FTS Q 08-14

QUOTATION FOR THE DEMOLITION AND RECONSTRUCTION OF A ROOF SLAB AT SIR ADRIAN DINGLI SECONDARY SCHOOL, PEMBROKE

IMPORTANT NOTE:

- Participation Fee is Free

- No Bid Bond is requested for this quotation
- Tenderers are bound by their offers as per the period stated in article 3 in "QUOTATION FORM".
- Clarifications issued after the publication of quotation will be uploaded on the FTS website: **www.fts.com.mt** under the respective quotation number.

FOUNDATION FOR TOMORROW'S SCHOOLS

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2014

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Quotation No: FTS Q 08-14

Sealed quotations will be received up to 11.00 a.m. at this office (Foundation for Tomorrow's Schools, Sir Adrian Dingli Street, Pembroke) on 24th June 2014 for the demolition and reconstruction of a roof slab at Sir Adrian Dingli Secondary School, Pembroke.
The quotation shall not be considered unless:

a. it is received at the Foundation for Tomorrow's Schools' Office, Sir Adrian Dingli Street, Pembroke, Malta on or before the date and hour fixed above;
b. it is made on the prescribed form which contains the conditions of contract;
c. (i) in the case of a registered Company, it is signed by a person or persons duly authorised to act on behalf of the Company;
   (ii) in all other cases it is signed by the party tendering;
d. the postal address, telephone number and age of the individual (where applicable) are stated in the quotation document.

The successful bidder shall, where the conditions of quotation so specify, call to sign the contract where and when required to do so. The contract fees shall be borne by the successful bidder. The bidder / company whose offer is accepted shall incur a penalty equal to one (1%) per cent of the estimated value of the contract should he/she fail to call either personally or by proxy to sign the contract for two consecutive times when requested to do so. Moreover, if the said bidder fails to furnish information and/or documents necessary for the drawing up of the contract, this shall be construed as unwillingness on the part of the bidder to sign the quotation, and shall render the signatory of the quotation personally responsible and liable to the penalty aforesaid. This notwithstanding, the said bidder shall remain responsible to carry out his obligations under the agreement and may be compelled to carry out such obligations under the conditions governing the contract and shall be subject to the penalties specified in those conditions although a formal contract was not executed.

Bidders shall not retract or withdraw their offers for the period specified in the relative Form 1. During this period, which shall commence from the date of expiration of the time fixed for the presentation of quotations, the quotations shall remain binding and may be accepted at any time.

CHAIRPERSON – FOUNDATION FOR TOMORROW'S SCHOOLS

QUOTATION FORM

1. With reference to Quotation No. Q 08-14 published in the Government Gazette by the Foundation for Tomorrow's Schools on the 3rd June 2014, and in terms of the conditions therein mentioned and those thereto attached, I / We [A]

_____

(name of individual or firm making the quotation; to be entered in BLOCK LETTERS)

offer to:

(i) supply and deliver to store or site of works in Malta.
(ii) erect, complete hand over in working order and thereafter maintain as directed by the Head of Department, all charges paid including Customs Import Duty, VAT, Eco Contribution, levies and any other charges as applicable, and insured against any risks, the articles enumerated on the attached Schedule, at the prices stated on the same.

2a. I/We further offer to undertake to commence works within five (5) working days from the date of the Acceptance of Quotation of my/our quotation issued in writing.

2b. In addition, we offer to undertake to complete the works within a further four (4) calendar weeks.

3. I/We undertake that this quotation shall not be retracted or withdrawn for a period of Forty-Five Calendar Days from the date of expiration of the period fixed for its delivery, inclusively but shall remain binding and may be accepted by the Government at any time during the said period of Forty - Five Calendar Days.

NAME OF INDIVIDUAL / COMPANY _____

ADDRESS _____

_____

_____

TELEPHONE NUMBER _____

FAX NUMBER _____

V.A.T. REG. NO. _____

SIGNATURE _____

DATE _____

[A] In the case of quotation from a company, the name of the company and the date of registration in conformity with the Companies Act of 1995 or analogous of the country where the company is registered is to be indicated. The person signing the quotation should be and is considered to be fully authorised to act on behalf of the company for all purposes relating to the tender.

(*) Delete where not applicable.

TERMS AND CONDITIONS

1. Prospective bidders shall download and print the quotation document from the FTS website: www.fts.com.mt under the heading "Quotations" and the respective quotation number.

2. The prices shall be quoted in Euro Currency and shall include the cost of delivery to store or site as indicated, all charges paid, inclusive of VAT., ECO Contribution and all other charges as may be applicable.

3. From the closing date fixed for the receipt of quotations submitted prices shall remain binding for the period as stated in article 3 of "Quotation - Form 1"

4. In the event that further orders are required by the Foundation we reserve the right to utilise the rates quoted by the successful bidder, which shall remain valid for a period of six (6) months from the acceptance of quotation.

5 Technical Literature to be submitted with the quotation document

Item	Description	Reference in Technical Specifications
1.1	Waterproofing Membrane	Spec 29
1.2	A declaration stating that the waterproofing membrane has a guarantee for five (5) years	Spec 29

The literature submitted will remain property of the FTS and no claims for the cost of literature will be accepted by FTS.

6. Quotations are only accepted in whole.

7. Delivery Periods and Penalty for Delay:
   (i) Goods ex-local stock must be delivered as per Form 1 clauses 2a and 2b from the date of receipt of the acceptance of quotation.
   (ii) Where items can only be supplied ex-foreign stock, the delivery date must be indicated.
   (iii) A penalty of 1% per calendar day of the value of the order may be inflicted for late delivery.
   (iv) The Foundation also reserves the right to cancel any order awarded and not honoured within the delivery date indicated by contractor.

8. Any unsatisfactory service such as failure to meet orders either partially or in their entirety or failure to deliver goods in time will be recorded in Suppliers' Performance Records.

9. Unless otherwise stated the goods offered and supplied must be brand new, unused and free from apparent and inherent defects.

10. Successful bidders shall be bound to conform in all respects with VAT legislation and regulations.

11. The Foundation is not bound to accept any quotation and shall not give reasons for the acceptance or rejection of any particular offer.

12. Any instance of alteration or modification (not using the original downloaded document) of quotation documents used in the submission of a quotation result in disqualification.

The Chairman FTS, shall make any variation of the form, quality or quantity of the Works or any part thereof that, may in his opinion be necessary for that purpose or if for any other reason it shall, in his opinion be appropriate, the FTS shall have the authority to instruct the Contractor to do and the Contractor shall do any of the following:

a) increase or decrease the quantity of any materials / work included in the Contract.

b) omit any such work

c) execute additional work of any kind necessary for the completion of the Works with a written approval from the Chief Finance Officer of the FTS.

d) change any specified sequence or timing of delivery of any part of the Works

e) No such variations shall in any way vitiate or invalidate the Contract. Provided that where the issue of an instruction to vary the Works is necessitated by some default of or breach of contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor.

f) The Contractor shall not make any variations without written instructions by the Chief Finance Officer of the FTS.

13. The Contractor shall be responsible to coordinate and dove tail his work with that of the sub-contractors. In case of problems which occur and which affect the quality and progress of works, these shall be referred immediately to the Architect / Engineer-in-Charge and a meeting held with the parties concerned to find a solution.
The decision of the Architect / Engineer-in-Charge in such matters shall be final.

13 (i) Should the contractor from any cause whatever, become unable or fail to carry in the contract with efficiency; or should he not progress with the work in the manner intended by the contract, or not have the work ready for delivery in conformity with the terms of the contract; or should his preparations for commencement and his subsequent rate of progress be slow, from any cause whatever, that, in the opinion of the Head of Department he will be unable to complete and deliver the work by the expiration of the specified period; of should he refuse or neglect to comply with the directions given by the Head of Department or in any other respect act contrary to the terms of the contract, then the Government shall have the power to declare the contract at an end, and the Contractor shall only be paid for such portion of the work as shall have been actually delivered at the date of such declaration, after deduction of any sum liable under the conditions of such declaration will be valued by the Head of Department which valuation after being approved by the Government, and subject to any deduction liable under the conditions of the contract, shall be final.

13 (ii) The contractor shall, in addition, be liable to pay to the Government shall be entitled to further deduct the value of any expense, loss or damage (including any difference between the contract price of the work to be done, under the contract, or of such portion thereof as may, not have been delivered at the date of such declaration as aforesaid, and the price which the Government may have to pay for similar work provided in lieu of such portion as may not have been so delivered) which the Government may be put to or sustain by reason of, or in connection with the Contractor's breach of contract.

Name of Individual / Company _____

Signature of Individual / Company _____ Date: _____

Specifications

1 DEMOLITION

1.1 General – Safe Working Conditions

1.1.1 This specification does not replace the Contractor's legal responsibility to provide and maintain safe working conditions in accordance with current Maltese Occupational Health and Safety legislation, namely LN 36 of 2003, LN 281 of 2004 and other subsidiary legislation and regulations.

1.1.2 All worksite access gates and entry points should be strictly controlled to give the minimum amount of time open for passage of vehicles, in order to minimise plant vehicle noise to the local environment.

1.2 Crane Locations

1.2.1 Every effort shall be made to confine crane arcs to within the site periphery. Should crane rotation arcs extend beyond the site perimeter approval shall be sought from the Project Manager. When the erection of cranes is located in areas under the jurisdiction of public authorities and entities the Contractor shall ensure that all necessary permits, fees, protection and safety provisions are in place and at no additional expense to the Foundation for Tomorrow's Schools.

1.2.2 At the completion of works the Contractor will leave the site free from plant, rubble and any unwanted materials.

1.2.3 The security of neighbouring property should be considered. Care should be taken not to leave scaffolding and ladders or any conditions, which facilitate access to neighbouring property.

1.2.4 The Contractor will follow a "good housekeeping" policy at all times. This will include, but not necessarily be limited to, the disposal of rubbish and waste at adequate intervals.

1.2.5 Noise and Hours of Working

1.2.6 The Contractor shall comply with EU Directive 2002/49/EC relating to the assessment and management of environment noise.

1.2.7 Before works on site are commenced, the Contractor will be required to submit to the Project Manager for approval the following information: -

i. A method statement (in accordance with the principle described in BS 5228) stating precisely the type of plant to be used and the proposed noise control methods.

ii. A programme of work indicating the noise intensity and the location for each activity on the programme.

iii. Documentation from the manufacturers literature establishing the sound power levels of the plant.

iv. Calculations of L_{den} and peak levels at specified buildings, when so requested.

1.2.8 Vehicles and mechanical plant used for the purpose of the works shall be fitted with effective exhaust silencers and maintained in good and efficient working order and operated in such a manner as to minimise noise emissions.

1.2.9 For each item of plant used in the works, the values quoted in the relevant EC Directive should not be exceeded.

1.2.10 Plant muffling should be in accordance with the recommendations set out in BS 5228:1997.

1.2.11 Compressors should be fitted with properly lined and sealed acoustic covers, which should be kept, closed whenever in use.

1.2.12 Pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers.

1.2.13 Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.

1.2.14 Care should be taken when loading or unloading vehicles or dismantling scaffolding or moving materials etc. to reduce impact noise.

1.2.15 The delivery and collection of skips in noise sensitive areas will be restricted to specified hours.

1.3 Piling Operations (Where Applicable)

1.3.1 The noise sensitivity of the area should be considered when determining the method of piling to be used.

1.3.2 Sheet piling shall be carried out using hydraulically operated or vibratory hammers, wherever practicable.

1.3.3 The use of conventional impact hammers should be avoided. In cases where it is used a Hush Piling Rig or complete enclosure of the system should be deployed to reduce noise levels.

1.4 Blasting operations

1.5 Blasting is strictly **NOT PERMITTED**.

1.6 Hours of Working

1.6.1 Construction operation will be restricted to those periods recognised and permitted by local regulations and legislation.

1.6.2 Any works outside the permitted hours are to be by prior approval of the Project Manager.

1.7 **Noise limits**

1.8 Sound levels will be monitored according to the methods set out in Annex E of BS 5228:1997 Part 1. All measurements shall be made on a sound level meter (currently calibrated) complying with BS EN 60651:1994, Specification for Sound Level Meters. A programme of noise monitoring by a suitably qualified specialist will be agreed between the Contractor and the Project Manager.

1.9 The noise limits to be applied to a site are those set out in the BS 5228, Appendix 1.

1.9.1 Noise shall be measured at first floor level or above, 1 metre from the nearest residential facade. These limits do not apply to buildings in occupation during construction.

1.10 Dust and Air Pollution

1.10.1 Dust pollution will be minimised during demolition works and the watering of the area should be undertaken where necessary to minimise dust transference into neighbouring premises. Whenever possible dust suppressed tools should be used.

1.10.2 Stockpiles shall aim to minimise the effects of attrition and wind action. They shall be sited and shaped to minimise the potential for dust generation. Handling operations shall be kept to a minimum and materials must be deposited onto the stockpile from the minimum practicable height without causing obstruction to lighting to adjacent property. The surface of long-term stockpiles shall be stabilised.

1.10.3 Wheelwash facilities should be provided at site exits to prevent any transfer of mud onto roads.

1.10.4 The Contractor should take all necessary precautions to prevent the occurrence of smoke emissions or fumes from site plant or stored fuel oils for safety reasons and to prevent such emissions or fumes drifting into residential areas. In particular, plant should be well maintained and measures taken to ensure that they are not left running for long periods when not in use.

1.11 Demolition - Preliminary Considerations

1.11.1 An experienced supervisor shall be continuously in charge of the works.

1.11.2 Demolition operations shall generally comply with BS 6187: Code of Practice for Demolition.

1.12 Demolition - General Site Provisions

1.12.1 Plant and equipment must only be operated by skilled operators and must be regularly serviced.

1.12.2 Protective Clothing and shoes must be worn at all times.

1.12.3 Buildings where chemicals have been stored or where asbestos, lead paint, dust or fumes may be present will require specialized protective clothing. Projecting nails, pieces of metal, etc. resulting from demolition can cause accidents.

1.13 Demolition - Technique

1.13.1 The Contractor shall comply with the recommendations set out in BS 5228:1997, Code of Practice for Noise Control on Construction and Demolition sites.

1.13.2 The demolition technique and choice of equipment should be dependant on the nature of the structure, the surrounding buildings and the environment.

1.14 Shoring and Underpinning

1.14.1 When removing sections of the building which could leave other parts unsafe, the Contractor shall provide adequate temporary supports and shoring.

1.15 Working Areas

1.15.1 These will need to be well signposted and clear warnings given that demolition work is in progress. This shall include the necessity for adequate illumination during the night.

1.16 Debris

1.16.1 Sections of the building must not be overloaded with debris either on suspended floors or against walls.

1.17 Weather Conditions

1.17.1 All walls and slabs shall be propped to protect against strong winds.

1.18 Overhead Cables

1.18.1 Crane heights must be checked against the height of any surrounding overhead cables to avoid damage and cutting off supplies etc.

1.19 Scaffolding and Hoarding

1.19.1 These must be constructed and illuminated to the relevant building regulations.

1.20 Demolition Processes

1.20.1 The demolition method shall take into account the method of construction used for the original building and its proximity to other buildings, structures and the general public.

1.21 Building Information

1.21.1 If information on the building in terms of "As Built" drawings and structural details, are not available adequate site investigations are necessary, both to ascertain the way in which the building was originally constructed, and to identify the stresses and strains which exist within it. Consideration should be given to conducting a site and building survey, with a structural bias.

1.21.2 Details and drawings from site survey activities where no such information is available;

1.21.3 Programming the sequence of demolition work;

1.22 Demolition Method Statement - General

1.22.1 A detailed method statement, produced before demolition work starts, is mandatory. It should include fulfilling the recommendations arising from the Risk Assessment, identify problems and their solutions, and form a reference for the site supervision.

1.22.2 The method statement should be easy to understand, agreed by and known to all levels of management and supervision.

1.23 Demolition Method Statement – Risk Assessment

1.23.1 A detailed risk assessment in accordance with Legal Notice 36 of 2003 is mandatory.

1.24 Demolition Method Statement – Isolation of Structure

1.24.1 If only parts/sections of the building is to be demolished the Method statement shall contain details of how to isolate the part/s to be demolished from the remaining structure. This shall normally be through vertical cuts in masonry walls and horizontal stitch drilling in concrete floor slabs using hand held tools.

1.25 Demolition Method Statement - Particulars

1.25.1 The Method Statement shall clearly define:

1.25.1.1 The sequence and method of demolition or dismantling of the building or structure with details of personnel access, working and protective platforms and machinery requirements;

1.25.1.2 Details and design of any temporary supporting structures to be used during the demolition process;

1.25.1.3 Specific details of any pre-weakening on structures which are to be pulled down or demolished;

1.25.1.4 Arrangements for the protection of personnel and the public and the exclusion of unauthorized persons, with details of areas outside the site boundaries that may occasionally need to be controlled to improve safety during critical aspects of the work;

1.25.1.5 Details of the removal or making safe of electrical, and other services and drains;

1.25.1.6 Details of temporary services available or required for the contractor's use;

1.25.1.7 Arrangements for the control of site transport used for the removal of demolition debris.

1.26 Demolition Methods

1.26.1 Generally buildings and structures should be demolished in the reverse order to their erection, although where partial demolition is involved a more careful evaluation of the nature of the effects of the demolition is necessary.

1.26.2 *Normally, the demolition Contractor is able to adopt a method of work which gradually reduces the height of the building; Controlled collapse of the building or structure is strictly NOT PERMITTED.*

1.26.3 *Only piecemeal demolition, using hand-held tools or machines, to reduce the height of the building or structure gradually shall be permitted.*

1.26.4 Demolition of buildings or structure by hand-held tools such as electric or pneumatic breakers, sometimes as a preliminary to using other methods, should be carried out, where practicable, in the reverse order to the original construction sequence. Lifting appliances may be necessary to hold larger structural members during cutting and for lowering severed structural members and other debris. Chutes may be used to discharge debris into a vehicle or hopper. Note - Foundations would normally be grubbed up by

excavation machines.

1.26.5 Where a building that is to be demolished by machine is bonded to another structure, the two should be separated by the use of hand methods before the main demolition process begins.

1.26.6 No machinery shall be supported directly on the structure that is being demolished.

1.26.7 No demolition personnel shall be supported directly on the structure that is being demolished.

1.26.8 When any part of a building is being demolished only the machine operator and assistant should be allowed close to the working area. The cabs of all machines should be strong enough to protect the operator against the fall of debris. In particular, the windscreen and rooflight should be of shatterproof material and guarded by a grille of steel bars or a substantial mesh.

1.26.9 Balling machines comprising a drag-line type crawler chassis fitted with a demolition ball are **NOT ALLOWED.**

1.26.10 Impact hammers and nibblers are permitted but in either case, material should be removed from the top of walls or columns in courses not greater than 600mm in depth whilst steel reinforcement should be cut separately as necessary.

4 CONCRETE

4.1 General

4.1.1 The performance and production of concrete shall generally comply with BS EN 206-1: Concrete. Specification, Performance, Production and Conformity

4.2 Compliance - Sample Size and Frequency of Sampling (Where Applicable)

4.2.1 Where applicable, sample size and frequency of sampling for compliance shall be established on the basis of standard statistical guidelines.

4.3 Compliance – Testing and Certification

4.3.1 Compliance shall be demonstrated through testing and/or certification of products and/or processes as outlined in the ensuing clauses.

4.4 Classification - Exposure

4.4.1 The exposure classes of concrete related to environmental shall be as classified in BS EN 206-1, Table 1 – Exposure Classes and Table 2 – Limiting Values for Exposure Classes for Chemical attack from natural soil and ground Water.

4.4.2 The concrete may be subject to more than one of the actions described in Table 1 and Table 2.

4.5 Classification - Consistency

4.5.1 The classification of consistency shall be as indicated in Table 3 – Slump Classes. The consistence suitable for different uses of in-situ concrete is indicated in BS 8500-1: Complementary British Standard to BS EN 206-01, Method of Specifying and Guidance for the Specifier, Table A.19.

4.5.2 Any addition of water and admixture at delivery is forbidden unless under the direct responsibility of the producer. Any additions at delivery are subject to the condition that any limiting values incorporated in the specification are not exceeded. All additions shall be recorded on the delivery chits.

4.6 Classification – Compressive Strength

4.6.1 The classification of compressive strength shall be as indicated in BS EN 206-01, Table 7, Column 3 – Minimum Compressive cube strength for normal-weight and heavy-weight concrete.

4.7 Limiting Values

4.7.1 The recommended limiting values for the composition and properties of concrete shall be as indicated in BS EN 206-01, Table F.1

4.8 Site Mixed Concrete

4.8.1 The production of site-mixed concrete shall be limited to non-structural use and in quantities smaller than $2m^3$.

4.9 Cement

4.9.1 Cement for use in concrete shall comply with EC Directive 89/106/EEC as implemented in decision 97/555/EC. Technical characteristics shall comply

with BS EN 197-1: Cement. Composition, Specifications and Conformity Criteria for Common Cements. The cement shall be Portland Cement, Type CEM1, strength class 42.5N. CE marking is mandatory for all cement supplied for use in the concrete mix.

4.10 Cement Temperature

4.10.1 The temperature of the cement shall not exceed 65 Degrees Celsius at the time of incorporation into a concrete mix.

4.10.2 The cement shall be used as soon as possible after delivery, each consignment being used in correct rotation so as to prevent cement lying for long periods in storage. Accurate records shall be kept by the Contractor to identify the dates of delivery of cements.

4.10.3 Each consignment of cement delivered to the batching plant shall be accompanied by a certificate showing the place of manufacture and the results of standard tests carried out on each day's production, included in the consignment, these to include physical and chemical tests.

4.11 Cement - Supplier

4.11.1 Before placing orders for cement, the Contractor shall submit :

a) The Name of the proposed supplier.
b) Cement manufacturer's certificates stating the Declaration of Conformity

4.12 Cement – Minimum Content in Mix

4.12.1 The minimum cement for the specified maximum water cement (w/c) ratio and maximum aggregate size shall be as indicated in BS 8500-1: Complementary British Standard to BS EN 206-01, Method of Specifying and Guidance for the Specifier, Table A.18.

4.13 Aggregate

4.13.1 Aggregate for use in concrete shall comply with EC directive 89/106 as implemented in decision 98/598/EC. Technical characteristics shall comply with BS EN 12620, Aggregates for Concrete.

4.14 Aggregate – Test methods

4.14.1 Test methods for aggregates shall comply with EN 933, EN 1744 and EN 13179, EN 1367 and EN 1097.

4.14.2 Differing sizes of aggregate shall be stored on site in separate bins constructed in such a manner as to avoid cross-contamination of the individual aggregates. Bins should have concrete floors to prevent ground contamination of aggregates. Adequate provision for drainage shall be made and all aggregates are to be stored and handled so as to avoid segregation.

4.14.3 During hot weather the aggregates should be covered or shaded in order to reduce the mixing temperature. A water sprinkler system shall be installed to wet the aggregates in the storage bins.

4.14.4 A sufficient separate stockpile of the tested and approved aggregates shall be maintained on site to ensure that no delays occur during construction.

4.14.5 The maximum nominal upper aggregate size shall be 20mm unless indicated

otherwise in the drawings.

4.14.6 Aggregate recovered from wash water or fresh concrete may be used as aggregate for concrete.

4.14.7 Aggregate recovered from hardened concrete may be used if the material is not contaminated and complies with the requirements of BS 8500-1: Complementary British Standard to BS EN 206-01, Method of Specifying and Guidance for the Specifier, Table 2. The limitations in Table 3 shall apply.

4.14.8 The Los Angeles Coefficient of the combined coarse aggregate shall not exceed LA_{40}.

4.15 Marine Sand - Prohibition

4.15.1 The use of marine and beach sand is prohibited.

4.16 Mixing Water

4.16.1 Mixing water for concrete shall comply with EU directive 89/106/EEC as implemented in the relevant decision. The technical characteristics shall comply with BS EN 1008 - Specification for Sampling, Testing and Assessing the suitability of Water, including Water recovered from processes in the concrete industry, as Mixing Water for Concrete.

4.17 Standby Water Supply

4.17.1 The Contractor shall install a standby water source of sufficient capacity to ensure continuation of concreting for sections of work being cast should water supplies be disrupted.

4.18 Admixtures

4.18.1 Admixtures shall not be used without the written approval of the Project Manager.

4.18.2 Admixtures for incorporation in concrete shall comply with EU directive 89/106/EEC as implemented in the relevant decision. The technical characteristics shall comply with BS EN 934-6: Admixtures for concrete, Mortar and Grout, Sampling, conformity control and evaluation of conformity. Test methods shall be as indicated in BS EN 480, Parts 1 to 14

4.18.3 The total amount of admixtures, if any, shall not exceed the maximum dosage recommended by the admixture producer subject to a maximum dose not exceeding 50g of admixture per kg of cement. Admixtures used in quantities of less than 2g/kg of cement are only permitted if they are dispersed in part of the mixing water. If the total quantity of liquid admixtures exceeds 3 l/m^3 of concrete, its water content shall be taken into account when calculating the water/cement ratio.

4.18.4 Where more than one admixture is proposed for incorporation in the concrete mix, the compatibility shall be certified.

4.18.5 Calcium chloride and chloride based admixtures shall not be added to concrete containing steel reinforcement, prestressing steel reinforcement or other embedded metal.

4.19 Additions

4.19.1 Additions (filler, pigments, fly ash, silica fume) shall not be used without the written approval of the Project Manager.

4.20 Chloride Content

4.20.1 The chloride content of a concrete, expressed as a percentage of chloride ions by mass of cement, shall not exceed the values given in BS EN 206-1, Table 10.

4.21 Designed Concrete

4.21.1 Concrete for structural use shall be designed concrete.

4.22 Designed Concrete - Trial Mixes

4.22.1 Designed concrete shall conform to the requirements specified in BS 8500-1: Complementary British Standard to BS EN 206-01, Method of Specifying and Guidance for the Specifier, Table 9.

4.22.2 Initial trial mixes shall be carried out on all mix designs prior to their use in the works. Trial mixes shall be produced using the plant and transport intended for use in the works, unless otherwise agreed by the Project Manager.

4.22.3 The mandatory trial mixes of each concrete grade shall be executed as per D.O.E (UK) method or approved equivalent.

4.22.4 The trail mixes shall be sampled and tested according to the requirements of BS EN 12350 and BS EN 12390. Accelerated curing techniques that predict 28 day cube crushing strengths with acceptable accuracy may be used.

4.23 Production Control

4.23.1 All concrete shall be subject to a production control system under the direct responsibility of the producer. The production control system shall cover, at least, the measures indicated in BS EN 206-1, clause 9 with particular reference to the recorded data and other documentation (See Tables 20, 21, 22, 23, 24).

4.24 Conformity Control and Conformity Criteria

4.24.1 The producer is responsible for evaluation of conformity. The tasks to be carried out by the producer shall be as indicated in BS EN 206-1, clause 10 with particular reference to Annex A.

4.25 Evaluation of Conformity

4.25.1 All concrete shall be subject to a conformity control system under the direct responsibility of the producer. The control system shall cover, at least, the measures indicated in BS EN 206-1, clause 8 with particular reference to clause 8.2.1.2 (Sampling and Testing Plan) and Tables 13, 14, 15, 17, 18, 19a, 19b).

4.26 Action in Event of non-compliance

4.26.1 In the event of non-conformity with the specified standards, the producer shall take the actions prescribed in BS EN 206-1, clause 8. The Project Manager shall approve the producer's proposal for action to be taken with regards to

concrete already placed. This may range from rejection and removal of the suspect concrete to qualified acceptance, depending on the degree of non-compliance and the type of member involved.

4.26.2 The Project Manager may order further tests to be carried out on the hardened concrete which may include cored samples and non-destructive testing. The cost of such action and testing shall be at the Contractor's expense.

4.27 Concrete Mix – Information from the Producer and Delivery Chits.

4.27.1 The information from the Contractor to the producer shall be as indicated in BS EN 206-01, clause 7.1.

4.27.2 The information from the producer to the user shall be as indicated in BS EN 206-01, clause 7.2.

4.27.3 The producer shall provide a template of the delivery chits at least seven days before the start of the Works. These shall contain the minimum information contained in BS EN 206-01, clause 7.3.

4.28 Notification of Concrete Pours

4.28.1 The Contractor shall give the Project Manager 24 hours written notice of any intended concrete pour. The Contractor must submit a 'Notification of Concrete Pour' form for any intended concrete pour.

4.29 Concrete Pumps (Where Applicable)

4.29.1 Should the Contractor opt for the use of Concrete Pumps in placing operations the agreement of the Project Manager shall be sought.

4.30 Concrete Profilers (Where Applicable)

4.30.1 The use of Mobile Concrete Slipform Profilers is permissible. The plant, methodology, mix design, curing, alignment, levelling, joints and tolerances provisions shall be to the approval of the Project Manager.

4.31 Placing

4.31.1 Concrete shall not be placed unless the Project Manager or his representative is present and has previously examined and approved the positioning, fixing and condition of reinforcement, any other embedded items and the cleanliness, alignment and suitability of the formwork or other containing surfaces.

4.31.2 Concrete shall be deposited as early as possible in its final position and shall be placed in such a manner as to avoid segregation of the materials and displacement of formwork, reinforcement and other embedded items. The manner of placing shall be to the approval of the Project Manager.

4.31.3 Placing shall be continuous between specified or approved construction joints. The concrete shall be compacted and in its final position within two hours of the introduction of cement in the mix. Fresh concrete shall not be placed adjacent to concrete that has been already placed and compacted in excess of 45 minutes.

4.31.4 If, for any reason, the placing of concrete is discontinued, the Contractor shall immediately inform the Project Manager's representative. All works involved in any remedial measures shall be carried out at the Contractor's expense.

4.31.5 Concrete shall not be placed in running water and any water standing on areas to receive concrete shall be removed before concrete is deposited.

4.32 Batching of Concrete

4.32.1 Batching of constituent materials shall be as provided in BS EN 206-1, clause 9.7.

4.33 Delivery Trucks and Cleaning

4.33.1 All delivery trucks shall be certified as complying with BS EN 206-1, clause 9.6.2.3 and registered as suitable for their purpose in a data schedule. This shall include the calibration data in respect of water gauges. Arrangements will be made to designate an area where all concrete delivery trucks can wash out. This area will be situated well away from any concreting activities.

4.34 Workability

4.34.1 The workability of the concrete being placed shall be checked regularly by means of the slump test. When the measured slump is outside the specified limits, the concrete shall not be used in the works.

4.35 Execution - General

4.35.1 The execution concreting operations shall generally follow the provisions and requirements of BS 8110, Part 1:1997: Structural use of Concrete and ENV 13670-1: Execution of concrete structures.

4.36 Protection against rainfall

4.36.1 The Contractor shall provide adequate cover as necessary to protect concrete pours in progress against damage from rainfall.

4.37 Placing in High Temperature

4.37.1 Freshly placed concrete is to be given adequate protection to resist the combined evaporative effect of direct sunlight, air temperature, relative humidity and drying winds on the surface of the placed concrete, particularly for concrete placed in horizontal areas.

4.37.2 The Contractor shall take measures to control the maximum concrete temperature after placing and the temperature gradient within any concrete pour. The maximum concrete temperature after placing should not exceed 65 Degrees Celsius.

4.37.3 The Contractor shall supply suitable maximum/ minimum thermometers and record the shade and ambient temperatures at locations where concrete is being placed.

4.38 Compaction

4.38.1 The concrete shall be fully compacted throughout the full extent of the layer. It shall be thoroughly worked against formwork and around reinforcement or embedded items without displacing them. Compaction is to be in such a way that it does not promote a) segregation; b) formwork and reinforcement displacement,

4.38.2 Successive layers of the same lift shall be thoroughly worked together.

4.38.3 Care shall be taken to prevent the formation of air bubbles against vertical or sloping formwork.

4.38.4 Unless otherwise directed by the Project Manager, approved power driven vibrators shall be used to ensure that the concrete is satisfactorily and uniformly compacted.

4.38.5 Surface vibrators of approved type, capacity and frequency shall be used to compact thin slabs, pavements and road slabs as directed by the Project Manager.

4.38.6 The position and arrangements of construction joints will be as shown on the Drawings or as approved by the Project Manager.

4.38.7 The surface of concrete already cast which is to receive further concrete is to have the laitance removed either when green by compressed air and/or water jetting or, if hardened, by micro hacking with light air picks. Care shall be taken not to crack concrete or loosen the aggregate. Before placing fresh concrete, the surface shall be clean , having no loose or foreign materials, and shall be wetted thoroughly.

4.39 Construction Joints

4.39.1 Fresh concrete after deposition shall be thoroughly compacted against all joint surfaces. Particular care shall be taken to prevent the leakage of grout at joints by use of adequate seals such as a foamed plastic strip compressed between the inner face of the formwork and the previously placed concrete.

4.40 Water Bars

4.40.1 Where ordered, water bars or water stops shall be inserted in joints and care shall be taken to ensure that the concrete is well compacted against them and that they are not damaged or displaced during placing operations. A half width of the water bars shall be inserted in one pouring of the concrete and the other half encased by a subsequent pouring. Joints in water bars shall be made as directed by the manufacturers.

4.40.2 Water bars shall include means, such as reinforced flanges to facilitate accurate and rigid fixing in the joint.

4.41 Expansion Joints

4.41.1 Expansion joints shall be formed in positions as shown on the Drawings or as directed by the Project Manager. Expansion joints shall be formed with joint material of the dimensions shown on the Drawings.

4.42 Sealing of Joints

4.42.1 The cavity for the joint sealer shall be of the dimensions shown on the Drawings and the surfaces shall be thoroughly cleaned and primed or de-bonded in accordance with the manufacturer's instructions before placing the sealant. The sealing compound in all joints shall be to the approval of the Project Manager, and of the type shown on the Drawings and shall be applied as directed by the manufacturers.

4.43 Curing and Protection - General Requirements

4.43.1 The Contractor shall ensure that curing is carried out in such a way that thermal and plastic cracking of the concrete does not occur.

4.43.2 For a minimum period of 7 days after placing the concrete, it shall be kept protected against loss of moisture, rapid temperature change, rain and flowing water, mechanical injury, contamination by airborne dust and sand, drying winds and surface heating by the sun's rays. This period may be increased on the instructions of the Project Manager.

4.43.3 Following the completion of the above period a further period of controlled drying out will be required as directed by the Project Manager. This may require that covers, sand layers and the like be kept in place for longer than the 7 day minimum curing period otherwise specified.

4.43.4 The Contractor's attention is particularly drawn to the importance of starting curing as early as possible after placing concrete and maintaining full curing procedures throughout, as specified and directed herein.

4.43.5 Any concrete which exhibits plastic settlement, or plastic early thermal contraction, or early drying shrinkage cracking, or which has not been properly cured, shall be rejected by the Project Manager.

4.44 Curing Methods

4.44.1 The Contractor shall prepare and submit his proposals for wet curing of concrete and for maintaining the curing regime to the standards and for the times specified herein. The method proposals shall be to the satisfaction of the Project Manager and the approved methods will be strictly enforced. Purpose-made curing frames will be provided by the Contractor for the vertical faces of the deck and quay walls. Methods for other areas shall include the use of curing membranes, watering, covers, shades and any other precautions that are required for the Contractor to ensure satisfactory curing of the concrete. Where necessary, the Project Manager may insist on the use of thorough and continuous wetting of concrete surfaces.

4.44.2 The Contractor's attention is drawn to the recommendations of the American Concrete Institute (ACI) Standard 308-71, 'Recommended Practice for Curing Concrete'. These or similar methods will be required to satisfy the Project Manager in respect of the adequacy of curing methods.

4.44.3 The Contractor shall provide the necessary climate measuring equipment and check for conditions in which plastic cracking is likely to occur.

4.45 Curing Membrane

4.45.1 Curing membranes shall only be used where approved by the Project Manager. The Contractor shall submit full details of the materials he proposes to use including their comparative efficiency with respect to the specified method of water curing.

4.45.2 Where used, curing membranes shall be of resin based, white reflective type and shall be sprayed on the surface of the concrete as soon as all free water has evaporated from the surface, except where provided for below.

4.45.3 It shall be of a film type which fully degrades by exposure to UV light without leaving detrimental residue on the surface.

4.45.4 Curing membranes shall not in any case be applied until at least 7 days curing with water has been applied.

4.45.5 Where a surface treatment is to be applied to the concrete (eg. a surface hardener) a curing membrane shall only be used if it is compatible with the surface treatment.

4.46 Water Curing

4.46.1 The water used for curing shall be fresh water. The concrete shall be covered with sacking, hessian, or other absorbent material, or a 75mm layer of sand, kept constantly wet for 7 days and, where directed by the Project Manager, also covered with plastic sheeting to reduce loss by evaporation. Care shall be taken to ensure that the temperature of the water used during all stages of the curing process is as close as possible to that of the concrete being cured. Under no circumstances shall seawater be used for curing of concrete.

4.47 Use of Curing Covers

4.47.1 Curing of concrete surfaces may be carried out by sealing with opaque, reflective plastic sheeting held in close contact with the surface of the concrete and forming an airtight fit around the element to be cured. The sheeting shall form a continuous seal and be without tears or holes.

4.47.2 If necessary the Contractor shall provide frames for the plastic sheeting so that the covers can be placed over deck slab pours immediately after the concrete has been floated off and before the brush finish is applied.

4.48 Wetting of Formed Surfaces

4.48.1 To compensate for any surface drying that has occurred and as soon as the forms are removed, formed surfaces shall be sprayed with water and allowed to reach a uniformly damp appearance before continuing with curing.

4.49 Curing of Concrete - Procedure

4.49.1 Curing of concrete shall proceed as follows:-

a) Large Flat Areas, e.g. Slabs (Preferred Method)

i) Immediately after trowel finish, cover the concrete surface with polythene/wooden frames to minimise evaporation. All gaps at sides and ends must be filled in to avoid wind-tunnel effects.

ii) When the surface can carry weight, replace the frames by a layer of damp hessian covered by polythene sheet. The hessian must be kept continuously damp for 7 days (ie not wet/dry cycles), and suitable weights must be used to keep the polythene in place. If appropriate, surfaces may be ponded.

iii) After 7 days wet curing, apply white-pigmented resin based curing compound in accordance with the manufacturer's instructions.

iv) Cover with dry hessian for 14 days.

b) Flat Surfaces with Starter Bars

i) Shade the whole area from sunshine before concreting commences, leaving enough room for personnel/placing access, and ensuring that no gaps are left in the sides/ends which would allow wind-tunnel effects.

ii) As soon as concreting is complete, cover the top surface with damp hessian (which is to be kept continuously damp for 7 days) and a layer of polythene.

iii) Maintain cover-only curing from the 7th to the 14th day.

c) Vertical Surfaces

i) Leave formwork in place for at least 24 hours and keep continuously wet and then, after removing the forms, immediately wet the surface and cover the sides by damp hessian (which is to be kept continuously damp for 7 days) covered by white polythene.

ii) Maintain cover-only curing from the 7th to the 14th day.

4.49.2 Any necessary repairs or finishing processes shall be carried out as soon and as quickly as possible, only exposing small areas at any one time.

4.50 Use of Covers

4.50.1 Polythene sheeting shall be continuous without tears or holes and shall be white, opaque and reflective.

4.51 Thick Sections

4.51.1 The Contractor's attention is drawn to the need to take special precautions, such as careful planning of construction joint locations, to limit the build-up of heat in thick sections of concrete, particularly during hot weather.

4.52 Protection of Joints

4.52.1 Rebates formed to receive sealants and the surfaces of construction joints shall be protected from curing membrane by wet Hessian, maintained continuously damp, to ensure proper curing of the joint surface and the adjacent concrete. The wet hessian shall be maintained in place until the sealant is placed.

4.53 Curing Notices

4.53.1 Curing notices shall be exhibited for each concrete pour, stating the time and date when the concrete was placed, date for last wet curing and the date for completion of cover curing.

4.54 Curing of Repairs

4.54.1 All concrete repairs shall be cured in accordance with the above provisions.

4.55 Damaged Concrete

Any concrete found to have been damaged by weather effects shall be cut out

and replaced with concrete as specified in this Specification, by the Contractor at his own expense.

4.56 Mass Concrete

4.56.1 The requirements for quality control, placing, compacting, testing and compliance for reinforced concrete shall apply equally to mass concrete.

4.57 Blinding Concrete

4.57.1 Wherever structural reinforced is shown on the Drawings as in contact with the ground and is to be constructed 'in the dry', a layer of concrete shall be provided as detailed on the Drawings.

4.58 Early Loading

4.58.1 At no time will concrete be subjected to any loading, including its own weight, which will induce a compressive strength in it exceeding 0.4 of its compressive strength at the time of loading, nor shall the induced stress exceed 0.33 of the specified characteristic strength.

4.58.2 For the purpose of this clause, the assessment of the strength of concrete and stresses produced by the loading shall be subject to the agreement of the Project Manager.

4.59 Waterproof Underlay

4.59.1 Any waterproof underlay shall be as indicated in the drawings.

4.60 Screeds

4.60.1 Screeds shall comply with EC Directive 89/106/EEC.

4.60.2 The performance characteristics of screeds shall comply with EN 13813, Screed material, properties and requirements.

4.60.3 The following test methodologies shall pertain:

a. Flexural and Compressive Strength:	EN 13892-2
b. Wear Resistance – Bohme or BCA:	EN 13892-3
c. Determination of Surface Hardness:	EN 13892-6
d. Bond Strength:	EN 13892-8

4.61 Lightweight Aggregates

4.61.1 The use of lightweight aggregates shall be subject to the approval by the Project Manager.

4.61.2 Lightweight aggregates shall comply with EC Directive 89/106/EEC.

4.61.3 The performance characteristics of screeds shall comply with EN 13055-1.

5 FORMWORK FOR CONCRETE

5.1 Formwork – General

5.1.1 The requirements for formwork shall generally follow the provisions and requirements of BS 5975 Code of Practice for Falsework and BS 8110, Part 1:1997: Structural use of Concrete with particular reference to clause 6.9, Formwork.

5.1.2 Formwork shall be so designed and constructed that the concrete can be properly placed and thoroughly compacted and that the hardened concrete, whilst still supported by the formwork, shall comply with the required shape, position and levels subject to the tolerances and the standards of finish required by this Specification. Drawings of all formwork shall be provided by the Contractor and submitted to the Project Manager when requested.

5.1.3 Fabrication drawings of all formwork shall be provided by the Contractor and submitted to the Project Manager when requested.

5.1.4 Formwork or shuttering shall not be re-used without the prior approval of the Project Manager.

5.2 Contractor's Option to Precast

5.2.1 In addition to those sections of the Works where the Drawings indicate the use of precast construction, and provided that his proposals meet the Project Manager's approval, the Contractor may opt to precast any sections which are shown on the Drawings as in situ concrete.

5.2.2 If the Contractor wishes to exercise this option, then, following approval in principle as required above, he shall submit to the Project Manager all calculations and layout and detail drawings necessary for the manufacture and installation of the precast units and for the completion of each section of the Works to satisfy the original design requirements. All these calculations and drawings shall be approved by the Project Manager before any work is commenced on the manufacture of precast concrete units.

5.3 Sufficiency of Formwork

5.3.1 The Contractor shall be responsible for the sufficiency of all formwork, but if required by the Project Manager, he shall, before it is erected, submit details of formwork and supports he proposes to use for approval. Guidance on the loads and worst combination scenarios is given in CIRIA Report No. 13 and BS 5975:1996: Code of practice for Falsework.

5.4 Cleanliness of Formwork

5.4.1 Special care shall be taken to ensure the cleanliness of formwork prior to deposition of concrete. Temporary openings shall be provided in stop-ends for the removal of water and debris.

5.4.2 All re-usable formwork shall be thoroughly scraped, cleaned and, if necessary, repaired before being raised.

5.5 Ties

5.5.1 The material and positioning of any ties passing through the concrete shall be

approved by the Project Manager. The whole, or part of the tie shall be capable of being removed so that no part remaining embedded in the concrete shall be nearer the surface than the specified cover to reinforcement. Any holes left after the removal of ties shall be plugged immediately with a cement mortar of the same richness using non-shrink materials.

5.6 Surface Treatment of Forms

5.6.1 The faces of the formwork in contact with the concrete shall be coated with non-staining shuttering oil or other approved material to prevent adhesion. Care shall be taken that the coating material is kept out of contact with reinforcement or embedded steelwork.

5.7 Inspection and Approval

5.7.1 All shuttering shall be inspected and approved by the Project Manager before concrete is placed within it.

5.8 Striking of Formwork

5.8.1 Minimum striking times shall be in accordance with BS 8110, Part 1, clause 6.9.3 with special reference to Table 6.6. or as otherwise agreed with the Project Manager. Notwithstanding any approval given by the Project Manager, the Contractor shall remain responsible for any damage arising from the removal of formwork.

5.8.2 All formwork shall be designed so that it can be removed without shock or vibration.

5.9 Retarders

5.9.1 The use of retarders on formwork shall not be permitted except with the written permission of the Project Manager.

5.10 Tolerances

5.10.1 Except where detailed elsewhere in this Specification, the tolerances on all concrete works shall be as indicated in BS 8110, Part 1, clause 6.11.2.

5.11 Quality of Finishes

5.11.1 The classes of the finishes required shall be as indicated on the Drawings.

5.12 Classes of Surface Finish Where Cast Against Formwork

5.12.1 <u>Class F1</u>

5.12.1.1 Finish for surfaces against which backfill or other concrete is to be placed. Formwork shall consist of sawn boards, sheet metal or any other suitable material which will prevent the loss of grout when the concrete is vibrated.

5.12.2 <u>Class F2</u>

5.12.2.1 Finish for permanently exposed surfaces but where special finishes are not required. Formwork shall be faced with sound and plain plywood, steel panels or other suitable materials arranged in a uniform pattern. Joints in facing shall be horizontal and vertical unless otherwise directed.

5.12.2.2 On striking the formwork the surface shall be plain and smooth and shall not be treated in any way. The Project Manager may order rubbing down of any minor surface blemishes at the Contractor's expense.

5.12.3 Class F3

5.12.3.1 Finish required for permanently exposed surfaces where a high standard is of particular importance.

5.12.3.2 The formwork shall be faced with plywood or equivalent suitable material in large sheets arranged to the approval of the Project Manager in a uniform pattern. Metal panels shall not be used for F3 finishes.

5.12.3.3 Where possible, joints in sheets shall be arranged to coincide particular features or changes in the direction of the surface. All joints shall be vertical and horizontal unless otherwise directed.

5.12.4 Permanent formwork of precast slabs, natural stone, brickwork and the like shall have surface finishes of the quality shown on the Drawings. They shall be fixed to the structure by approved means and joints shall be made tight with mortar or other means of preventing grout leakage.

5.13 Classes of Surface Finish When Not Cast Against Form Work

5.13.1 Class U1

5.13.1.1 Finishing operations shall consist of compacting and tamping the concrete to the required lines and producing a uniform lightly ridged surface.

5.13.2 Class U2

5.13.2.1 Finishing operations shall consist of the above requirements for Class U1 and, after allowing the concrete surface to harden sufficiently floating the surface by hand with a wood float to produce a uniform surface free of screed marks. Care shall be taken not to work the surface more than is necessary.

5.13.3 Class U3

5.13.3.1 Finishing operations shall consist of the above requirements for Class U2 and, after allowing the concrete surface to harden sufficiently then floating the surface by power tool to produce a uniform surface free of screed marks. Care shall be taken not to work the surface more than is necessary.

5.13.4 Class U4

5.13.4.1 Non-skid surface. Finishing operations shall consist of the above requirements for class U2 using a plain wood float finish and evenly dusting the surface with carborundum grains graded between 500 microns and 3mm at the rate of 1.0 kg/sq.m of surface area before the surface of the concrete has set. The carborundum shall then be trowelled lightly into the surface.

5.14 Chamfers to Arises

5.14.1 Unless otherwise indicated on the drawings, all exposed arises shall be chamfered 25 x 25 mm.

5.15 Defective Concrete Finishes

5.15.1 Any defective concrete finish shall be rejected and the Project Manager may order the defect(s) to be cut out and made good, all at the Contractor's expense.

5.15.2 Any proposed remedial treatment to concrete surfaces shall be submitted to the Project Manager for approval and no work shall be carried out until the approval has been obtained. This remedial treatment will be at the Contractor's expense.

5.15.3 Any concrete, the surface of which has been repaired before being inspected by the Project Manager shall be liable to rejection.

7 PRECAST CONCRETE PRESTRESSED SLABS

7.1 Conformity

7.1.1 Pre-cast units shall comply with EC Directive 89/106/EEC, decision 95/2304/EC of 1995 and FTS Specification Series 007.

7.1.2 The technical characteristics of Precast, Prestressed Concrete Hollow Core Slabs shall comply with EN 13225.

7.2 PreCast Pre-Stressed Concrete Slabs – Load, Thickness and Span requirements

7.2.1 The pre-stressed hollow-core planks shall be capable of sustaining the superimposed loads as indicated in the Bill of Quantities.

7.3 PreCast Pre-Stressed Concrete Slabs – Additional Requirements

7.3.1 The manufacturer shall indicate the design standard applicable to the manufacture of the precast prestressed concrete slabs. A copy of this standard, in the English language, shall be forwarded to FTS on demand.

7.3.2 The manufacturer shall submit a schedule of safe loads indicate the applicable to the manufactured Precast prestressed concrete slabs.

7.3.3 The Precast prestressed concrete slabs shall be manufactured by firms that have demonstrated the capability, subject to approval, to produce and erect the type of work as specified for at least five years.

7.3.4 The Precast prestressed concrete manufacturer shall have as part of its staff or shall engage a qualified registered Professional Structural Engineer to certify that the manufactured precast prestressed concrete units conform in all aspects to the specified requirements.

7.4 Temporary Transport Stresses

7.4.1 The Contractor shall evaluate the temporary stresses and stability of all members during transport and locate supports in such a manner as to maintain stresses within acceptable levels. Impact loadings shall be included in the evaluation. The Contractor shall consider the actual route that will be used for transporting the member and any special conditions, such as sharp curvature, high superelevation, uneven roadways, that will cause leaning, rotation, twisting, or impact loadings, shall be considered in any evaluation of shipping methods. The lateral stability of beams with a length-depth ratio greater than 20 shall especially be evaluated for transporting. Temporary stresses induced into the members during shipping shall be within the acceptable stresses listed in the design code.

7.5 Handling

7.5.1 Lifting devices for precast prestressed slabs shall have a minimum safety factor of 4. Exterior lifting hardware shall have a minimum safety factor of 5.

7.6 Concrete Mix

7.6.1 Unless indicated otherwise in the Drawings, the compressive strength of the concrete mix for precast prestressed concrete slabs shall not be less than 35N/mm^2 at 28 days.

7.7 Finishes

7.7.1 Standard Underside: Resulting from casting against approved forms using good industry practice in cleaning of forms, design of concrete mix, placing and curing. Small surface holes caused by air bubbles, normal color variations, normal form joint marks and minor chips and spalls are acceptable, but no major or unsightly imperfections, honeycombing, or other defects will be permitted.

7.7.2 Standard Top: Resulting from vibrating screed and additional hand finishing at projections. Normal color variations, minor indentations, minor chips and spalls are acceptable. No major imperfections, honeycombing or defects will be tolerated.

7.7.3 Exposed Vertical Ends: Strands shall be recessed and the ends of the member will receive a sacked finish.

7.8 Erection

7.8.1 The manufacturer shall provide true, level surfaces on field placed bearing walls and other field placed supporting members.

7.8.2 All the shoring required for composite beams and slab shall have a minimum load factor of 1.5 times (dead load plus construction loads).

7.8.3 The installation of precast prestressed concrete shall be performed by the fabricator or a competent erector. The members shall be lifted with suitable lifting devices at points provided by the manufacturer. Temporary shoring and bracing, when necessary, shall comply with the manufacturer's recommendations.

7.8.4 Members shall be adequately braced to resist wind forces and the weight of forms and other temporary loads, especially those eccentric to the vertical axis of the members, during all stages of erection.

7.9 Non-Complying Prestressed Members

7.9.1 When a precast prestressed concrete member does not comply with the requirements of this Specification or is damaged, the following provisions shall be used for evaluating and disposing of deficiencies. These provisions shall be applied in all cases which clearly fall under the circumstances described. Situations not covered by these specific circumstances shall be considered on their individual merits.

7.9.2 All deficiencies shall be examined by the Project Manager to determine the applicable provisions and requirements of these provisions and which course of action is appropriate. If the Engineer determines that a deficiency is repairable within the terms of these provisions, appropriate repairs may be executed immediately. If the Engineer determines that a deficiency requires an engineering evaluation and disposition, the Contractor may submit a repair

proposal. All repairs which require a repair proposal shall be made under the observation of and to the satisfaction of the Engineer.

7.9.3 The costs of repairs and any actions taken to rectify deficiencies shall be borne by the Contractor at no cost to FTS.

7.10 Surface Deficiencies

7.10.1 Regardless of the types of deficiencies, when the total surface area of all deficiencies within a single member exceeds 1% of the product of the member's length times its depth, the member shall require engineering evaluation and disposition.

7.10.1.1 Bughole: A bughole is a form surface air pocket void with an area up to 20 sq. cm and a depth up to 37.5mm. Any air pocket void with a dimension exceeding either of these dimensions shall be treated as a honeycomb. Any bughole with a depth less than 10mm and less than 20mm in diameter need not be repaired, unless otherwise indicated in the plans or specifications. All other bugholes are considered cosmetic and shall be repaired accordingly.

7.10.1.2 Spall: A spall is a depression resulting when a fragment is detached from a large mass by a blow, action of weather, by pressure or by expansion within the larger mass. A cosmetic spall is a circular or oval depression not greater than 25mm in depth nor greater than 20 sq.cm in area. A minor spall is a spall no larger than 0.1 sq. m and no deeper than 37.5mm. A major spall is a spall which is deeper than 37.5mm regardless of the surface area, or a shallower spall with a surface area greater than 0.1 sq. m. A major spall shall require engineering evaluation and disposition.

7.10.1.3 Chip: A chip is the local breaking of the corners or edges of the concrete with the resulting void containing angular surfaces. Cosmetic chips are chips where the sum of the two lateral dimensions perpendicular to the length does not exceed 50mm. Regardless of length, cosmetic chips need not be repaired except for visually exposed surfaces which may require repair. Minor chips are chips where the sum of the two lateral dimensions perpendicular to the length exceeds 50mm, but does not exceed 100mm, and with a length of no more than 300mm. Major chips are any chips larger than minor chips. Major chips shall require engineering evaluation and disposition.

7.10.1.4 Surface Porosity: Surface porosity is the localized porosity of a formed surface due to medium scaling. Medium scaling is defined as the loss of surface mortar up to 10mm in depth and exposure of concrete aggregate.

7.10.1.5 Honeycombing: Honeycombing is voids in the concrete, loss of fines or other material from between the aggregate particles, the inclusion of air pockets between aggregate particles, or larger volumes of lost material. Honeycombing shall be removed in its entirety to sound concrete prior to establishing the classification of the defect. Minor honeycombing is a void no deeper than 37.5mm to the sound concrete and no larger than 0.1 sq.m in area that results after the removal of unsound material. Major honeycombing is a void deeper than 37.5mm to the sound concrete regardless of the surface area, or shallower but with a surface area greater than 0.1 sq.m that results after the

removal of unsound material. Major honeycombing shall require engineering evaluation and disposition.

7.10.1.6 Formed Surface Mis-shapening: Formed surface mis-shapening is the visual and measurable deficiency or excess of material from the specified tolerance on any surface of a member.

7.10.1.7 Other Surfaces: Any deficiency exceeding the plan dimensions for size, length, squareness, designated skew, plumbness, and the like by up to twice the specified plus (+) tolerance may be corrected by grinding to within the allowable tolerance. Any deficiency exceeding the specified minus (-) tolerance or twice the specified plus (+) tolerance shall require an engineering evaluation and disposition.

7.10.1.8 Bearing Areas: The bearing area shall be considered to extend from the end of the member to 75mm beyond the edge of the bearing contact area for the full member width. Minor defects in the bearing area shall be treated.

7.11 Cracks

7.11.1 A crack is the separation of a member or portion thereof which may appear before or after de-tensioning and may or may not cause separation throughout the member thickness or depth. Cracks shall be identified by the classifications and locations described below and shall be subject to the disposition required by the identified crack. Regardless of the classifications and locations of cracks within any single member, if the total surface length of all cracks on any and all surfaces exceeds one-third of the member's length, the member shall require engineering evaluation and disposition. Crack sizes shall be established subsequent to release of all pre-tensioning forces.

7.11.2 Occasional hairline surface cracking caused by shrinkage or tensile stress in the concrete from handling will not be cause for rejection.

7.12 Classification of Cracks

7.12.1 Regardless of the cause and for the purposes of this specification, cracks in prestressed components shall be identified according to their surface appearance in accordance with the following classifications:

7.12.1.1 Cosmetic cracks are any cracks which are less than 0.15mm wide and are in structurally non-critical locations on the member.

7.12.1.2 Minor cracks are any cracks which are between 0.15mm and 0.3mm wide, inclusive, and are in structurally non-critical locations on members.

7.12.1.3 Major Cracks: Major cracks are any cracks of any width which are located in structurally critical locations on members or cracks in structurally non-critical locations which are greater than 0.3mm wide. Major cracks require an engineering evaluation and disposition.

7.13 Location of Cracks

7.13.1 Regardless of cause and for the purposes of this specification, cracks shall be

identified as occurring in either structurally critical or structurally non-critical locations according to the following criteria and conditions:

7.13.2 Structurally Critical Locations: Structurally critical locations of cracks are any locations in which a crack would tend to open under stresses occurring at any time during the service life of the structure, or which may reduce the ultimate capacity or fatigue life of the member. Cracks in structurally critical locations shall require engineering evaluation and disposition.

7.13.3 Structurally Non-critical Locations: Structurally non-critical locations of cracks are defined by the position within a member's length, the position within a member's depth, and the orientation of the crack. For Simple Span Prestressed Slab Units the structurally non-critical locations are normally:

7.13.3.1 End Zones (within a distance of twice the depth of the member from the end): One horizontal crack at either or both ends in the top half of the member, which is not in the plane of nor intersecting any row of pre-stressing strands, and extending from the end of the member for a length not to exceed half the member's depth.

7.13.3.2 Mid-span Region (between end zones) before de-tensioning: Vertical cracks in the top half of the member.

7.13.3.3 Any Location (after de-tensioning): Vertical cracks in the top half of the member.

7.14 Documentation

7.14.1 To establish evidence of proper fabrication and quality of precast prestressed concrete members, a system of records shall be maintained in the manufacturing plant which will provide full information regarding the testing of materials, tensioning, concrete proportioning, placing and curing, and disposition of members. Record keeping for the work specified in this specification shall also include deficiencies found from inspection and testing and the disposition of deficiencies. The Contractor shall keep certified test reports for materials incorporated into the production of precast prestressed concrete members, including certified physical properties reports on file. Reports of tests performed by the Contractor shall also be kept on file.

7.14.2 Items for which certifications and/or test reports are required shall include, but are not limited to prestressing steel, reinforcing steel, concrete materials and/or concrete, curing materials and embedded items. The printout for the stressing operations shall be maintained and reflect the identification of the bed and members fabricated.

7.15 Records

7.15.1 Records shall be maintained by the Contractor until all the precast prestressed members for a project have been fabricated. The records shall then be submitted to the Project Manager. Records shall be available for inspection at any time.

29 SPECIFICATIONS FOR WATERPROOFING

29.1 Compliance – Sample Size and Frequency of Sampling (Where Applicable)

29.1.1 Where applicable, sample size and frequency of sampling for compliance shall be established on the basis of standard statistical guidelines.

29.2 Compliance – Testing and Certification

29.2.1 Compliance shall be demonstrated through testing and/or certification of products and/or processes as outlined in the ensuing clauses.

29.3 Plastic and Rubber Vapour Control Layers

29.3.1 Plastic and vapour control layers for waterproofing shall comply with EN 13984.

29.4 Flexible Sheets (Membrane) for Roof Waterproofing

29.4.1 Reinforced flexible sheets shall comply with EC Directive 89/106/EEC as implemented by decision 99/90/EC.

29.4.2 The membrane shall be laid and installed strictly as per manufacturer's instructions. The Contractor shall submit a copy (in English) of the installation methodology before the start of the Works.

29.4.2.1 Technical properties shall comply with prEN 13707.

29.5 Roof Waterproofing Membrane – Test Characteristics

29.5.1 Performance characteristics shall be as follows:

PROPERTY	TEST METHOD	TYPICAL VALUE
Reinforcement	NA	Polyester/Fibreglass or Fibreglass
Weight (kg/m^2)	NA	4 (Min.)
Flow resistance at 100^{0}C	EN 1110	Stable
Tensile Strength at Break (Long. / Transverse)	EN 12311-1	> 400 N/50mm

29.5.1.1 Polyester reinforced waterproofing membrane laid horizontally over concrete screeds that shall remain exposed is to incorporate a mineral chippings surface of approved colour and quality.

29.5.2 Where the waterproof membranes is to be covered over, a layer of not less than 25 mm of fine graded material is to be laid directly over the waterproof membranes (i.e. before laying the ground slab concrete slab) to ensure that the membrane is not in any way damaged. This layer is to be wetted to its optimum moisture value and tamped to a site density of at least 95%.

29.5.3 The Contractor shall make good at his expense any damage which results in the waterproof membrane as well as any damage to the building and/or finishes and fixtures which results from failure of the waterproof membranes

29.5.4 The membrane shall extend over any cement/sand fillets and up all upstands and sides of parapet walls to a height of not less than 230 mm above finished

roof level. The membrane shall be lapped and heat welded at all joints so as to give a continuously unbroken, impermeable surface.

29.6 Site Conditions

29.6.1 The Contractor shall verify the site conditions by inspecting the surface to be treated prior to the execution of the works. The Contractor shall also be responsible for the provision of any additional technical expert assistance, if this is required.

29.6.2 The surface to receive the membrane should be dry, free from standing water, sharp protrusions and hollows. The surface shall be primed with 2 coats of bituminous primer (min. 55% penetration grade bitumen residue) before applying the membrane.

29.6.3 Vertical surfaces shall be smooth, regular, dry and free from nails and primed with a bituminous primer (min. 55% penetration grade bitumen residue) at the rate depending on the porosity of the surface and allowed to dry completely before the application of the membrane. Masonry work and brickwork shall be flush pointed and rendered respectively to provide a smooth surface before priming. Any adhering paintwork shall be removed.

29.6.4 All cracks, expansion and construction joints and blisters shall be raked out, thoroughly swept, washed, cleaned and made good with an approved joint sealer before the application of the waterproofing treatment by the Contractor.

29.6.5 The membrane shall be installed in such a manner that:

a) would allow for differential thermal and structural movement between the membrane and the roof.

b) would include all necessary accessories such as edge flashings, funnel inserts for down pipes, and air-vents.

29.6.6 Parapet wall to roof slab junctions shall be filleted with a sand/cement in order to eliminate right angled corners.

29.7 Base Granular Material for Roofing Screed (Serving as the Base for Concrete Surfacing)

29.7.1 The base granular material shall consist of selected granular franka graded chippings ("Torba") free of any organic soil, clay or deleterious substances, spread, laid to levels, falls or currents, wetted to its optimum moisture content, tamped and adequately consolidated to the thicknesses described and detailed to provide a suitable surface to receive the concrete screed.

29.7.2 The material shall have the following typical grading:

Sieve (mm)	75	Passing (%)
	14	100
	2	< 75
	0.3	< 50
	0.63	< 20

29.7.3 The base granular material shall be compacted to a site density of 95%.

29.7.4 Before consolidation of the bedding layer the Contractor is to liaise with the M&E Contractors to ensure that all services (if any) that are required to pass through the granular bed have been laid, covered and tested, and that no other work on them is required prior to casting of the concrete screed. The minimum consolidated thicknesses of torba beds at outlet points (into rain water pipes) are to be 75 mm and a slope as indicated in the Drawings is to be provided for in the compacted thickness.

Quotation

Bills of Quantities

Item No.	Description	Qty	Unit	UNIT RATE including VAT and all other expenses that may be applicable.	TOTAL AMOUNT including VAT and all other expenses that may be applicable.
	Bill No. 1 - Preliminaries			**€**	**€**
	(i) Bidders must quote the price for each individual item as per Bills of Quantities. Prices shall include Customs Duty, Levies, VAT, ECO Contribution (if applicable) and all other charges and taxes as applicable at the current period of the publication.			Incl.	Incl.
	(ii) The cited rates shall be deemed to be inclusive of the supply of all materials described hereunder, other materials which may be accidentally necessary to the nature of the works, transport to site, hoisting to location and labour. Rates shall also include for any double handling of materials which may be required. Furthermore, rates shall allow for the cleaning of the site and surroundings, at all times, inclusive of carting away of debris on a daily basis. The rates shall also be inclusive of any dumping charges that the Contractor might be required to pay in order to dispose of any unwanted materials.			Incl.	Incl.
	(iii) The rates shall include for all preparatory work including erection and dismantling of scaffolding, temporary props, plant, machinery such as crainage and tools, both mechanical and manual, insurances, establishment fees, police permits, etc.			Incl.	Incl.
	(iv) Rates are to include any temporary works necessary to enable access to site and reinstatement of same. Rates shall also allow for furnishing, installing and maintaining suitable barriers and fences to protect the work, existing facilities and construction operations and to remove same when no longer required or on completion of works. Barriers and fences shall be structurally adequate for the required purpose and shall comply fully with local laws and regulations.			Incl.	Incl.
	(v) The contractor shall make provisions for the guarding of the site, as necessary, to guard all utilities, plants, equipment, material, etc delivered on site . The contractor shall also be responsible to guard all work carried out under this contract. Such provisions shall remain in operation until handing over of the works.			Incl.	Incl.
	(vi) Rates shall include for working beyond normal working hours and on weekends.			Incl.	Incl.
	(vii) Tenderers are requested to inspect works and to check the site conditions, **especially for the crainage requirements and acessibility**. No claims arising out of failure of the Contractor in understanding the nature of the works shall be considered following the award of the contract.			Incl.	Incl.
	Subtotal Carried Forward			***€***	***0.00***

Item No.	Description	Qty	Unit	UNIT RATE including VAT and all other expenses that may be applicable.	TOTAL AMOUNT including VAT and all other expenses that may be applicable.
	Subtotal Brought Forward			**€**	*0.00*
	(viii) All works carried out shall be measured in accordance with accepted measurement practice and standards.			Incl.	Incl.
	(ix) The contractor shall ensure that site works are properly conducted so as to create the least possible obstruction to third parties and their activities. Care is to be taken during works to minimise disturbance to the neighbouring buildings and to protect existing services and finishes. Care shall also be taken to minimise disturbance to third party property.			Incl.	Incl.
	(x) In case of damage to items in item above, the contractor is to make good for all such damage immediately. In case of failure to do so, the client will commission the required repairs and back charge the contractor for the costs.			Incl.	Incl.
	(xi) The rates are deemed to allow:			Incl.	Incl.
	a) Provide personal protective equipment (PPE) to all workmen on site. Particular attention is to be given to provision of safety harnesses to workers working at heights.			Incl.	Incl.
	b) Keep the site clear and free from accumulated debris and waste at all times. This is particularly important in staircases and landings.			Incl.	Incl.
1.00	**Demolition Works**				
1.01	Demolition and carting away of existing reinforced concrete slabs. Rate is to include breaking up of exisiting slabs and reinforced concrete beams as well as carting away of waste concrete, reinforcement and loose material. Rate is also to include the provision of a propped surface to support broken off debris and waste material such that no damage is caused to the existing bathroom below. Rate is to also include all necessary dumping charges.	1	Lump Sum	Lump Sum	
2.00	**Concrete Works**				
	(i) All the cited rates shall be deemed to be inclusive of the supply, hoisting and placing as indicated in the specifications.			Incl.	Incl.
	(ii) All the cited rates are to be deemed inclusive of all the necessary formwork, propping and compensation for working at heights up to 4 metres above ground level. No claims for extra compensation for working at heights or for formwork for thicker slabs shall be entertained			Incl.	Incl.
	(iv) ***All steel reinforcement shall be measured and paid for separately*** (except for precast elements), unless otherwise indicated. Rates for all reinforcement are to allow for plastic spacers, as per specifications.			Incl.	Incl.
	(iii) Concrete surface finishes shall comply to the relevant specifications			Incl.	Incl.
	Subtotal Carried Forward			**€**	

Bill of Quantities for the Demolition and Reconstruction of a Roof Slab at Sir Adrian Dingli Secondary School, Pembroke

Item No.	Description	Qty	Unit	UNIT RATE including VAT and all other expenses that may be applicable.	TOTAL AMOUNT including VAT and all other expenses that may be applicable.
2.01 a	*Subtotal Brought Forward* (v) All the cited rates for reinforcement are to be inclusive of supply, cutting, bending, fixing and testing in accordance with specifications. Manufacture, supply, transport and lay precast prestressed hollow core slabs, inclusive of grouting with grade C30 concrete. Slabs capable of sustaining a superimposed load of 1,500 kg/sqm with an approximate span of 5.0 metres. (Area approx. 5.0m x 8.0m)	40	sqm	**€** Incl.	Incl.
2.02	Supply, lay and spread 3/8" franka stone chippings roof screed, average thickness 200mm, laid to falls. Rate is to be deemed inclusive of hoisting, spreading.	8	cum		
2.03	Grade C25 concrete in 100mm thick concrete roof screed, cast in bays. Rate is to be deemed inclusive of hoisting, spreading and power floated finish and waterproofing additive with consideration for the installation of expansion joints (measured separately). Rate is to also include the provision of 75mm x 75mm coved triangular fillet between edges of concrete roof screed and parapet walls.	40	sqm		
2.04	Form expansion joints 6mm thick including insertion of compressible joint filler	10	lm		
2.05	Supply and apply polyester-reinforced, bituminous waterproofing membrane with 75mm overlaps torch welded and extended up and over parapet walls	50	sqm		
2.06	Clear Site of all rubbish and waste material. Rate is to include carting away and disposal at an approved dumping site.	1	Lump Sum	Lump Sum	
	Total Value of Works including VAT and all other expenses as may be applicable			**€**	

Company _____

Address _____

_____

Telephone: _____ Fax: _____ Mobile Phone: _____

e-mail: _____

Trading Licence No._____ Valid up to_____

V.A.T Registration No._____

Signature of Tenderer: _____ I.D No._____

Full Name (Block Letters) _____ Date: _____

Quotation

List of Drawings

NOT APPLICABLE