

REPUBLIC OF LEBANON
Ministry of Public Health
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

**Supply and Installation of Medical Equipment, Furniture
and related Civil and Electromechanical Works
for CT Scanner, Standby Generator and ICU Unit
to Al Jabal Hospital – Kornayel**

VOLUME 2.1 – SPECIFICATIONS

CIVIL WORKS

- ICU AT FIRST FLOOR PLAN
- CT-SCAN AT GROUND FLOOR
- GENERATORS ROOM



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DIVISION 1

GENERAL REQUIREMENTS

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DIVISION 1
PARTICULAR REQUIREMENTS
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Division 1

PARTICULAR REQUIREMENTS

1. SUMMARY OF WORKS

A. Scope

This Specification covers the construction, completion and remedy defects maintenance of the "Al Jabal Hospital Rehabilitation – Addendum 1", which is to be provided as shown on the drawings and as detailed in the Contract Documents.

B. Performance and standards

The performance required of materials and products and the standards to be complied with are specified in subsequent sections of the Specifications.

C. Related Items

Mechanical and Electrical Coordination.

D. Description of the project

The project consists in the Rehabilitation of the works as shown and described on the drawings:

1. ICU DEPARTMENT
2. CT – SCAN ROOM
3. GENERATORS ROOM

2. MECHANICAL AND ELECTRICAL COORDINATION

A. Scope

- 1- This section specifies the Contractor's responsibilities in coordinating the Mechanical, HVAC and Electrical Works.
- 2- The Contractor shall ensure that the Mechanical, HVAC and Electrical Works are carried out in proper sequence having regard to the progress of the work, and that the necessary provision is made for locating, routing, supporting and fixing the engineering services, providing the necessary holes, chases and access for them, and in all respects fully integrating them with the building fabrics.

B. Performance and standards

The Contractor shall obtain all necessary approval from the Engineer before starting any connection works of the Infrastructures.

3. CONTRACTOR'S TEMPORARY FACILITIES

A. The Contractor shall be responsible for and shall make his own arrangements in respect of all temporary facilities required by him for the execution of the Works including but not limited to:

- Necessary land and site offices (min 25 m²) for the Contractor's use and the use of his Sub-Contractors
- Yards and stores
- Sheds & hard standings,
- access roads and fencing

and the like together with all necessary services,

- water supply, drainage, sewerage, electricity, power, communications, first aid, fire protection and other facilities.

B. The Engineer's approval is to be obtained for the intended siting of all spoil heaps, Temporary Works and services.

C. Temporary Works are to be constructed to recognized standards and codes of practice so that they are fit for their purpose. Drawings and details of proposed Temporary Works are to be provided by the Contractor if requested by the Engineer.

4. SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS

The Contractor shall comply with all the requirements of the CDR "Safety, Health and Environmental Regulations" included in Appendix I to the Conditions of Contract.

In the event of any contradiction between these Specifications and the Safety, Health and Environmental Regulations the requirements of the latter shall govern.

5. TEMPORARY FIRST AID FACILITIES

The Contractor shall make his own arrangements for treatment of casualties on the Site in such first-aid units as may be considered necessary and shall provide an adequate number of first-aid units and personnel suitably trained in first-aid treatment, and shall provide for the removal in ambulances of injured or sick persons to hospitals or to their place of residence.

6. TEMPORARY SIGN BOARDS

The Contractor shall provide and erect at locations agreed with the Engineer one signboard 3.00 x 1.20m , consist of painted galvanized steel frames, painted steel sheets and reinforced concrete base, indicating such particulars as names of Employer, Engineer and Contractor, project name, execution period, etc., all to the approval of the Engineer. The signboard shall be erected within two (2) weeks from commencement and shall be removed upon completion of Works.

7. CONSTRUCTION PROGRAMME

The Contractor shall prepare a Construction Programme showing the order and method in which he proposes to execute the works and the dates upon which the various elements, trades and sections of the works will be started and completed including dates for submittal and approval of shop drawings and samples; for procurement and delivery of materials and equipment; for construction, installation, inspection, testing and commissioning.

The project shall be subdivided into phases and parts to be approved by the Engineer and to be compatible with the programme of work.

A. The Construction Programme shall be in the form of Computerized Network Precedence Diagrams incorporating activities for all work to be performed by the Contractor, his Sub-Contractors and other Contractors to be employed in or about the site, supported by computer analysis and schedules and prepared in accordance with the principles of Critical Path Method (CPM) programming showing at least 300 activities.

The Construction Programme shall be the latest version of PRIMAVERA project planner or other approved software.

B. The Construction Programme shall be prepared by a qualified Network Analysis Engineer in collaboration with the Contractor. The Network Analysis Engineer shall be approved by the Engineer and shall be skilled and experienced in construction programming of the kind specified for this project. The Network Analysis Engineer shall provide the Engineer an access to the Engineer's database for loading into the Engineer's computer, whether by means of floppy diskettes or dataline communications.

C. The network diagrams shall be clearly and accurately presented with work activities relating to specific locations or levels grouped for ease of reference. Each work activity shall have the following information shown in the diagram:

- Activity number.
- Concise description of the work.
- Specification reference or trade code.
- Location of work or area code.

- Duration in calendar days.

D. Computer Analysis

1- In addition to the network diagrams the Contractor shall submit the following computer analysis output:

- Activity Status Report.
- Master Working Report: chronological listing by early start of all activities and milestones.
- Milestone Report: Chronological listing by early start of all milestones.
- Contractor Reports; individual reports, sorted chronologically by early start, for each Contractor. These reports will only have the early start and early finish dates for distribution to Contractors.
- Material Procurement Report: based on the early start Construction Programme, for all material items. This report shall include dates for submittal, approval release for ordering/fabrication, shipping and delivery to site.
- Shop Drawings and Samples Reports: This schedule shall detail the dates for submission and approval of shop drawings and samples required by the Contract Documents, including those required from Contractors shall make due allowance for reasonable time of processing of shop drawings by the Engineer.
- Manpower Report: a listing of all activities displaying estimated crew sizes and manpower requirements for each activity.
- Current Status Report: a listing of actual start and finish dates, activities already started and completed and percentage completion of activities still in progress.
- Cash Flow Report: showing projected monthly and cumulative expenditure.

2- The activity status report shall have the following minimum data for each activity:

- Activity number.
- Concise description of the work.
- Specification reference or trade code.
- Location of work or area code.
- Duration in calendar days.
- Early start date (calendar).
- Early finish date (calendar).
- Late start date (calendar).
- Late finish date (calendar).
- Total float (calendar days).
- Estimate crew size.
- Percentage completion.
- Remaining duration in calendar days.

E. Supporting Data

- 1- The Contractor shall also prepare and submit in narrative form the number mentioned supporting data with the submittal of his Construction Programme. Any changes in this information shall be submitted with successive updates and revision.
 - The proposed number of working days per week.
 - The holidays, and other non-working days (except Sundays) observed during the duration of the Contract (by date).
 - The planned number of shifts per day.
 - The number of hours per shift.
 - The planned usage of major construction plant and equipment on the site, on a monthly basis.
 - The planned procurement and delivery of local and imported materials.
 - The average weekly manpower usage for each trade to be employed for the works.
 - The productivity rates for each major work sequence or for any specific activities required by the Engineer.
 - Explanation of all changes in logic, durations, manpower, plant and equipment.
 - Actual start and finish dates of activities already completed, and percentage completion of activities still in progress.

F. Forty five (45) Day Programme

At monthly intervals, the Contractor shall submit a separate programme developed from the approved Construction Programme covering a period of forty five calendar days and denoting the Contractor's and Sub-Contractor's daily work activities and their interrelationship with the work of other Contractors, if any.

G. Construction Programme Revisions and Updates

- 1- Once the initial Construction Programme is submitted and approved by the Engineer, the Network analysis Engineer shall perform monthly updates in collaboration with the Contractor. The update will follow a visit to the job site where in the presence of the Engineer, the Network Analysis Engineer and the Contractor will record the actual starts and percentages complete and, using this data, update the computer analysis. The updated analysis will be accompanied by a narrative report containing the supporting data referred to herein before, which shall indicate the necessary action dates and requirements for material, labour and plant acquisition. The narrative report shall also focus upon the construction progress and shall particularly note conditions that may delay progress of the work. In the event of such delays, the Contractor shall describe actions proposed to overcome the adverse conditions to maintain the planned Construction Programme.

- 2- Site progress meetings attended by the Engineer, the Contractor, the Network Analysis Engineer and the principal Sub-Contractors, will be held monthly immediately following the monthly site visit referred to in the previous paragraph, specifically to review the progress of the work. At this meeting the latest update of the last approved Construction Programme will be examined with reference to the records made during the said site visit in order to verify the following:
 - Actual start and finish dates of activities completed during the period since the previous update or revision.
 - Remaining durations and percentage of completion for all activities in progress.
 - Logic, time and cost data for variation order work that will be incorporated into the Construction Programme.
 - Contractor's measures to rectify delays from the planned dates.
- 3- The Contractor shall perform the work in accordance with the latest approved Construction Programme. If any work is found not to be on programme during any regular review of the work, the Contractor shall immediately advise the Engineer in writing of action proposed to bring the work on programme. The Contractor shall thereupon prepare and submit a revised Construction Programme indicating such action, together with a list of revisions to programme logic. Correction and updating of the Programme will be done as often as necessary until the project is on Programme.
- 4- Within five (5) working days after receipt of a notice from the Engineer, the Contractor shall submit a revised Construction Programme for any of the following reasons:
 - When delays in completion of any activity or group of activities indicates a slippage of the Contract completion date or a Milestone date by fourteen (14) calendar days or ten percent (10%) of the remaining duration of the Contract period, whichever is less.
 - When delays in submittals or deliveries or work stoppage area encountered which make replanning of the work necessary.
 - When the Programme does not represent the actual execution and progress of the work being performed in the field.
 - Where a change in the work sequence is proposed or has been instituted by the Contractor. Any such change should not, in any case, be made without the Engineer's approval.
 - Where the issue of a change order or other instruction would significantly effect the programme and/or progress of the works.
- 5- In the event the Contractor requests an extension of time for completion of the works or requests an extension to the specified milestone dates, he shall furnish such justification and supporting data as the Engineer may deem necessary for the evaluation thereof. Submission of proper substantiation based on revised activity logic, durations and costs is obligatory with any such request.
- 6- Float belongs to the project and must be used in the best interest of completing the project on time. Accordingly, any existing float shall be used to the maximum extent possible to offset unexpected delays which occur in connection with the Contractor's work, acts of God, and authorized variations in the scope of the work.

H. Programme Submittal Procedures and Requirements

- 1- Submittal of the initial Construction Programme for approval shall be in accordance with the following procedure:
 - The Contractor shall submit his initial Construction Programme, in four copies and one digital, within 3 weeks of the date of signing of the Contract. Such initial Construction Programme shall include the following completed documents:
 - Network Precedence Diagram showing the sequence and interdependence of all items of work required under the Contract and Milestone dates.
 - All the computer analysis reports required under this Contract.
- 2- After approval of the Contractor's initial Construction Programme, all subsequent revision and monthly update submittals shall comprise the following:
 - Two (2) prints of the Network Diagrams from the last approved Construction Programme, suitably marked up in red ink to show all revisions, and signed by the Contractor and all Sub-Contractors.
 - Two (2) copies of the updated Activity Status Report.
 - Two (2) copies of all supporting data.
 - Two (2) copies of the updated master working report.
- 3- Revisions and monthly updates to the Construction Programme shall be submitted within five (5) working days of the data date for inputting revised/updated information to create the revision/updated computer analysis. The data date for the first monthly update shall be one month after approval by the Engineer of the Contractor's initial Construction Programme, and successive data dates shall be at monthly intervals. The said data date should coincide with the date of the site progress meeting at which time the records of progress are verified.
- 4- Each programme submitted shall be signed by all principal Sub-Contractors and Nominated Sub-Contractors before being submitted to the Engineer thereby confirming that they have reviewed the said programme. If any Sub-Contractor has reservations regarding his ability to comply with the requirements of the programme to which he has appended his signature, the Contractor shall instruct the Sub-Contractor to list such reservations in writing and a copy thereof shall be submitted to the Engineer with the programme submittal for his information. No reservation by any Sub-Contractor, nor the fact of informing the Engineer in respect thereof, shall relieve the Contractor of his responsibilities under the Contract in the times prescribed therein.

8. SHOP DRAWINGS AND SAMPLES

Shop drawings shall establish actual details of manufactured or fabricated item and of work to be executed; they shall clearly identify materials, dimensions, thicknesses, components, attachments, relation with adjoining work and spaces, and all other pertinent information. Shop drawings shall be based on the actual existing remeasured structure and shall clarify and amplify the design drawings and other design requirements and shall, subject to the Engineer's approval, incorporate minor changes in design or construction as may be necessary or otherwise desirable to suit the requirements of the work. Where the Contract Documents require the Contractor to submit samples, the same shall satisfactorily establish that the quality, construction, workmanship, finish, colour, pattern and any other characteristics of the material or equipment to be provided, are in conformance with the Contract requirements and to the Engineer's reasonable satisfaction.

- A. The Contractor shall prepare, review, coordinate and submit to the Engineer for his approval (7 days to 14 days) such shop drawings and samples as are required by the Contract Documents or as may be required by the Engineer during the course of the works.
- B. At the time of making his submission, the Contractor shall inform the Engineer in writing of any deviation between shop drawings/samples being submitted and the requirements stipulated or reasonably implied by the Contract Documents.
- C. By submitting shop drawings and samples the Contractor thereby represents that he has determined and verified all dimensions, relations to existing work, coordination with work to be installed later, coordination with information in previously submitted shop drawings and has verified their compliance with all the requirements of the Contract Documents. The accuracy of all such information is the responsibility of the Contractor and in reviewing shop drawings and samples the Engineer shall be entitled to rely upon the Contractor's representation that such information is correct and accurate. The Contractor shall be responsible for and shall make any alterations in the work due to discrepancies, errors or omissions in the shop drawings and samples supplied by him whether or not such shop drawings and samples have been approved by the Engineer, provided that such discrepancies, errors or omissions are not due to inaccurate information or particulars furnished in writing to the Contractor by the Engineer. The Contractor shall be responsible for the correct locations of his work, irrespective of approval by the Engineer, and shall pay all costs and expenses incurred by others due to improper location of his work.
- D. Sub-Contractors shall submit their shop drawings and samples through the Contractor who shall review and coordinate with his own and other Sub-Contractor's drawings and/or samples before submitting to the Engineer. The Contractor shall be responsible in all respects for his Sub-Contractor's shop drawings and samples as if they were his own.
- E. Neither the fabrication of prefabricated items, nor the ordering of any work, materials or equipment, nor the execution of any work on site, shall commence until shop drawings and samples, relevant to the said items, work, etc., and required by the specifications, have been submitted and approved in writing by the Engineer.

- F. Shop drawings to be prepared by the Contractor and by his Sub-Contractors for structural, architectural and electro-mechanical works, shall be prepared on the site to facilitate proper liaison and coordination between trades and so as to allow the Engineer ready access for review during the preparation process.
- G. Shop drawings and samples shall be prepared after site dimensions have been taken. Shop drawings shall be prepared on reproducible transparencies, and using metric units of measurement.
- H. Shop drawings shall describe accurately the method of fabrication, installation, applied finishes, types and sizes of all members and fixings, and shall, where applicable, indicate methods of marking components for site erection. Shop drawings shall be to scales approved by the Engineer.
- J. The Contractor shall verify all dimensions and field conditions and shall check and coordinate the shop drawings and samples required in connection with a particular trade or section of the works with the requirements of other trades or section related thereto.
- K. In order to ensure proper coordination, shop drawings and samples for each system or element of work shall be submitted in a single package. The Engineer may require in writing that all relevant part of a system or element be submitted before any component item is approved.
- L. Except for finish, pattern, colour and other matters in respect of which the Engineer's decision is required in accordance with the Contract Documents, the Engineer's review and approval of shop drawings and samples submitted by the Contractor is for general conformance with the design concept and specifications and shall not relieve the Contractor from responsibility for any deviation from, or errors or omissions in respect of the requirements of the Contract Documents, unless the Contractor has informed the Engineer in writing of specific deviations and the Engineer has given written approval thereto.
- M. The Contractor shall make any corrections or amendments required by the Engineer's review of shop drawings and samples and shall resubmit until the "APPROVED" status is achieved. All such corrections or amendments shall be clearly indicated on the resubmitted drawings by the use of revision numbers in circles or triangles, or other method approved by the Engineer.
- N. The Contractor shall direct specific attention in writing or resubmitted shop drawings and samples to revisions other than the corrections requested by the Engineer or previous submissions. Unless such written notice has been given, approval of a resubmitted shop drawing or sample shall not constitute approval of any changes not requested on the prior submission.

P. In the event of written rejection by the Engineer to a particular material or sample, the Contractor shall submit within fourteen (14) calendar days of such rejection, samples of three alternative materials for the Engineer's approval and the Engineer shall reject or approve all or any of these materials within fourteen (14) days of their submission. This procedure shall be repeated until such time as a sample of material is approved by the Engineer. Failure on the part of the Contractor to obtain the Engineer's approval, which shall not be withheld unreasonably, to all or any one sample or material shall in no way relieve the Contractor of his liabilities and obligations under the Contract.

Q. The Engineer may at any time call upon the Contractor to submit samples of any material used or to be used in the work, including those specified in the Contract by "Brand Name", for comparison with the specification and/or approved sample. Should any such sample fail to meet the requirements of the specification and/or standard of the accepted sample, then all materials from which the sample has been taken shall be removed from the site immediately and all work executed incorporating such material shall be cut out and made good to the satisfaction of the Engineer all at the expense of the Contractor.

R. No acceptance or approval by the Engineer or any shop drawing or sample submission made by the Contractor, nor any notes, comments, stipulations, requests for clarifications, etc., made by the Engineer upon such submissions during his review and approval thereof, shall constitute an authorization to any variation in the Contract Price or to any extra Time for Completion of the Works.

9. ENGINEER'S REPRESENTATIVE REVIEW OF SUBMITTALS

- 1- The Engineer's Representative will process the submission and indicate the appropriate action on the submission and the transmittal.
- 2- The Engineer's Representative will process transmittals in the following sequence:
 - a. Date Received
Date arriving in the Engineer's Representative office.
 - b. Date Return
Date leaving the Engineer's Representative office to the Contractor.
 - c. To/Date
Name of Engineer to whom submission is sent for review and date leaving the Engineer's Representative office.
 - d. From/Date
Name of Engineer reviewing submission and date arriving in the Engineer's Representative office.
 - e. Action
Indicate action taken on submission.
 - f. Distribution
Number of copies distributed and type of material distributed (sepia, print, brochure or sample, etc.).
 - g. Engineer's and Engineer's Representative Remarks
Note major deviations from the Engineer's Contract Documents or reasons for resubmit if there are not notes on the material submitted.

10. ADJOINING PROPERTIES

The Contractor shall prevent damage to existing buildings fences, walls, if any and other properties on the Site or adjacent there to which are to remain in position during execution of the Works. All precautions are to be taken by the Contractor to prevent damage to adjoining property, including ground movements, subsidence, loss of support, movement cracks, etc, as a result of the execution of the Works. Any such damage shall be made good by the Contractor to the satisfaction of the owners of the affected property.

11. SUBMITTALS OF RECORDS

The Contractor shall submit to the Engineer in formats agreed with the Engineer the following records:

- Labour Record each week showing the daily number types and designations of staff and labour;
- Equipment Record each week showing the daily number types and designations of the Contractor's equipment;
- Work Record daily showing the activities and work locations actually carried out and relevant quantities;
- Materials and Plant Record each week showing the type, quantity and designation of all materials and Plant delivered to the Site;
- Weather Record weekly showing daily weather conditions of temperature, humidity, rainfall and winds;
- Monthly Progress Report monthly showing programme; progress; activities carried out and planned; and any relevant project-related matter;
- Monthly financial report showing actual and projected cash flow.
- Photographs at monthly intervals to show statue of the work taken from 10 approved locations as minimum, 3 prints of 16x20 cm of each photograph monthly.

12. SITE MEETINGS

The Engineer's Representative will hold site meetings with the Contractor at intervals not exceeding 2 weeks to discuss project-related matters. Minutes will be recorded and distributed by the Engineer's Representative to all attendees.

13. ASSISTANCE TO THE ENGINEER'S REPRESENTATIVE

The Contractor shall provide to the Engineer's Representative and his staff at all times during the continuance of the Contract all necessary tools, instruments, labour and assistance in the execution of his and their duties as the Engineer's Representative may require.

14. SITE SURVEYS AND RECORDS

The Contractor shall prepare and maintain documentary records of existing topographic surveys of the Site, sub-surface investigations and all other condition surveys prior to commencement of the work and at all stages during execution. Such surveys and records shall be made available for review as the Engineer may require.

15. LIMIT OF PROJECT

- A. The Contractor is fully and entirely responsible to set out the exact limits of the project.
- B. Any conflict in the limits, whether it is raised during or after the execution and completion of the work, shall remain the full and entire responsibility of the Contractor, and he shall assume all consequences resulting from this conflict.
- C. The cost of this work shall be deemed to be included in the total price, and will be deducted if not instructed by the Engineer.

16. SUB-SURFACE INVESTIGATIONS

- A. The Contractor shall carry out all additional sub-surface soil investigations and tests to determine the nature and characteristics of soil strata, bearing capacities, water table and other data required for the execution of the Works on the Site, for the Contractor's construction operations and for ascertaining the adequacy of sub-surface conditions below foundations and structures.
- B. Such investigations and tests shall be performed in accordance with recognized standards and procedures and conducted at the locations and in the manner approved by the Engineer.
- C. The cost of this work shall be deemed to be included in the total price, and will be deducted if not instructed by the Engineer.

17. CODES AND STANDARDS

- A. Reference to codes and standards in the Contractor Documents shall be deemed to include the latest edition or issue except when specifically indicated.
- B. Where codes or standards are not specifically mentioned in the Contract Documents, work, material, Plant, equipment, performance, tests, manufacture, installation, etc..., shall conform as a minimum to acceptable relevant national or international codes and standards.
- C. If the Contractor proposes to adopt codes or standards other than those particularly specified, he shall submit to the Engineer complete data with respect to such codes or standards including detailed list of differences between those proposed and specified and a confirmation that the proposed codes and standards meet, as a minimum those specified. The decision of the Employer and the Engineer in respect of such proposals shall be final.

18. BRAND NAMES

Where brand names, manufacturers' or suppliers' names or catalogue numbers or types are mentioned in the Contract Documents, such are for guidance on quality, function, size, design, and working space requirements and the Contractor may offer any equivalent or superior model or make subject to the approval of the Engineer.

19. MATERIALS, PLANT AND EQUIPMENT

- A.** All materials, Plant and equipment incorporated or to be incorporated in the works shall be the best of their respective kind, obtained from reputed suppliers and manufacturers and shall be in accordance with the requirements of the Contract Documents. Materials and Plant shall be suitable for long and trouble-free service and suitable for the intended purpose.
- B.** Defective materials or Plant or those damaged in the course of manufacture, transport, storage, installation, testing or operation shall not be used in the Works and shall be replaced or, subject to the Engineer's approval, repaired in a satisfactory manner to meet the requirements of the Contract Documents.
- C.** In the choice of materials and Plant due regard shall be given to the conditions to which such materials and Plant may be exposed during their service life.
- D.** The Contractor shall, when required submit to the Engineer for review detailed description of all procedures of manufacture, calibration, quality control criteria, testing, examination, performance, etc., in connection with materials, Plant or equipment. The Contractor shall make available to the Engineer upon request detailed production schedules of all materials Plant and equipment to be incorporated in the Works.
- E.** Where and to the extent that materials, products and workmanship are not fully specified they shall be of a standard appropriate to the Works and suitable for the intended purpose stated in or reasonably inferred from the Contract Documents and in accordance with recognized current standards of good practice.
- F.** All the material and equipment used in the project for the various works shall be as per general and technical specifications, drawings, list of approved materials and B.O.Q. or approved equal. In case of equal materials and equipment are proposed, the Contractor to submit all supported document from relevant authorities justifying the equivalent quality and technical performance.

The approval of the Engineer for the proposed materials or equipment shall be within fourteen (14 days) from the date of submission of these materials by the Engineer.

20. CONTRACTOR'S DESIGN AND ENGINEERING DATA, DRAWINGS, PRODUCT DATA AND SAMPLES

- A.** The Engineer may supplement the Contract Drawings with further drawings and instructions in accordance with the Conditions of Contract, as he deems necessary.
- B.** The Contractor shall prepare all other drawings required for Temporary Works and for fabrication and coordination of trades, all shop drawings and other drawings and documents required under the Contract, in addition to drawings and data for work to be designed by the Contractor. (refer to paragraph 10).
- C.** The Contractor shall provide and maintain qualified personnel for the coordination, control and development of the detailed construction design of the works. The Contractor is required to develop, where necessary, the Engineer's design intent by providing the detail drawings and data to enable the execution of the works.

D. By submitting design and engineering data, drawings, product data and samples, the Contractor represents that he has determined and verified all aspects of the submittals and that he has checked and coordinated the information contained therein with the requirements of the works and the Contract Documents.

E. Submission and approval of the design and engineering data, drawings, product data and samples shall precede the commencement of any work to which they relate. No portion of the Permanent Works shall be executed other than in accordance with approved submittals.

21. AS BUILT DRAWINGS

The Contractor shall prepare complete "as built" drawings of the Works and submit to the Engineer for approval. Upon approval or incorporation by the Contractor of any modifications requested by the Engineer, three copies and one reproducible copy of all "as built" drawings and floppy disk shall be submitted by the Contractor upon completion of the Works.

22. CERTIFICATES BY AN INTERNATIONAL INSPECTION OFFICE

The Contractor shall, as required by the Engineer, submit manufacturers' test certificates for materials and Plant intended to be incorporated in the Works. Such certificates shall, to the extent prescribed by the Engineer, be endorsed for authenticity by a recognized international office employed by the Contractor and approved by the Engineer. All manufacturers' test certificates shall be in the English or French language.

23. TEMPORARY SITE & OFFICE FACILITIES FOR THE ENGINEER AND / OR EMPLOYER

A. All facilities provided for the Engineer's and / or the Employer's staff by the Contractor shall remain available until the end of the Defects Liability Period or until such earlier time as the Engineer may instruct.

B. Representative Site Offices

B.1. Office

The Contractor shall provide for site of the project prefabricated portable or demountable offices for the exclusive use of the Engineers and/or the Employer's staff, comprising:

- 2 offices size of each approximately 3m x 4m
- 1 meeting room for 6 persons.
- 1 secretary's room approximately 2m x 2m
- 1 kitchen approximately 2m x 2m
- 1 toilet
- 1 store
- entrance area with space for desk

The offices are to be of proprietary manufacture, with hard-wearing, easy to clean surfaces and robust and secure fittings. The Contractor shall submit full

details to the Engineer's Representatives for approval before delivery to the Site.

B.2. Office Furniture and Equipment

B.2.1. Each office shall contain :

- 1 desk with lockable drawers and chairs
- 1 lockable steel filling cabinets
- 1 plan chest with minimum of five drawers
- 1 waste paper baskets

and, in addition, the following shall be provided for the site :

- 1 secretary's desk and swivel chair
- 4 office chairs
- 2 scientific calculators
- 1 photocopying machine
- 2 computer system

all consumables for photocopying machine and computer pinboards and shelves

B.2.2. Conference Room Furniture and Equipment

This shall contain:

- 1 conference table
- 6 chairs
- 2 pinboards

B.2.3. Kitchen Furniture and Equipment

This shall include:

- 1 refrigerator 12 cubic foot capacity
- 1 water filter and cooler
- 2 electric boiling rings
- 1 stainless steel sink and drain
- 1 heat resistant work tops
- 1 set of storage cupboards
- 2 dozen set of crockery and cutlery

together with all necessary consumables for making beverages for the duration of the Contract.

B.2.4. Store Room Furniture and Equipment

This shall include :

- shelving units
- drawing hangers and racks.

B.2.5. Toilet Furniture and Equipment

This shall include:

- 1 W-C suite with toilet roll holder
- 1 wash basin with mirror
- 1 towel rail
- 1 soap dispenser

together with all necessary consumables.

B.2.6. Computer System

The computer system shall consist as a minimum:

- Computer Pentium IV, two GHz.
- 101 key English-Arabic Keyboard.
- Low radiation 17 inch rotating color monitor
- Laser printer similar to HP Laser Jet 5L with paper cassette (A4)
- UPS Uninterruptible Power Supply for all above equipment with minimum 2 hours backup batteries
- Computer table and chair to accommodate computer, monitor, keyboard and printer
- antistatic dust covers for all above equipment
- Loaded with a modem and internet connection

B.2.7. Services and Utilities

The Contractor shall provide and maintain the following for the Site Office:

- electric lighting and power
- heating and air conditioning
- water supply
- sanitary system
- drainage system
- fire fighting appliances
- telephone system with two external lines and extensions and one portable cellular phone (including cost of all local calls).
- one dedicated facsimile service (including cost of all transmissions)
- cleaning and rubbish disposal
- general labour attendance including provision of one full time janitor/tea boy
- full time secretary
- security and guards

B.2.8. Vehicles for use by the Engineer and/or Employer

The Contractor shall provide and maintain for the duration of the Contract the following new vehicles with air conditioning for the exclusive use of the Engineer's Representative and his staff and shall supply all fuel and lubricants; repair and maintain the vehicles to keep them in good roadworthy condition at all times; comprehensively insure each vehicle for any driver at all times; and replace with identical vehicle any vehicle removed for repair or for any other reason.

- 1 No. Four Wheel Drive Vehicles (6 cylinders).

A competent driver, employed by the Contractor for attendance during normal working hours. The vehicles are to remain in the possession of the Engineer's Representative and his staff after normal working hours.

24. CLEANING

A. Scope

- 1- Execute day to day cleaning, during progress of the work, and at completion of the work.
- 2- If the Contractor fails to clean up during construction or at the completion of the work, the Employer may do so and the cost thereof shall be charged to the Contractor.

B. Disposal requirements

Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

C. Materials

- 1- Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- 2- Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

D. Execution during construction

- 1- Execute day to day cleaning to keep the work, the site and adjacent properties free from accumulations of waste material, rubbish and windblown debris, resulting from construction operations.
- 2- Provide on-site containers for the collection of waste materials, debris and rubbish.
- 3- Remove waste materials, debris and rubbish from the site on a daily basis and dispose of at legal disposal areas away from the site.

E. Dust control

- 1- Clean interior spaces to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- 2- Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

F. Final cleaning

- 1- Employ skilled workmen for final cleaning.
- 2- Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.
- 3- Wash and shine glazing and mirrors.
- 4- Polish glossy surfaces to a clear shine.
- 5- Vacuum clean interior of buildings, including HVAC ducts.
- 6- Hand dust, clean and polish shelving and cabinets.
- 7- Wax and polish finish floors.
- 8- Clean all hardware.
- 9- Clean all fixtures.
- 10- Comply with all special cleaning instructions contained in the specifications.
- 11- Ventilating Systems
 - i. Clean permanent filters and replace disposable filters if units were operated during construction.
 - ii. Clean ducts, blowers and coils if units were operated without filters during construction.
- 12- Remove temporary services, construction equipment, tools and facilities, mock-ups, temporary structures, surplus materials, debris and rubbish from Employer's Property.
- 13- Put site in neat, orderly condition, ready for use. Leave roof areas, pipe spaces, and other spaces clean and free from debris. Clean to normal "Clean" condition for a first-class building cleaning and maintenance programme.
- 14- Broom clean exterior paved surfaced; rake clean other surfaces of the grounds.
- 15- Prior to final completion, or Employer occupancy, conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that the entire work is clean.

25. WARRANTIES AND BONDS**A. Scope**

- 1- This section describes the Contractor's responsibility in respect of warranties, guarantees and bonds.
- 2- The Contractor shall ensure that he receives from manufacturers and suppliers all available warranties, guarantees and bonds that are normally offered with the product, fully completed and documented to assure the whole of the benefits which they offer.
- 3- All warranties, guarantees and bonds shall run for the stipulated period commencing at the date of the completion of the Contract.
- 4- Warranties for all mechanical, electrical, waterproofing and other works shall be as called for in the Conditions of Contract.

26. PROTECTION AND MAKING GOOD**A. Scope**

- 1- The Contractor shall protect all completed Works from damage until the completion of the Works to the approval of the Engineer.
- 2- Should the Contractor allow any Works to be damaged he shall at his expense make good or replace, as required by the Engineer, to the approval of the Engineer.
- 3- Completed floors shall be secured and protected and uncontrolled access shall be prohibited.

27. MEASUREMENT AND PAYMENT

A. Unless otherwise measured separately in the Bill of Quantities, no separate payment shall be made for any of the requirements specified in this section and all costs and expenses in respect of such requirements shall be deemed to be included in the Contractor's rates and prices for other work measured in the Bill of Quantities.

28. BILL OF QUANTITIES

The Works shall be measured and paid for only against the Pay Items prescribed in the Bill of Quantities. Any work required to be performed or executed by the Contractor in accordance with the Contract Documents, but for which no specific Pay Item is designated in the Bill of Quantities, shall be performed or executed by the Contractor and the price thereof shall be deemed to be included in the Contract Price and the rates and prices inserted by the Contractor against other Pay Items in the Bill of Quantities.

SCOPE OF WORK

SCOPE OF WORK

1. THE WORK

The purpose of the project is AL JABAL Hospital Rehabilitation Addendum 1.

2. DESCRIPTION OF THE WORKS

The extent of the works pertaining to the Rehabilitation of AL JABAL Hospital project - Addendum 1, include the following main elements:

- Demolition
- Concrete work
- Architectural work
- All associated electrical and mechanical work

DIVISION 2

SITE WORK

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02050 **SELECTIVE DEMOLITION**

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DIVISION 2

SITE WORK

Division 2

SELECTIVE DEMOLITION (02050)

A. Scope

Work includes all labour, materials and equipment, and performance of all operations related to demolition as indicated, required and specified.

B. Description of work

Refer to Drawings, and BOQ.

C. Requirements of regulatory agencies

1. Comply with applicable codes and regulations of local authorities, utility companies and governing bodies having jurisdiction.
2. Regulatory Requirements 01060

D. Submittals

Submit schedule of demolition showing proposed methods, procedures and sequence of demolition to the Engineer for review prior to beginning work.

Demolition work shall not be commenced before obtaining the written approval of the Engineer.

E. Protection

Existing work to remain shall be protected from damage by means of barricades, planking or other approved means.

1. Contractor shall be responsible for devising methods of protection.
2. Contractor shall be liable for all damage to existing construction beyond that required to accomplish the work under this Contract.
3. Maintain and leave protection in place until surface protected is no longer subject to damage by construction operations.
4. Contractor shall pay special attention to the existing supporting columns while demolishing internal & external wall partitions.
5. Contractor shall provide protection to the existing concrete slabs while performing opening holes for electrical & mechanical facilities.

F. Materials

1. All materials resulting from demolition shall be removed from the site to a location directed by the Engineer.
2. The use of explosives is strictly forbidden.

G. WORKMANSHIP

1. Preparation
 - a. Inspect existing conditions prior to beginning demolition to determine surfaces and construction which may be subject to damage.
 - b. Review surfaces and construction, and proposed bracing, shoring and protection measures with Engineer prior to beginning demolition.
 1. Provide shoring, bracing or support to prevent movement, settlement or collapse of work to be demolished and adjacent improvements to remain.
 2. Provide structural shoring where necessary to transfer the load prior to demolition and maintain until work to existing structure is complete.
 3. Provide protection at corners, projecting features and similar items prior to demolition and maintain until threat of damage has ceased. Use substantial boarding securely anchored and properly maintained.
 - c. Provide temporary enclosures and employ other approved methods to limit amount of dust and dirt dispersed into the atmosphere.
 - d. Provide all plant, scaffolding, gangways, etc... for the proper execution and protection of the works and roadways and footpaths.
 - e. Demolition work is to be carried out in such a manner as to cause the minimum possible inconvenience to adjoining Building sector 1. All rubbish and debris and the works where necessary are to be sprinkled with water to prevent dust arising and screens and protection to the satisfaction of the Engineer.
2. Demolition
 - a. Proceed with demolition in systematic manner from top down. Complete demolition work above each floor before disturbing supporting members at floor below.
 - b. Exercise care not to overload structure.
 1. Shoring shall bear on suitably supported surfaces.
 2. Locate demolition equipment and demolished materials throughout structure and remove as soon as possible so as not to impose concentrated or excessive loads.
 3. Remove masonry in small section and lower to ground with hoists, pulleys or cranes which will avoid impact or shock to structure.
 - c. Remove all work in ways which will prevent damage to other work, and will facilitate proper patching and repair.
 1. Cut materials with power driven saw in neat, workmanlike fashion. Avoid excessive vibration to work to remain.
 2. Shore and brace floor slabs, where-ever advisable to assure structural adequacy of affected work.
3. Noise and speed
Perform demolition and removals as quietly as practicable and with deliberate speed once demolition work has begun.

4. Extent and methods of demolition

Demolish, or remove and reinstall as applicable, all, or parts of, site work interfering with new construction, masonry, concrete, walls and partitions, floor and roof construction, roofing, parapet construction, doors, frames, metal protection finish hardware, plaster, gypsum board, false ceilings, suspension systems, fixing system, furring, lathing, finishes, cabinetry, ventilation items, plumbing fixtures, mechanical and electrical equipment, piping, lighting, telephone central, metallic structure, and other materials and items as necessary to do the work under this contract and, in addition, where removal is indicated.

a. Use methods required to complete work within limitations of governing regulations.

b. Proceed systematically.

c. Demolish concrete and masonry in small section.

d. Also demolish or remove walls and partitions in small sections whatever the materials of construction.

e. Remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

f. Doors: Completely remove all existing doors, windows, frames, and metal protection.

g. Remove all plaster on walls, columns and ceiling where approved and keep the area clean for receiving the new finishings.

h. Floors

1. When removing existing walls and partitions resting on the structural slab, also remove traces of mortar and other materials to expose structural slab beneath the location of partition or wall.

2. Completely remove existing finish flooring. Leave top of exposed substrate completely free from materials that would interfere with bond of new materials.

3. Completely remove existing tiles. Leave top of exposed substrate completely free from materials that would interfere with bond of patching, topping, or finish material.

4. When removing existing floor finishes, completely remove loose materials and damaged substrate materials.

5. Completely remove existing asphalt, flower beds and leave top of surface free from materials that would interfere with bond of new materials.

6. Where Contract requires removing existing concrete foundations, concrete slabs, and stairs also remove reinforcement. When filling openings with concrete, prepare slab edges as shown.

i. Ceilings

1. Where existing false ceilings have been removed, existing hangers and hanger attachments shall be removed.

j. Walls

1. Remove existing wall finishes and prepare surfaces to receive indicated new finishes. Leave nothing that will affect new finish. Where substrates will be exposed in the completed work, remove every trace of old finish.
2. Remove supports for existing finishes removed under this Contract or earlier.
3. Remove concrete water tank on roof in small sections.
4. Remove all water proofing system on roof and upper roof as agreed by the Engineer.
5. Demolish all concrete work related to the central stair and lift in all levels, in small section.
6. Remove external fence.
7. Remove telephone central carefully in a way not to be damaged, to a place approved by the Engineer.
8. Remove all equipment related to Bathrooms and main kitchen in all levels.
9. Remove all built-up furniture in all levels.
10. Other Materials and Items: Remove where removal is necessary to permit work under this Contract. Remove such items and materials only to extent necessary.

5. Satisfactorily and promptly repair damage to existing materials and equipment to remain, or provide new equal approved products at no additional cost.
6. Cutting and drilling
 - a. Cut and drill existing construction to permit the work under this Contract. Include cutting holes and other openings for plumbing, mechanical, and electrical work.
 - b. Cut by hand or with small power tools when possible. Cut holes and slots neatly to size required, with minimum disturbance of adjacent work. Cut round holes in concrete using core drills. Cut square and rectangular holes by line drilling and using chipping hammers to remove material between drill holes. Do not use large air hammers.
 - c. Do not operate air compressors inside building unless otherwise approved by the Engineer.
 - d. Do not drill or cut structural supporting elements without specific approval in each case, unless the element is shown on structural drawings to be drilled or cut. do not cut existing concrete slab reinforcement.
 - e. Cover openings temporarily when not in use, and patch as soon as work is installed.
7. Patching
Promptly repair all damage to work not indicated to be removed at no cost to Owner. Match existing adjacent materials and surfaces to satisfaction of Engineer.
8. Grub up services

Grub up gulleys, break up manholes etc. Stop off all disused drains at point of entry and seal with concrete. Remove all water supply pipes at point of entry; plug and seal all dead ends.

9. Removal of plant

The Contractor shall, upon completion of the demolition works, remove and clear away all temporary plant, rubbish and superfluous materials, and shall leave the Site in a clean and tidy state, debris to the satisfaction of the Engineer.

DIVISION 3

CONCRETE WORK

DIVISION 3
CONCRETE WORK
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Division 3
CONCRETE WORK

BASIC CONCRETE MATERIALS AND METHODS (03050)

A. Scope

This section specifies Concrete mixes for all Concrete Work shown on the drawings.

The works of this division shall be executed in accordance with the Conditions of Contract, the Specifications, the General Requirements, the Drawings and the Bills of quantities.

B. Performance and Standards

All materials shall conform to relevant British Standards, whether referred to in this section or not, and shall be to the complete satisfaction of the Engineer.

C. Related Items

Concrete Forms and accessories	03100
Concrete Reinforcement	03200
Cast-in-place Concrete	03300
Masonry Mortar	04100

The design bearing capacity of the soil is considered 2 kg/cm². The Contractor must verify that the excavation levels shown on the drawing will verify this assumption.

D. Submittals

The Contractor shall follow the requirements in section 03300 Clause D regarding preparation of trial mixes, testing, and other submittals.

E. Product Handling

Storage and handling of materials shall be in accordance with the requirements of section 03300 Clause E.

F. Materials

Concrete mixes and materials shall be in accordance with the requirements below, and shall conform with the relevant items specified in section 03300 Cast-in-place Concrete.

CONCRETE FORMS AND ACCESSORIES (03100)**A. Scope**

1. This section specifies formwork for all Concrete Work indicated as in-situ Concrete on the drawings.

B. Performance and Standards

1. Formwork shall be constructed to maintain the correct positions, shape, profile and surface finish of the Concrete in accordance with the following standards and this Specifications.

C. Related Items

Cast-in-Place Concrete 03300.

D. Submittals

1. The Contractor shall prepare trial panels for formwork, when required by the Engineer in accordance with G8.

E. Materials**1. Ordinary Formwork**

This shall be obtained by the use of properly designed formwork or moulds of closely jointed sawn boards. The surface shall be free from voids, honey combing or other large blemishes.

2. Workmanship**3. Design and Construction**

The design and construction of formwork shall be carried out by competent persons, taking due account of the surface finish required.

The formwork shall be sufficiently rigid and tight to prevent loss of grout or mortar from the concrete at all stages and for the appropriate method of placing and compacting.

4. Cleaning and Treatment of Forms

All rubbish shall be removed from the interior of the forms in contact with the concrete. Forms shall be clean and treated with a suitable release agent, where applicable .

5. Projecting Reinforcement, Fixing Devices

Where holes are needed in forms to accommodate projecting reinforcement or fixing devices, care shall be taken to prevent loss of grout when concreting or damage when demoulding.

6. Cast-In Fixings

Allowance shall be made to accommodate cast-in fixings as shown on the drawings or where directed by the Engineer.

CONCRETE REINFORCEMENT (03200)**A. Scope**

These works shall consist of the supply and fixing of the unstressed steel bars, wires, mesh and mats for the reinforcement of concrete in accordance with the Drawings and Workmanship

1. Cutting and bending

CAST-IN-PLACE CONCRETE (03300)**A. Scope**

These works shall consist of the specifications for concrete materials including sampling, testing and storage of such materials, concrete strength requirements, concrete testing procedures and requirements, and job mixes.

- a. Workmanship

2. Concrete Strength requirement :

- a. Design mixes

Concrete shall be designed in full compliance and in accordance with BAEEL 91.

BEDS AND SCREEDS (03500)**A. Scope**

Screeds are to be the depths, thickness and location shown on the drawings.

Screeds shall be furnish in roof, terraces, parkings and where shown on the drawings.

B. Performance and standards

1. The proportion of the mixes used and the hardness of the finished beds and screeds should be determined during the course of the work by methods referred to in clause 72 B of BS CP 204. Specimens shall be provided from samples of the mixes being made and in accordance with the stipulations contained in CP 204. All screeds and beds shall be free of curling, and shall not crack unduly. Hollow sounding areas shall be cut out and shall be made good.
2. The tolerance of screeds and beds shall be in accordance with BS CP 204.
3. Standards
BS CP 203, Tile Flooring and Slab Flooring.
BS CP 204, In-Situ Floor Finishes.

C. Related Items

Joint Sealers	07900
Membrane Roofing and Waterproofing	07500-07100

D. Submittals

1. Aggregate Samples
Supply samples for the Engineer's approval of all aggregates, sources of supply are to be indicated.
2. Aggregate Testing
Carry out preliminary tests on natural aggregates to determine drying shrinkage as set out in BRE Digest 35, and submit results for approval. Carry out tests on aggregates to BS 812 for the following and submit for approval.
 - a. Sieve Analysis
 - b. Clay and Fine Silt
 - c. Specific Gravity
 - d. Water Absorption
 - e. 10% Fines Value
3. Additives
Additives such as workability aids shall not be used without permission of the Engineer. If such permission is sought full particulars of the material shall be submitted.
4. Sample of Screed
Prepare specimens of the mixes being used for the approval of the Engineer.
5. Other Materials
Submit manufacturer's data for all ancillary materials used in conjunction with the laying of beds and screeds.

E. Product Handling

1. General

The specifications regarding the delivery, storage, handling and transport of cement and aggregates, Cast In Place Concrete, shall apply.

2. Mixing

Except where hand-mixing of small batches is approved by the Engineer, mechanical mixers of an approved type shall be used. Mixers shall be thoroughly cleaned after each batch and kept free of deposit from previous batches.

3. Transport and Placing

Care shall be taken to avoid contamination or segregation of ingredients in the manner in which mixed materials are transported and placed.

F. Materials

1. Cement

Cement shall be ordinary Portland Cement to BS 12.

2. Fine Aggregates

Clean washed sharp pit sand to BS 882, Part 2 Table 2, Zone 2, well graded from 5mm down.

3. Coarse Aggregate

Clean washed crushed shingle to BS 882, Part 2, Table 1, well graded from 10mm down. Maximum drying shrinkage of concrete : 0.045%.

4. Aggregate Quality

All aggregates shall be free from deleterious algae or minerals.

5. Additives

Additives shall not be used without the permission of the Engineer. If permitted, such use must be maintained throughout the Contract and trowelling off must be carried out at the correct period. Calcium chloride shall not be used.

6. Water

Water shall be clean and uncontaminated to the Engineer, and shall be tested if so instructed by the Engineer to BS 3148.

7. Bonder

The bonder shall be a PVA based adhesive. The bonding agent shall also be incorporated in the screed mix as recommended by the manufacturer.

8. Separating Layer

Separating layer shall be as shown on the drawings, and provided by an approved manufacturer.

9. Screed Mixes

a. For screed thicknesses up to and including 40mm 1:3 cement: fine aggregate by volume, bonded.

b. For screed thicknesses in excess of 40mm 1:1 1/2:3 cement: fine aggregate: coarse aggregate by volume, unbonded.

G. Workmanship

1. General

Comply with the recommendations of BS CP 202 and BS CP 204.

2. Preparation

Protect all existing work and approaches with sheets, duck boards or other suitable means.

Clean all bases thoroughly to remove all dirt, dust, rust and oil.

3. Roof screed Preparation

Before laying screed cut shall neat holes through roof slab at low points to effectively drain surplus water. When screed has drained completely, fill and seal holes to approval.

4. Pipes, Conduits Etc.

Where any pipe, conduit, bolt head or other article is to remain buried in the screed, it shall have a strip of wire netting overlaid of sufficient width to extend 225mm each side beyond the pipe etc.

5. Unbonded Screeds

Lay polythene sheet on the base and lap all joints not less than 50mm.

6. Batching and Mixing

Mixes incorporation dense aggregate shall be batched by weight.

The water content of mixes shall be the minimum necessary to achieve full compaction, and low enough to prevent excessive mortar being brought to the surface during compaction.

7. Laying

The screed shall be laid so that the surface is even, smooth and free of ridges, and shall be fully compacted by approved means. Cement shall not be sprinkled on the surface.

Maintain precise levels or falls as required.

8. Joints

Screeds and beds shall be laid in alternate bays not exceeding 10 square meters, limiting the length of each bay to 1 1/2 times the width. The forms used shall be true and square, with steel top surface, securely fixed, and at the edges to ensure that joints are level and close butted. Wherever practicable form a joint to coincide with construction joints concrete base.

9. Tolerances

Sudden irregularities shall not be permitted. The maximum permissible deviation from the designed level or fall shall be plus/minus 3mm in any distance of 2m, non-accumulative.

The roof screed low spots will not be acceptable between drainage outlets.

10. Curing and Drying Out

Immediately after laying protect the surface from wind, draughts and strong sunlight. As soon as the screed has set cover it closely with polythene sheeting and keep it so covered for not less than 7 days.

Do not heat screeds or the building artificially during the first 4 weeks after laying, then raise the temperature slowly.

Prevent damage by following trades.

DIVISION 4

MASONRY

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Division 4**MASONRY****MASONRY MORTAR (04100)****A. Scope**

1. This Section specifies the constituent materials, mixing, handling and testing of mortars for use with precast concrete blockwork.
2. Procedures for the use of mortars with precast concrete blockwork are specified in Section 04220.

B. Performance and Standards**1. Performance**

The constituent materials for mortar shall be subject to the same standards of quality control as those specified for cast-in-place concrete, with regular sampling and testing. Sampling and testing of mortar mixes shall also be carried out to ensure compliance with the requirements of BS 5628.

2. Standards

Cement: Portland cement complying with BS 12, Part 2.
Sand: Naturally occurring sand complying with BS 1198, BS 1199, BS 1200

Water: To comply with requirements of BS 3148.

Colouring Agents: To comply with the requirements of BS 1014.

Plasticisers: To comply with the requirements of BS 4887.

Sampling and Testing of Aggregates: Carried out in accordance with BS 812, Parts 1-4.

Storage and Testing of Mortar Samples: Carried out in accordance with BS 4551.

Strength of Mortar: Complying with BS 5628, Part 1.

C. Related Items

Masonry accessories 04150

Concrete Unit Masonry 04220

D. Submittals**1. Sampling of Materials**

As soon as practicable but at least 8 weeks before the commencement of laying, the Contractor shall arrange for representative samples of sand and cement for the approval of the Engineer. Samples shall be labeled as follows:

- a. Type of material
- b. Name of site
- c. Name of supplier.
- d. Source

2. Compliance of Materials

The constituent materials for mortar shall be subject to the same standard or certification and compliance as those specified in Section 03300 for cast-in-place concrete.

E. Product Handling**1. Storage of Cement**

Cement shall be stored off the ground in a dry structure so as to permit inspection and used in the order of delivery. Cement affected by dampness shall not be used.

2. Storage of Sand

Sand shall be stored separately, according to type, where it will not become contaminated.

3. Reconstitution

Mortars shall be used before the initial set takes place. Any mortar left after this shall be discarded, and on no account shall mortars be reconstituted.

4. Cleanliness

All plant and equipment used for mixing and transporting mortar shall be kept clean. All such containers shall be thoroughly washed out whenever mixing ceases, or whenever there is a change of mix.

F. Materials**1. Cement**

The cement used in mortars shall be:

- Portland cement to BS 12 - Part 2.

2. Sand

Sand for mortar shall comply with the requirements of either BS 1198, or BS 1200 and the grading shall be to BS 1200. Sand which has been in contact with sea-water shall not be used unless the Engineer is satisfied that it has been washed adequately and that no trace of deleterious salts remains.

3. Water

Water shall be clean and free from any harmful impurity, and shall pass the tests referred to in BS 3148.

4. Calcium Chloride

Calcium chloride or additives based on calcium chloride shall not be used.

5. Colouring Agents

Pigments shall conform to the requirements of BS 1014 and shall be premixed with the cement or sand, so as not to exceed 10% by weight of the cement in the mortar, care being taken to ensure that the strength of the mortar remains adequate. Carbon black shall be limited to 3% by weight of the cement.

6. Plasticisers

Plasticisers shall conform to the requirements of BS 4887, and shall be used only with the written approval of the Engineer. Only plasticisers of known chemical compositions shall be permitted. Where permitted they shall be used strictly in accordance with the manufacturer's instructions.

G. Workmanship**1. Proportioning**

The proportioning of the constituents in all mortars for blockwork shall be those given BS 1200 corresponding to the appropriate mix specified by the Engineer in each respective section.

2. Mixing

Every batch of mortar shall be thoroughly mixed and shall be used within 2 hours of mixing.

MASONRY ACCESSORIES (04150)**A. Scope**

1. This Section specifies wall ties for blockwork joints for blockwork.

B. Performance and Standards

1. All materials shall perform as required without deterioration due to dampness of other conditions.

2. Standards.

The Structural Use of Masonry : BS 5628, part 1.
Hot Dip Galvanized Coatings : BS 729

C. Related Items

Concrete Unit Masonry	04220
Metal First Fixing	05010

D. Submittals**1. Samples**

The contractor shall supply samples for the Engineer's approval.

E. Product Handling**1. Delivery**

Materials shall be properly packed and labeled for delivery.

F. Materials**1. General**

The wall ties shall be vertical twisted type constructed galvanized steel strip and shall be obtained from approved manufacturer and complying with BS 1243.

2. Strip Reinforcement to concrete

These shall be woven mesh made from high tensile steel wire with straight tension strands at 19mm centers in widths to suit blockwall used in corners and intersections in blockwall construction.

3. Angles

Angles for support of stonework shall be galvanized steel angles to meet the specification of section 05010.

G. Workmanship**1. Wall Ties & Strip Reinforcement**

Build in ties as specified in Section 04220.

CONCRETE UNIT MASONRY (04220)**A. Scope**

1. This Section covers the performance standards, materials, workmanship and other requirements to be met in the construction of precast concrete blockwork as required for walls and partitions, cavity walls, sills, closing up openings and cavities.

B. Performance and Standards

1. The blockwork is designed, detailed and specified to achieve a performance not less in any respect than that described in BS CP 121, Part 1: code of Practice for Walling, Brick and Block masonry, and BS 5628, Part 1 : The Structural Use of Masonry. Materials and workmanship shall comply with the above Codes of Practice and all relevant British Standards, in particular BS 6073, Parts 1 and 2. Precast Concrete Blocks, as included in his specification, and with the recommendations and instructions of the manufacturer.
2. The constituent materials for precast concrete blocks will be subject to similar standards of quality control to those specified for in-situ concrete work, with regular sampling and testing of cement, sand, coarse aggregate and water, as specified in Section 03300.

C. Related Items

Masonry Mortar	04100
Masonry Accessories	04150

D. Submittals**1. Sample Blocks**

The Contractor shall submit for approval samples of each type of block specified. Sufficient samples shall be provided to show the range of appearance and surface quality within which the blocks shall lie.

2. Sample Wall panels

As soon as possible upon obtaining possession of the site the Contractor shall erect samples of blockwork using the specified mortar.

Sample panels shall be not less than 2m square. Samples shall be produced until the approval of the Engineer is obtained, and the approved sample shall be retained and protected until all blockwork is completed.

3. Testing

All sampling and testing of blocks shall be carried out in accordance with BS 607, Part 1 and the frequency of testing shall be as directed at any time by the Engineer.

Certified copies of test reports shall be submitted as soon as possible after testing.

The testing of all materials used in the manufacture of the blocks shall be in accordance with the relevant British Standards and test reports shall be made available if called for by the Engineer.

E. Product Handling**1. Storage of Materials**

The Contractor shall provide storage for all materials suitable for their respective kinds. Cement delivered in bags shall have a weatherproof store having a raised timber floor. (a concrete floor will not be permitted) to avoid any presetting of the material.

Storage shall be so organised to ensure a turnover of stocks on the basis of first delivered, first used. All masonry accessories shall also be stored under cover.

Sands shall be stored separately according to grade, on a prepared base that will prevent the possibility of contamination, particularly from soil.

Blocks shall be stored in stacks on a prepared base.

All deteriorated blocks shall be removed from site.

2. Maturing

No blocks shall be built into the structure until 21 days have elapsed from the completion of the manufacturing process allowing a longer period if possible.

No "hot" blocks shall be delivered to site.

F. Materials**1. Precast Concrete Hollow Blocks**

The hollow blocks shall be made with an approved block making machine and the blocks and their constituent materials shall conform in all respects with BS 6073, Part 1. The blocks shall be of the following work sizes:

400 x 200 x 200 Hollow

400 x 200 x 150 Hollow

400 x 200 x 100 Hollow

400 x 200 x 60 Hollow

And shall be of a minimum compressive strength of 60kg/cm².

The hollow blocks shall be minimum 60 minute fire rated where directed by the Engineer.

2. Blocks for Plastering or Rendering

Blocks which are to be plastered or rendered shall have a coarse surface, suitable in all respects to receive plaster or render.

3. Brick tiles

Brick tiles shall be as manufactured by Muller industries, type (Marseille) or equivalent approved by the Engineer.

4. Cement

Grey cement and white cement shall conform to the requirement of BS 12 and shall be delivered to site in sealed bags.

5. Aggregate

Aggregate shall be obtained from approved sources which shall be capable or supplying adequate guarantees of a consistent quality throughout the contract. The aggregates shall be one or more of the aggregates listed in paragraph 5.2 BS 6073, Part 1, and shall conform with the British Standards listed therein appropriate to the selected aggregate.

6. Water

Water shall be clean, free from impurities and shall pass the tests referred to in BS 3148.

7. Other Materials

The specification for other materials used in concrete blockwork construction is to be found in the Section listed below:

Masonry Mortar	04100
Masonry Accessories	04150
Joint Sealers	07900

G. Workmanship

1. Precast Concrete Blockwork

a. Laying and Jointing: Generally

Lay concrete masonry units with full mortar coverage mix (1:4) on horizontal and vertical face on the units.

Construct walling with all materials fully bonded or tied together and joints filled to ensure compliance with design requirements for stability and strength. Block walls are to be full height, floor to underside of roof, unless otherwise detailed, made good around all services.

b. Accuracy

Blockwork, unless specified otherwise by the Engineer, shall be constructed to the tolerances given below. Notwithstanding the above, all work shall be set out carefully to ensure satisfactory junctions and joints with adjoining or built-in elements and components.

Tolerances:

i. Length

Up to and including 5m, plus or minus 10mm.

Over 5m up to and including 10m, plus or minus 15mm.

ii. Height

Up to and including 3m, plus or minus 5mm.

Over 5m up to and including 6m, plus or minus 15mm.

Over 6m, plus or minus 20mm.

iii. Straightness

In any 5m (not cumulative), 10mm.

iv. Vertically

In any 8 courses, plus or minus 5mm.

Blockwalls shall not deviate more than 10mm from the vertical in their full height.

c. Height of Lifts

No portion of any section of the work shall rise more than 1.2m above the general level at any time: Between levels during construction the work shall be racked back. The maximum height of blockwork that shall be built in a day is 1.5m.

d. Bonding

The walls shall be built in stretching half lap bond when not specified otherwise. Setting out shall be carefully predetermined so that full length blocks occur beneath lintols.

e. Pointing

Samples of pointing to be approved by the Engineer.

f. Built-in Work

Built-in items such as door jamb, louvres, access doors, lintols, steel plates shall be grouted solidly into masonry work.

g. Interruption of the Works

Freshly laid work shall be adequately protected at the completion of each day's work and at any interruption caused by rain or any other factor.

h. Curing

As laid, the work shall be kept continuously damp by sprinkling for not less than 2 days, or such other method as the Engineer may approve.

j. Appearance

- i. Blocks shall have unbroken arises and flat surfaces.
- ii. Use solid blocks when cutting is required at jambs, junctions and closing of cavities ends.
- iii. Putlog scaffolding will not be permitted.

k. Colour

Unless the wall is to be painted or coated, blocks of varying colour shall be evenly distributed throughout the work so that no patches appear. Different deliveries which vary in colour shall be mixed to avoid horizontal stripes and racking-back marks.

l. Chases and Holes

Chases and holes where permitted blockwork shall be in approved locations. They shall be cut cleanly without damage to the wall, using suitable tools, to the smallest practical size and not more than:

- i. Horizontal and diagonal chases, 13mm depth.
- ii. Vertical chases, 25mm depth.
- iii. Holes, 300mm square.

- m. Anchors
 - Provide continuity at corners and wall intersections by use of prefabricated "L" & "T" sections. Anchor walls to concrete members horizontally and vertically with "L" shaped anchors.
- n. Seismic system
 - Constructives dispositions of Masonry shall be applied according to the seismic regulations of PS92 (Règles de Construction Parasismique, item 12.3) the Contractor shall submit shop drawings for approval.

2. Brick tiles

Brick tiles shall be true and free from deleterious cracks, laminations, cavities and block core.

Brick shall be laid on wood backing fixed on concrete, as shown on drawing.

The work shall be executed as per manufacturer's instruction and by an experienced skilled and to the approval of the Engineer.

DIVISION 5

METALS

DIVISION 5**METALS****INDEX**

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05500	METAL FABRICATIONS	A-5/7

Division 5**METALS****METAL FIRST FIXING MATERIALS (05010)****A. Scope**

1. This section specifies metals used in first fixing of all items specified elsewhere in this Specification.
2. Metals included are mild steel, galvanized steel, aluminum and stainless steel.

B. Performance and Standards

1. All metals used in the Works shall comply with all relevant British Standards whether or not listed in 05010F below.

C. Related Items

Metal Finishes 05030

D. Submittals

1. Samples
The Contractor shall submit any samples called for by the Engineer.

E. Product Handling

1. All materials shall be handled, stored, transported and protected as necessary to prevent damage or deterioration.

F. Materials**1. Steel**

Mild steel sections shall conform to BS 4: Part 1, or rolled from steel to BS 4360 or ASTM A283, ASTM A 786.

Mild steel angles shall conform to BS 4848, Part 4 or ASTM A 36.

Square hollow sections shall conform to BS 4848, Part 2 or ASTM A 53 Schedule 40.

Circular hollow sections shall conform to BS 1387.

2. Cold Rolled Steel

Cold rolled steel sections shall generally conform to BS 2994 or ASTM A 500, Grade 5. Galvanized cold rolled steel shall be made from galvanized sheet to BS 2989.

3. Galvanized Steel

Galvanized steel, not required to be galvanized after manufacture of the complete item shall be to BS 2989. Hot dip galvanized coating shall be to ASTM A 123 Table 1 or ASTM A 153 Table 1.

4. Aluminum

Wrought aluminum shall be of the alloys stated and shall conform to:
 Angle Channel, I and T Sections - BS 1161.
 Plate Sheet and Strip - BS 1470.
 Drawn tube - BS 1471.
 Bars and Extruded Round Tubes and Sections - BS 1474 or ASTM B 221.
 Alloys 6061-T6 or 6063-T6

5. Stainless Steel

Bars to ASTM A 276, Type 316L.
 Plate to ASTM A 167, Type 316L.
 Fasteners to ASTM F 593, Type 316L.

6. Iron Casting

Gray iron casting shall conform to ASTM A48, class 30.
 Malleable iron castings shall conform to ASTM A47, Grade 32510.

7. Brackets, Flanges and Anchors

Brackets, flanges and anchors shall match the supporting rails.

8. Fixings and Fastenings

Fixings and fastenings shall be of adequate size and frequency to provide the necessary stability and strength.

Unless otherwise specified fastenings are to be of the same metal as the item being fixed with matching finish or coating.

Steel bolts and nuts shall conform to BS 4190 and have 150 metric screw threads conforming to BS 3692 or ASTM A 307.

Machine screws and nuts shall conform to BS 4183 or to FS FF-S-92.

Anchor bolts shall be approved by the Engineer.

Self-tapping screws shall conform to BS 4174 or FS FF-S-92.

Wood screws shall conform to BS 1210 or FS FF-S-111 flat head carbon steel.

Drilled in expansion anchors: shall conform to FS FF-S-325, Group VIII Type I and machine bolts complying with FS-B-575 Grade 5.

Concrete inserts threaded or wedge type, galvanized ferrous castings, either malleable iron ASTM A 47 or cast steel ASTM A 27. Provide bolts, washers and shims as required, hot dip galvanized, ASTM A 153.

Drilled-in Expansion Anchors complying with FS FF-S-325 - Group VIII, Type 1, and machine bolts complying with FS-FF-B575.

G. Workmanship**1. Quality of Work**

Fabricate metalwork carefully and accurately to ensure compliance with design and performance requirements, using types and grades of metal appropriate for the purpose. Finished work must be free from distortion and cracks. Use proprietary products to manufacturer's recommendations.

2. Corners

Unless specified otherwise, miter junctions of identical sections. Miters shall be precisely formed and true in plane.

3. Holes

Holes for metric bolts and screws to be sized to BS 4186, medium fit series, unless specified otherwise.

4. Cleaning

Remove all burrs and sharp arises which would be visible after fixing or a hazard to the user.

5. Riveted Joints

Riveted joints shall be drawn tightly together, with rivets closed to completely fill holes.

6. Mechanical Joints

Mechanical joints shall be tight with no visible gaps.

Where screw heads will be visible after component is fixed, or raised screw heads would interfere with any moving part of component, use countersunk machine screws unless specified otherwise.

Mechanical Joints of components which will be located externally shall be bedded in bedding compound, including all mating surfaces, cleats and other fixings.

7. Welding of Steel**a. Thoroughly clean surfaces to be welded.**

Ensure accurate fit using clamps and jigs where practicable. Use tack welds only for temporary attachment unless specified otherwise.

Make joints with parent and filler metal fully bonded throughout with no inclusions, holes, porosity or cracks.

Completely remove all traces of flux residue and slag.

b. Spatter.

Prevent weld spatter falling on surfaces of materials which will be self-finished and visible in complete work.

c. Butt Welds.

Butt welds which will be visible in completed work shall be finished smooth flush with adjacent surfaces.

d. Metal arc welding to BS 5135, or other equal subject to approval.**e. Do not weld, braze or solder on site without approval.****8. Site Dimensions**

Site dimensions must be taken before starting where necessary to ensure proper fit and relationship to other parts of the building elements.

9. Compatibility of Materials

Where different metals which are incompatible are in contact, then the Contractor shall introduce a separating membrane or coating between the contact faces.

Before fixing apply two coats of bitumen solution, or mastic impregnated tape, to surfaces of aluminum in contact with blockwall, concrete, plaster, render, or non compatible metal.

METAL FINISHES (05030)

A. Scope

1. This section covers the following types of finish to the surface of metals except where finishes are specified in other sections of the work:
Galvanizing; zinc spraying;
Anodizing.
Works Priming.

B. Performance and Standards

1. All finishes shall be applied in conformity with the recognised best methods in the trade; in the case of coatings shall measure up to the specified density and/or thickness; shall where so specified afford the intended protection to the metal; shall, where required for decorative purposes, present a uniform, even and unblemished surface; and shall maintain its specified quality on all surfaces including arisses, joints, internal corners and wherever the protection or decorative effect is required.
2. All finishes shall withstand all conditions of temperature, humidity, solar radiation, sand abrasion and other conditions that can be expected at the Site, to the extent that is generally accepted as good quality and good practice.

All finishes shall conform all current relevant British Standards with particular reference to the following:

BS CP 3012 Cleaning and Preparation of Metal Surfaces.

BS 729 Hot Dip Galvanised Coatings on Iron and Steel Articles.

BS 1615 Anodic Oxidation Coatings on Aluminum.

BS 1706 Electroplated Coatings of Cadmium and Zinc on Iron and steel.

BS 2569 Sprayed Metal Coatings: Parts 1 and 2.

BS 2989 Hot-dip Zinc Coated Steel Sheet and Coil.

BS 3698 Calcium Plumbate Priming Paints.

BS 2987 Anodic Oxide Coatings on Wrought Aluminum for External Architectural Application.

BS 4232 Surface Finish of Blast-cleaned Steel for Painting.

BS 4479 The Design of Metal Articles that are to be coated.

BS 4652 Metallic Zinc-rich Priming Paint.

BS 5493 Code of Practice for Protective Coating of Iron and Steel Against Corrosion.

BS 6001 Sampling procedures and tables for inspection by attributes.

ASTM A123 Table 1, Hot dip galvanizing.

ASTM B633 Electro-galvanizing.

ASTM A446 Hot dip galvanizing steel sheet.

ASTM A153 Table 1, Galvanizing coating on iron and steel hardware.

ASTM A383 Table 1, Galvanized coating on assembled steel products.

SSPC Good Painting Practice.

SSPC Systems and specifications.

C. Related Items

Metal Materials 05010

Metal Fabrications 05500

D. Submittals**1. Samples**

The Contractor shall provide the Engineer for approval with any samples called for to demonstrate the quality of the metal finishes, and shall only proceed with the generality of the work when the relevant samples have been approved.

In particular, samples shall be provided to enable selection to be made of colour and tone of Aluminum works..

2. Guarantee of Anodizing or Powder Coated Finish

The firm carrying out anodizing or powder coated works shall be an approved specialist firm who shall furnish to the Engineer a written guarantee against failure of the finish over a ten year period subject to reasonable maintenance by the Employer as recommended by the specialist firm.

Information on processes and methods shall be submitted as detailed in G3 below.

E. Product Handling**1. General**

Prevent all damage to surfaces.

2. Protective Film

Apply protection film to all exposed bright work or Aluminum works. The film shall be applied prior to site delivery and completion of the Contract without leaving adhesive remnants on the protected item.

The requirements in respect of handling and temporary protection set out in Appendix G of BS 3987 relating to Aluminum works shall be strictly complied with.

F. Materials**1. Galvanized Steel Sheet**

Galvanized steel sheet, not required to be galvanized after manufacture of the completed item, shall be to BS 2989.

2. Galvanized Works

Unless otherwise described, work specified to be galvanized shall be galvanized after manufacture or fabrication by immersion in a zinc bath in one operation in accordance with BS 729, to produce a coating not less than 200 micron.

3. Anodizing of Aluminum

a. All anodic coating and sealing of Aluminum members shall conform to the requirements of BS 3987 and BS 1615.

b. The work shall be carried out by a firm approved by the Engineer.

c. Anodizing shall be by the 'hard' integral process. The Kalcolor, Analok or Duranodic processes, applied in each case to the appropriate Aluminum alloy, will be acceptable. The Contractor shall be responsible to ensure that the correct alloy is used and that the anodizing firm and the manufacturer of the articles to be anodized are mutually satisfied on this point. The Engineer shall be informed of the selected process.

d. The thickness of the anodic coat shall be an average of 25 microns, and not less than 21 microns.

- e. The colour and surface texture of each category of anodized items shall be selected by the Engineer by reference to approved samples. The texture of all anodized surfaces shall be mechanically produced, non-directional etched, and shall be satin unless otherwise specified.
- f. The anodizing of any part or component shall be carried out as far as is feasible after that part or component has been fully formed and fabricated.

4. Powder Coated Finish of Aluminum

The procedure of powder coated shall be as follows:

- a. After decreasing and cleaning, the profiles shall undergo a chemical conversion treatment.
- b. The thermo-hardinry polyester powder coated shall be applied under an electrostatic pulverisation field.
- c. Then the complete polymerisation of the polyester powder shall be obtained by heating in an over to a temperature of + 190°C.
- d. The coating thickness shall be 60 microns.

5. Works Priming of Steel

Primer for steel, shall apply, and is to be painted on site shall be calcium plumbate primer to BS 3698.

G. Workmanship

1. General

All finishes shall be properly applied to give a surface free from distortion or cracks, and shall be subject to strict quality control.

Making good of damaged finishes shall only be done with the agreement of the Engineer and by approved methods.

Where making good is not agreed, the damaged component shall be removed and replaced.

2. Preparation

All metals shall be carefully and thoroughly prepared for the finish that is to be applied including cleaning and removal of dirt and loose particles by hand, power driven carborundum discs, wire brushes (where steel is being prepared wire brushes must have steel bristles) etc. All welding slag, weld spatter, anti-spatter compounds, paint, grease, flux, rust, burns and sharp arisses shall be removed. All defects which would show after application of the finish shall be made good.

3. Anodizing

The anodizing shall present a uniform appearance of all visible surfaces in a colour and texture corresponding to the approved sample for the item concerned, and within the range of tolerance for colour and texture demonstrated by the approved tolerance samples. The extent of 'significant' surfaces, as defined in BS 1615, shall be agreed between the manufacturer and the anodised, and approved by the Engineer, as shall the position and size of contact marks. All necessary pre-anodic treatments to achieve the required textural finish shall be carried out. The film of anodising shall be free of inter metallic particles, resistant against pitting and bloom, and free from banding or streaking.

The sampling procedures applied to general production for acceptance of the product by the Engineer shall be agreed with the Engineer and shall be in accordance with guidance given in BS 6001.

4. Powder Coating

The powder coating shall present a uniform appearance of all visible surfaces in colour and texture corresponding to the approved sample for the item concerned. Within the range of tolerance for colour and texture demonstrated by the approved tolerance samples.

5. Works Priming

See sections 09900 for full Painting Specification. Entirely coat the whole of the fabricated steelwork, prior to assembly, including all contact surfaces, with specified primer, applied to prepared surfaces which shall be clean and dry.

METAL FABRICATIONS (05500)**A. Scope**

This section covers metal fabrications but not limited to the following:

- Metal ladders
- Balustrades and handrails
- Corugated sheet cover
- Lift
- Features.

B. Performance and Standards

1. All handrails, balustrades and other metal work shall be designed to withstand an intensity of load on the top rail of 740N/m whether cast iron or steel fabrication.
2. All work shall be as approved by the Engineer.
BS CP 3 chapter V, Part 1 and BS 6180.

C. Related Items

Metal Materials 05010

Metal Finishes 05030

D. Submittals**1. Samples**

The Contractor shall supply such samples as the Engineer may require, fully finished except where the finish is to be site applied.

2. Shop Drawings

The Contractor shall provide at his own expense all layout and detailed drawings as required by the Engineer. The responsibility and the procedure for submission of drawings shall be as set out in section 01300, Submittals.

Where Site dimensions have been taken prior to the submission of the drawings, Site dimensions which vary from design dimensions shall be given on the drawings and they shall be clearly identified as such.

E. Product Handling**1. Protection and Handling Generally**

Prevent distortion of metalwork during transit, handling, storage and fixing.

Store under cover.

Protect finishes.

Prevent damage to arises, projecting features, and surfaces which will be exposed in the finished work.

Prevent contact with mud, ashes, plaster and cement.

Provide protective coverings as necessary and remove all protection on completion.

Do not use railings as strutting or supports after fixing.

F. Materials**1. All materials shall be as set out in section 05010, Metal Materials.****2. All fabrications shall accord with the Engineer's detail drawings or with shop drawings when these have been approved by the Engineer.****G. Workmanship****1. Quality of Work**

Fabricate metalwork carefully and accurately to ensure compliance with design and performance requirements, using types and grades of metal appropriate for the purpose. Finished work must be free from distortion and cracks. Use proprietary products to manufacturer's recommendations.

Where appropriate, metalwork shall be fabricated with rebates to receive other finishes.

2. Pre-finished Metal

Pre-finished metal may be used if:

a. Finish complies with this Specification.

b. Methods of fabrication do not damage or alter appearance of finish.

c. Finish is adequately protected during fabrication.

3. Corners

Unless specified otherwise, mitre junctions of identical sections. Mitres shall be precisely formed and true in plane.

4. Holes

Holes for metric bolts and screws to be sized, medium fit series, unless specified otherwise.

5. Moving Parts

When assembled all moving parts must move freely and without binding.

6. Cleaning

Remove all burrs and sharp arises which would be visible after fixing or a hazard to the user.

7. Bonding

Prepare surfaces of metals to receive adhesives by degreasing and abrading mechanically or chemically.

Use adhesives to manufacturer's recommendations.

Form bond under pressure.

8. Riveted Joints

Riveted joints shall be drawn tightly together, with rivets closed to completely fill holes.

9. Mechanical Joints

Mechanical joints shall be tight with no visible gaps.

Where screw heads will be visible after component is fixed, or raised screw heads would interfere with any moving part of component, use countersunk machine screws unless specified otherwise.

Mechanical Joints of components which will be located externally shall be bedded in bedding compound, including all mating surfaces, cleats and other fixings.

10. Welding of Steel**a. Thoroughly clean surfaces to be welded.**

Ensure accurate fit using clamps and jigs where practicable. Use tack welds only for temporary attachment unless specified otherwise.

Make joints with parent and filler metal fully bonded throughout with no inclusions, holes, porosity or cracks.

Completely remove all traces of flux residue and slag.

b. Spatter.

Prevent weld spatter falling on surfaces of materials which will be self-finished and visible in complete work.

c. Butt Welds.

Butt welds which will be visible in completed work shall be finished smooth flush with adjacent surfaces.

d. Welding of Steel.

Metal arc welding subject to approval.

e. Welding of Stainless Steel.

TIG welding or other methods subject to approval. Use double level butt welds, backing bars to remove heat, jiggling, tack welds and any other measures necessary to minimize distortion. Remove slight distortion by light hammering, taking care not to damage surface finish.

f. Welding of Aluminum Alloys.

TIG welding or MIG welding or gas welding or other methods subject to approval.

g. Do not weld, braze or solder on site without approval.**11. Site Examination**

Site dimensions must be taken before starting where necessary to ensure proper fit and relationship to other parts of the building elements.

12. Compatibility of Materials

Where different metals which are incompatible are in contact, then the Contractor shall introduce a separating membrane or coating between the contact faces.

Before fixing apply two coats of bitumen solution, or mastic impregnated tape, to surfaces of aluminum in contact with brickwork, concrete, plaster, render, or non compatible metal.

13. Fixing**a. Position metalwork accurately, plumb, level and true to line. Fix securely to prevent pulling away, deflection, or prevent other movement during use. Do not distort when tightening fastenings.**

14. Cast iron Railings and Handrails

- a. Fabricate railings and handrails to comply with requirements indicated for design, dimensions, details, finish and member sizes, including wall thickness of pipe, post spacings and anchorage, but not less than required to support structural loads.
- b. Interconnect railing and handrail members internal connectors units.
- c. Provide wall brackets, end closures, flanges, miscellaneous fittings and anchors for interconnections and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.
- d. For railing posts set in concrete, fabricate sleeves less than 150mm (6 inches) long and with steel plate closure welded to bottom of sleeve.

15. Lift

All materials used in this work shall be as specified in their relative section.

16. Miscellaneous Steel and Structural Steel

- a. Furnish and install steel framing, posts, bracing, brackets, columns, beams, girders, plates, angles, channels, closures, brackets and miscellaneous steel indicated on the drawings or described in this specification.
- b. Miscellaneous steel shall include required support steel for the work of this section, and for the work of other sections.
- c. Steel members shall be of such shapes and sizes indicated on the drawings and details or as required to suit the condition and shall be provided with necessary supports and reinforcing such as hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly support and rigidly fasten and anchor same in place and to steel, concrete, masonry and other connecting and adjoining work.
- d. Equip units with integrally welded anchors for casting into concrete or building in to masonry. Space anchors 300mm on center and provide minimum anchor units of 31.6mm by 6.4mm by 200mm steel straps.
- e. Steel shall be of domestic source conforming to ASTM A36 or equivalent.
- f. Included under this heading of miscellaneous steel are:
 1. Steel angles for framed opening in floors.
 2. Steel angles and plates for pipe and duct protection.
 3. Elevator tie down and machine beams.
 4. Steel supports for cladding if directed by the Engineer.
 5. Plaster stops.

DIVISION 6
WOOD AND PLASTICS

DIVISION 6
WOOD AND PLASTICS
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Division 6**WOOD AND PLASTICS****ROUGH CARPENTRY (06100)****A. Scope**

1. The work covers Sub-frame, rough framings, blocking and grounds, etc ... whether shown on drawings or as commonly necessary in the proper execution of the work of the Contract. The work covers traps ... etc and as shown on drawing.

B. Performance and Standards

1. All members shall be employed, secured, jointed as in most appropriate, and constructed so as to transmit the loads and resist the stresses to which they will be subjected.
2. All materials shall conform to the appropriate British Standards where such standards exist, including:
BS CP 112, Part 2: 1971, The Structural Use of Timber.
BS 1186, Quality of Timber and Workmanship in Joinery.
BS 4471, Part 1: Sizes of Sawn and Planed Timber.
BS 1455, Plywood: Note, Grade 3 acceptable for rough carpentry.

C. Related Items

Architectural Woodwork 06400

D. Submittals

1. Samples
If the Contractor wishes to use a timber outside the range of timbers specified he shall obtain the Engineer's approval of the proposed timber.
2. Drawings
Where appropriate, shop drawings shall be submitted for approval.

E. Product Handling**1. General**

All timber shall be handled, stored and protected as specified in section 06400.

F. Materials**1. Seasoning and Treatment**

All timber used in rough carpentry, whatever its use, shall be properly seasoned and treated with preservative as specified in section 06300, Wood Treatment.

2. General

The timber shall in every case be appropriate to its use, free from pitch pockets, splits, loose, decayed or dead knots, knot holes, knots exceeding half the width of the face on which they occur, rot, beetle attach, and warping detrimental to its specified use.

3. Softwood

Softwood shall be Douglas Fir, European Redwood, Longleaf pine or other equal approved.

4. Nails

Nails shall comply with BS 1207, Part 1, of a type to suit each case.

5. Screws

Steel screws shall be finished to resist corrosion.

G. Workmanship**1. General**

All rough carpentry shall be soundly constructed and firmly fixed and shall be properly sized, to perform its intended function, all to the complete satisfaction of the Engineer. All work shall be full to the dimensions stated, whether wrought or unwrought.

ARCHITECTURAL WOODWORK (06400)**A. Scope**

1. The work covers sub-frame, rough framings, blocking and grounds, etc., whether shown on drawings or as commonly necessary in the proper execution of the work of the Contract.

B. Performance and Standards

1. The Design, Materials and Workmanship of all woodwork shall comply with the provisions of BS 1186, Parts 1 and 2: Quality of Timber and Workmanship in Joinery. Where better quality is required this will be noted subsequently in this Specifications.
2. Hardwoods
BS 1186, exposed surface Class 1 in Appendix C. (clauses 8,9,10,11,15,16 shall read 'not permitted').
3. Plywoods
BS 3444, bonding type BR, long grain.
4. Chipboard
BS 2604, minimum density 480 Kg/m³.
5. Hardboard
BS 1142, section 2.
6. Adhesives
BS 1204, Part 1 Gap filling, Part 2 close contact bonding WBP.
7. Decorative Laminates
BS 3794, Class 1 material.

C. Related Items

Rough Carpentry 06100

D. Submittals**1. Samples of Timber**

The Contractor shall provide for the Engineer's approval samples of each species of timber he wishes to use, in accordance with the Specifications.

Each sample shall be labeled to indicate its species and the purpose for which it will be used, and country of origin. Where the indicated use is for a component which is specified as requiring a wood treatment, the sample shall be treated and the labeling shall indicate the treatment.

Where the indicated use is for a component which is to be stained, clear sealed, polished or otherwise finished so that the grain and character of the timber is apparent, two samples shall be provided, one unfinished and one finished.

Each sample shall be a piece 1.5m long; its cross-sectional profile shall accord with its intended use or, where the species will have a variety of uses, shall be not less than 75 x 35mm in section. Approved samples shall be regarded as representative of the quality and characteristics of the timber that shall be used in the work.

2. Alternative Timbers

If the Contractor wishes to use a timber outside the range of specified timbers he shall submit for approval samples of the species for which it is an alternative.

3. Wood Veneer and Melamine Samples

Samples of each type of veneer and melamine shall be submitted for approval.

The samples shall be 1m x 1m applied to their specified backing, and shall have two adjacent edges finished as they will be in the work, including concealed or exposed lipping, chamfering etc., and showing the method of forming and finishing corners.

Where these materials are specified to receive an applied finish half of the sample is to be so finished. In addition to the above samples the Contractor shall submit samples, not less than 200 x 200mm, to show the extremes of colour or grain variation in wood veneers.

4. Other Board and Sheet Samples

Samples, 1m square and with one half finished as may be specified, shall be provided for approval of each type of hardboard, plywood, blockboard, chipboard or other board or sheet material specified, or which the Contractor wishes to use appropriately labeled as in D1 above.

5. Ironmongery Samples

Note: This clause is to be read in conjunction with relevant clauses in sections:

Aluminum Doors and Windows 08120-08520

Ironmongery 08700

Samples of all ironmongery used in the joinery work, whether specified or not, shall be submitted to the Engineer for approval. When approved, a corresponding set of samples, labeled as being approved, shall be lodged with the joinery manufacturers concerned.

6. Prototype Components

For all repetitive items a prototype full sizes is to be prepared for approval, which must be obtained before the main production of each item is commenced.

7. Drawings

Before fabrication is commenced shop drawings of each item which requires such drawings are to be submitted to the Engineer for approval. The drawings shall be fully dimensioned and shall indicate those dimensions which have been ascertained by Site Measurement. They shall be specific as regards indication of materials and compliance with Standards and Specification clauses as appropriate. Methods of fixing and relationship to adjacent components shall be as shown as necessary.

8. Manufacturer's Data

Data covering Specification, recommendation and instructions shall be submitted for the Engineer's consideration on manufactured components, proprietary fittings, sheet, board and laminate materials and adhesives. Where applicable this data shall indicate compliance with the Specification.

9. Certificates

The Contractor shall supply certificates of assurance that all specified preservative and flame retardant treatments have been carried out.

E. Product Handling**1. Handling Generally**

All materials and components shall be carefully handled at all times at Works, during transportation and storage and on Site to prevent damage. Any damaged or defective item shall be removed from Site and replaced at no additional cost.

2. Identification

Fabricated items shall be clearly identified by marking or secure labeling, but marking shall not be applied to any surface which will be visible in the finished work.

3. Protection

Joinery shall be stored in the manufacturer's factory stores before delivery and shall be given waterproof cover during transit and at all times kept dry. Timber and woodbase sheet materials shall be stored in stacks with provision for air circulation within stacks. The bottom of stacks shall be protected against contact with damp surfaces.

All necessary precautions are to be taken to protect timber products from fungus or insect attack before, during and after incorporation in the work. Joinery shall be protected from damage with approved temporary covering.

4. Delivery to Site

No joinery shall be delivered to work Site until conditions are suitable.

F. Materials**1. Softwood**

Softwood shall conform to BS 1186, Part 1, Class 2. Exposed surfaces shall be as defined in Appendix C. Softwood shall be kiln dried, free from Sapwood, pitch pockets, and Wayne edge.

It shall be free of splits, ring shakes, knots exceeding 25mm diameter or exceeding half the width of the face on which they occur, loose or decayed or dead notes or knot holes unless cut out and plugged.

The softwood shall be of low resin content. The species of timber shall not be mixed unless so specified in any group of items.

2. Hardwood

Hardwood shall conform to BS 1186, Part 1, with exposed surface conforming to Class 1 as defined in Appendix C, subject to the proviso that clause numbers 8,9,10,11,15 and 16 shall read 'not permitted'. The material shall be kiln dried, free from Wayne edge, warping, brittle heart, rot stain (in so far as this will affect the finished appearance only) and beetle attack. Isolated sound tight knots will be permitted provided they do not occur on joints or on visible surfaces.

3. Plywood

Plywood generally shall comply with the requirements of BS 1455, bonding type WBP, Grade 1 face veneer having the grain of the face parallel to the long dimension of the board. The thickness shall be as indicated on the drawings and in no case shall be less than 5mm. Manufacture shall be by the dry-cementing process.

Where plywood is specified on the drawings as 'Resin Bonded' it shall be similar in all respects to a material complying with BS 1088, Plywood for Marine Craft.

4. Blockboard and Laminboard

Blockboard and laminboard shall be to BS 3444, bonding type BR, Grade 1 face veneer, having the grain of the face parallel to the long dimension of the board. The face veneer shall be approved by the Engineer. The thickness of the board shall be as shown on the drawings.

Where the edges of the board are exposed in the work they shall be lipped in hardwood matching the face veneer and shall show 9mm thickness on the board face.

5. Chipboard

Chipboard shall be resin bonded, having a density of not less than 480 Kg/m³, and shall comply with the requirements of BS 5669. Thickness shall be as shown on the drawings.

6. Fire Resistant Mineral or Extruded Particle Board

Fire resistant cores shall be mineral or extruded particle board and have a Class 0 fire rating with all the properties, strength etc., as required by the contract or as directed by the Engineer.

7. Hardboard (MDF)

The various type and qualities of fibre boards shall comply in all relevant respects with BS 1142, fibre building boards, for insulating board, standard hardboard and medium hardboard in accordance with section 2 that standard.

8. Veneers

Wood veneers shall be of the timber varieties shown on drawings: all sheets of one variety shall come from the same source. Veneers shall be hard, free from disfiguring defects to the satisfaction of the Engineer, capable of being easily finished to a smooth surface, and consistent in colour and grain.

9. Adhesives**a. General**

Synthetic adhesives for general joinery use shall comply with BS 1204, part 1, gap filling: Part 2 close contact bonding WBA: cold setting with in a range of 10° -25° C, warm setting 25° -90° C. The Contractor shall select the type of adhesive appropriate to the form of jointing to be adopted and to the working temperature to be expected.

b. Plywood, Blockboard, Laminboard: adhesives shall comply with BS 1203, WBP Grade.

10. Nails

All nails and pins shall comply with BS 1202, Part 1 of a type to suit each case. Nails in external work shall be galvanized.

11. Screws

All steel screws shall be finished to resist corrosion by sherardizing, cadmium plating, nickel plating or other approved finish.

Screws shall be protected steel, stainless steel, brass silicone bronze, nickel/copper alloy or aluminum as specified on drawings or as appropriate to the work. Screws for fixing hardware shall match the items being fixed.

Screw heads shall be for the generality of the work, countersunk slotted. Screw heads in the finished work shall, unless otherwise described, be brass, bronzed finish with matching fully countersunk brass cups. Phillips cross-head screws or pozidrive screws shall be used where so described on drawings.

12. Bolts

Bolts shall be steel and comply with BS 916 and washers to BS 3410, Part 2.

G. Workmanship**1. Quality**

The Contractor shall be responsible for the proper rigid and sound construction of all components and joints including the selection of jointing methods to provide the largest possible gluing area, and the use of suitable and sufficient fixing to all connections.

All joinery shall be substantially fixed to a high standard of accuracy and to Engineer's satisfaction.

2. Site Dimensions

The Contractor shall take all necessary Site dimensions to ensure an accurate fit of all items.

3. Building Tolerances

The Contractor shall take note of the agreed tolerances for the structural element of the buildings.

4. Sizes

Timber sections shown on detail drawings are full finished sizes. The Contractor must allow for sawn sizes that will achieve the dimensions required after planing and machining. Grounds, backings, fixing slips etc. may be sawn sections of the size indicated.

5. Preservative Treatment

No converting to smaller sections, planing, rebating etc. will be permitted after treatment, and cutting to length shall be avoided as far as possible. Cut ends, bored holes etc. made after treatment shall have the cut generously swabbed with an approved preservative.

6. Framing and Jointing

The terms 'frame', 'framed' or 'framing' means work put together by proper carpentry or joinery joints such as morticing and tenoning, dovetailing, doweling etc. Butted and screwed or nailed joints or halved and the like will not be accepted for framed work, unless specifically so shown on the drawings.

All joints shall be properly made and accurately machined to give a perfect fit without gaps between shoulders of the joints and abutting surfaces. All joints shall be glued properly under pressure with the best quality glues of the appropriate type, applied in accordance with the glue manufacturer's instructions.

Open joints disguised with filler will not be accepted. Excess glue shall be cleaned off. Glue staining of surfaces that are to receive a clear finish will not be accepted.

7. Timber Finishing

On completion of assembly and gluing-up the surface of all members shall be cleaned off to ensure a true surface, and shall be sanded to ensure that a planner marks, grain texture or joints are apparent after decoration.

8. Arises

All exposed arises shall be finished rounded to a radius of 1.5mm.

9. Matching

Joinery for staining, clear sealing or polishing shall have all surfaces of the same character of grain and similar colour.

10. Bonding of Plastic Laminate Veneers

Bonding must be under pressure using the specified and approved adhesive in accordance with the manufacturer's instructions.

Balancing veneers shall always be used, and for surfaces not visible these can be standard brown laminate veneer mad for this purpose.

Where specified or shown on the drawings that the laminate is carried over the edgings, it shall be brought flush with the face of the edging and then finished with a chamfer at 60° to the face of the panel for the full depth of the laminate.

Panels shall be faced on each side with a single sheet of laminate faces shall be drawings. Finished laminate faces shall be flat and true, free from warping, waving, high or low spots. Spalling of the edge of laminate will not be accepted.

11. Post Formed Laminate

Post forming grade laminate shall used for all post forming work. The work shall be carried out by a specialist in this field.

12. Decorative Wood Veneers

The decorative wood veneers shall be laid at right angles to the grain of the plywood or blockboard backing. The moisture content of the veneer shall match that of the backing.

The veneer shall be finished by fine sanding or scraping to eliminate high spots or undulations.

13. Core Construction

All cores to panels or components shall be solid and of the same material throughout and shall be chipboard, plywood, laminboard or blockboard, as specified or shown on drawings. The core to fire doors shall be fire resistant mineral or extruded particle board as described herein where the drawing indicates a fire resistant requirement. The core shall be in one piece in any one panel.

14. Hardwood Edgings

All cores shall be edged all round with hardwood to match the timber veneer or as specified. Tongues between edgings and cores, whether or not shown on drawings, may be considered as optional and may be omitted if the Contractor undertakes to provide equally strong glued joints without a tongue. Edgings shall applied with adhesive, not panel pins, and shall be sanded flush with the core material before veneering. Exposed corners shall be precisely mitred.

15. Prefabricated Fittings

Fittings such as floor and wall cabinets and cupboards, counters and such like shall be constructed as detailed on the drawings and all constituent materials shall be specified herein. Doors and drawers shall operate smoothly and shall be fitted with minimum tolerances consistent with such operation.

16. Ironmongery and Hardware

Install specified ironmongery and all items of hardware associate with Architectural Woodwork in accordance with manufacturer's instructions and lubricate operating mechanisms as required.

17. Fixing Generally

The Contractor shall fix all joinery items securely and accurately: fixings shall not be visible on exposed surfaces of finished components beyond the extent shown on the drawings. The fixed components shall be plumb and square. The Contractor shall supply all necessary nuts, bolts, screws, rawlbolts, grout, lugs, packings, grounds etc. required to fabricate components and complete the installation.

18. Grounds

Grounds shall be clean sawn hardwood or softwood, free from knots, splayed as required, plugged to walls as necessary to ensure complete firmness, and in continuous lengths, level, even and plumb.

Grounds shall be treated with a preservative as specified in F2 above.

19. Scribing

All skirtings, architraves, cover strips, scribing fillets etc., which are required to have a close butt connection to floor, wall or other adjacent surfaces shall be accurately scribed to fit thereto. They shall be in long lengths, with joints scarfed, mitred on external corners and square butted and scribed at internal corners.

20. Drilling and Plugging

Where fixing to concrete or blockwork etc., (except where plugs are shown on drawings) holes for screws shall be drilled with a rotary drill and plugged with cold caulking compound or approved proprietary plugs. No end grain fixing into timber plugs will be allowed. Where fixing to hollow partitions etc. the method of fixing (by toggle bolt, butterfly bolt, expanding bolt etc.) shall be agreed by the Engineer.

Fixings shall be at such intervals as will provide firm fixing to the approval of the Engineer.

21. Screwing and Nailing

Screw heads in work which is to be painted are to be sunk below the timber surface and stopped. Screws which are visible only on the opening of cabinet or cupboard doors or in other locations as may be approved by the Engineer shall be brass countersunk. Screws fixing panels etc., which may be periodically removed for access purposes shall be brass countersunk with fully countersunk brass cups. Small items such as beads or fillets shall be fixed with brass cups and screws.

Screws in exposed hardwood surfaces generally or any timber which will be stained or clear finished, shall be sunk and pelted with timber of matching species and with the grain of the pellet in the same direction as the grain of the member.

Where nails are permitted they shall be of lost-head type, punched in and stopped with approve hard stopping.

22. Notching

Notching and drilling of joinery members for services, conduits, etc. shall be kept to a minimum and the responsibility for any weakening of members cause thereby shall be the Contractor's.

23. Final Finishing

Ensure after fixing that all work is cleanly finished and ready to receive Site-applied finishes.

24. Timing of Site Work

Joinery work in general shall not be installed until the building is enclosed, watertight and dry to the satisfaction of the Engineer.

25. Defective Work

Should any shrinkage, warping or other defects appear during construction or during the defects liability period, all such defective work shall be made good at the Contractor's expense.

DIVISION 7

THERMAL AND MOISTURE PROTECTION

DIVISION 7

THERMAL & MOISTURE PROTECTION

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THERMAL & MOISTURE PROTECTION

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Division 7**THERMAL AND MOISTURE PROTECTION****A. Submittals**

1. Prior to commencing work, the Contractor shall obtain from the membrane manufacturer full fixing instructions which shall be handed to the Engineer.

B. Product Handling

1. All sheet shall be carefully handled at all times, during transportations, storage and on site to prevent damage. Particular care shall be taken to prevent damage to the edges of sheet.
2. All materials shall be maintained in condition which shall in no way cause deterioration of the material.
3. Any damaged or defective items shall be removed from site and replaced at no additional cost.
4. All product shall be delivered clearly marked and stamped with the manufacturer's brand.

C. Materials**1. Primer**

Primer for sealing concrete surfaces

D. Workmanship

1. Waterproofing system to wet areas shall be liquid rubberized bitumen emulsion reinforced by fibre-glass with special accessories for pipes penetration and protected with sand bed and ceramic tiles.

E. Materials**1. Waterproofing System****a. Wet Areas (bathrooms and kitchen)**

The waterproofing system shall be two coats of rubberized bitumen emulsion reinforced with fibre-glass and shall be applied by roller at the rate of 0.75 kg/m² for each coat and shall be extend to 15cm min. height to walls, with special connection to pipe penetration.

All internal and external angles shall be reinforced with an additional layer of membrane.

2. Bituminous Coating

Solvent type bituminous mastic, normally free of sulfur, compounded for 375 micrometers (15 mil) dry film thickness per coat.

F. Workmanship**1. Protection**

All pipes, conduits, sleeves and other shall be protected.

DIVISION 8
DOORS AND WINDOWS

DIVISION 8
DOORS AND WINDOWS
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Division 8

DOORS AND WINDOWS

STEEL DOORS (08110)

A. Scope

This work shall include for the supply, installation and fixing of steel doors, access doors, steel frames, and others as shown on drawings.

B. Performance and Standards

1. Steel doors shall comply with BS 1245. All mild steel shall comply with BS 4630 and with BS4, Part 1. All sheet steel shall comply with BS 1449, Part 1.
The fire rated doors shall comply with the requirements of the relevant parts of BS 476 and to be acceptable to the Fire Authority.

C. Related Items

Metal Materials	05010
Metal Finishes	05030
Ironmongery	08700
Painting	09900

D. Submittals

1. Samples of Doors
The Contractor shall provide for the Engineer's approval one sample, 200mm long, of each separate profile that is to be used in the work.
2. Drawings
Fully detailed shop drawings shall be submitted to the Engineer for approval before fabrication commences.
3. Ironmongery
The Contractor shall supply to the manufacturer of doors samples of all item of ironmongery as specified which will be fixed to the frame to ensure that proper provision is made for their fixing, and all details are to be given to the manufacturer as to which items apply to which frames.
The samples and information are to be given to the manufacturer before production is commenced.

E. Product Handling

1. Handling Generally

All doors shall be carefully handled at works, during transportation and storage and on site to prevent damage. Any damaged or defective frames shall be removed from the site and replaced at no additional cost.

2. Identification

All doors shall have suitable identification in terms of the door frame schedule marked on them or attached in such a way that the labeling will not easily become detached. Crates shall similarly clearly identify their contents.

3. Protection

The doors are to be suitably protected and crated to prevent damage during transportation and storage. The protection shall be such that doors are not subject to damp.

4. Storage

Storage on site shall be in dry conditions. Doors shall be stored in such a way that they are not liable to distortion caused by undue weight in stacking.

F. Materials**1. Steel**

Doors shall be manufactured from metal angles, plate & sheets, and shall be to BS4, Part 1 and BS 1449, Part 1. Dimensions and frame profiles shall conform to the detail drawings.

Fire rated door, frame accessories and hardware shall conform to S.D.I. 118-88 steel door Institute or approved equal, and shall be rated for minimum 60 minutes.

Fire steel door and hardware shall be of class as manufacturer's recommendations, all as directed and to the approval of the Engineer.

Steel doors shall be insulated with mineral wool insulation and fire rated steel doors shall be insulated with 90 minutes fire proof insulation.

2. Welding

Welding shall be in accordance with BS 693 or BS 5135 as appropriate.

3. Corrosion Inhibiting Coatings

a. Protection coat plus 1 coat calcium plumbate primer to BS 3698, type B or equal approved.

b. At manufacturer's discretion other corrosion inhibiting coatings recommended in BS CP2008 may be offered for approval.

4. Water Bar

Provide water bars to those doors and frames shown on the drawings requiring them.

G. Workmanship**1. Preparation**

Steel shall be free of scale, dust, grease, oil and surface adhesives before priming.

2. Profiles

Profiles shall be formed as shown on drawings and shall be appropriate to the thickness of the doors and windows.

3. Joints

Joints shall be welded to proper lines..

4. Provision for Ironmongery

The frames shall be factory-prepared to receive specified ironmongery.

a. The hinges shall be welded to doors, windows and frames.

- b. Striking plates for the specified locks and latches shall be fitted, complete with mortar guards.
- c. Bolt holes for double doors shall be drilled at works and provided with mortar guards.
- d. Fixings or all other specified ironmongery which fixes to the frame shall be provided, tapped as necessary, reinforced by backplates where necessary, and provided with mortar guards where the fixing penetrates the frame.
- e. The manufacturer shall make provision for and shall fit all items of ironmongery listed for the aluminum doors and the drawings or schedules of ironmongery.

5. Frame Fixings

The provisions for jamb fixing shall be as shown on drawings. In addition there shall be a m.s. horizontal plate at the foot of each jamb welded in all drilled with 6mm holes for fixing down to the floor.

6. Alignment

The doors supplier shall provide a steel for alignment purposes.

7. Fixing

Frames are to be fitted plumb, square, without racking, twist, sag or misalignment. Where frames are built in temporary struts shall be positioned between jambs to prevent bowing.

8. General Quality of Finished Work

Any parts of the installation which are indented, distorted, out of alignment, visible welds not ground flush, or defective in any way shall be rejected and replaced at no additional cost or made good to the satisfaction of the Engineer.

Any damage to the corrosion inhibiting coatings shall be made good immediately on completion of the frame fixing.

9. Painting

Frames shall be zinc-plated hollow steel frames and shall be painted on site in accordance with decoration schedules and with the Specification for Painting in section 09900.

ALUMINUM DOORS AND WINDOWS (08120&08520)

A. Scope

1. The work includes the removal of the existing aluminum doors as shown on the drawing and the supply, installation and fixing of new aluminum doors, windows, mullions, cills, framing and associated work, in accordance with the design drawings.
2. The term "doors and windows" in this section shall also include louvres and frames manufactured in aluminum.
3. The doors and windows shall be obtained from an approved manufacturer and shall be constructed using his standard components and methods of assembly when these have been agreed on submission of design and shop drawings and such samples as are specified here or called for by the Engineer. They shall incorporate all necessary ironmongery, fixing components, operating gear and weather stripping glass and shall be powder centered.

B. Performance and Standards

1. Materials, Goods and Workmanship shall be of the best quality of their respective kinds, and those for which there is a British Standard or Code of Practice shall comply therewith unless otherwise stated. All articles and materials are to be not less than those standards contained in the latest British Standards Institution Specification where such exists. No Workmanship shall be inferior in any way to the standards laid down in the latest British Standard Codes of Practice.

All British Standards and Codes of Practice relevant to aluminum work, window, metalwork and to glazing shall be deemed to form part of this Specification in their entirety, or to a limited extent if so directed. A Contractor's ignorance of any of the provisions of the British Standards or Codes of Practice shall in no way be considered to relieve him of his responsibility to comply with them insofar as they apply.

Materials provided of whatever origin shall comply with the relevant British Standards.

2. The doors and windows shall conform with the requirements of BS 4873.

3. Performance

The Contractor shall have full regard to BS CP 3, Chapter 5, Part 2, Wind Loads, or an equal and approved document when detailing for strength requirements. Reference should also be made in establishing test criteria to Technical Note No.1, "Performance Requirements for Windows", published by the DOE.

Test methods shall be in accordance with BS 5368, depending on the ability to test in the available rig. the procedures in BS 5368 shall preferably be used.

This wind exposure condition to be applied in the following tests shall be:

Pressure Difference 1250 N/m².

- a. Strength

All doors and windows and spandrel elements shall be capable of resisting sporadic pressures from wind gusts as stated above.

There shall be no fracture or permanent deflection of any part, nor any deterioration of specified performance. The deflection/span ratio of any part of a light shall not exceed 1/250 for glazing. However in a vertical load test a concentrated load of 15 kg acting vertically and applied at the centre of the span of any horizontal sash rail shall not cause a vertical deflection of more than 1/375. The max. deflection in case of double glazing shall not exceed 8mm.

These requirements shall apply when the exposed face is subjected to pressure or to suction.

If so required by the Engineer the Contractor shall state the actual deflection ratio of any part of the light at the specified pressure.

The method of test to establish compliance with the above requirements shall be established by transducer.

- b. Air Penetration

For the air permeability test the pressure shall be applied to the outside face only of the window. The maximum pressure to be applied shall be 600 Pa.

For fixed lights the average leakage rate shall not exceed 1m³/h per metre length of perimeter joint.

For opening lights the average leakage rate shall not exceed 6.5m³/h per metre length of perimeter joint.

c. Water Penetration

There shall be no water leakage at a pressure of 200 Pa.

There shall be no water leakage after a repeated gusting test to a pressure difference of 1250 N/m² when tested again with a pressure of 200 Pa.

d. Temperature Conditions

The window may be exposed to variations in ambient still air dry bulb temperature within the extreme limits from -20° C to +50° C.

Any changes in dimension of a window or its parts, due to changes in temperature within the specified limits, shall not affect the performance as specified elsewhere. The Contractor will be required to state the amount of the thermal movement which will occur, and the effect of this movement on the dimensions or shape of system. Allowance should be made assuming that surface temperatures of up to 90° C may be experienced.

e. Movement

There shall be no loss of function or domination of performance as described in this Specification due to:

- i. deflection of the window caused by wind pressure,
- ii. the design deflection of the building structure,
- iii. thermal movement of the building structure.

The design of the fixings, the fixing gap around the window, and manufacturing tolerances shall take full account of the above.

C. Related Items

Metal Materials 05010

Metal Finishes 05030

Joint Sealers 07900

Ironmongery 08700

Glazing 08800

D. Submittals

1. Design Drawings

Design drawings prepared by the Engineer shall form the basis of the manufacturer's design of the doors and windows insofar as they show the basic design requirements including size, configuration, type of opening, and other functional and architectural requirements.

The Contractor shall submit for approval the manufacturer's preliminary design drawings to indicate that the Engineer's design parameters have been met. These drawings shall include full scale details of the extensions or pressings that the manufacturer intends to use, typical details of fixings, and details of sealing and glazing.

2. Shop Drawings

Upon approval of the manufacturer's design drawings fully detailed shop drawings shall be submitted to the Engineer for approval before fabrication commences. The drawings shall show elevations of all units, full-size sections of members, methods of installation and anchorage, locations of operating and other ironmongery, method and material of weather stripping, details of relationship with adjacent work, glazing methods, glass thickness, sealants, and provision of thermal movement. Adequate time in accordance with a program to be agreed by the Engineer shall be allowed between submission of drawings and commencement of manufacture, to take account of comments made and modification called for by the Engineer.

Approval of the shop drawings by the Engineer will not relieve the Contractor of responsibility for fulfilling all the requirements of the design drawings and the Specification.

3. Sample Doors and windows

The Contractor shall supply for the Engineer's approval one complete sample window of each separate window type as will be determined by the Engineer. Each sample shall be completed with all its specified ironmongery and weather-stripping, and shall be glazed with the specified glass. Sample doors and windows shall be finished in accordance with the Specification. When the samples have been approved they shall be so marked and retained on site for reference.

4. Testing

At the Engineer's discretion a sample of any type of door and window he may require shall be submitted to an approved testing authority for tests to determine compliance with the performance requirements specified in B above. Should the door and window not meet these requirements the design shall be modified and further samples re-tested until they are met. Testing and any necessary re-testing shall be at no cost to the Contract. Samples which have satisfactorily passed tests shall be labeled accordingly.

5. Capillarity Data

The Contractor shall provide details of the methods by which capillarity will be controlled, so that the specific performance of the lights and doors is unaffected by this phenomenon.

6. Maintenance-free Period

The Contractor shall state the periods of maintenance-free life of all assemblies. Within the period of maintenance free life, the assembly shall perform at or above the levels specified elsewhere.

The Contractor shall give a recommended method of maintenance, after the expiration of the maintenance free life, in order to ensure that the components shall serve throughout the expected life of the building without loss of performance or appearance.

7. Window Data

The Contractor shall supply the Engineer with copies of all relevant manufacturer's data relating to the window.

E. Product Handling

1. Handling Generally

The doors and windows shall be carefully handled at all times at works, during transportation and storage and on site to prevent damage. Any damaged or defective items shall be removed from site and replaced at no additional cost.

The requirements in respect of handling and temporary protection set out in Appendix G of BS 3987 shall be strictly complied with.

2. Identification

The doors and windows shall be clearly identified in accordance with the window schedules. Identification shall be on a surface which shall not be visible in the finished work.

3. Protection

The doors and windows shall be carefully packaged for transport and when in store shall be properly protected against damage and discolouration.

4. Stacking

When in store the doors and windows shall be so stacked that they will not be subjected to undue stress or liable to distortion.

5. Gaskets

Gaskets shall be suitably protected before and during delivery and during storage by packing in polythene bags to keep free from dust and dirt.

6. Installation

The doors and windows shall be installed in the work only when all relevant conditions are suitable and when the general progress of the work is such that they will not be liable to undue damage.

F. Materials

1. Aluminum Components

All alloys to be similarly finished shall comply with BS 1474 or other equal approved Specification.

Aluminum shall be bronze anodized aluminum profile, colour to the approval of the Engineer.

All extensions shall be of adequate thickness and strength, not only to meet the structural requirements, but also to eliminate any risk of distortion in the finished surfaces. The thickness of extension shall be sufficient to ensure their complete rigidity in the lengths required in the final installation.

No web shall be less than 1.8 mm in thickness.

The aluminum sheet and plate shall be of suitable thickness and quality, suitably laminated where appropriate, to be retained in their position, without showing any deformation whatsoever under thermal influence, windload and any other physical force. Deformation in excess of any tolerances under clause "Tolerances" will not be permitted.

2. Bolts and Screws

All bolts and screws shall be of sufficient strength for their purpose. Visible screw or bolt heads will in general not be permitted. All bolts and screws in contact with aluminum shall be stainless steel.

3. Glass

The glass for opening and fixed parts of the door assemblies shall be in accordance with section 08800, Glazing. The Contractor shall ensure that the type and weight of glass is fully in accordance with regulations for the safe glazing of doors or windows.

4. Weather-stripping

The weather-stripping shall be Neoprene gasket as manufactured strictly in accordance with the recommendations of the raw product manufacturer. It shall be entirely suitable for the performance required of it, easy to install and replace, shall not change its shape or become tacky as a result of aging or temperature variation. Samples of gaskets shall be tested by approved testing firm in accordance with BS 4255.

The gaskets shall withstand water penetration and air penetration under the aforementioned wind load or wind load combined with driving rain and shall have "no leakage" as defined by BS 4315.

Gross leakage shall not be accepted. The clamping pressure shall be designed to be such strength as to allow for the effects of weather aging, normally anticipated to be approximately 25-30%. The reduction of clamping pressure i.e. stress relaxation shall be tested when exposed to a weatherometer test for at least 900 hours under alternating exposure to UVL, ozone and water. The clamping pressure after the weatherometer test shall be such as to provide for a safety factor normally used in structural members.

Gaskets shall be suitably protected before and during storage by packing in Polythene bags to keep free from dust and dirt.

5. Ironmongery

The window manufacturer shall be responsible for the selection of entirely suitable ironmongery which shall be subject to the approval of the Engineer.

All working parts shall be capable of withstanding at least 20,000 operations under the normal conditions of use without causing damage to any part of the window nor showing any applicable sign of wear or defect.

All materials shall be mutually compatible and able to withstand the effects of the climatic conditions of the site.

Metals shall comply with the requirements of sections 05010, Metal Materials, and 05030 Metal Finishes. Ferrous metals shall be rustproofed by approved galvanic methods.

All doors and windows shall be complete with all ironmongery as listed in the window schedules, including butts, locks, internal and external handles, kicking plates and push plates, flush bolts and door/window stops.

The manufacturer shall make provision for and shall fit all items of ironmongery listed for the aluminum doors and the drawings or schedules of ironmongery.

Where ironmongery is not specified for a particular door the provision of section 08520; F5 shall apply.

6. Water Bar

All doors and windows shall have a water bar of aluminum same colour as profile set in mastic.

7. Fixing

Fixing devices, including nuts, bolts, washers, packing pieces, lugs etc. shall be in accordance with the approved shop drawings and shall be in materials conforming with section 05010, Metal Materials.

8. Fly Screens

All aluminum louvres shall be in ordinary anodized colour and supplied with fly screens.

G. Workmanship**1. General**

A high standard of finished workmanship and precision in assembly and fixing of components is required.

2. Dimensions

The overall size of each assembled unit shall be such that with a joint width between structure and unit of 6mm + 0mm - 3mm it shall fit into the actual opening as called for on the Engineer's drawings.

3. Tolerances

The surface flatness shall be established by use of a metal straight edge and a feeler gauge. Permitted deviations from the true shall not be in excess of + 1.00mm non-accumulative. Permitted deviation of window width shall not be in excess of +0.5mm and permitted deviation in window height shall not be more than +1.0mm. Permitted variations in diagonals shall not exceed 1.0mm.

The required testing instruments and appliances shall be placed at the disposal of the Engineer in order to establish compliance.

All finished metal surfaces shall be flat and free from undulations or irregularities.

4. Manufacture

All joints between extrusions shall be carefully machined in the shop. Corners of hinged frames shall be mitred. Carry out all work necessary to ensure closely fitting, straight flush joints in all cases. After fitting together in the shop, all members shall be suitably marked on a concealed face so that they can later be identified on site and fixed in their correct relationship with each other.

Arises where shown on drawings shall be sharp and precise and worked to a radius of no more than 1mm.

Extrusions adjacent to, and in the same plane as, pressings shall be formed so as to have the same radius.

After fabrication all aluminum surfaces to be exposed to view shall be smooth and even in texture, free from superficial blemishes or damage of any kind and ready for the finish specified.

Fabricate all necessary weather stripping, flashings, supports and other component parts required for the complete installation.

5. Fixing

Completely concealed fixing methods shall be adopted as a principle throughout the work. If in isolated cases, face fixings are unavoidable, particular care shall be taken to locate these in unobtrusive positions, where heads of screws or bolts etc., shall be countersunk and finished to match the adjoining exposed aluminum surfaces. Details of all fixings to be subject to Engineer's approval at shop drawing stage.

All members at joints in external work shall be bedded in sealant.

The Contractor shall supply all fixing devices necessary. Due regard must be paid to the wind pressure to be expected and the method of fixing must meet the performance requirements previously specified.

The design shall take account of the building tolerances normally to be anticipated but ensure that the fixings are flexible to take up the tolerances to ensure accurate and straight positioning of the window.

The fixings to the concrete or concrete blocks of steel or other material, as agreed by the Engineer conforming to all statutory requirements both as to strength and to type. They shall be fully protected to prevent corrosion and electrolysis. It shall be the Contractor's responsibility to allow for suitable materials.

In the case of a number units being installed to provide a continuous range, the jointing between adjoining units shall be such that no ingress of air or water shall take place.

All external jointing and screw fixings shall be coated to prevent the incursion of crevice corrosion. Face fixings shall be avoided.

The fixings shall be such that final positioning of the units may be adjusted to provide an accurate whole, truly vertical, in proper alignment and thoroughly secure.

6. Corrosive Action between Metals

No metals likely to cause galvanic or other corrosion must be placed or fixed in contact with the aluminum. Any other dissimilar materials are to be treated to avoid such action between metals.

7. Perimeter Sealing

The joint around the window frame on all sides shall be pointed in polysulphide or silicone sealant backed by joint filler.

8. Glazing

All doors and windows shall be single or double glazed with glass conforming to the Specification in section 08800 and using glazing materials and methods therein specified.

9. Protection

The Contractor will be responsible for the adequate protection of his work until completed and handed over, and particular emphasis is placed upon the importance of avoiding any blemishes whatsoever on the finished aluminum faces.

Any protective tape or coating shall be removed with great care to avoid any damage whatsoever to the finished surfaces of the window.

10. Defective Work

The Contractor shall be required to replace at no extra cost any window which does not come up to the approved sample, or show signs of twisting, or any other defect. The cost shall not fall on the Contract for any fixing, decoration, transferring ironmongery or any other operation consequent upon the replacement of the window. The installation shall be carried out with care to avoid damage to adjacent materials and surfaces.

11. Completion

On completion, all work shall be left clean and free from damage or defect, to the satisfaction of the Engineer.

WOOD DOORS (08210)

A. Scope

The work shall include the supply and fixing of internal wood doors.

If recommended by the Engineer or stated in the B.O.Q.

Frames for wood doors shall be pre-painted steel frames as specified in Steel Doors, or painted wood as shown on drawings.

B. Performance and Standards

1. General

The doors shall comply generally with BS 459, Part 2 and BS 4787.

If recommended by the Engineer or stated in the B.O.Q. The fire rated doors shall comply with the requirements of the relevant parts of BS 476 and to be acceptable to the Fire Authority.

2. Seasoning

All timber shall be well seasoned to a moisture content of approximately 10% plus or minus 2%.

3. Specific Standards

Timber for cores and lipping shall be as defined in Appendix A of BS 1186, Part 1 as being suitable. Plywood shall be MR to BS 1455 paragraph 6, with facings Grade 2 in paragraph 3.

C. Related Items

Steel Doors	08110
Ironmongery	08700
Painting	09900

D. Submittals

1. Sample Doors

Prior to general manufacture the Contractor shall provide for the approval of the Engineer one standard size single door melamine laminate.

In addition to the above the Contractor shall supply one construction sample of each type of door as detailed on the drawings.

When the samples have been approved they shall be so marked and retained on site for reference.

2. Ironmongery Samples

Samples of all approved ironmongery associated with wood doors shall be supplied by the Contractor to the door manufacturer before manufacture is commenced to ensure that proper provision is made for their incorporation, and full details are to be given as to which items apply to which door.

Particular attention is to be paid where concealed hinges are specified in order that the provision for fixing is adequate to withstand stresses set up by the operation of the hinges.

E. Product Handling

1. Handling Generally

The doors shall be carefully handled at all times at works, during transportation and storage and on site to prevent damage. Any damaged or defective item shall be removed and replaced at no additional cost.

2. Identification

The doors shall be clearly identified in accordance with the door schedules. Identification shall be on the top edge of the door.

3. Protection

The doors shall be carefully packaged for transport and when in store shall be properly protected against damage, discolouration, damp and insect attack.

4. Stacking

The doors shall be stacked when in store in such a manner that they will not be subjected to undue stress or liable to distortion, and they shall have adequate air circulation to all faces.

5. Installation

The doors shall not be installed within the building until the building is closed in.

F. Materials

1. Doors

The clauses hereafter shall apply equally to flushed faced or patterned doors.

2. General

All materials shall be in accordance with the requirement of BS 459 and BS 476 for Fire Rated Doors.

3. All doors shall be of MDF laminated board, as shown on the drawings. Doors and fire rated doors shall be 45mm thick.

4. Frames shall be fire rated steel as detailed on the drawings.

5. Core Construction: Timber

Timber cores shall consist of fully glued longitudinal battens, wrought on all faces, of Western Red Cedar or other approved softwood or exotic redwood hardwood.

The laminations shall be tight butted throughout their length: battens shall be continuous through the height of the door except for rails at the top and bottom to which the battens are to be tight butted.

The top and bottom rails shall be framed to vertical jamb members.

The assembled frame shall be precision planed or sanded to a true level surface before faces are applied, and opposite faces shall be truly parallel.

6. Fire Resisting Construction

Materials and components to meet fire resistance requirements to the Fire Authority when tested in accordance with the requirements of BS 476: Parts 20 to 23 inclusive and as appropriate.

Wood doors shall also be treated with flame retardant material applied by brush all in accordance with BS 476: Part 7 or equivalent and agreed. All plywood, hardwood and others shall be treated in accordance with manufacturers recommendations for specific type and thickness of wood.

7. Provision of Ironmongery

Adequate provision shall be incorporated in the core to accept fixings for the specified ironmongery. The provision for concealed hinges, locks and latches shall be such that hinges, lock or latch case shall be entirely surrounded by solid material.

The provision for fixing hinges, door closers and pivots shall in all cases be solid timber, not chipboard or flaxboard.

8. Plywood or Hardboard

The final facing of the door, consisting of melamine laminate, shall be applied to a substrate of plywood not less than 4mm thick, or approved hardboard not less than 3.2mm thick at the manufacturer's description. The substrate shall be fully bonded to the core.

9. Lipping

Doors shall be lipped on all vertical and top edges with lippings not less than 8mm thick. Single swing doors shall have a head lipping to the door and bottom lipping to the panel of adequate dimension to permit the rebate to be accommodated entirely in the lipping, and in any case not less than 25mm thick.

Lipping shall be in hardwood suitable in all respects for the finish to be applied. The lipping shall be of the same species as the melamine laminate and matching it in colour and general appearance.

10. Adhesives

All adhesives used in the manufacture of the doors and windows shall be in all respects appropriate to the duty required of them and the best of their respective types.

G. Workmanship**1. Dimensions**

Doors and frames shall be of the dimensions and profiles shown on the drawings.

The Contractor shall be responsible for coordinating the size of doors with internal width and height of door frames so that the gap between door and frame shall be 2mm at jambs and head, the gap between leaves of double doors shall be 3mm and the clearance between bottom of door and finished floor 3mm.

2. Finish and General Quality

Doors and frames shall be finished flat and smooth, free from undulations, ripples, unevenness, face blistering, other defects and in particular any splitting of the face melamine laminate: in achieving the required finish the manufacturer or the Contractor shall not sand or scrape the faces to the extent that the face melamine laminate thickness is significantly reduced.

3. Painting

The painting of door's frame or other is specified in section 09900.

The paint will be as specified in 09900.

Workmanship shall be in full accordance with 09900 G; particular attention shall be paid to filling of the surface to eliminate grain, as specified in 09900, including board knife filling is required, to the complete satisfaction of the Engineer.

The transparent lacquer for veneered doors shall be applied in accordance with the manufacturer's instructions.

4. Hanging

The recesses for hinges shall be cut accurately to provide correct hanging without the introduction of packing.

5. Morticing for Ironmongery

The mortices shall be minimum size to accommodate the ironmongery.

Mortice for locks and latches shall be on the centre line of the thickness of the doors.

6. Defects

Doors shall be straight and true on all faces, opposite faces shall be parallel, and the doors shall be square. Doors shall be judged for general flatness and for squareness in accordance with BS 5277 and BS 5278 respectively.

The Contractor shall be required to replace at no extra cost any door which does not come up to the approved sample, or shows signs of warping, twisting, undulation, unevenness, face blistering or splitting or any other defects. The cost shall not fall on the Contract of any hanging, decoration, transferring ironmongery or any other operation consequent upon the replacement of the faulty door.

IRONMONGERY (08700)**A. Scope**

1. The work includes the supplying and fixing of all ironmongery and door furniture described in the schedules of ironmongery.
2. All ironmongery shall be subject to the approval of the Engineer as regards quality, compliance with specified standards, functional performance and appropriateness, appearance in terms of finish and of compatibility with other items and availability for spares and replacements.

B. Performance and Standards

1. Ironmongery to be used externally shall not deteriorate in the conditions of temperature/humidity that pertain to the area.
2. Standards
BS 455 & 2088: Locks and latches for doors and performance requirements.
BS 2377: Hinges.
BS 1331 & 4112: Hardware for housing and performance tests.
BS 316: Stainless steel.

C. Related Items

Metal Materials 05010

Metal Finishes 05030

Aluminum Doors and Windows 08120-08520

D. Submittals**1. Samples**

The Contractor shall supply a sample board (or boards) of all listed ironmongery, including locks fitted into door thickness panels for the approval of the Engineer before placing an order for the materials as a whole.

2. Manufacturer's Data

Copies of all manufacturer's published data fixing instructions, etc. shall be lodged with the Engineer.

3. Mastering Schedule

A full mastering schedule shall be submitted to the Engineer for approval.

4. Samples for Door and Frame Manufacturers

The Contractor shall supply samples of approved ironmongery to door, door frame and window manufacturers as specified in Sections, 08211, 08520.

E. Product Handling**1. Packaging**

Ironmongery shall be securely packed and clearly labeled.

2. General Handling

Ironmongery shall be handled at all times to avoid damage, scratches, burred metal, etc. and shall be removed temporarily from surfaces which are to receive paint or other applied surface treatment, to permit these operations.

F. Materials**1. Ironmongery**

The materials shall be to the approval of the Engineer "McKinney" or approved equal. The following materials shall be used as appropriate:

Aluminum Alloy

HE9-TF (extrusions)

NS4-0 (sheet)

HE9-M (stampings), and

LN5 (castings)

Anodized to a minimum of 10 microns.

Stainless steel 18/10/3

Chromium - nickel-molybdenum type.

2. Screws

All necessary screws shall be provided by the ironmongery suppliers. They are to be of the same material as the item they are to fix: screw heads shall match the finish of the adjacent metal and shall be packed with the ironmongery item. Crosshead countersunk screws shall be used where exposed to view.

3. Floor Springs

Floor plates shall not be engraved.

4. Key and Lock Marking

All keys and lock for ends or cylinders shall be engraved for identification as required by the Engineer.

5. Number of Keys

3 keys to each lock.

6. Locksets

Knob locksets shall be 6 line standard duty BHMA certified under ANSI A156 2 series 4000 Grade 2 U2 listed for use on fire doors or approved equal.

7. Automatic door holders and stops

Stops shall be Sargent 1300 series No. 1312 wall type and 1324 floor type or approved equal.

8. Door Closers

Door closers shall be Sargent 1250 and 1251 series standard (S) type or approved equal.

9. Hinges

Hinges shall be full mortise bearing hinges TA-TB2314 steel 5 knuckle type or double acting clamp flange spring butt-hinges No. 1001 or approved equal.

10. Steel hinges

Type TA-TB 2895 steel hinges or approved equal.

11. All ironmongery for all wood doors and closets shall be to the approval of the Engineer.**G. Workmanship****1. Fixing**

All ironmongery shall be fitted strictly in accordance with the manufacturer's instructions.

Screws shall be driven centrally in drilled fixing holes and shall finish true to the face of the fixed item.

2. Security

The sub master and grand master keys are to be dispatched direct to the Engineer by the lock manufacturer.

Keys used by the Contractor during the works shall be held only by responsible persons named as key holders, whose names shall be given to the Engineer.

No keys shall leave the site: when the site is not operating keys shall be kept in a secure place.

3. Damage

Any scratched or otherwise damaged ironmongery shall be replaced.

4. Completion

All ironmongery shall be adjusted, cleaned, oiled and put in proper working order on completion.

GLAZING (08800)

A. Scope

1. This Section describes the glazing of screens, doors, windows and mirrors and covers single and double glazing.
Glass nameboard is covered in this section.

B. Performance Standards

1. All glass shall be in accordance with BS952. Glazing shall comply fully with the recommendations of BS 6262, especially in the selection of appropriate type and thickness of glass having regard to wind load safety under impact.
Toughened or other safety glass shall be used where shown on the drawings or where necessary to comply with BS 6262, Clauses 4.7 and 5.7, and BS 6026, Clause 4.
2. The Contractor shall ensure that all glazed-in materials are of adequate thickness, quality and strength to meet the required standards for wind loading and fire rating.
Exposure up to 1800 N/m² shall be allowed for.
The glass shall not fail under thermal stress or thermal shock caused by part of the glazing being exposed to the sun while another part lies in shadow. This applies in particular to double-glazing units.
3. Unless otherwise directed, all situations where the presence of transparent glass may not be evident, or where the injury or risk of breakage is to be assumed, and in order to avoid the risk of human impact with the glazing, stainless steel discs or other configurations approved by the Engineer shall be adhered to indicate the presence of glass.

C. Related Items

Aluminum Doors and Windows 08120-08520

D. Submittals

1. Samples of Glass
Samples 300mm square of each type of glass specified shall be submitted for approval of colour, texture and pattern only. Compliance with other requirements is the exclusive responsibility of the Contractor.
2. Samples of Glazing Materials
Samples 300mm long of each type of glazing gasket or sealant shall be submitted for approval.
3. Manufacturer's Data
The Contractor shall submit manufacturer's specifications, data and installation instructions, including certified test results where available, for all glass and glazing materials.

E. Product Handling

1. Delivery

All glass shall be delivered to site in proper containers with marker's name, guarantee, type of glass and thickness or weight of glass attached to the outside of the containers.

Safety glass shall be visibly marked to indicate the tested level of impact resistance.

All deteriorated glass shall be removed from site

2. Storage on Site

Glass on site shall be stored in a dry, sheltered location, in felt-lined racks with back support in a near vertical position, secured against wind loading. Stacked glass in opened cases containing glass must not be subjected to direct sunlight which can cause build-up in the stack resulting in thermal stress breakage.

Stacks shall not be more than 500mm deep.

3. Protection

The glass shall be protected at all times from edge damage during handling and installation.

F. Materials

1. General

Glass shall be of uniform thickness, free from waviness, air bubbles and all other defects. It shall be in conformity with BS 952.

Striations, where visible, shall run horizontally.

Glass shall be obtained from "Ford", "Saint Gobain", "Glaverbell" or approved equal.

2. Clear single glass

Clear single glass shall be ordinary glazing quality in accordance with the following table or as shown on drawings.

Nominal Thickness	Thickness Range	Approx Mass
mm	mm	Kg/m ²
6	5.7-6.3	15.0

3. Miscellaneous Glazing Materials

a. Setting Blocks

3mm thick x 75mm long x width to suit rebate details, neoprene or P.V.C. with a Shore a hardness of approximately 70-80.

b. Location pieces and distance pieces

Neoprene or other approved resilient material of not more than 25-30 Shore a hardness.

c. Glazing Compound

Shall be from an approved manufacturer.

d. Gaskets

Gaskets shall be pre-formed sections providing a continuous surround for the glass and a weather tight seal when compressed, and shall be manufactured from Neoprene from an approved supplier.

e. Wash Leather

Wash leathers for the use of fixed glazing in banisters, etc. where not under constant vibration shall be synthetic wash leather from an approved supplier.

f. Glazing Beads

Glazing beads shall be secured with self-tapping screws at distances of not more than 300mm unless fixed by other approved methods.

G. Workmanship

1. General

Watertight and airtight installation of each piece of glass is required, and the glazing must withstand temperature changes, wind loading, impact loading in the case of doors and opening lights, without failure of glass or glazing materials. The recommendations of glass and glazing compound manufacturers shall be followed.

2. Preparation

Rebates and beads must be clean immediately before glazing. Primer or sealer shall be applied to the timber surfaced in contact with glazing compound if so recommended by the compound manufacturer.

3. Measurement and Cutting

The Contractor shall take all necessary site measurements. Safety glass and sealed double-glazing units shall be manufactured to the required size and shall not be cut, nipped or abraded on site. All glass panels shall be cut or manufactured to allow a 2mm gap all round each opening to be glazed, or as otherwise specified by the manufacturer and agreed by the Engineer.

4. Dimensional Tolerances

a. Single and Double Glazing

Glazed units shall be square and the maximum variation shall be plus or minus permissible tolerance for glass shall be plus or minus 3mm out of square and plus or minus 0.5mm in thickness.

5. Installation

Comply with the requirements and recommendations of BS 6262. All glass panes shall be set on setting blocks, centralized by means of location pieces between the edge of the glass and the face of the opening, and spaced equally between the back of the rebate and the bead by distance pieces. The spaced around the edge of the glass shall be completely filled with glazing compound. Tool exposed surfaces of the glazing compound in such a way as to shed water away from the glass, leaving clear smooth surfaces with any excess compound trimmed away.

Securely fix beads on a thin bed of glazing compound with cups and screws as specified for wood doors and windows, or in accordance with manufacturer's details for aluminum doors and windows. Eliminate glazing compound stains and discolourations from glass and all adjacent surfaces.

Glazing materials shall be used in accordance with the recommendations of the manufacturer.

6. Protection and Cleaning

Protect glass from breakage after installation and indicate presence of glass by a form of taping or marking which will leave no mark or stain after eventual removal. Before buildings are handed over remove and replace any broken, damaged, stained or marked glass, however caused.

Wash and polish both faces of glass immediately before hand-over.

DIVISION 9

FINISHES

DIVISION 9**FINISHES****INDEX****COMMENCING
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Division 9**FINISHES****CEILING SUSPENSION SYSTEMS (09120)****A. Scope**

1. The work shall consist of the supply and fixing of new suspension systems appropriate in all respects to each of the types of suspended ceiling employed in the Contract.

B. Performance and Standards**1. Adequacy of Support**

- a. The suspension systems shall be designed to provide substantial support for the ceiling finishes and associated light fittings, grilles, margins and any item forming part of the finished ceilings, in order that the soffit of the ceiling remains permanently true and level within specified tolerances.
- b. The method of fixing the suspension system to the building structure shall be agreed with the Engineer and shall be completely secure.
- c. Where so required the system shall be sufficiently robust to provide fixings and support for mechanical and electrical services suspended within the ceiling voids, and shall be designed and set out to facilitate the integration of such services.
- d. Where partitions terminate at the suspended ceiling level and are not otherwise restrained the suspension system shall be sufficiently robust and suitably braced to provide rigid support to the tops of the partitions.

Wherever possible the bracing shall be two directional forming a 'V' in elevation and 'X' in plan, with 45 deg. angles.

2. Rust and Corrosion Resistance

All members shall not rust and shall not suffer any form of corrosion.

3. Thermal Movement

The system shall make allowance for thermal movement of the ceiling material due to temperature fluctuations deriving from heat emitted by light fittings or from any other cause.

4. Standards

All materials shall conform to relevant British Standards, in particular to those Standards, where appropriate, listed in sections 05010, Metal Materials, and 05030, Metal Finishes. BS CP 290.

C. Related Items

Metal Materials	05010
Metal Finishes	05030
Suspended Ceiling Systems	09515

D. Submittals**1. Data**

The Contractor shall supply the Engineer with duplicate copies of manufacturer's published data, instructions for fixing and assembly and any other relevant information.

2. Samples

The Contractor shall provide samples of components and materials to be used in the work.

A mock-up shall be erected of each type of ceiling, including light fittings, diffusers, etc., as described elsewhere. The mock-ups shall comprehensively include the suspension system, which shall be approved by the Engineer before the commencement of the work in general.

3. Shop Drawings

The Contractor shall submit requisite copies of shop drawings showing all necessary details prior to the commencement of work and shall obtain Engineer's approval.

E. Product Handling

1. All materials shall be handled at all times as to prevent damage. Any damaged materials shall be replaced at no additional charge.

F. Materials

1. Note: The Contractor is referred also to the following sections which include relevant suspension systems:

Section 09515 Suspended Ceiling Systems

2. Materials Generally

Suspension systems shall generally be of hot dip galvanized steel members comprising all hangers, runners, trimmers, bearers, clips, tie wires, bolts and screws necessary to install the ceilings rigidly and to a true and level finish. The use of timber is to be avoided where possible, but if necessary, shall be carcassing grade softwood free from defects, pressure impregnated, rendered fully resistant to termite attack, and of appropriate moisture content.

All cut ends and any damage to protective coatings shall be made good before plastering commences, to ensure that no subsequent staining occurs on adjacent finishes and that no corrosion will occur in the ceiling void on any ceiling components. Should any such defects occur before the end of Defects Liability period, the Contractor will be required, at his own expense, to cut out and make good to the satisfaction of the Engineer, including redecoration of the complete ceiling involved.

In spaces of particularly high humidity, (80 deg. humidity) the members of the suspension system shall be aluminum alloy in lieu of steel.

Wherever dissimilar metals are in contact with each other precautions shall be taken to prevent corrosion from electrolytic action.

3. Bolts and Screws

All bolts and screws, washers and nuts shall be sherardized or otherwise protected to the Engineer's satisfaction, and shall be of sufficient strength for their purpose.

4. Tying Wire

All tying wire shall be galvanized soft wire conforming with BS 443 and shall be 1.2mm (for securing expanded metal) and 3mm (for securing ceiling runners to bearer channel).

5. Expanded Metal Beads

At all perimeters and openings in expanded metal ceilings, angle bead, or stop beads shall be to the approval of the Engineer.

All metal beads shall comply with BS 1246: 1959.

6. Hangers, Bearers, Runners, etc.

The principal components of the suspension system shall be in accordance with the drawings, or approved manufacturer's standard components, in mild steel, (or aluminum: see F2 above).

G. Workmanship**1. General**

Methods of erection and all workmanship shall be in accordance with the recommendations of the manufacturer of the ceiling system, and with the relevant clauses of BS CP 290.

2. Setting Out

The contractor shall allow for all secondary systems of suspension as may be necessary to bridge ducts or other services to maintain the necessary fixing centres on the system. Before starting work ensure that light fittings, grilles, etc., are in correct positions relative to ceiling grid. Ensure that all trades use common setting out points. Ensure that the ceiling is properly related to each grid line of the building, and that there is no accumulative creep over the length or width of any ceiling. The ceilings are part of a modular co-ordination system joint lines will dictate locations for pre manufactured partitions, panels, screens, etc., which will be fixed later. No cutting or making up will be allowed.

PORLAND CEMENT PLASTER (09220)**A. Scope**

This section specifies internal plaster of cement and sand to blockwall or concrete surfaces.

B. Performance and Standards

1. The plaster shall have complete adhesion to the wall and shall not crack or craze.
2. Cement BS 12
Sand BS 1199. Table 1.

C. Related Items

Precast Concrete Blockwork 04220
Suspended Ceiling Systems 09515

D. Submittals**1. Samples of Materials**

The Contractor shall supply a sample of the sand for plastering for approval by the Engineer, and such samples as the Engineer might require of miscellaneous plastering materials such as plaster stops and casing beads.

2. Sample of Workmanship

The Contractor shall carry out the plastering of one wall as a sample of workmanship and finish. The generality of the work shall not proceed until the sample is approved by the Engineer.

E. Product Handling

Cement shall be delivered in the manufacturer's sealed bags or other approved container, and shall be stored off the ground, in a dry shed. Sand shall be kept free from organic or any other contaminated substance.

F. Materials**1. Cement**

Cement shall be Portland Cement to BS 12.

2. Sand

Sand shall be clean, washed sharp sand to BS 1199, Table 1.

3. Angle Beads, Stop Beads, etc.

All such plastering accessories shall be standard galvanized mild steel products.

4. Mix

The mix shall be 1 part cement to three parts sand by volume, or as otherwise agreed with the Engineer. Plasticiser shall only be used with the approval of the Engineer.

5. Accessories

Angle beads shall be to the approval of the Engineer.

Stop beads shall be to the approval of the Engineer.

The above accessories are from 0.56 tight coat galvanized sheet, synthetic coated, with white PVC protective nosing.

G. Workmanship**1. Preparation of Substrate**

Ensure that all chases or other apertures have been cut. Ensure that the substrate surface is free from dust, oil, etc. Ensure adequate key for plaster, if necessary by hacking the surface or applying a coat of approved bonding agent. Rake out joints in blockwork.

2. Trims and Joints

Fix beads, stops, angle beads, etc., plumb, square and true to line and level, as indicated on drawings.

3. Plaster

Unless single coat plastering is agreed by the Engineer apply plaster in two coats to a total thickness as shown on drawing on as stated in the B.O.Q.

Cross-scratch surface of first coat to provide key for second coat.

Allow the first coat to dry thoroughly before applying second coat.

Dub out as necessary to correct inaccuracies; dubbing out shall not exceed 10mm.

Apply second coat and finish with a wood float.

Each coat shall be applied firmly to achieve good adhesion, in one continuous operation. Finish the surface to a true plane to the correct line and level and plumb, with all angles and corners to a right angle unless otherwise shown on the drawings.

Wire mesh metal lathing shall be installed at all junctions of dissimilar materials.

4. First coat of plaster under wall cladding where indicated shall be scratched for good adhesion of mortar for tiling.**CERAMIC WALL TILES (09310)****A. Scope**

This Specification covers glazed ceramic wall tiling in selected sizes and colours.

B. Performance and Standards

1. The work shall comply with BS 5385, Code of Practice for Wall Tiling, Part 1, and Part 2.
2. Tiles shall comply with BS 1281.

C. Related Items

Joint Sealers 07900

Ceramic Floor Tiles 09312

D. Submittals**1. Samples of Tiles**

For each specified type or colour of tile the Contractor shall supply for the Engineer's approval a panel of tiles not less than 300mm square stuck onto a backing board of hardboard or similar and grouted with the specified grout.

The Contractor shall also submit full size samples of each tile accessory.

2. Sample of Work

Before the generality of the work is commenced carry out one area of each type (not necessarily each colour) of tiling, not less than 4m sq. which, when approved, shall stand as the minimum standard of workmanship to be achieved. Where appropriate in the context of the work and as may be required by the Engineer the sample shall include a length of at least 1m of sealant jointing. The remainder of the work shall not proceed before approval has been given to this sample.

3. Data

Copies of the tile and tiling materials manufacturer's data and fixing recommendations or instructions shall be handed to the Engineer, and tile fixing shall not be at variance with these instructions without the written agreement of the Engineer.

E. Product Handling

1. Tiles

The tiles shall be transported and stored in the manufacturer's cartons with seals unbroken and labels intact until time of use.
Tiles shall at all times be handled and stored to prevent damage and soiling.

2. Pointing Mortar and Grout

Materials shall be transported and stored in the manufacturer's sealed containers until required for use and shall at all times be handled in accordance with the manufacturer's instructions.

3. Cement and Sand Mortar

Cement and sand mortar shall be as specified in 04220 Precast concrete blockwork.

F. Materials

1. Glazed Ceramic Wall Tiles

a. Source

b. All tiles shall be obtained from. Lebanese suppliers or others countries approved by the Engineer . All tiles shall be in accordance with BS 6431.
Each type of tile shall be obtained from a single manufacturer together with all fittings and specials relating to that type.

c. Tiles

The tiles shall be to BS 1281 with cushion edges and spacer lugs. Fittings and specials shall be to BS 1281: round edge fittings shall be as Fig. 1 in the BS.
All internal and external corner tiles whether vertical or horizontal shall be round edged.

d. Sizes

Size shall be as indicated on the drawings.
or as otherwise agreed with the Engineer. Tolerances shall be in accordance with BS 6431.

e. Colours, Finish and Patterns

Colours, finish and patterns for ceramic wall tiles shall be selected by the Engineer and shall accurately match approved samples.

f. Defects

The tiles shall be entirely free from defects and blemishes.

2. Mortar

Cement and sand mortar shall be 1:3.

The cement shall be portland cement to BS12. The water shall be clean, free of impurities and the least needed for proper workability.

The bedding mortar shall consist of a mixture not richer than 1 part cement to 3 parts sand and not leaner than 1 part cement to 4 parts sand, and shall be not less than 12mm thick. The sand for the mortar shall be in all respects in accordance with the requirements of BS 1200.

3. Grout

The ceramic tiles grout shall be determined by the Engineer. The grout shall be used in accordance with the instructions of the manufacturer. The Engineer shall determine what grout will be used if there was a danger of damp penetration.

4. Tiling adhesive shall be a thin-bed PVA adhesive Type BCR or approved equal if recommended.

G. Workmanship

1. General

a. Manufacturer's recommendations are to be strictly followed for all products and materials.

b. Standards

Comply with the requirements of BS 5385, Part 1.

c. Setting Out

The tiling shall be set out strictly in accordance with the Engineer's drawings or approved Contractor's drawings.

Cut tiles shall be kept to a minimum and shall not be less than half the width of a full tile. Joints shall be truly horizontal and vertical and horizontal joints in adjacent walls shall align. All joints shall be 1.5mm wide or as determined by spacers.

d. Tolerance

Maximum permissible gap under a 2m straight edge shall be 3mm.

Owing to variations which may occur in tile sizes within the limits of BS 6431, the Contractor shall be responsible for sorting all tiles into batches after delivery to site and before any fixing is commenced. Each batch shall contain tiles of the same size and the tiler shall apportion the batches to ensure that only tiles of one size are used in any one room.

2. Background

a. Acceptance of Background

Before fixing tiling ensure that the background is:

- i. Adequately true and level to achieve specified tolerances.
- ii. Free from contamination and loose areas.
- iii. Adequately prepared to give a good bond.

b. Tiling on Plaster

Tiles may be applied to plaster surfaces only in the case of small areas where agreed by the Engineer. Such areas shall include splash backs to sanitary fittings where the area of tiles does not exceed 1m square.

Plaster surfaces shall be cleaned before tiling, in accordance with the manufacturer's instructions.

c. Drying Out

Before fixing tiles ensure that concrete and masonry backgrounds have been exposed to the air for not less than four weeks and are thoroughly dry.

3. Fixing

a. Preparation of Tiles

Tiles which are dirty or have a coating of dust shall be cleaned with clean water, but must be entirely dry before application of adhesive.

b. Floated and Buttered Thin Bed

- i. Apply adhesive to dry background as a continuous float coat, using a plasterer's trowel having 6mm x 6mm notches at 25mm centres.
- ii. Apply a thin, even coat of adhesive to the backs of dry tiles.
- iii. Press tiles onto bedding with a twisting/sliding action to give a finished bed thickness of not more than 3mm.
- iv. Ensure solid bedding under the whole tile and adhesion over the whole of the background and tile back.

c. Adjustment

Make any necessary adjustment to tiles within 10 minutes of fixing.

d. Cleaning Off

Remove surplus mortar as soon as bedding is complete. Do not disturb tiles.

4. Grouting

When bedding has set sufficiently to prevent disturbance of tiles, but not more than 7 days after fixing, all joints are to be grouted by working ceramic tile grout in so that the joint is completely filled. Finish flush and thoroughly clean off surplus grout as the work proceeds using a damp cloth. Tool joints smooth.

5. Finishing

The finished work shall be left clean and free from cement, plaster, paint, dust or any other marks or imperfections; cleaning down must not be carried out with materials which will scratch or in any way impair the finished work.

Final polishing shall be done with a soft dry cloth.

6. Protection

The Contractor shall adequately protect the tiling from all damage, howsoever likely to be caused, until the handing over. Any damage which does occur shall be made good by the Contractor at his own expense. The whole of the work shall be prepared for handover in a state satisfactory to the Engineer.

CERAMIC FLOOR TILES (09312)

A. Scope

1. This section covers the supply and fix a mass ceramic tiles and skirting.
2. The work shall include all necessary expansion and control joints and joint sealers as specified in section 07900: Sealants.

B. Performance and Standard

1. Fully vitrified tiles shall have a water absorption not exceeding 0.3%.
2. The whole floor, including bedding and jointing materials shall be capable of resisting the action of acids, oils or fats to which it can be expected to be subjected according to its location in the project.
3. The ceramic floor tiling shall be carried out in accordance with BS CP 202.
4. The tiles shall conform to BS 6431, Fully vitrified ceramic.

C. Related Items

Beds and Screeds 03500

D. Submittals

1. Sample Tiles

The Contractor shall submit for the Engineer's approval sufficient plain flooring tiles to indicate the quality and range of color or shade variety that can be expected.

2. Sample Panel

Following initial selection of a specific tile the contractor shall submit a panel not less than 1m square of the tiles stuck onto an appropriate rigid backing sheet with joints of the specified width pointed with the specified grout.

3. Sample Floor

Following approval of the sample panel the Contractor shall lay one complete room floor which, when approved, shall remain as the standard by which the remainder of the work shall be judged.

The room shall be one selected by the Engineer, and shall include a movement joint which shall be completed with the specified joint sealer as part of the sample.

4. Compliance with Standard

The Contractor shall supply a written statement of compliance with the specified standard in respect of each type of tile submitted.

5. Data

Copies of the manufacturer's data and fixing recommendations shall be handed to the Engineer. Any variation between such recommendations and the requirements of this Specification shall be called to the attention of the Engineer.

E. Product Handling**1. Tiles**

The tiles shall be transported and stored in the manufacturer's cartons with seals unbroken and labels intact until time of use.

Tiles shall be handled and stored at all times to prevent damage and soiling.

2. Bedding Materials

Cement, aggregates, etc., shall be handled and stored.

3. Mortar

Cement and sand mortar shall be 1:3.

The cement shall be Portland cement to BS12. The water shall be clean, free of impurities and the least needed for proper workability.

The bedding mortar shall consist of a mixture not richer than 1 part cement to 3 parts sand and not leaner than 1 part cement to 4 parts sand, and shall be not less than 12mm thick. The sand for the mortar shall be in all respects in accordance with the requirements of BS 1200.

F. Materials**1. Tiles**

a. All tiles shall be as manufactured by Lebanese suppliers or others countries approved by the Engineer . All tiles shall be in accordance with BS 6431.

b. Tiles shall be fully vitrified as defined in BS 6431.

c. Tiles used in wet areas shall have an approved anti-slip surface produced by the nature of the tile ingredients and not by ribbing, projecting studs or other form of surface profiling.

Tiles used for steps shall be provided with special anti-slip grooves.

d. Sizes

Size shall be as indicated in the Bill of Quantities and/or as directed by the Engineer.

- e. Skirting tiles shall be 80mm high x 8mm thick and shall match the floor tiles with rounded edge and be from the same manufacturer.

- f. Colours, Finish and Defects

These shall be selected by the Engineer and shall accurately match approved samples. The tiles shall be entirely free from defects and blemishes.
Ceramic tiles shall be mat, or as directed by the Engineer.

2. Bedding Materials: Mortar

Cement shall be Portland Cement to BS 12. Sand shall comply with the requirements of BS 1200 clean, sharp, not too fine and free from clay, organic or soluble matter. Sea sand shall not be used. The mixture shall be not richer than 1:3 and not leaner than 1:4, cement: sand, and the mortar shall not be less than 12mm thick.

3. Grout

The grouting mortar shall be flooring grade colored grout to the Engineer's approval.

G. Workmanship

1. General

The floors shall be laid in accordance with BS CP 202.

2. Inspection and Protection of Base

The Contractor shall inspect the base on which the ceramic tiles are to be laid. The base surface shall be thoroughly clean, free from dust, oil, plaster, lime or other foreign materials immediately before tile laying is commenced.

3. Bay Division

The floor areas shall be sub-divided into bays not exceeding 10m² with the long side of each bay not exceeding the shorter side by more than one and a half times.

Movement joints around the perimeter of the floor and at bay sub-divisions shall be 6mm wide, through the depth of the tile and bed, filled with strip filler materials and finished with sealant.

4. Ceramic Tile Fixing

- a. Tiles shall be fixed by bedding on a bed of cement and sand mortar, at the discretion of the Contractor who shall be solely responsible for making any adjustments including dimensional adjustments, to the satisfaction of the Engineer, which his choice necessitates.

- b. Ceramic skirting shall be fixed as ceramic tiles.

5. Grouting

The tiling shall be grouted on completion with epoxy of a colour to match the tiles, ensuring, that all joints are completely filled.

Surplus grout is to be cleaned off the face of the tile and adjoining surfaces and the tiles are to be carefully cleaned.

6. Final Cleaning

The final polished surface is to be washed with hot water and alkali-free detergent, and left clean and protected from damage to the satisfaction of the Engineer.

SUSPENDED CEILING SYSTEMS (09515)

A. Scope

1. This section covers suspended ceilings consisting of Aluminum panels and strips complete with suspension system and all necessary trims and accessories.

B. Performance and Standards

1. Suspension System

The suspension system shall be designed to provide substantial support for the ceiling finish and associated light fittings, and for grilles, margins and any item forming part of the finished ceiling, in order that the soffit of the ceiling remains permanently true and level.

2. British Standards

All materials shall comply with the relevant current British Standards.
Workmanship shall be in accordance with BS CP 290.

C. Related Items

Ceiling Suspension Systems 09120

D. Submittals

1. Samples

The Contractor shall supply samples of sizes and type and such other members as may be called by the Engineer.

2. Shop Drawings

The Contractor shall submit for approval shop drawings showing all necessary suspension and fixing details, including trimming for light fittings, grilles, etc ...

E. Product Handling

1. Protection and Handling Generally

Prevent distortion or damage or panels and other components during transit, handling, storage and fixing.

Store under cover.

Protect metal finishes as specified in Section 05030.

Prevent contact with wet plaster or cement or any other deleterious matter.

Provide protective coverings as necessary and remove all protection on completion.

F. Materials

1. False ceilings

Metal strips paneling, or cell shall be of thickness 0.5 to 0.6mm, lacquered aluminum strips and panels with sealed joints as manufactured by metal screen, Sadi metal, rechter or equal approved by the Engineer.

Sizes to be as per drawings and finishing schedule.

2. Access to Ceiling Void.

All units must be demountable without disturbance to adjacent units, by means of a key, without distortion or risk of damage to the panel or tile.

3. Accessories

The system is to be complete with all necessary accessories including infill channels, perimeter trim, etc., as may be shown on the Engineer's or manufacturer's approved drawings.

4. Suspension

The suspension system shall consist of angle hangers or suspension wires, primary suspension channels and main runners, with all necessary clips. The main runners shall be of the split "T" type to give a fully concealed fixing system. All members shall be zinc sprayed, sherardized or given other approved protective coating.

G. Workmanship**1. General**

The Contractor shall set out the whole ceiling in accordance with the approved drawings, in such a way that close tolerances are achieved. The deviation from the nominal shall not be in excess of + or - 3mm over 4m length, non-accumulative.

Method of erection and all workmanship shall be in accordance with the instructions of the manufacturer of the ceiling system, and with the relevant clauses BS CP 290.

2. Suspension

The method of fixing hangers to the structural soffit shall be agreed with the Engineer.

3. Additional Loads on Suspension System

Light fittings, ventilation diffusers, etc., are to be supported on the ceiling suspension at ceiling level and the Contractor shall allow for substantial support for these loads when designing the system. He shall liaise with the manufacturers of the various items so that they are compatible with the ceiling system, and he shall incorporate the necessary runners, lugs or other support to fix or rest on the ceiling suspension.

4. Installation

Ensure that only boards bearing the same batch number are used in any one space. All wet trade activities shall be completed and dried out before panel installation is commenced.

5. Cut Ends, etc.

All cut ends and any damage to protective coatings shall be made good before fixing to ensure that no subsequent staining will occur on the finished work and no corrosion will occur in the ceiling void or on any member.

6. Fixings, Miscellaneous

The panel and tile fixing system is an invisible one; no visible fixing will be permitted unless there is no alternative; if unavoidable, screws shall be countersunk with flat Phillips head, stove enameled to match the panel or tile. All concealed screws and bolts shall be sherardized and of sufficient strength for their purpose.

The use of timber is to be avoided where possible, but if necessary, shall be in all respects as specified in section 06400.

7. Cleaning, Protection and Patching

- a. Clean and repair surfaces soiled or damaged in connection with the work of this Section to the approval of the Engineer. Pay the cost of replacing finishes or materials that cannot be satisfactorily cleaned.
- b. Upon completion of the work, remove debris, equipment and excess material resulting from the work of this Section from the site.
- c. Protect completed work from damage through construction period.

SUSPENDED CEILING SYSTEMS (09516)

A. Scope

1. This section covers suspended ceilings consisting of Acoustical Vinyl Tiles , complete with suspension system and all necessary trims and accessories.

B. Performance and Standards

1. Suspension System

The suspension system shall be designed to provide substantial support for the ceiling finish and associated light fittings, and for grilles, margins and any item forming part of the finished ceiling, in order that the soffit of the ceiling remains permanently true and level.

2. British Standards

All materials shall comply with the relevant current British Standards.
Workmanship shall be in accordance with BS CP 290.

C. Related Items

Ceiling Suspension Systems 09120

D. Submittals

1. Samples

The Contractor shall supply samples of sizes and type and such other members as may be called by the Engineer.

2. Shop Drawings

The Contractor shall submit for approval shop drawings showing all necessary suspension and fixing details, including trimming for light fittings, grilles, etc ...

E. Product Handling

1. Protection and Handling Generally

Prevent distortion or damage or panels and other components during transit, handling, storage and fixing.

Store under cover.

Protect metal finishes as specified in Section 05030.

Prevent contact with wet plaster or cement or any other deleterious matter.

Provide protective coverings as necessary and remove all protection on completion.

F. Materials

1. Shall be Acoustic vinyl panel board tiles 60 x 60cm as manufactured by Hunter Douglas or equal or as approved by the Engineer.
2. Access to Ceiling Void.
All units must be demountable without disturbance to adjacent units, by means of a key, without distortion or risk of damage to the panel or tile.
3. Accessories
The system is to be complete with all necessary accessories including infill channels, perimeter trim, etc., as may be shown on the Engineer's or manufacturer's approved drawings.
4. Suspension
The suspension system shall consist of angle hangers or suspension wires, primary suspension channels and main runners, with all necessary clips. The main runners shall be of the split "T" type to give a fully concealed fixing system. All members shall be zinc sprayed, sherardized or given other approved protective coating.

G. Workmanship

1. General
The Contractor shall set out the whole ceiling in accordance with the approved drawings, in such a way that close tolerances are achieved. The deviation from the nominal shall not be in excess of + or - 3mm over 4m length, non-accumulative. Method of erection and all workmanship shall be in accordance with the instructions of the manufacturer of the ceiling system, and with the relevant clauses BS CP 290.
2. Suspension
The method of fixing hangers to the structural soffit shall be agreed with the Engineer.
3. Additional Loads on Suspension System
Light fittings, ventilation diffusers, etc., are to be supported on the ceiling suspension at ceiling level and the Contractor shall allow for substantial support for these loads when designing the system. He shall liaise with the manufacturers of the various items so that they are compatible with the ceiling system, and he shall incorporate the necessary runners, lugs or other support to fix or rest on the ceiling suspension.
4. Installation
Ensure that only boards bearing the same batch number are used in any one space. All wet trade activities shall be completed and dried out before panel installation is commenced.
5. Cut Ends, etc.
All cut ends and any damage to protective coatings shall be made good before fixing to ensure that no subsequent staining will occur on the finished work and no corrosion will occur in the ceiling void or on any member.
6. Fixings, Miscellaneous
The panel and tile fixing system is an invisible one; no visible fixing will be permitted unless there is no alternative; if unavoidable, screws shall be countersunk with flat Phillips head, stove enameled to match the panel or tile. All concealed screws and bolts shall be sherardized and of sufficient strength for their purpose.
The use of timber is to be avoided where possible, but if necessary, shall be in all respects as specified in section 06400.

7. Cleaning, Protection and Patching

- a. Clean and repair surfaces soiled or damaged in connection with the work of this Section to the approval of the Engineer. Pay the cost of replacing finishes or materials that cannot be satisfactorily cleaned.
- b. Upon completion of the work, remove debris, equipment and excess material resulting from the work of this Section from the site.
- c. Protect completed work from damage through construction period.

STONE (09600)**A. Scope****1. Work Included**

- a. The Contractor shall furnish and install all stone and Related Work as required by the drawings and/or herein specified, generally as follows:
Stone exterior wall facing, Paving and where indicated on the drawings.

B. Performance and Standards

Refer to Masonry Mortar 04100

Masonry accessories 04150

C. Related Items

Masonry Mortar 04100

Masonry accessories 04150

D. Submittals**1. Shop Drawings**

- a. The Contractor shall prepare and submit shop and setting drawings of all work included herein for the Engineer's approval.
- b. Shop and setting drawings shall show in detail all sizes, arrangement of joints, and all provisions for anchoring and soffit suspension.
- c. Shop drawings shall be submitted as directed by the Engineer.
- d. All installed materials shall conform to the approved corresponding shop drawings.

2. Samples

- a. Samples of all materials proposed to be used shall be submitted for approval. Samples of stone shall show the extremes of variations in quality, texture, colour and finish. Materials incorporated in the finished work must be within the approved ranges of the approved samples or will be rejected.

- b. Samples shall be submitted as directed by the Engineer.
- c. Field mock-up shall be erected on the site where directed by the Engineer. The panels shall be of sizes directed by the Engineer and shall include joint profile and mortar colour, and anchoring. The mock-up panels shall be immediately revised by the Contractor during the presence of the Engineer, if the Engineer so directs, until each panel is approved by the Engineer. All installed stone construction shall conform to approved mock-up panels. The mock-up panels shall remain intact until their removal is directed by the Engineer, and subsequently, shall be removed by the Contractor.

3. Measurements

The Contractor shall take all necessary measurements as required to assure proper fabrication and installation of the work of this section.

4. Coordination

All work of this section shall be closely coordinated with the work of other sections whose work affects or is affected by the work specified in this section.

E. Materials

1. Stone

- a. Stone shall be natural and as indicated on the drawings, and to the approval of the Engineer.
- b. The actual stone used shall be sound, of uniform texture, and shall be free from holes, seams, shakes, clay pockets, spalls, stains, starts, and other defects which would impair the strength, durability or appearance of the work, as determined by the Engineer.
- c. Inherent variations characteristic of the stone and the quarry from which the stone is obtained shall be brought to the attention of the Engineer at the time the samples are submitted for approval, and such variations shall be subject to approval of the Engineer.
- d. All stone and Granite stone shall be selected for background colour, veining, marking and matching, and shall run in even shades.
- e. The Contractor shall cut all stones to sizes required by the drawings and as approved by the Engineer.

2. Mortar Setting Materials

- a. Cement shall be white cement conforming to ASTM C-150, Type 1, latest edition.
- b. Lime shall be either hydrated or quicklime, Hydrated lime shall conform to ASTM C-207, latest edition, and shall be at least 92% hydrated quicklime shall conform to ASTM C-5, latest edition.
- c. Lime putty shall be stiff mixture of lime and water, kept moist until used. Putty made from quicklime shall be slaked and allowed to soak before using as recommended by the manufacturer of the lime used.
- d. Sand shall conform to ASTM C-144, latest edition.
- e. Water shall be clean and fresh, from the water supply system.

F. Workmanship

1. Examination of Surfaces

- a. All surfaces which will receive the work of this section shall be carefully examined prior to the installation of the work. Starting installation on any surface shall be construed as an acceptance of such surface and acceptance of all prevailing conditions, and as a waiver of any subsequent claim to the contrary.

2. Stone

- a. All stone shall be accurately cut to the shapes, dimensions and profiles indicated on the drawings and in conformance with the approved shop and setting drawings.
- b. Exposed surface tolerance shall not exceed 3mm in 2.50 meters.
- c. Holes shall be cut in all stone weighing more than 100 pounds unless other methods of raising stone not requiring holes. No holes shall come closer than 50 to exposed faces of stone.
- d. Joints of all stone shall be full and square for full thickness of the stone. All concealed surfaces of joints shall be sawed.
- e. The backs of all stone shall be sawed or roughly dressed to approximately true planes.
- f. All sawed surfaces shall be cleaned of rust stains and iron particles.
- g. Stone wall facing shall be natural finish as shown on the drawings. Jointing, coursing, setting patterns and finish of stone shall be as shown on drawings.
- h. Joints within stone shall be of thickness indicated and shall have a "raked" profile.
- i. Joints shall be 1/16" thick and shall be flush.
- j. Stone shall be set in mortar, and all joints shall be filled with mortar and the back of the stone shall be treated with mortar repellent paint.
- k. When setting stone, adjacent pieces shall be selected for similarity in colour, veining and matching.
- l. Stone shall be set accurately, true to line, plumb and level.
- m. All exposed surfaces shall be free from waves, and faces of stone in the same plane shall be flush at joints. Arises shall be sharp and true, square and continuous with adjoining arises.
- n. Partially completed stone work shall be thoroughly covered when work is interrupted to prevent water and moisture from entering behind stone.
- o. The Contractor shall have a thoroughly competent stone superintendent in charge of the stone at all times during the handling and setting of stone.
- p. Stone shall be so delivered and handled to protect it from damage at all times. The patching or hiding of defects shall not be permitted. Stone chipped or stained on the surface shall be redressed or cleaned to remove all traces of such defects before it is set in place, or new stone shall be furnished as directed by the Engineer.

- q. Walls to receive stone cladding shall be plastered with cement mortar if that shown on drawings. This plaster shall be 10mm thick and scratched while it is green.
- 3. Mortar Joints
 - a. Mortar shall consist of one part of non-staining white cement, one part hydrated lime, and four parts fine sand or five parts coarse sand.
 - b. All mortar for joints shall be coloured to match the stone with which it is used.
- 4. Protection
 - a. All work of this section, and related adjacent construction, shall be protected from damage, staining, or other imperfections at all times. Damaged, stained, or imperfect materials shall be repaired or replaced as directed by the Engineer, to the Engineer's satisfaction, without cost to the Owner.
 - b. Use all reasonable means to keep the exposed surface of stone while being laid and particularly to keep it free from and/or caulking compound.
 - c. Galvanized steel cramps and hooks to the bracing wall shall be used as directed by the Engineer.
- 5. Cleaning
 - a. All exposed surfaces of the work of this section and related adjacent surfaces shall be maintained in a clean condition, and upon substantial completion of the Contract shall be thoroughly cleaned to the satisfaction of the Engineer.
 - b. Lebanese suppliers or others countries approved by the Engineer . All tiles shall be in accordance with BS 6431.

RESILIENT FLOORING (09650)

A. Scope

1. This section covers the Resilient flooring sheet roll approx. 2300x200cm complete including accessories.

B. Performance and Standard

ASTM – American Society for Testing and Materials

1. ASTM D 257 Test Methods for DC Resistance or Conductance of Insulating materials.
2. ASTM E 84 Test for Surface Burning Characteristics of Building Materials.

C. Submittals

1. Submit shop drawings and product technical data
2. Provide seaming plan and location of joints

3. Provide product data on specified products, describing physical and performance characteristics, sizes, patterns and colors available.
4. Submit 2 samples, in actual size, illustrating color and pattern for material specified.
5. Submit manufacturer's installation instructions.
6. Submit cleaning and maintenance data include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

D. Transportation, Handling and Storage

1. Deliver materials to site in original sealed packages or containers, clearly marked with the Manufacturer's name or brand, type and color, production run number and date of manufacture.
2. Store materials in weatherlight and dry storage facility. Protect from damage, from handling, weather, and construction operations before, during and after installation.

Guarantee

3. Submit a written guarantee signed by Contractor and Manufacturer for a period of 2 years from the date of substantial handover. Guarantee shall cover repair and replacement of defective material and workmanship.

Quality Assurance

4. Install resilient flooring and accessories in strict compliance with manufacturer recommendations and instructions.
5. Install resilient flooring and accessories after other finishing operation, including painting, have been completed.
6. Do not install resilient flooring on Terrazzo tiles until tiles have been cured and are sufficiently dry to achieve bond with adhesive as determined by Manufacturer's recommended bond and moisture test.

E. Materials

1. Resilient Flooring Materials

The resilient flooring shall be anti-static slip retarded, anti-acid resistant of uniform thickness as manufactured by "Tarket-Type Souplan AS", homogenous resilient static control flooring, conducts static electricity, where indicated on the finishing schedule and optima, homogenous vinyl flooring classic Traventine look, where indicated on the finishing schedule or approved equal and to the approval of the Engineer.

Vinyl flooring rolls shall be in compliance with the following requirements:

Size : sheets (Rolls) 200x2300cm meters approx. unless otherwise indicated on drawings.

Total thickness : unless otherwise indicated on drawings, total thickness shall be 2 mm.

Resistant to static electricity.

Abrasion / Thickness Loss: 0.15 mm maximum; in compliance with DIN 51963.

Flame spread: glass B1 in accordance with DIN 4102 as well as BS 476: Part 7.

Chemical Resistance : resistant; in compliance with DIN 51958.

Electrical Resistance : 108 ohm

Colours shall be selected by the Engineer and shall accurately match approved samples.

2. Adhesive

The adhesive for vinyl fixing shall be as manufactured by the manufacturer conforming to BS5980 as a Type 1 Class AA adhesive.

B. Workmanship

1. General

All workmanship shall be fully in accordance with BS 5385, Parts 1 and 2. manufacturer's instructions are to be strictly followed for all products and materials.

2. Setting Out

Setting out shall be in accordance with the drawings. Level setting out lines shall be established.

3. Tolerances

The maximum permissible gap under a 2m straight edge shall be 3mm, except in the case of the marble vinyl to the waterfall where a degree of roughness shall be deliberately achieved in accordance with approved sample, which maintaining overall levels.

4. Backgrounds

The Contractor shall ensure that backgrounds are sufficiently true to permit the finished work to achieve the specified tolerances, and free from contamination or loose areas. Background shall be Terrazzo tiles 30x30x25cm..

5. Vinyl Fixing

The vinyl is to be fixed by the thin-bed method as described in BS 5385.

The bedding adhesive shall be evenly spread to a thickness of 2mm. Immediately before applying the vinyl sheets, pre-grout the backs of the sheets. There shall be no voids in the bedding layer. The vinyl shall be firmly pressed down into the bed: adjacent sheets shall be flush, and the outline of sheets shall not be detectable in the finished work.

Provide brass strips of 5mm wide x 10mm thick where vinyl tiles are in junction with ceramic tiles.

6. Finishing

Leave the work clean and free of excess adhesive or any other alien matter to the complete satisfaction of the Engineer.

VINYL COVERING (09650)

A. Materials

1. Vinyl Covering (Roll) (Refer to finishing schedule)

The vinyl covering shall be anti-static slip retarded, anti-acid resistant of uniform thickness as manufactured by "Tarkett Optima" or approved equal and to the approval of the Engineer.

Homogeneous vinyl shall be of Vylon plus type Tarkett OR APPROVED EQUAL.

Colours shall be selected by the Engineer and shall accurately match approved samples.

2. Adhesive

The adhesive for vinyl fixing shall be as manufactured by the manufacturer conforming to BS5980 as a Type 1 Class AA adhesive.

As shown on drawings

Technical Data		Somplan AS
Type of floor covering	EN 649	Permanently static conductive pressed homogeneous vinyl flooring
CE certification		Yes
Classification	EN 685	Commercial : 34 Industrial : 43
Wear layer thickness	EN 429	2.0 mm
SQ PUR		Yes
Total Thickness	EN 428	2.0 mm
Total Weight / m ²	EN 430	3000 g
Dimensional stability	EN 434	< 0.40% for rolls < 0.25% for tiles
Abrasion loss	Thickness EN 660: Part 1	Group P : ≤ 0.15mm
	Volume loss EN 660 : Part 2	Group P : ≤ 4.0 mm
Residual indentation	EN 433	Approx. 0.03 mm
Castors chair test	EN 425	Suitable
Static electrical charge	EN 1815	< 2 kv
Electrical insulation	VDE 0100, Part 600	R < 5 × 10 ... Ohms

Electrical resistance	ESD – approval – SP method 2472 EN 1081 EN/ IEC 61340-4-1 EN/IEC 61340-4-5	R < 10 Ohms R1 $5 \times 10 < R < 10$ Ohms R2 $5 \times 10 < R < 10..$ Ohms R ... $5 \times 10 < R < 10...$ Ohms < 3.5×10 Ohms
Underfloor heating		Suitable – max 270C
Impact sound reduction	EN ISO 717/2	Approx. + 4 dB
Thermal resistance	EN 12667/DIN 52612	Pending
Reaction to fire	EN ISO 13501-1 EN ISO 9239-1 EN ISO 11925-2	Class B1 s1 > 8 kW/m ² Pass
Light fastness	EN ISO 105-B02	≥ level 6
Chemical resistance	EN 423	Good Resistance
Fungi and Bacteria resistance	DIN EN ISO 846-A/C	Does not favour growth
Slip resistance	DIN 51130 EN 13893	R9 > 0.3
Colours		10
Form of Delivery	EN 426 Sheet (rolls) EN 427 Tiles (box)	Approx. 23 m x 200 cm Art. no. 3093 5 61 x 61 cm 14 tiles / box = 5.21 m Art. No. 3094

B. Workmanship

1. General

All workmanship shall be fully in accordance with BS 5385, Parts 1 and 2. manufacturer's instructions are to be strictly followed for all products and materials.

2. Setting Out

Setting out shall be in accordance with the drawings. Level setting out lines shall be established.

3. Tolerances

The maximum permissible gap under a 2m straight edge shall be 3mm, except in the case of the marble vinyl to the waterfall where a degree of roughness shall be deliberately achieved in accordance with approved sample, which maintaining overall levels.

4. Backgrounds

The Contractor shall ensure that backgrounds are sufficiently true to permit the finished work to achieve the specified tolerances, and free from contamination or loose areas. Background shall be cement screed.

5. Vinyl Fixing

The vinyl is to be fixed by the thin-bed method as described in BS 5385.

The bedding adhesive shall be evenly spread to a thickness of 2mm. Immediately before applying the vinyl sheets, pre-grout the backs of the sheets. There shall be no voids in the bedding layer. The vinyl shall be firmly pressed down into the bed: adjacent sheets shall be flush, and the outline of sheets shall not be detectable in the finished work.

6. Finishing

Leave the work clean and free of excess adhesive or any other alien matter to the complete satisfaction of the Engineer.

PAINTING (09900)**A. Scope**

1. This section includes the Site Painting of all interior and exterior items and surfaces throughout the project except as otherwise indicated or work having a natural specified finished surface. The term 'Painting' in this context covers all coating and finishing systems and their component or accessory materials whether used as prime, intermediate or finish coats, and this Specification includes the Site preparation of surfaces by cleaning, roughening, rubbing down, stopping and filling, or other preparatory process all as specified hereunder.

All exposed items and surfaces shall be painted and all materials that require a protective coating shall be painted except where indicated on drawings or schedules as being unpainted, work having a natural specified finished surface, and work covered in the following paragraph.

The work covers the painting and protection of all plant, apparatus, pipework and equipment installed under the Mechanical and Electrical Work.

B. Performance and Standards

1. All painting systems shall be entirely satisfactory in terms of compatibility of constituent to substrate, adhesion, coverage, color-fastness and durability in the climatic and other conditions pertaining to the site within the limits of accepted good practice.
2. Work in this section shall comply with:
BS CP 231 Painting of Buildings.
BS CP 3012 Cleaning and Preparation of Metal Surfaces.
BS 3900 Methods of Tests for Paints.
BS 5493 Code and Steel Structures against corrosion.
3. All materials shall conform to applicable British Standards whether referred to in this Section or not.

C. Related Items

Metal Finishes 05030

D. Submittals**1. Manufacturer**

The names, official addresses and technical brochures of the paint manufacturers, giving properties of materials, shall be submitted to the Engineer for clearance, prior to ordering.

2. Manufacturer's Instructions

Provide the Engineer with copies of the manufacturer's application instructions and call his attention to any discrepancy between these instructions and the Specification. Obtain the written concurrence of the Engineer and manufacturer as appropriate to any proposed change in either Specification or manufacturer's instruction.

3. Coordination

Ensure that the paint manufacturer is aware of and accepts the substrate to which his product is applied, in particular, to ensure compatibility, where the surface to be painted has already received a coating such as shop-applied primer. Provide barrier coats over incompatible primers or remove and reprime as required.

4. Color Samples

After selection but prior to application provide samples of each color on cards 500 x 500mm and obtain the Engineer's approval thereof.

5. Control Samples

Complete representative sample areas of each type of coating as directed by the Engineer, including preparation of surfaces. Obtain approval of appearance before proceeding. Provide, for the Engineer's inspection, lighting conditions such as those under which the work will normally be seen.

6. Testing

Arrange for any tests called for by the Engineer to be carried out to determine compliance with the Specification, and submit the results of the tests to the Engineer.

Permit coating manufacturers to inspect work in progress and to take samples of their products from Site if required. The results of any tests carried out by or on behalf of manufacturers shall be submitted to the Engineer.

7. Certificates

The Contractor shall submit test certificates in respect of any fire-retardant coatings he proposes to use.

E. Product Handling**1. Delivery and Labeling**

Coating materials and all materials used in painting shall be delivered to Site in sealed undamaged containers, clearly labeled with the following information:

- a. Type of material.
- b. Manufacturer's name, brand name, if any, and identification related to colour schedules.
- c. Manufacturer's batch number and date of manufacture.
- d. Contents by volume for major pigment and vehicle constituents.
- e. Manufacturer's intended use.
- f. Thinning and application instructions.

- 2. Order of Use**
Batch deliveries of coating materials shall be dated for use in order of delivery which shall reflect the order of manufacturing dates.
- 3. Container Size**
Paints other than water-based and bituminous paints shall be delivered in containers not exceeding 5 liters capacity.
- 4. Storage**
Store materials in a clean, dry area protected from extreme temperatures. Keep storage space neat and accessible at all times. Protect floors from paint spillage. Discard and remove from Site any paints in containers which have received any but superficial damage.
- 5. Pre-Installation Protection of Mechanical and Electrical Equipment**
All ferrous apparatus and equipment shall be provided at the manufacturer's Works with a protective coat of primer paint to minimize corrosion prior to installation. All bright, polished machined parts, chrome-plated or similarly finished components shall be wrapped with self-adhesive plastic which shall be retained on Site by the Contractor, until the equipment is commissioned. The Contractor shall then remove the wrapping, clean up and re-instate the original finish.

F. Material

- 1. General**
Coating materials shall be obtained from one approved manufacturer only for each type of material. All coats from primer to finishing coat in a system shall be from the one manufacturer.
- 2. Filling, Stopping, Cleaning Materials**
 - a. Paint strippers, abrasive papers and blocks, cleaning agents, etching solutions, mould inhibitors, rust inhibitors, size, stopping, knotting, fillers and other ancillary materials shall be the best of their respective kinds, used as recommended by their respective manufacturers and the decorative coating manufacturer for the surface being prepared, unless otherwise specified.
 - b. White spirit shall be to BS 245.
 - c. Knotting shall be to BS 1336.
 - d. Stopping for woodwork to receive clear finish shall be tinted to match surrounding woodwork, to approval.
 - e. Stopping for other internal work shall be plastic base, non shrinking.
- 3. Gloss/Semi-Gloss Paint**
 - a. Long - oil based alkyd paint, undercoats and finishing coats to BS 2524.
 - b. Polyurethane based paint, undercoat and finishing coat.
 - c. Titanium Dioxide paint, undercoat and finishing coat.
- 4. Emulsion Paint**
Vinyl emulsion paint, matt and semi-gloss as directed by the Engineer. All emulsion paints shall be vinyl unless otherwise specified.
- 5. Emulsion Primer/Mist Coats**
Material shall be thinned strictly in accordance with manufacturer's instructions.
- 6. Wood Primer**
Acrylic.

7. Steel Primer
 - a. Calcium plumbate to BS 3698.
 - b. Zinc-rich primer.
8. Steel Primer for Mechanical Work

Zinc chromate.
9. Galvanized Steel Primer

2 pack etching primer.
10. Bituminous Paint

To BS 3416.
11. Anti-Alkaline Primer

As recommended and manufactured by the manufacturer of follow-up coats
12. Lead Content

Lead content in the pigment shall not be allowed.

G. Workmanship

1. Preparation
 - A. Generally
 - a. Prepare surfaces in accordance with decorative coating manufacturer's recommendations.
 - b. Remove ironmongery, electrical plates and fittings, etc., from surfaces to be decorated and refix on completion of decoration.
 - c. Use rust inhibitors, size, stopping, knotting and fillers in accordance with manufacturer's recommendations.
 - d. Ensure that all holes, cracks, defective joints and other defects in surfaces to be prepared and decorated have been made good so that they are not visible when decoration is completed.
 - e. Ensure that pre-primed surfaces have been properly prepared and that the primer is of a suitable type, firmly adhering and in good condition.
 - f. Before decorating allow surfaces to dry thoroughly.
 - g. Brush down all surfaces immediately before decorating to remove dust, dirt and loose material. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning.
 - h. Apply three (3) coats of putty to concrete and plaster surfaces, if required by the Engineer, or as per B.O.Q.
 - B. New Concrete, Block, Plaster and Render Surfaces
 - a. Remove release agents by washing with a weak detergent solution and rinse off with clean water.
 - b. Ensure that surface deposits and loose or flaking material are removed.
 - c. Efflorescence: Remove surface salts with a stiff brush or coarse dry cloth. Remove residue with a damp cloth frequently wrung out in clean water. Leave for 48 hours and repeat process if further efflorescence occurs. Sand or scrape glossy-surfaced hard bloom to provide a key for finish.

C. New Iron and Steel Surfaces

- a. Manual cleaning: chip, scrape and wire-brush surfaces to remove loose scale, welding slab and spatter. Clean out crevices. Remove oil, grease and dirt using white spirit, naphtha or steam.
- b. Pre-primed surfaces: ensure that defective primer, rust and loose scale are removed back to bare metal, and patch primer to match existing. Remove dirt and grease from satisfactorily primed surfaces and rub down lightly.

D. New Timber, Plywood, Chipboard, Fibre Board Surfaces

- a. Moisture content: ensure that at time of decorating timber has a moisture content appropriate to its use.
- Loose knots: ensure that large and dead knots are removed and made good with sound timber. Rub down flush before priming.
- c. Smoothness: ensure that surfaces have a smooth, even finish with arises rounded or eased.
- d. Nail and screw heads: ensure that heads are countersunk sufficiently to hold stopping. Ensure that pelletting is of full size, fills the whole of the recess and is securely fixed.
- e. Stopping for painting: after priming, stop nail and screw holes and similar depressions with stopping pressed well in. Finish off brush with surface.
- f. Stopping for clear coatings: stop nail and screw holes and similar depressions with stopping to match color of timber, pressed well in. Finish off flush with surface.
- g. Knotting: remove resinous exudations and apply knotting to resinous timber and all knots and allow to dry.
- h. Degreasing: wash down with white spirit immediately before priming hardwoods containing an excess of natural oil. Clean off surface oils from building boards with white spirit and roughen surface with fine abrasive paper. Dust off surface before decorating.
- j. Filling: after priming or sealing and stopping, fill pore and grain irregularities with filler, brush or knife applied. Remove surplus and rub down to leave a smooth, even surface.
- k. Pre-primed surface: ensure that any areas of defective primer are removed and patch-primed to match existing. Remove dirt and grease from satisfactory primed surfaces and rub down lightly.

E. Mechanical and Electrical Installations

All ferrous pipework, fittings, pump bodies, valves and steelwork supports installed in the Contract Works shall be cleaned down by wire brushing, until all signs of rust have been removed. All surfaces shall then be given a coat of red oxide prior to the application of thermal insulation, or final painting.

All copper pipework where exposed in rooms shall be cleaned down, degreased and adhering metal cleaned off without damage to the installation.

All cement is to be removed from pipework, brackets, etc.

F. Miscellaneous New Surfaces

- a. Plastic Surfaces: wash down with soap and water or detergent solution to remove dirt and grease and while wet lightly abrade with fine abrasive paper. Rinse off with clean water.

2. Coating Materials

A. Generally

- a. Prepare surfaces for decoration as specified in G1 above.
- b. Where surfaces have been treated with preservatives, check with treatment manufacturer that coating materials are compatible with the treatment.
- c. Cleanliness:
Keep all brushes, tools and equipment in clean condition. Keep all surfaces clean and free from dust during coating and drying.
- d. Provide suitable receptacle for liquids, slop washings, etc.

B. Precautions and Protection

- a. Place paint or solvent soaked rags, waste or other materials which might constitute a fire hazard in metal containers and remove from premises at close of day's work. Take every precaution to avoid damage by fire.
- b. Protect freshly applied coatings from damage.
- c. Exhibit 'Wet Paint' signs and provide protection barriers where necessary.
- d. Protect adjacent surfaces adequately.
- e. Protect cordage, seals and the like from contamination by paint. Remove any paint that does get on by appropriate solvent.
- f. Remove ironmongery and other fittings as in G 1.01 (b)above. Items which must remain in position during painting must be adequately and carefully taped.

C. Preparation of Materials

- a. Generally. Prepare coating materials as recommended by their manufacturers.
- b. Strain through fine gauze any coating materials showing brittleness in application.
- c. Do not intermix different coating materials.
- d. Stir coating materials to attain an even consistency before use unless otherwise recommended by manufacturers.

D. Application

- a. Carry out decoration in color as selected by the Engineer and in accordance with approved samples.
- b. Generally: apply coatings in accordance with their manufacturer's recommendations to clean, dry surfaces in dry dust free atmospheric coats have hardened.
- c. Covering capacity: the Contractor is to allow for quantities of paint necessary to give proper cover in the number of coats specified and in accordance with the nature of the material to which it is to be applied.
- d. Unsuitable conditions: do not apply coatings:
 - i. To surfaces affected by moisture or frost.
 - ii. When ambient temperature is below 4 degrees C.
 - iii. When heat is likely to cause blistering or wrinkling.

- e. Priming Generally:
 - i. Apply priming coats by brush unless other methods are approved.
 - ii. Work primer into surface, joints, angles and end grain.
 - iii. Ensure that priming coats are of adequate thickness and suit surface porosity.
 - iv. Ensure that any primed surfaces which have deteriorated on Site or in transit are touched up or re-primed.
- f. Concealed joinery surfaces: apply priming coat to all concealed surfaces of built in joinery components before fixing.
- g. Priming metal: prime metal surfaces on same day as they have been cleaned.
- h. Undercoats: apply an even film over all exposed surfaces, avoiding uneven thickness at edges and angles.
- j. Finishing coats: apply an even film over all exposed surfaces, avoiding brush marks, sags, runs and other defects.
- k. Rub down all priming and undercoats to a smooth surface with abrasive paper and remove all dust before applying the next coat.
- l. Cut in neatly and cleanly. Do not splash or mark adjacent surfaces.
- m. Brush Painting:
 - i. Apply all paints by brush unless otherwise specified.
 - ii. Lay off all areas evenly and ensure that finished surfaces are free from brush marks.
- n. Roller painting will be permitted in the application of emulsion paint and should applied in one coat or if necessary in two coats with roller on priming coat.
- p. Spray painting will be permitted in the application of emulsion paint.
- q. Spray Painting: mask all adjoining surfaces.
- r. Cleaning: clean off any paint spots or spillage from adjacent surfaces as the work proceeds without damage to that surface.

E. Painting of Electrical Installations

The Contractor shall paint all steel supports, bearers, plinths, and structures in the following non-habitable areas:

- a. Plantrooms where required.
- b. Switch rooms, where applicable.
- c. Tank rooms.
- d. Ducts, voids and cavities.
- e. Work above false ceilings, if required.

The Contractor shall paint all of the pipework, and brackets, lagged or unlagged and ventilation ductwork in habitable areas where these items are exposed and visible. Chromium plated, stainless steel or brass valves and stopcocks are not to be painted.

Damage to priming coats on all equipment and plant shall be made good as the work proceeds as soon as possible after the damage occurs to prevent deterioration.

Priming coats listed hereunder are additional to the Works applied primer specified in E5 above.

All black steel pipework is to be wire-brushed cleaned and painted with one coat of zinc chromate primer as work proceeds.

Uninsulated black steel pipework in ducts, voids and cavities is to be wire-brushed, cleaned and painted one coat zinc chromate primer and one coat of best quality bituminous paint as work proceeds.

All uninsulated black steel pipework in plant rooms, switch rooms and tank rooms is to be wire-brushed, cleaned and painted one undercoat as work proceeds and one coat of hard gloss to an approved color prior to completion.

Supports, bearers and other uncovered steelwork in ducts, voids and cavities shall be prepared, rust-proofed and painted one coat zinc chromate primer and one coat of black bituminous paint as work proceeds.

Exposed bearers and supports and other exposed steelwork, not galvanized, in plant rooms and tank rooms shall be prepared and painted one coat of zinc chromate and two coats of approved epoxy resin paint of approved color.

All exposed metal flues shall be cleaned, prepared, rust-proofed and painted two coats of heat resisting paint of approved quality and color.

All polished work and polished or satin-finished plated articles shall be protected during the progress of the Works and cleaned and repolished immediately prior to handover.

All lagging on pipework and ductwork installations with a cold hard setting or white cotton canvas finish shall be prepared, primed, and painted two coats of approved long oil based alkyd paint to selected color.

All uninsulated non-ferrous valve bodies shall be thoroughly cleaned and left unpainted.

All finishing coats of paint shall be applied when the Works are nearing completion or as directed.

EPOXY (09905)

The Epoxy shall be a two-part epoxy resin system which produces a high build, hard wearing, chemically resistant floor coating, and a slip resistant surface. It shall be applied at the rate of 5m²/litre for the 1st coat and 4m²/litre (slip resistant) for the second coat. One coat shall be applied for wall (if requested) and beginning from above one meter from the slab, all as manufacturer's instructions and to the approval of the Engineer

DIVISION 10

IDENTIFYING SIGNS

DIVISION 10
IDENTIFYING SIGNS
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Division 10

IDENTIFYING SIGNS

IDENTIFYING SIGNS (10400)

A. Scope

The extent of identifying sign work includes the provision and installation of letters and numbers where directed by the Engineer.

B. Performance and standards

Codes and Standards : Comply with the applicable requirements of the following codes and standards :

1. American Society for Testing and Materials (ASTM)
2. Specification for Aluminum-Alloy Sand Castings (BS26)
3. Specification for Aluminum-Alloy Permanent Mold Castings (BS 108)

C. Related items

Metal First Fixing Materials 05010
Architectural Woodwork 06400

D. Submittals

Manufacturer's Data : Submit manufacturer's technical data and installation instructions for signs required.

The Engineer will review samples for fabrication, colour, texture and compliance with all other requirements and give approval accordingly.

E. Product Handling

All letters shall be in Arabic and English. The Contractor shall submit complete shop drawings and samples for approval.

Painting for lettering shall be as manufacturer's instruction.

F. Materials

All signs shall conform to the dimensional requirement on the drawings, and shall meet the following minimum requirement :

- a. Aluminum-Alloy works : Refer to Division 8
- b. Wood works : Refer to Division 6
- c. Painting works : Refer to Division 9

d. Galvanized steel : Refer to division 5.

1. Door and wall signs

Door signs consisting of 1mm thick aluminum plate finished in colored polyester powder, glued to black painted plywood panel.

Sizes and details to be as shown on drawings.

2. Bracket mounted signs

Signs sizes as shown on drawings, consisting of 30mm thick extruded aluminum profile finished in colored polyester powder, fixed to 2mm thick prepainted galvanized steel plate, and black aluminum cover edge. Details to be as shown on drawing.

3. Snack name:

Shall consist of bronze anodized aluminum frame light blue plexyglass panel and colored letters, sizes as shown on drawing.

4. School name :

Consisting of 5cm thick brass letters, sizes and details as shown on drawing.

G. Workmanship

The Contractor shall examine the substrates and the conditions under which the signs shall be installed and correct any unsatisfactory conditions, and do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

Installation

Install signs at locations where required securely mounted with concealed theft resistant fasteners, unless otherwise indicated. Attach signs to substrates in accordance with manufacturer's instructions.

Install level, plumb, and at proper height. Repair or replace damaged units as directed by the Engineer.

LIST OF ARCHITECTURAL AND STRUCTURAL APPROVED MATERIALS
(ANY SIMILAR EQUAL WILL BE ACCEPTED)

ITEM	MATERIAL
1. MASONRY (6,10,15 & 20 CM THICK, BLCKWALL)	DERVICHE HADDAD N. ARAMANE
2. PRECAST CONCRETE TILES & KERBS	DERVICHE HADDAD N. ARAMANE
3. ALUMINIUM	TECHNAL SHUCO
4. IRONMONGERY	MCKINNEY – ESSEX – VACHETTE – VALLI & VALLI
5. WATERPROOFING MEMBRANE	POLYGLASS –INDEX – FORSROC – IMPER – SPEC (BARDAWIL)
6. THERMAL INSULATION	KILZI
7. EPOXY COATING	BCR – FOSROC – IMPER
8. CEMENT	LOCAL CEMENT FACTORIES
9. GLAZING	PILKINGTON – SAINT GOBAIN – FORD
10. PAINTING:	TINOL – SIPES –PLASTER – DUTCH BOY
11. WOOD	MEKER – TECHNOWOOD- FRANCEPORTE
12. GLAZED CERAMIC WALL TILES	AMERICAN OLEAN FLAVKER, MARAZZI – VACCARI – JHONSON
13. FULLY VITRIFIED CERAMIC FLOOR TILES	VACCARI – MARAZZI – AMERICAN OLEAN - FLAVIKER
14. SUSPENDED CEILING	PROMETAL – SEDIMETAL – HUNTER DOUGLAS – RICHTER SYSTEM
15. MARBLE & NATURAL STONE	BOTTOCINO – CRÈME MARFIL
16. NATURAL RAMLY STONE	IMPORTED