rate.
- (viii) The supports for equipment wherever necessary, shall be paid separately.

## 2.9 PAINTING AFTER ERECTION

### 2.9.1 General

- Only touch up painting shall be applied as necessary after erection.
- The procedure of touch up painting shall be applying primer coat and final paint application.

### 2.9.2 Inspection & Testing of Painting Works

- All painting materials including primers & thinners brought to site by the Contractor for application shall be procured directly from reputed and approved manufacturers and shall be accompanied by manufacturer's test certificates.
- The painting work shall be subject to inspection by the Engineer- in-Charge or his/her representative at all times. In particular, the stage inspection will be performed and Contractor shall offer the work for inspection and approval at every stage before proceeding with the next stage. The record of inspection shall be maintained. Stages of inspection are as follows:

1. Surface preparation

## 2. Primer application

### 3. Each coat of paint

- Any defect noticed during the various stages of inspection shall be rectified by the Contractor to the satisfaction of the Engineer-in- Charge before proceeding further. Irrespective of the inspection, repair and approval at intermediate stages of work the Contractor shall be responsible for making good any defects found during final inspection/guarantee period/defect liability period, as defined in General Conditions of Contract. Dry film thickness (DFT) shall be checked and recorded after application of each coat.
- The thickness shall be measured at as many locations as decided by the Engineer-in-Charge or his/her representative. The Contractor shall provide standard thickness measuring instrument such as Elko meter (with appropriate range for measuring dry film thickness of each coat) free of cost to the Engineer-in-Charge whenever asked for.

### 2.9.3 Payment

- The cost of painting of structural steel works shall be included in the floor area rate.

## 2.10 METAL SHEET ROOFING AND CLADDING

### 2.10.1 Purpose

- The purpose of this standard is to define the specifications to be followed for metal sheet roofing and cladding.

### 2.10.2 Scope

- The work described herein shall cover providing and installing metal sheet roofing and cladding including translucent (polycarbonate) sheets and all accessories such as flashings, capping, gutters, trims, supporting straps, brackets, foam fillers, sealants and the work shall be carried out strictly in accordance with this specification and applicable drawings. The supplier after preparing shop drawings for roofing, cladding, gutters, etc. shall take the approval of employer prior to manufacturing and supply. Based on roof slope, supplier shall propose the type of profiled sheet to be used justifying the proposal through proper calculations.

### 2.10.3 Technical Requirements

#### 2.10.3.1 Material

- Material for sheets and accessories shall strictly conform to BIS/BS/ASTM/AS specifications as mentioned. Supplier shall furnish test certificates for verification of the same and shall make arrangements for inspection and marking of the materials at his works. Erection shall not be started before approval of materials including all accessories.



- Length shall be such that numbers of joints are minimum. Wherever specified, to avoid longitudinal overlaps for larger span, sheets shall be of single length and shall be site formed.

#### 2.10.3.2 Cladding Sheet

- PPGL sheet with Total coated thickness (TCT) of sheets shall be minimum 0.55 mm with base metal thickness without any coating shall be minimum 0.50 mm with minimum yield stress 550MPa. The colour to be used, Walls – Grey & Roof – Dark Green.

#### 2.10.3.3 Translucent Sheets

- Skylights shall be made of translucent white acrylic modified, ultraviolet stabilised, fibreglass with minimum thickness of 2 mm and tensile strength of 10.3 kN/cm<sup>2</sup>. Translucent panels shall provide the same coverage as the panel width with length of 3600 mm. The translucent panels shall meet the light transmission value of 80%(+5%) according to ASTM D 1494.

#### 2.10.3.4 Accessories

- Materials and coatings for ridge capping, barge capping, apron flashing, cover flashing, monitors and expansion joints shall be manufactured out of the same material as roofing / cladding sheets material and shall be shaped to match sheet profile.

#### 2.10.3.5 Roof Extractors

- Roof extractors shall be fixed in position as per approved drawings. The work shall include making required opening in the sheeting, fixing the extractors as per the manufacturer's instructions with necessary fasteners. Lead fillers, felts or any other specified flashing shall be tucked into the sheeting. The lead flashings used shall be weighing not less than 30 Kg/sq. meter. No allowance in the rates for fixing of extractors on the roofs shall be made for wastage, cutting, extra bolts, nuts and washers, flashings, flat sheets etc.

#### 2.10.3.6 Eaves Gutter (Not applicable)

- Eaves gutter shall be fabricated from Aluminium or equivalent sheet of minimum 18 gauge thickness with necessary accessories required including brackets, welding clamps, bolts, nuts, galvanised iron and bituminous washer, drop ends, nozzles, stop ends, etc. laid to required slopes making joint water tight, testing, etc. complete as specified and directed.

#### 2.10.3.7 UPVC downtake Pipe (Not applicable)

- UPVC downtake pipe shall be provided as per manufacture's specification and as directed by Engineer In charge. Necessary pipe bends, socket/collar required for

joining the pipes.

#### 2.10.3.8 Fasteners

- Fasteners shall be of metallic polyster coated heat treated carbon steel conforming to AS 3566 Class 3 or equivalent. Sheets shall be fixed with hexagonal head self drilling screws, assembled with galvanised steel washers with EPDM seals.
- For self drilling / self tapping screws, high rpm (2000-2500 rpm) drivers with high amperage (4-7 amps) shall be used to achieve the proper torque to secure fastening. Drill bits shall be cleared out after the completion of drilling of sheets.
- Aluminum sheets shall preferably be fixed with aluminum fasteners. Untreated steel fasteners shall never be used for fixing aluminum sheets in order to avoid galvanic reaction between aluminum and M.S. Hot dip galvanised or cadmium plated steel fasteners may be used but in corrosive conditions G.I or cadmium plated steel accessories shall preferably be painted with aluminum paint. Stainless steel hardware can be used except in strong saline atmosphere. Aluminum curved/flat washers along with bituminous felt, neoprene or rubber washers shall also be used along with the fasteners.

#### 2.10.3.9 Handling & Storage at Site:

- The materials specified herein above shall be handled and stored in the manner so as not to damage the same. The material damaged in transit, storage and erection or otherwise shall not be used and paid for. Such damages shall be borne by the Contractor. Sheets shall be stacked on the firm and levelled ground on wooden battens according to the approved stacking methods and /or as per instructions of the manufacturer. Sheeting or panels shall preferably be stored with a slight inclination in longitudinal direction to allow water that may get into the stack to drip off. Sheets shall be stored under cover particularly when they are to be stacked for a longer period.

2.10.3.10 Installation & Fixing:

- The work shall be completed to the satisfaction of engineer-in-charge as per the approved detail drawings and as per the instructions of the manufacturer wherever necessary and shall be approved by the Consultants/ Client.
- Sheets shall be lifted onto roof supports with ribs up. First sheet shall be fixed in position with the female rib facing the starting edge. Female rib of the second sheet shall be lapped with the male rib of the first sheet and shall be fixed with side lap fasteners before fastening the second sheet to supports. The same procedure shall be followed for subsequent sheets. For side cladding too, the same procedure shall be followed. Minimum end lap shall be 150 mm for roof and 100 mm for side cladding. Side lap shall be minimum 75 mm. For roof pitches below 70 end laps shall be sealed with approved silicone sealants.
- Roof sheeting shall be fixed by crest fixing only. Side cladding shall be fixed preferably by crest fixing but can be fixed by valley fixing also. In valley fixing fastener locations should be as close as possible to the ribs. Side lap fasteners to be fixed at an interval of 350-450 mm to hold the side laps of sheets firmly in place and to maintain a weather-proof joint. Holes must always be drilled and not punched. Extreme care shall be taken to avoid over tightening of fasteners to stave off deformation of sealing washers, sheet damage, damage of the fastener threads. Fixing of flashings in masonry / concrete wall shall be done by making groove of appropriate height & depth for embedding the same with mastic / cement mortar (1:2) and water proofing compound.
- Specific workmanship shall be employed while carrying out work at laps and expansion joints to ensure zero leakage.
- All the sheets and accessories which are found to be cracked / bent after fixing shall be replaced by new ones. The cracked sheet so removed shall be salvaged by the Contractor by cutting into smaller but sound lengths whenever ordered. No extra payment for such works shall be made.

2.10.3.11 Measurement and Payment:

- Payment for roofing works shall not be made separately and shall be deemed included in floor area rate of building.

2.11 Rates

- In addition to the normal scope of supply detailed elsewhere, the Rate shall cover the cost of the followings:-
  1. Cost of materials, transport, storage and incidentals thereon.
  2. Cost of erection
  3. Cost of all the hardware required for fixing

## 2.12 Preferred Make list

Sl. No	Description	Preferred make	Mention Deviation if any/mention proposed make
1	UPVC doors & Windows	Fenesta, Encraft,	
2.	PUF Insulated Cement Sheet Wall Panel	Everest or equivalent brand	
3.	PUF Panel 50mm thick	Jindal, Everest	
4.	PPGL Sheets	Perfect, Tata, Jindal	
6.	Pipes (MS)	Jindal / TATA /SAIL/ Surya	
7.	Butterfly Valves	Audco / L&T/ IVC/ Fouress	
8.	Check Valves /NRV	IVC/ Audco/ L&T	
9.	PEB	Bluescope/ Interarch/ Kirby/ Everest/ Pennar OR equivalent	
10.	PUMPS	Kirloskar/ CG/ Beacon/ Mather and Platt/ KSB/Grundfos	
11.	PLC Panels	ABB/SIEMENS/HONEYWELL/R OCKWELL/	
12	Inverter type Split type Air conditioners	Carrier/Bluestar/Voltas/Daikin	
13	Cement		
	(A) White	Birla Plus. J.K White, Nerolac, Berger/ <i>or equivalent.</i>	
	(B) Portland	Peden Cement, Dungsam Cement	
14.	Steel	Pelden TMX	
15.	Ceramic Tiles/ Vitrified Tiles	Kajaria, Nitco, Orient, Somany,Johnson, Simpolo	
16.	Water Proofing Compound	Pidilite, Sika , Cico	
17.	Distemper	Berger, Nerolac, Asian Paints, JK	

## Annexure III

18.	Red Oxide, Zinc Chromate	Berger, Nerolac, Asian Paints, JK	
19.	Waterproofing Cement Paint	Berger, Nerolac, Asian Paints, JK	
20.	Wall Putty	Berger, Nerolac, Asian Paints, JK	
21.	Cement Primer	Berger, Nerolac, Asian Paints, JK	
22.	Acrylic Emulsion	Berger, Nerolac, Asian Paints, JK	
23.	Premium Acrylic Emulsion	Berger, Nerolac, Asian Paints, JK	
24.	Synthetic Enamel Paint	Berger, Nerolac, Asian Paints, JK	
25.	Flush doors ( any type)	ISI marked crystal, green ply ,centuary.	
26.	Locks	M/S Godrej And M/S Link/ <i>or equivalent.</i>	
27.	Floor Springs	M/S Everite, M/S Garnice/ <i>or equivalent.</i>	
28.	Hydraulic Door Closer	M/S Hafele India Pvt. Ltd.& M/S Godrej/ <i>or equivalent</i> ,	
29.	Block Board, Any Ply Board	M/S Green Ply Industries Ltd, M/S Kitply Industries Ltd, M/S Century Ply Boards (I) Ltd/ <i>or equivalent.</i>	
30.	Prelaminated Partical Board Phenol Bonded Exterior Grade Teak Particle Board	M/S Novapan Industries Ltd, M/S Kitply Industries Ltd/ <i>or equivalent.</i>	
31.	Prelaminated Partical Board Phenol Bonded Interior Grade Part cle Board With Isi Mark.	M/S Kitply Industries Ltd, M/S Novapan Industries Ltd/ <i>or equivalent.</i>	
32.	False Ceiling	M/S Armstrong World Industries Ltd,	
33.	Laminate	M/S Greenlam/ <i>or equivalent.</i>	

## Annexure III

34.	Cistern		
	(A) Lowdown Pvc Cistern	Parryware/ Hindware/ Jaguar / Kohler	
	(B) Lowdown Viterous China Cistern Viterous China	Parryware/ Hindware/ Jaguar / Kohler	
35.	Wash Basin / Laboratory Sink	Parryware/ Hindware/ Jaguar / Kohler	
36.	Water Closet/Foot Rest		
	A) European Type	Parryware/ Hindware/ Jaguar / Kohler	
	B) Indian Type	Parryware/ Hindware/ Jaguar / Kohler	
	C) Orissa Type	Parryware/ Hindware/ Jaguar / Kohler	
37.	C.P Brass Bib Cock	Omco, Jaquar, Essco	
38.	C.P Brass Stop Cock	Omro, Jaquar, Essco	
39.	C.P Pillar Cock	Omco, Jaquar, Essco	
40.	Ferrule Brass	Leader / Zoloto	
41.	Pvc Pipe & Fitting	Prince / Supreme/Astral	
42.	Ductile Iron Pipe	M/S Electrosteel / <i>or equivalent</i>	
44.	DG set	Jackson/ <i>or equivalent</i>	
45.	Electrical Panels	L&T/ SIEMENS/ABB/KEPL / Tricolite / Schneider	
46.	Switchgear, Control gear, Starters, Relays	Siemens / L & T / Schneider / ABB / Danfoss	
47.	MCCB.	L & T / Siemens / Schneider/ C&S	

### Annexure III

48.	MCB.	L & T / Hager/ Legrand /Schneider	
49.	Cables.(As per IS)	CCI / Havells./ Finolex/ Polycab	
50.	HRC Fuses	L & T / Siemens/ Schneider	
51.	Indicating Lamps	Schneider/L & T/ Siemens	
52.	Push Buttons	Automatic Electric/Rishab	
53.	Voltmeters, Ammeters	Kappa/ AE/	
54.	Current Transformers	Siemens / Honeywell / Sauter Race /ABB	
55.	MCB Distribution board / SS Enclosure/ Load line DB	ABB / MDS / L&T / Havell's/Schnider / Siemens	
56.	FRLS PVC insulated copper conductor single core cable	Havell's / Polycab / HPL / Mescab / Standard / KEI	
57.	LED Light fittings	Philips / Osram / Wipro	
58.	1.1KV grade, PVC insulated and PVC sheathed heavy duty/XLPE aluminium conductor cables	Havell's/Polycab/HPL/ Mescab/Laser/KEI	
59.	Electric Motor	ABB/C.G/Seimens/ Kirloskar/BBL/ Marathon	

NB : If any bidder is not in a position to quote as per the list mentioned above then the matter would be discussed in Pre-bid and if felt necessary CHL will come out with an amended preferred list wherever required and will post the same on website as final specification. However, compliance to the "Make" or definition of an "equivalent" make will be the decision of the Technical committee of CHL and will be binding on all the quoting firms.

**1. DRAWINGS: Attached.**

1. Architectural Drawing
2. Electrical Drawing
3. Reference pictures