

Posting Date: August 28, 2016

S.N.	Particulars
1	Detail drawing & specification of structural steel work (RFQ No. 14) required.
Reply 1	The final design does not have the structural steel works. However, the specification is attached (page 02) "Էջ 02-Ստրուկտուրալ ածխածնի արձանագրություն" .
2	Detail drawing & specification of wooden work (RFQ No. 13) required.
Reply 2	Wood works are for door, window and ventilation only. Hence, drawing is not applicable. But specification is attached (page 07) "Էջ 07-Ստրուկտուրալ ածխածնի արձանագրություն" .
3	3. Plan doesn't match of both side of the door D1 (Page 8D; Vertical Reinforcement Plan of Grid 3)
Reply 3	It is typo error. Please replace "second floor with first floor".
4	Details of sanitary duct reconstruction - whether it will be a plain brick wall or jacketing will be applied there. A vertical section of the sanitary duct wall is required.
Reply 4	It will be plain brick wall. It is suggested to prepare section as per the site.
5	Sec A2-A2 doesn't match with the plan (Page 15)
Reply 5	Please see the section conjunction with plans in page 13 (ground floor plan) and 14 (mezzanine floor plan) simultaneously.
6	6. Besides these, can you clear us the difference between Jacketing & Splint Bandage.
Reply 6	Refer the attachment (page 11) in the below section.

10.1 STEEL WORKS

10.2.1 Scope of works

This works shall consist of providing stainless railing for staircase as per specification, drawing and instruction by the Engineer.

10.2.2 Materials

Materials used shall be of following Grades or their equivalent as a minimum.

Structural Steel: IS2062 Grade E 220 or equivalent

Stainless Steel: S 304 or equivalent

Nuts and Bolts: Grade 4.6 or equivalent

10.2.3 Fabrication: General Requirements

a) General

This Clause shall apply to all operations undertaken in the fabrication in the workshop or elsewhere whether on or off the site. The requirements contained herein shall not be waived, nor shall be modified to conform to any set of rules that any shop adopted as its standard unless so authorized in writing by the Engineer.

The various components/elements of the steel structure shall be fabricated in accordance with the approved shop Drawing. Any errors or omissions in them shall be reported to the Engineer, and his decision for their correction shall be final.

b) Shop Details Drawing and Design Calculation

The Contractor shall submit design calculation and shop detail drawing of all components/elements required by the contract.

Shop detail Drawing shall be prepared in a neat and legible form, on the dull side of tracing cloth, with India ink, or by other methods approved by the Engineer. Each sheet shall have a title in the lower right hand corner giving the fabricator's name, the fabricator's contract number and brief description of the details shown on the sheet.

Bills of material and bolt lists may be furnished on the fabricator's own standard sheets.

c) Workmanship and finish

All metals shall be neatly and accurately cut to require size with proper allowance as may be necessary or required for finishing operations.

All fins, ragged or distorted edges resulting from shearing, speed sawing, or frame cutting shall be removed by milling, chipping, or grinding.

Shearing shall not be used for the purpose of cutting non-ferrous metals where the thickness is greater than 13 mm.

d) Flame cutting

The gas cutting torch may be employed in the operation of cutting metals or preparing joints provided that the metal is not carrying stress during the operation. Carbon steel above 0.30 carbon alloy steel, heat treated steel or aluminium, wrought non-ferrous metals and plated metal shall not be flame cut unless subsequent corrective treatment is provided which shall be subject to the approval of the Engineer.

When the cutting torch is used, the burned edges shall be trimmed smooth to exact lines by milling, chipping or grinding. Maximum deviation for “free hand” cutting shall be 1.5 mm from true lines. A mechanical guide shall be used for the flame cutting torch on all work requiring precision cutting on which the maximum deviation permitted shall not be greater than 0.8 mm. All “notch effects” shall be completely removed from the portions of members where the extreme fibre is subject to flexure, tension or perpendicular shear.

Where the ends of members which are to take bearing, are cut with a torch, a suitable allowance in their length shall be made to permit proper milling or planning.

Joints for welding may be prepared by “flame gouging” provided all slag and oxidized metal are removed.

e) Bending

All bending or crimping shall be done at the bend lines shown, by a mechanical operated press, without unnecessary loss of Section in the metal being bent. The bends shall conform to wood or metal templates. All low carbon steel and other wrought metals shall be bent cold when the required bending will not produce cracks or fractures. When heating is necessary to accomplish bending of ferrous metals, the material shall be carefully heated to and bent at or above a temperature by a dark red colour, but in no case at a lower temperature. All material bent below such temperature shall be rejected and annealing shall not be considered a corrective measure. Heated material shall be slowly cooled after the bending operation. Heat treated metals shall be shaped before heat treatment. Material having fractures or other defects caused by bending shall be rejected.

Cold-bent load-carrying rolled steel plates shall conform the following:

- (i) They shall be so taken from the stock plates that the bent-line is at right angles to the direction of rolling.
- (ii) The radius of bends, measured to the concave face of the metal shall be more than specified below.

Angle through which plate is bent

Radius

61° to 90°	1.0 T
91° to 120°	1.5 T
121° to 150°	2.0 T

Where T is the thickness of the plate undergoing bend.

- (iii) Before bending, the corners of the plate shall be rounded to a radius of 1.5 mm throughout that portion of the plate at which the bending is to occur. If a shorter radius is essential, the plates shall be bent hot.

f) Straightening Material

All wrought and extruded Sections must be made straight or cambered as shown in the plane before being marked, punched or otherwise worked on in the shop. If straightening is necessary, it shall be done by method which will not change the physical properties, reduce the Section, or otherwise damage the metal. Material which develops kinks, fractures or evidence of embitterment shall be rejected. Materials that are warped by cutting, punching or welding shall be straightened to correct lines and dimensions before being assembled. Sections that are distorted during assembly and/or welding shall be straightened by methods that will not shear, fracture, or pre-stress the welds or connecting members. If, in the opinion of the Engineer, Section cannot be properly straightened after assembly, the bent material shall be taken out, straightened and reassembled in the unit. Any material damaged during such operations shall be replaced with equivalent or better material.

Unless otherwise specified in the contract, structural steel Section which deformations do not exceed normal rolling tolerance will be acceptable without straightening. When the plans so indicate, beams shall have unwrapped webs with flanges at true right angles thereto. Such beams shall, if necessary, be straightened cold by an approved method of web pressing.

10.2.4 Welding

The final finished surface of the weld shall be smooth and regular and shall conform as closely as practicable to the design requirements. All slag shall be removed from the finished weld. All flux deposit which may cause paint to rot shall be entirely removed. The entire surface shall be thoroughly wire-brushed before painting. If required by the Engineer, the final surface shall be finished smooth by chipping and grinding the weld deposit

Inspection shall be made during the welding process and after the weld is completed and cooled in accordance with IS 3600. All defects shall be entirely removed or repaired to the satisfaction of the Engineer. The Engineer shall designate at least 25 mm of every 2500 mm of welding for removal, to determine the penetration, fusion and porosity of the weld.

10.2.5 Field Erection

Structural metals shall be carefully unloaded manually or by means of suitable equipment so as to avoid damage to the materials or their painted surfaces. Under no circumstances shall structural steel be dropped or skidded off cars or vehicles, nor shall it be dragged over the ground. Beams and girders shall be transported and handled in upright position. Pin holes, or other field connection holes, shall not be used as places for “hook-on”.

Material not to be placed directly in the structural shall be stored above probable high water, on skids or platforms in a manner that will prevent distortion in the members or the accumulation of water or dirt on such members. Beams and girders shall be stored in an upright position and securely stored. Provision shall be made to protect all metals against corrosion.

All damaged metals shall be rejected.

10.2.6 Protection against corrosion

Stainless steel does not need to be protected against corrosion. Other structural steel shall be cleaned mechanically and paint shall be applied to it.

Mechanical cleaning shall be carried out by power-driven tools, such as carborundum grinding discs, chipping hammers and needle guns, followed by steel-wire brushing and dusting to remove all loosened material. Excessive brushing of the metal through prolonged application of rotary wire brushes shall be avoided.

The cleaned surface shall be protected by 2 coat of red oxide primer followed by one coat of enamel paint of approved colour.

Painted surfaces shall be cleaned of all dust immediately prior to the application of further paint. Any loose paint and rust shall be removed. Areas contaminated by oil and grease shall be cleaned with white sprit. Where required by the Engineer, the whole surface shall then be cleaned by washing down with a solution of an approved liquid detergent followed by rinsing with clean fresh water and allowed to dry thoroughly before paint is applied.

10.2.7 Measurement and Payment

The railing prepared by stainless steel as measured shall be paid at the contract unit rate which shall be the full and the final compensation to the Contractor as and also for the cost of all operations required for fabrication, connections, oiling, painting, temporary erection, inspection, tests and final erection including all other ancillary and incidental works needed to complete the work as per these Specifications and/or directed by the Engineer.

All operations like cutting, bending, straightening, heat and cold treatments, machining, temporary and permanent erection, connection, bolts, nuts and washers, welding, painting and protection against corrosion and other ancillary and incidental operations shall be deemed included in the area of the steel structure as measured above.

The measurement for the steel handrail shall be in running meters as per drawings, specification and instruction by the Engineer.

10.2 GRILL WORKS

Scope of works

This works shall consist of providing grill for windows and ventilators as per specification, drawing and instruction by the Engineer.

General

The material for the grill work shall be MS plate of 4.5 x 20mm size. The spacing in between two vertical or horizontal bars should not be greater than 5cm. The design of grill shall be fixed by the Engineer.

Measurement and Payment

The rate shall be inclusive of all MS plate, sand paper and coating with red oxide paint, erection and fitting with nut bolts to all complete as per drawings, specification and instruction by the Engineer.

The measurement for the grill work shall be in square meter.

9.1.1 Wood Work & Structural Timbers:

This includes all timber work in chaukosh (Frame) of doors, windows, batten and beams etc. All the timber for windows and doors shutters shall be mechanically seasoned in standard process in a reputable seasoning plant approved by the Engineer.

The timer shall be of "select" and "standard" class as approved or as directed and should be Sal as per accepted standards. The timber shall be of the best and hard quality, dry, well-seasoned mechanically in standard seasoning plant and free from saps, knots, warps, cracks and other defects.

The structural quality and properties of the timber shall comply with the Relevant Standard.

The scantlings shall be sawn in the direction of the grains. All wood work shall be planed and neatly and truly finished to the exact dimensions. All joints shall be neat and strong, truly and accurately fitted, and coated with glue before being fitted together. Joints for frame work of doors, windows, chaukhos shall be mortise and tenon joint with hard wooden pins. All portions of timber build into or in contact of masonry of concrete shall be given two coats of preservative whose quality shall be approved by Engineer.

9.1.2 Methods of Treatment:

All the seasoned timber which shall need preservative, the preservative is to be applied. All necessary cutting and shaping of the timber should be as far as possible be completed before the preservative is carried out.

If timber which has been treated is cross cut, cut-in at end of drilled for holes, liberal application of preservative should be applied to the expose surfaces.

Whatever type of preservative is used it should be applied liberally and care should be taken to treat all creaks and checks. The manufacturer's specification shall strictly be follow while applying to obtain sure penetration. Before the delivery and application of preservative, the contractor shall propose with specification and sample with guarantee there with to the Engineer for approval. The preservative shall be used in approved way and method in the presence of the Engineer/Engineer's representatives.

The chaukhas shall be of section as per drawings. The shutters may be panelled, glazed, part glazed and part panelled, with mosquito proof mesh screen battened or Venetian as specified. The thickness of shutter panel shall be 38mm as specified. The styles, tails shall be framed properly and accurately with mortise and tenon joints and fixed with wooden pins. Panels shall be of one piece without any joints and shall be fixed with 15mm insertions into the rails and styles provided with mouldings as per design.

The doors shall be solid core readymade flush door both sides teak faced, commercially ply faced or Formica faced as shown in the drawings manufactured in standard workshop approved by the Engineer.

The rates shall be for the complete work including fixing and fitting, mortise lock fixtures, seasoning, preservative painting with necessary fixture in position, all complete. The fixing with concrete or masonry will be done with M.S hold fast of standard size as per direction and specified and should be incorporated in Unit rate of timber works. Any decorative glued resin of oil based paint used shall be measured as per shown in the Bill of Quantity.

The required timber for the whole work should be brought in site and stored properly just before the execution of foundation work to avoid any possible shrinkage, warping, unequal part or whole of the work if the quality of material workmanship etc. is not according to their satisfaction. The contractor shall provide samples of the materials for the approval of the Engineer before procurement of them.

9.1 DOOR AND VENTILATOR FRAMES:

9.2.1 General

The work under this Clause shall comprise the supply of all labour, materials and plant, and the performance of all work necessary for the fabrication and fixing of carpentry and joinery work for frames in the buildings. The work shall be performed as shown on the Drawings or as directed by the Engineer and as specified herein. The Contractor shall submit working drawings for respective work items in this Clause to the Engineer for approval.

9.2.2 Materials and workmanship

Timber shall be of standard Sal wood and the selection of timber shall be subject to the approval of the Engineer.

All timber shall be well-seasoned and shall be free from large knots, flaws, shakes or blemishes of any kind. Timber with loose, rotten or dead knots will not be accepted. Sawn timber shall have the shape and size shown on the Drawings, twisted or warped materials shall not be used.

All wooden members shall be wrought and fixed exactly as shown on the Drawings and planed wherever exposed to view.

All wooden door and Ventilator frames shall be mortise joint and the frames shall be moulded as shown in the drawings or as directed by the Engineer. These shall be sanded to so as receive oil paint.

9.2.3 Door and Ventilator Shutter:

9.2.4 General

The work under this Clause shall comprise the supply all labour, materials and plant and the performance of all work necessary for providing wooden doors in the buildings.

Before manufacturing wooden doors and ventilator shutter and ventilators the Contractor shall submit shop drawings showing complete details of the doors for approval of the Engineer.

All wood surfaces shall be sanded and putty filled to smooth surfaces to receive oil painting.

9.2.5 Wooden door and Ventilator leaves (Shutter)

All wooden door leaves shall be flush type, 38 mm thick, with pans or louvers as shown on the drawings and shall be faced with 25 mm thick first grade salwood panel planks.

The plywood sal/sanj/jamun/locally available hard wood panel planks shall be covered with lauan lamina, putty polished and oil painted. Panels or louvers shall be fixed with adequate beads.

9.2.6 Hardware

The Contractor shall supply and install the hardware for wooden doors and Ventilators as listed in the Drawings.

The Contractor shall submit catalogues or samples of the hardware to the Engineer for approval.

The hardware shall comply with the following requirements:

Hinges	Bronze or stainless steel, 13 cm in approximate size, 3 hinges for each door leaf
Knobs	Stainless steel
Lock sets	Bronze, Cylindrical lock, 3 sets of keys to be furnished
Door closers	Magnetic door stopper

The Contractor will supply master key (s) set as directed by the Engineer.

9.2.7 Mesh Screen

Mesh screen shall be mosquito-proof of at least 20 mesh per square inch of annealed GI wire of 18 gauge, Mesh screen shall be fixed with seasoned timber bead as works demand as per the Bill of Quantity and as per direction. Diamond cross net shall be in approved quality. Before the supply and procurement of mesh screen and diamond cross net sample be produced to the Engineer for their approval.

9.2.8 Measurement and Payment

The unit price tendered shall include supplying and installing all materials including hardware and any other relevant works required.

Measurement for payment for wooden doors and Ventilator frames shall be made on the basis of the actual total volume in cubic metres of door or Ventilation frames installed in accordance with the Drawings and Specification and as directed by the Engineer.

Measurement for payment for wooden doors and Ventilator Shutters shall be made on the basis of the actual total area in square metres of door or Ventilator leaves supplied, fabricated and fixed in accordance with the Drawings and the Specifications and as directed by the Engineer.

3.3.1 Jacketing

This method is adopted on buildings constructed with a material that is of heavy in weight, weak in strength, and brittle. It helps to basket the wall, hence improve its shear strength and ductility. This method also improves integrity and deformability. Main improvements in different structural elements of the building by this method are as follows:

Walls: To improve strength, deformability and to reduce risk of disintegration, delaminating of walls resulting in total collapse of the building thin reinforcement concrete jacketing of all the walls is done. In this alternative two steel meshes should be placed on either two sides or one side of the wall and both the meshes should be connected by some steel bars connectors passing through the wall. The thickness of the added concrete should be about 40 to 50 mm thick. The concrete used ought to be a micro-concrete i.e. concrete with small aggregates. Selection of one side jacketing or two side jacketing depends on the analysis result.

Floors: If the floor is flexible, bracing of the floor elements with steel sections and tie up of the floor elements with walls should be done to improve stiffness of the floor system and integrity between walls and floor.

Roof: If the roof is flexible, similar to floor, bracing of the roof elements with steel or timber sections and tie up of the roof elements with walls should be done to improve stiffness of the roof system and integrity between roof and walls.

False Ceiling: Ceiling may need replacement with a light ceiling system and better anchorage system.

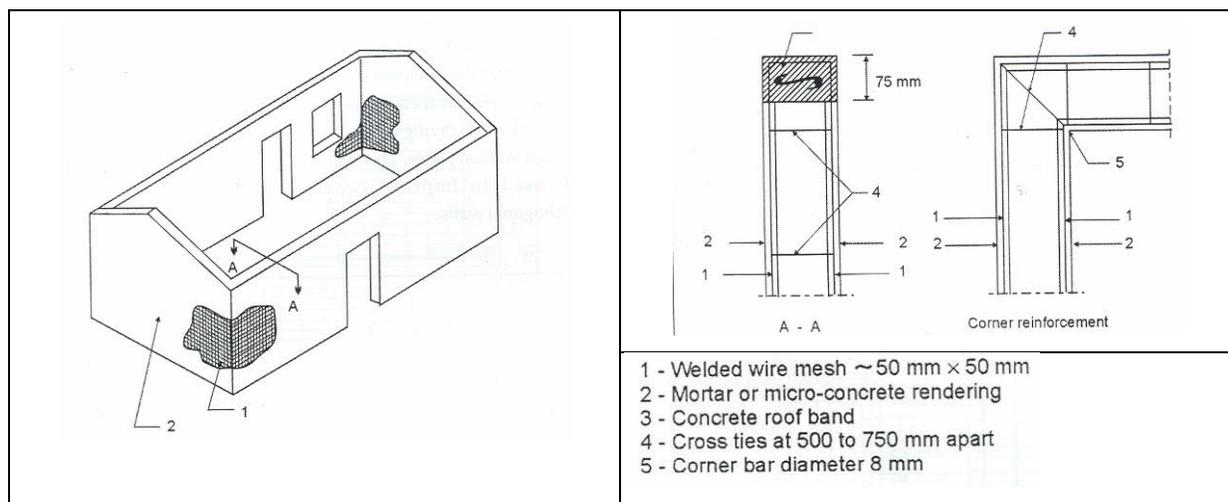


Figure 3: General scheme of jacketing

3.3.2 Splint and Bandage

The Splint and Bandage system is considered as an economic version of jacketing where reinforcing bars are provided at most critical locations (Figure 2) wherever stress concentrations can develop. Splints are

vertical elements provided at corners, wall junctions and jambs of openings in the external faces of the building. The objective is to provide integrity in vertical direction.

The bandages are horizontal elements running around all the walls and building to integrate various walls together thereby preventing potential out of plane collapse of walls. In addition, openings are also surrounded by splints and bandages to prevent initiation and widening of cracks from their corners. Splints are provided in the external face only. The bandages could be provided on both the faces of the walls just at the lintel level and eaves level. This method is inferior to jacketing but better than bolting as discussed below in terms of safety enhancement.

In splint and bandage system, the strengthening and stiffening of the floor and roof is made in the same way as discussed above under Section 3.3.1 Jacketing.

