PARTICULAR SPECIFICATIONS (CIVIL)

PROPOSED G+2P+8+R MIXED USED (RESI. + RETAIL) BUILDING ON PLOT NO. IC1-CTYL-16_013 AT WARSAN 1-621, DUBAI, U.A.E

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1. GENERAL:

IMPORTANT NOTE: CONTRACTOR TO CONSIDER IN THEIR PRICES THE REQUIREMENT OF THE GREEN BUILDING AS PER THE ATTACHED REGULATION PROVIDED BY DUBAI MUNICIPALITY. THEY SHOULD CONSIDER THE U-VALUES AND SHADING COEFFICIENT FOR THE BUILDING ENVELOPE, VENTILATION REQUIREMENTS, SRI VALUES, VOC LIMITS, AIR TIGHTNESS OF THE BUILDING ETC. AS PER THE ATTACHED SPECIFICATION AND TABLES.COTRACTOR TO APPOINT GREEN BUILDING CONSULTANT FOR THE REQUIRED DOCUMENTATION AND APPROVAL PROCESS DURING THE CONSTRUCTION PERIOD.CONTRACTOR TO FOLLOW THE LATEST DUBAI BUILDING CODE.

The following specification is intended to provide particular details in conjunction with the General Specification contained elsewhere in these Tender/Contract documents and shall take priority over the latter for final approval of materials.

The Particular manufacturers mentioned in the following specifications and included in order toprovide a standard of acceptable material and workmanship for these works and approved equivalents will be considered with prior submission to the Engineer. Engineer has right to ask the contractor to submit at least three vendors/suppliers/materials for each discipline for the consultant approval

For all materials and suppliers, the Contractor is required to submit all relevant and necessary details and shall allow for both Engineer's and Employers approval accordingly. Any delays caused by the Contractor's failure to submit within a reasonable time will be the responsibility of the Contractor and additional costs required, as consequences will be borne by the Contractor in whole.

Contractor should be bound to work with approved/proposed sub-contractor/supplier by the Engineer'sand Employers. Engineers can change the approved/proposed sub-contractor/supplier as per the project progress/requirement.

2. CONSTRUCTION MATERIAL APPROVAL

The purpose of this document is to establish a procedure on the process of approving the construction materials prior to using the product on projects.

The following documents are required to process the approval of materials:

- Covering Letter.
- Company Profile/Pre-Qualification Documents and Qualification data.
- Copy of company's valid industrial license.
- Material Technical Specifications (Materials for Approval) along with compliancestatement.
- Local and International Certificates (Materials).
- Include list of completed projects with names and contact information for references.
- Test certificates or test results of materials from an independent third party/DCL / Green building Code Compliance.
- Design Data and calculations if applicable
- Shop Drawings if applicable

- Identify variation from project contract document if applicable.
- Contractor will be fully responsible for the delays due to the submission of the materials /applicators/sub-contractors not complying the project specification and vendor list.

3. PRELIMINARIES/OTHER CONDITIONS:

a) The Contractor shall check the full set of drawings and specifications not limited to Architectural, Structural, Shoring, Piling, MEP, Civil Defense, RTA, CCTV, Low voltage etc. for the construction of the project based on our tendered drawings/specifications/documents. Contractor to bring in consultant notice for any missing drawings/specification/documents/data required to complete the project full filling all the authority requirements.

b) Contractor shall inspect the site before tendering to consider all the site considerations such as excavation, filling, site access, space for the site offices and contractor material storage and workshop, working spaces and shoring etc.

c) Design, Supply and fixing, Maintenance/repair illuminated sign boards (back lit) of standard size asapproved by Engineer as per DM/DDA approval erected on steel post with concrete foundation and painting and handing over of same after the completion of the project.

d) Design, Supply and fixing, Maintenance/repair site fence and providing the additional fence as per the requirement of the project and handing over of same after the completion of the project.

e) Provide and maintain the 2mx2m project logo in English and Arabic on every third panel of thesite plot

f) The pattern and logo of the consultant and the owner if any shall be obtained and painted to the approval of the consultant. The cost of this shall be included in the tender.

g) The MEP work and all other electro-mechanical installations shall not be allowed unless &until shop drawings and builders plans related to such item are approved by the Engineer. Contractor to check electrical, Etisalat/Du, civil defense drawings and to take in to account all the possible items as per the standard requirement of the authorities. No variation will be allowed in the construction stage as it is assumed that the contractor is qualified enough and knows the latest standard/requirements of the Authorities including Civil Defense, DEWA, DM/DDA, Etisalat /Du, RTA etc...

h) Handing over of the project is strictly on complete handing over of the as built drawings, original valid guarantee letters, catalogue, manuals and maintenance manuals of all electro mechanical installations, and a complete training programmed for operations of all the equipment to the Owner's staff/Facility Management.

i) A complete layout of site offices, workshops, materials stakes, ablution, Consultants office, meeting room, Client Office with attached toilets etc. to be prepared and got approved by the Consultant and Approving authority including Civil defense.

j) Office facilities to the Engineer/Employer shall include PC/laptop with specification as required, One PC to facilitate for a central file sharing system, fully operational color printer/plotter, drawing stand as required, furniture's and cupboard for storing files etc. as required.

k) If the work progress is not satisfactory and if the subcontractor fails to keep the progress, the payment shall be held, contrary to this, if subcontractor's complaint for non-payment arises, themain contractor's payment certificate shall be held until payment done to subcontractor.

l) The contactor must study all the architectural, structural, services (MEP) and detail drawings tocheck they are tally with each other. To be sure that there are no missing details or Contradiction between them and to clarify all these doubts with the consultant before tendering/executing the work otherwise the contractor will be solely responsible to rectify the executed work on their own cost without any extension of time.

m) The contractor participating in the tender shall not assume or mention any condition of his own or modify or alternate or exclude any specification without written permission of consultant. Contractor to check for any missing items, which is required to complete the project in order to fulfill all the authority requirement and project requirement, not given in the specification,BOQ or drawing and check with the consultant for the same. If the contractor fails to fill in the BOQ or did not add on the additional items than all such items will be considered as includedin the contract price. No variations whatsoever will be entertained after finalization of the contract amount.

n) Contractor must follow all the safety requirements and guide lines ordered by authority. Contractor to have safety engineer and first aid person at the site. Any stoppage or penalty imposed by authority shall not be borne by client due to contractor's negligence.

o) Making any suspension from concrete for pipes, cable trays etc. use approved system as per consultant approval.

p) Consultant and owner has right to choose any material of the price mentioned in the specification.

q) Main contractor is also responsible for making Coordination with the specialized consultant and following their instructions regarding Building regulations and requirements.

r) Contractor to provide the access, storage and make necessary coordination for the client supplied items like kitchen appliances, Gymnasium equipment's, loose furniture, reception counters, garden furniture etc. For client supplied items contractor will not be entitled for any over heads and profit. All horizontal and vertical shifting within plot limit and offloading of client supplied material to be in Contractor Scope.

s) Contractor should not add any markup on the authorities' fees for the permanent connections or any other fees/deposits paid to the authorities. Contractor should not add any markups for the coordination with the authorities regarding the approvals etc.

t) The Contractor shall build on site complete mock-ups for each type of flats/apartments as per the required finishing as mentioned in specification. The Contractor is to allow for all out of sequence working etc. Necessary for the completion of mock ups.

u) The contractor shall not use the items given in the Bill of quantities as a basis for ordering materials until they are satisfied from the drawings, the specifications and project requirement that the items are given are covered the whole work to be executed. Contractor must check and confirm the quantities considering for any wastages due to the design and fixing restraints.

v) The Contractor will be held responsible for any nuisance caused by his own or the subcontractor's workmen to grounds surrounding the site and adjoining buildings etc. and must make good all such damage and settle any claims for compensation at his own expense.

4. SITE PROGRESS RECORDS:

Maintain at site a permanent written record of progress of the works in the form of a permanently bound log book with sequentially numbered pages. Make the record available at all times with

copies provided when requested by the Engineer. Include inrecord each day

i. Weather conditions with maximum and minimum temperatures and relative humidity.
ii. Conditions encountered during excavation.
iii. Water levels in observation wells.
iv. Commencement and completion dates of the work of each trade in each area of the works.
v. Erection and removal dates of formwork after placing of concrete in each area of the works.
vi. Dates, quantities and particulars of each concrete pour.
vii. Dates, quantities and particulars of waterproofing installation.
viii. Attendance of Contractor's and Sub-contractor's work forces at the works and a record of the work they perform.
ix. Visits to site by Employer, Engineer, Jurisdictional Authorities, Contractor, Sub-contractors,
x. Suppliers and any other authorized personnel.
xi. Delivery and/or transportation of any material or equipment to/from the site.
xii. Other pertinent data as directed by the Engineer.
xiii. Planned Vs Actual progress %
xiv. Planned Vs Actual labor histogram %
xv. Project tracking sheet with all key activities.
xvi. S-Curve to monitor the progress
xvii. Project Milestones and its plan of action.
xviii. Material log pertaining to authority like block, concrete, etc. and test results for the same.
xix. NCR/SOR Log
xx. Procurement Schedule for all the Items

Main contractor is responsible for all the builders' works of MEP. Main contractor to provide water, electricity, cranes, lifting equipment's and storage of material spaces to the sub-contractors /nominated subcontractors/suppliers working for the project.

5. EXCAVATION AND EARTHWORK

a. Contractor to check at site the sub-soil strata and ground water table level in line with soil investigation report. If found contradictory, the contractor shall do detailed soil investigation and ascertain the strata data prior to starting of the work. All operational cost is inclusive of tendered amount and no extra claim shall be accepted.

b. SOIL IMPROVEMENT to be done by the contractor to achieve the required Soil Bearing Capacity as per the soil report and as mentioned in the drawings.

c. Dewatering to be done by the contractor as per the soil report. All the cost to be considered by Contractor in their offer. The cost including the installation of the full dewatering system at site, connection charges to the Authority Discharge point, all the dewatering fees, rent to Authority to be paid by the contractor. Contractor to consider the security amount to be paid to Authority. Any cost/charges for the road crossing of the pipes, maintenance /rectification of the road/interlock due to damage due to dewatering issues. Taking clearance and the demobilization of the dewatering works from DDA/RTA. Payment of all the fines due to the dewatering issues.

d. Excavation includes cutting in any kind of strata to reach the foundation formation level including lift pit area, water tank area, sump pit etc. to be keep in the consideration. (Excavation to be done as considering the Structural, Architectural, MEP and other drawings, contractor to consider the surface preparation, chamfering, undulation, compaction and plate load and other test as per the

soil report and other extra required excavation in his scope). Contractor to check and take into consideration extra excavation for the required sump pits/trenches/lift pit or any other required services in order to complete the project requirements.

e. Formation level of foundation to be prepared by proper consolidation & watering as directed by the Engineer and level should be get check by the Engineer before making lean concrete. Required compaction test and plate load test need to be conducted and the required bearing capacity to be reconfirmed and report to be submitted to consultant.

f. Contractor to check the levels in drawings as well as on site for any additional cutting or filling. Contractor to include in their offer any additional cutting or filling.

g. Contractor to consider in their offer any soil improvement or road base as per the soil report if required.

h. Any ambiguity found in drawings as per site condition should be informed to the consultant strictly.

i. Prior to construction of the foundations the soil at formation level/ excavated surface should be compacted to not less than 95% (for natural soils) and 98% (for road base material) of minimum dry density, as determined from the modified Proctor test.

j. It is recommended that confirmation of compliance with compaction requirements shall be made by field density testing at a frequency of about one test every 300m2 to 500m2 per layer.The compacted surface should then be protected by immediately covering with a layer of concrete blinding.

k. When excavating to foundation level, care should be taken not to disturb strata underlying formation level otherwise settlement in excess of those quoted above could occur. If any disturbance does occur, or if any soft spots or gypseous material are encountered, the material should be removed and replaced by selected granular engineered fill, which should beproperly compacted before the foundations are constructed.

l. Do not place fill on excavated bearing surfaces until they have been approved by Engineer. Notify Engineer that bearing surfaces require inspection immediately after excavation is completed.

m. Backfilling has to be well wetted and compacted in max. 25cm layers to achieve a min/compaction to 95% on ASH scale and as per BS 1377 and shall be well graded and free from organic matter and shall not contain an excess of tines to comply with BS 8004.

n. The engineer may at any time carry out dry density tests in accordance with BS 1337 on contractor's expense.

o. Anti-termite treatments for the entire project shall be done by approved Pest Control Companyduly certified and registered with Dubai Municipality and approved by DM/DDA and with minimum 20 years guarantee.

p. Refer the soil report for detailing.

q. Only approved sand shall be used for filling and leveling.

r. Contractor has to ensure that the depth of excavation before doing the compaction as per requirement of water proofing system.

s. First trial trenches should be excavated around the periphery of plot to identify and isolate if any services are present underground. It is contractor's full responsibility to check for any services

liaising with authority and NOCs to obtain prior to start the work.

t. Dispose of all excess and unsuitable excavated materials away from site to a location approvedby local authorities.

6. BACKFIILING:

a. **General:**

i. Backfill with maximum 250mm deep layers of unconsolidated backfill material each compacted before the next is placed, unless otherwise specified.

ii. Compact fill only by tamping by mechanical means or by hand. Do not flood fill with water to compact.

iii. Maintain proper moisture content in fill to ensure specified compaction density.

b. To Raise Subgrade Levels at Paving: Where new exterior subgrade level at paved areas are above natural grades, backfill to new subgrade elevation with 200mm layers of subbase fill.

c. Back fill at Foundation Walls:

i. Backfill at foundation walls only after approval has been given.

ii. When backfilling both sides of walls, place fill simultaneously on both inner and outer faces to balance pressure on wall.

iii. Brace and shore walls on opposite side to backfill when backfilling is required only on one side, and until backfilling is completed as per authority requirement and HSEpolicy.

iv. Fill entire excavated area under paving or floor slabs, up to underside of fill specifiedfor them, at both interior and exterior walls with backfill material.

7. SUB STRUCTURES:

a) **Shoring and dewatering:**
Main Contractor to consider in his scope to excavate to the formation level and consider all the works up to the compaction and plate load test etc. Contractor to consider the full Dewatering works and its maintenance work complete until thetermination of the Dewatering works as per the Project requirement considering the water level as per the soil report and site condition including the Authority NOCs and all the payments/Fees/Rent to Authorities/any third-party payment to Nakheel or appointed dewatering agency, any deposits to Nakheel etc.

b) Provide cube test for designing the concrete mix.

c) Steel should be covered by polythene sheet and stacking 200mm above ground level.

d) Water for construction should be sweet water from DEWA only.

e) All Shuttering for RCC work must be new and shall be specialist design taking consideration ofthe concrete and construction load. Contractor will be fully responsible for the scaffolding design. Contractor should provide Third Party Inspection (TPI) certificate for scaffolding.

f) Steel Reinforcement used to be as per the latest DM/DDA guidelines should be from UAE **and to be DCL approved, steel** grade 460 or as mentioned in the drawing shall be used and if need changes due to any reason must be after approval of consultant.

g) Only washed sand aggregates shall be used for all works.

h) Grade of concrete to be used for different structural members shall be as per approved drawings unless specified (please check the approved drawings for final concrete grade): All concrete used to be as per the latest Municipality and DM/DDA regulations. Admixtures to comply with latest green building regulations.

i) Site Lab for sampling and testing of fresh concrete should be as per DM/DDA requirement.

j) Strength requirements of C20, C40, C45, C50, C60, and other specified grade shall comply with BS. Code 8110. Aggregates for reinforced concrete shall comply with BS.882 and cement shall be as per BS.12 unless specified. Required design mix and trial mix to be conducted before pouring of concrete at site. All concrete used to be as per the latest DM/DDA green building requirement.

k) Reinforcement for concrete: High tensile strength deformed bars with minimum design yield stress 460 N/mm^2 conforming to BS 4449 is indicated by 'T'. Fabric (steel wire mesh) reinforcement shall comply with BS.4482/4483.

l) Minimum clear cover to reinforcement:

Foundations	75mm
Shear Wall	30mm
Tie beams	50mm
Columns	40mm
Beams (super structure)	25mm (or diameter of the bars whichever is greater)
slabs (super structure)	25mm
slabs in compacted sand	50mm

m) Minimum lap length:

- Tensile bars: 60 diameters of bar,
- Compression bars: 60 diameters of bar.

n) All column center lines, levels etc. To be checked and conformed to architectural drawings and approved by consultant.

o) For unsupported block masonry exceeding 14 sq. meter, provide stiffener columns/ beams between members (size 200mm x 200mm with minimum steel 4 T 12mm + T 8mm links @ 150mm c/c.)

p) Cubes shall be tested at 7 days & 28 days as directed by consultant as per DM/DDA guidelines.

q) Minimum 6 numbers of concrete cubes shall be cast for each 20 cubic meter of concrete or as agreed by Engineer; cubes to be tested in laboratory approved by consultant and cube strength results to be submitted to consultant immediately after the test. The method of marking and storing of cubes shall be as approved by the consultant.

r) Any test of material, concrete, soil, workmanship or completed work shall be carried out by contractor as instructed by the Engineer and as per DM/DDA guidelines at contractor's cost by approved lab.

s) All concrete shall be thoroughly cured by covering it with permanently wet hessian cloth covered with polythene sheet for not less than ten days as directed by the consultant. Method statement for raft/pile cap etc to be submitted for engineer approval. Required measure to be taken to control the heat of hydration and arrangement for checking the concrete temperature by thermometer. Method Statement to include cold joint approval if any delay in concrete supply.

w) Contractor shall be responsible for providing PVC/metal pipe sleeves or conduits in concrete of size required for electrical and mechanical or any other services as approved by the consultant and prior to concreting.

x) Contractor shall prepare full bar bending schedule to consultant's approval, however is responsible for authority approval.

y) Permissible salt content (for mortar, concrete, concrete blocks etc.) Shall comply with BS8110 and CIRIA guide publication-31. Permissible limit of salt content (both sulphate & chloride contents) shall conform to CIRIA values at the time of construction.

z) All forms for the concrete parapets to achieve the effect/design as shown on elevations should have steel/PVC lining of the quality and type approved by the consultant.

aa) All column center lines, levels etc.to be checked & conformed to architectural drawings.

bb) The ready-mix concrete from approved supplier with approved mix design shall be used.

cc) A consolidated and compacted road base material of minimum 6" thick shall be provided at plinth level to receive floor concrete.

dd) Anti termite treatment with minimum 20 years guarantee from the approved supplier and subcontractor to be provided.

ee) Approved damp proof course to be used under all masonry and partition at plinth level by providing one layers of 4mm bituminous impregnated water proofing felt weighing 4 kg/m^2 minimum.

ff) For beam depths 600mm or more, shrinkage reinforcement T12mm @ 200mm c/c shall be provided on each face of the beams or as mentioned in the schedule.

gg) Reinforcement in beams shall be provided in two layers, if clear distance between bars is less than 30mm, provide spacers 25mm dia @ 1800mm.

hh) In order to raise levels contractor to consider light weight concrete to achieve the desired strength or other approved material as per Engineer approval.

ii) The capacity of underground RCC water tank to be as per approved drawing. Contractor have to check and fulfill the water requirement as per the DEWA standard and Civil Defense Standard. (Water capacity should fulfill the requirement of the Civil Defense, DEWA and project requirement. Contractor to consider any partition, sleeves, flanges, sumps, access ladders etc. required to the tank)

Concrete specification schedule (Design strength to be confirmed with Trial/ Design Mix)

	RCC Element Type	Concrete strength N/mm2	Min Cement Content (Kg/Cu.m)	Max. Water cement ratio	Type of Cement	Additive
Sub Structure	Raft/Pile Cap	50	420	0.40	27% OPC	66% GGBS & 5% MS
	Retaining Wall/Water tank wall	50	420	0.35	27% OPC	66% GGBS & 5% MS
	Shear Walls	60	420	0.35	27% OPC	66% GGBS & 5% MS
	Columns	60	420	0.35	27% OPC	66% GGBS & 5% MS
	Ramp Slabs	45	420	0.40	27% OPC	66% GGBS & 5% MS
	Slabs	45	420	0.40	27% OPC	66% GGBS & 5% MS
	Beams	45	420	0.40	27% OPC	66% GGBS & 5% MS
Super structure	Column	60/50	420	0.35	45% OPC	50% GGBS & 5% MS
	Shear Wall	60/50	420	0.35	45% OPC	50% GGBS & 5% MS
	Slabs	45	420	0.40	45% OPC	50% GGBS & 5% MS
	Beams	45	420	0.40	45% OPC	50% GGBS & 5% MS
	Parapets	40	380	0.40	45% OPC	50% GGBS & 5% MS

Above table is for the reference only, actual concrete grade to be used as per the approved structural design and drawing from Trakhees and as mentioned in the soil report and as per Trakhees approval. The value of GGBS, OPC & MS can be varied as per the authority requirement and concrete mix design as per consultant approval. **(DM/DDA LATEST REGULATION TO BE FOLLOWED FOR NOMINAL COVER, MINIMUM WATER CEMENT, GREEN BUILDING REQUIREMENT).**

8. SUPER STRUCTURE:

a. All shear walls, walls, slabs, column, beam, lintel, canopy etc. shall be executed as per the approved structure drawings, Grade of concrete shall be as mention above or as per approved drawings.

b. Contractor must check the plans, elevation, sections, required height etc. before casting of any element, contractor shall check the level and plumb before the casting of element and must be check with the approved architectural drawings.

c. All the slabs of the building from 1st Slab to the roof level shall be "Post Tension Slabs" including the beams and to be designed as per latest DM/DDA and local authority's requirements and approvals.

Post tension slab (thickness & beam as mentioned in drawings are for reference only) should be

designed by specialist PT contractor which should be an approved contractor by the DM/DDA. Contractor to consider the actual loads coming on the slab as per the DM/DDA requirements (e.g. Temperature load, seismic loads etc.). Contractor to get approval on design & drawings from the consultant and DM/DDA. Refer general specification for design detailing. Contractor to confirm with the specialist the required thickness of the PT slab. For PT slab in order to reduce shrinkage cracks, the contactor should consider the minimum top and bottom mesh of T10@250 c/c both ways apart from other steel like punching, temperature load etc. Main Contractor and the Specialist PT contractor will be solely responsible for the design and execution of the complete PT system. Consultant had right to ask for any third party checkingof the design which will be paid by the main contractor. All PT material used to be DCL

approved. All payment to the authority regarding the PT approval will be done by the main contractor. Main contractor will also be responsible for the third-party design review of the post tensioned design and drawings and its related cost/fees.

d. Ready mix concrete shall be approved by DM/DDA and must have DCLapproval.

e. Cement shall be as per the approval of local authorities.

f. Use formwork materials which are new at start of Work, except for unexposed locations suchas foundations, where used materials may be substituted.

g. Contractor to submit the calculation of all the form works to Consultant duly approved by the third party. Also, contractor to submit the calculation of the backproping as per the actual loads.

h. Joints between forms are properly sealed with double site tape or equivalent material.

i. ***Mechanical Couplers*** to be used for larger diameter bars (32mm and above) instead of lapping.Taper threaded couplers or hydraulically crimped couplers are not acceptable. All mechanical splices shall have tensile strength of at least 125% of the yield strength of the connected bar.All the mechanical couplers shall be type-II as per ACI318. Obtain from a manufacturerholding a valid Technical Product approval certificate issued by the UK Certification Authority for Reinforcing Steels (CARES) or equivalent. Approved couplers DEXTRA System. Full traceability is required for the couplers. Traceability shall guarantee tracing of production batches and raw materials of the couplers. Each coupler should be marked with traceability number which is relevant to the mill test certificate provided. Certificate of compliance must besubmitted for the Engineer for each couplers batch delivered to the site. The Supplier shall provide Static tension test, Static Compression test and cyclic tension & compression test certificate to certify that couplers are type-II. The Coupler itself shall not break or fracture during the test.

j. ***All Metal Works/Steel Structure:***
Main contractor must appoint the specialist contractor who are approved from the DM/Trakhees for the required design and approval, fabrication and installation of the work. Contractor must submit all the design and drawings to consultant for the approval. All the payments to the authority or any third party to be paid by the contractor only.

9. BLOCK/MASONARY WORK:

(All the concrete blocks shall confirm to the local authorityorder)

a. The solid blocks up to the depth of excavation level to be done all around the peripheral of the plot besides the shoring work/rafts (act as the permanent shuttering to receive the waterproofing of the retaining wall) will be done till ground level. The block to be used to be manufactured with SRC cement. The mortar used to be of SRC cement.

b. 200 mm thick Solid block to be also used as permanent shuttering for the lift pits, water tanks, sump

pits, other lower areas, level difference between rafts etc.

c. All external block works shall be thermal insulated with thickness 250mm/300mm (or as per architecture drawing) and shall be laid as per the standard specification provided by the supplier. U- Values to be matched with the approved heat load calculation and as per authority/green building requirement.

d. All internal blocks of thickness 200mm, 150mm & 100mm or as mentioned in the drawing shall be hollow/solid concrete blocks (as per Design/Authority requirement). First course of block work should be made of solid Concrete block and walls where plumbing/electrical services to be carried out shall be of solid concrete blocks as per Engineer approval.

e. Approved damp proof course to be used under all masonry and partition at basement, ground, first and Roof floor level by providing 2 layers of 4mm bituminous impregnated water proofing felt weighing 4 kg/m2 minimum or as per the specialist manufacturers recommendations.

f. A layer of reinforcement or expanded stainless steel mesh to BS 1449: Part 2:1983 must be provided in every third bed joint (every 60cm, vertically) of all internal and external masonry walls and partitions throughout the entire building as described in the general specification. All other required metal accessories (such as clamps etc.) for the block work to be used by the contractor as per consultant approval.

g. All block work to be properly grouted, leveled and plumbed to engineer's satisfaction.

h. All Blocks shall be sprinkled with water before laying.

i. Concrete blocks and pavers to be used as approved by Dubai Municipality.

j. All cutting for services in the concrete block shall be with mechanical cutter/ grinder. Curing for blocks work shall be 3 days.

k. Block work around windows and doors to be of solid block work.

l. Electrical / Telephone / DB areas to be concreted.

m. Do not build more than 6 courses of block work in one day without engineer's written permission.

n. Mortar for block work shall be prepared with addition of minimum water to sand/cement mixture (1:4) by volume.

o. All gaps between block work and structural elements such as beams, columns and others to be closed properly to the engineer's approval before any external or internal plaster work or other finishing works to be allowed.

p. Joint between block work and Concrete surface, around MEP services to be filled with flexible fire sealant as per DCD requirements.

q. All external columns and beams to be insulated with 50mm thick insulation board or as per latest Authority requirement.

Note: All external block works shall be thermal insulated and shall be laid as per the standard specification provided by the supplier.

(All the concrete blocks shall confirm to the local order/Authority)

10.SEISMIC AND WIND RESTRAINTS [Seismic /Wind Restraints]

A. General:

1. Provide positive seismic and wind restraints on systems and components required by the applicable building code and by the local authority having jurisdiction. This section covers design, supply, installation and inspection of complete SFRS {Seismic Force Resisting System} for all systems.
2. SFRS to be fully integrated into, compatible with noise and vibration controls in accordance with – VIBRATION ISOLATION AND NOISE CONTROL.
Specialist supplier to design the vibration isolation and seismic restraint for equipment specific values to be used in calculating the seismic restraint forces, including component importance factor, (I_E) / (I_P); Reference Code By Jurisdiction.
3. Provide restraint devices as required, specified, and as scheduled for isolated and non-isolated systems and equipment. Provide calculations to determine restraint loadings for all restrained systems and equipment resulting from seismic forces.
4. The contractor shall utilize a supplier familiar/experienced with the design of seismic systems to provide a comprehensive package of isolation and seismic restraint for the project. Provide detailed shop drawings showing the proposed restraint system for all required equipment, piping and ductwork on the project. The shop drawings shall include calculations certified by a registered design professional.
5. Seismic restraints are to be provided for all mechanical & non-structural components of building services in accordance with the current: IBC; NBCC; OBC; ASHRAE Standards.

11.WATER PROOFING:

Activities / Play areas, Swimming Pools, swimming pool deck, Area below the deck, machine floor, kitchen, toil Before Start of the work Contractor to follow the following specifications and to submit the proposed technical data sheets along with the approved supplier and applicator profile for approvals Terrace Floor, Flower beds/blocks, balconies and outdoor ets, powder room, laundry, garbage room, pump room and other wet areas/open to sky areas etc. should be waterproofed as directed by the Engineer.

General

1.1 SUMMARY

A. This Section includes the following:

1- Substructure foundation fully bonded waterproofing system.

B. PERFORMANCE REQUIREMENTS

- General: Provide installed applied membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- Material Compatibility: Provide fully bonded membrane for horizontal side and torch applied materials in vertical that are compatible with one another under conditions of service and application required, as demonstrated by applied manufacturer based on testing and field experience.
- System Design: Provide applied system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.

1.2 SUBMITTALS

- Product Data: For each type of product indicated.
- Shop Drawings: For fully bonded & torch applied system. Include plans, elevations, sections, details, and attachments to other Work such base flashings, cants, and membrane terminations.

- Samples for Verification: For the following products:

- 12-by-12-inch (300-by-300-mm) square of smooth-surfaced fully bonded or torch applied membrane sheet.

- Installer Certificates: Signed by applied system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install applied system.

- Manufacturer Certificates: Signed by applied manufacturer certifying that applied system complies with requirements specified in the project.

- Submit evidence of meeting performance requirements.

- Qualification Data: For Installer and manufacturer.
- Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of torch applied system.
- Research/Evaluation Reports: For components of applied system.
- Maintenance Data: For applied system to include in maintenance manuals.
- Warranties: Special warranties specified in this Section.
- Inspection Report: Copy of torch applied system manufacturer's inspection report of completed system applied installation.

1.3 QUALITY ASSURANCE

A. Manufacturer / Fabricator shall be ISO 9001:2015 certified and implement an equivalent or higher system of quality management; Local manufacture and having a minimum of 5 years documented experience in the fabrication of product/s specified in this Part.
B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by applied system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
D. Source Limitations: Obtain components for applied system from or approved by applied system manufacturer.
E. Preliminary applied Conference: Before starting substrate deck construction, conduct conference at Project site. Comply with requirements for pre-installation conferences. Review methods and procedures related to substrate deck construction and applied system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, applied Installer, applied system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects system applied including installers of substrate accessories and substrate-mounted equipment.
2. Review methods and procedures related to system applied installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness.

5. Review structural limitations of substrate during and after the applied system.
6. Review base flashings, special fully bonded/torch applied details, substrate penetrations, equipment and condition of other construction that will affect applied system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for applied system during and after installation.
9. Review substrate observation and repair procedures after system applied installation.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by applied system manufacturers. Protect stored liquid material from direct sunlight.
   1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
C. Handle and store applied materials and place equipment in a manner to avoid any damage for the applied system.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit applied system to be installed according to manufacturer's written instructions and warranty requirements.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form, without monetary limitation, in which installer agrees to repair or replace components of applied system that fail in materials or workmanship within specified warranty period.
Failure includes leaks.

   1. Warranty Period: 20 years from date of Taking Over Certificate.

B. Special Project Warranty: Submit applied Installer's warranty, signed by Installer, covering Work of this Section, including all components of applied system such as fully bonded/torch applied membrane and base flashing for the following warranty period:

   1. Warranty Period: Twenty years from date of Substantial Completion.

PRODUCTS

1- <u>SUBSTRUCTURE FULLY BONDED SBS-MODIFIED SHEET MATERIALS WATERPROOFING SYSTEM BASIS OF DESIGN OF HORIZONTAL & VERTICAL PRE-APPLIED (BLINDSIDE) WITH SILICON DIOXIDE CRYSTALS WATERPROOFING & VERTICAL TORCH APPLIED SYSTEM</u>

A. <u>VERTICAL & HORIZONTAL SHEET WATERPPFOING MEMBRANE SYSTEM</u>

High-performance, third-generation technology, pre-applied, fully bonded BSW waterproofing system, UAE manufactured with advanced Canadian/European technology. High bituminous blend engineered for sub-structure waterproof applications, including raft foundations, retaining walls, pile caps, construction joints, and other below-grade elements subjected to high permanent hydrostatic pressure.

Double-reinforced, 4.5mm single-layer Fully bonded bituminous sheet membrane, designed to adhere to raft, pile cap and retaining wall concrete, ensuring durable and reliable protection for deep foundation waterproofing applications.

The top surface is treated with a Specially Engineered Silicon Dioxide Crystals, and the underside is laminated with a distinct synthetic film. The unique system membrane design of duo selvedge technology allows for homogenous bond to structural concrete, resistance to hydrostatic pressure, lateral water migration and precise alignment of side-laps to be heat-welded using propane torch or a hot air gun.

Characteristics & Properties

- Thickness : 4.5 mm
- Tensile strength @ peak load, MD / CMD : 25/20 kN/m, ASTM D5147
- Elongation @ break, MD / CMD : 65/75 %, ASTM D5147
- Tear strength, MD / CMD : 700/600 N , ASTM D5147
- Puncture resistance : 1400 N, ASTM E154
- Heat resistance @ 2 Hrs. : 105 °C , ASTM D5147
- Water vapour transmission : < 2.1 ng / (Pa • S • m2), ASTM E96
- Water absorption : < 0.2 % , ASTM D570
- Peel strength/adhesion to poured structural concrete : 3700 N/m, ASTM D903
- Resistance to hydrostatic head : > 110 m , ASTM D5385
- Resistance to Lateral Water Migration : > 110 m , ASTM D5385
- Low temperature flexibility : Unaffected @ -30 °C , ASTM D5147

- Reinforcement Strip: as a high-performance waterproofing membrane composed of SBS modified bitumen and a non-woven polyester reinforcement. The surface is sanded, while the under face is covered with a thermo-fusible plastic film.

Characteristics & Properties:

- Thickness : 3.5mm
- Reinforcement : Non- woven polyester
- Tensile Strength MD/XD : 17/11.5 KN/m, (ASTM D5147)
- Tear Strength, MD/XD : 600 N/ 400 N, (ASTM D5147)

B- **post-applied waterproofing for open excavation on vertical application:**

- Solvent based bituminous waterproofing primer.
  Characteristics & Properties:

- Color : black
- Volatile % Wt. : 45 %, ASTM D-2369
- Density : 0.9 (± 5%) Kg/m3, ASTM D-1475
- Drying Time @ 23°C : 90 mins, (touch dry ASTM-D 2939
- Viscosity (Saybolt) @ 25°C : 25 - 125 Sec
- VOC content : 350 g/L
- Test on Residue from distillation at 25°C : 20 - 50 dmm. ASTM D 5
- Solubility in Trichloroethylene : 99 %, ASTM D 2042

- Double layer of a high-performance, flexible, reinforced SBS-modified sheet membrane used in post-applied below-grade waterproofing applications. It comprises a proprietary blend of Elastomeric Styrene-Butadiene-Styrene (SBS) modified bitumen combined with dimensionally stable,non-woven polyester reinforcement. The top surface and underside are laminated with a thermofusible synthetic film.

- Thickness : 4.0 mm
- Tensile strength, MD / CMD : 1000/800 N/5cm, EN 12311 – 1
- Cold Flexibility : -20 C ASTM D6162
- Elongation, MD / CM : 45 / 50 %, EN 12311 – 1
- Flow resistance at elevated temp. : 105 °C, EN 1110
- Dimensional stability : ≤ 0.5 %, EN 1107

- Resistance to static puncture : L4 (25 kg), EN 12730
- Tear strength, MD / CMD : 650 / 450 N, ASTM D 5147
- Resistance to tearing, MD / CMD : 210 / 250 N, EN 12310 – 1
- Puncture resistance : 975 N, ASTM E 154
- Shear resistance of joints : ≥ 650 N / 5 cm, EN 12317 – 1
- Water absorption @ 24 hrs : < 0.15%, ASTM D 570
- Resistance to hydrostatic pressure : > 70 m, ASTM D5385

- Protection course:
  Reinforced multi-layer, asphaltic protection board for use as protection course to waterproofing against backfilling. Mix of bitumen compounds, additives, modifiers and rot-proof fabric reinforcement.
  - Thickness : 6 mm
  - Softening point : ≥150 °C, (ASTM D36)
  - Asphalt content : ≥ 70 %, ASTM D 545
  - Flow resistance at elevated temp : 120 °C, (EN 1110)
  - Flexibility @ 25 °C : Flexible, (EN 1109)
  - Water absorption @ 24 hrs. :< 0.4 %, (ASTM D 570)
  - Tensile strength, : 800 / 500 N / 5 cm, (EN 12311 – 1)
  - Puncture resistance : 650 N, (ASTM E 154)
  - Chemical resistance : Resistant, (AST D543)

C- PILE HEAD TREATMENT

- Single component, shrinkage compensated, pile care profiling and repair mortar manufactured from selected cements, aggregates and additives. Manufactured from high strength cement, special aggregates and additives all collectively are designed to provide a high strength, flowable, ready-to use formula to serve the purpose of reprofiling irregularities in concrete and void filling of structural deformations.

  - Compressive strength:
  - 24 hours : 18 MPa
  - 7 Days : 45 MPa
  - 28 Days : 65 MPa
  - Chloride content : < 0.1 % by weight
  - Permeability : < 10 mm

- Polyurethane/Bitumen liquid-applied flashing: FLASHING System: is a ready-to-use single component polyurethane/ bitumen waterproofing resin applied directly onto substrate without a primer. Also, it is used with polyester reinforcing fleece fabric fully embedded into the resin used to flash penetrations in blindside waterproofing applications.

  - Density at 25 °C :1.1 ± 0.05 g / cc, ASTM D1475
  - Solids content :45 ± 5 %, ASTM D2939
  - VOC content :<140 g/L
  - Wet film thickness :0.6 mm per coat.
  - Drying time: :20 - 40 mins. (applied on concrete surface at 25 °C)
  - Dry film thickness :0.30 mm per coat

- Flashing Reinforcement: non-woven polyester reinforcement.

  - Average Thickness: 0.38 mm.
  - Average Net Weight: 100 g/m² (3 ounces per square yard)
  - Tear Strength: 80/45 N
  - Elongation: 16/36 %, (ASTM D1682)
  - CBR breaking strength: 528 N
  - Vertical permeability coefficient: 0.117 Cm/s

- Three-component, high performance fluid epoxy resin designed for general heavy-duty civil engineering applications and for encapsulating pile tops in the range from 20 to 25 mm. It's manufactured from a combined blend of epoxy resins with select aggregates all delivering a durable flowable & homogeneous grout when mixed together. Used in void-filling applications in the construction industry. With exceptional resistance to aggressive chemicals such as acids, alkalis and sea water.

  - Compressive Strength (7days) : > 90 N/mm2, (ASTM C579)
  - Flexural Strength (7 days) : 40 N/mm2, (ASTM C580)
  - Tensile Strength (7 days) : 18 N/mm2, (ASTM C307)
  - Specific gravity : 2.18 g/cc ASTM 1475
  - Volatile Organic Content (VOC Content) : 7 g/L, (ATM C 579)
  - Impact Resistance :20 jules, ASTM D 2794
  - Pull-off strength at 7 days : 5.2 N/mm2, ASTM D 7234

D- CONSTRUCTION JOINT TREATMENT

- Internal Water-stop Hot-dip galvanized steel sheets, coated on both sides with a blend of pressure sensitive coating that bonds to the poured concrete. A split back silicone release reliably protects both pressure sensitive sides and is removed prior to casting concrete. It is a high quality engineered and diverse bitumen compatible water stop for sealing and waterproofing concrete construction joints. It can be installed over external and internal horizontal and vertical construction joints.

  - Thickness : 1.7 mm
  - Softening Point (EN 1427) : 90°C - 120°C
  - Burning Point : > 220°C
  - Auto Ignition Temperature : > 250°C
  - Density at 25°C : 1.9 gm/cm³
  - Solubility in water : Insoluble
  - Water Absorption : Pass
  - Resistance to Hydrostatic Pressure : 60 m
  - Adhesion to poured Concrete : Pass
  - Chemical Resistance : Pass

- Multi use re-injectable hose system designed and made of flexible solid PVC Nitrile blend (Thermoplastic Rubber) wrapped around by sponge strips while the whole assembly is strengthened by Nylon Braiding.

  Characteristics & Properties:
  - Dimensions : 100 m Rolls
  - Internal Diameter : 6 mm

E- MISCELLANEOUS:

- Sealant: solvent-based mastic composed of modified bitumen, fibers, and mineral fillers.

It is an ideal complementary product for waterproofing with bituminous waterproofing membranes and is used as a jointing mastic, caulking material, and joint filler.

Characteristics & Properties:
- VOC CONTENT : 200 g/L
- Specific gravity : 1.05 approx.
- Heat flow resistance @ 60 °C : The cured film does not sag or flow under normal conditions
- Flexibility @ 0 °C : Provides a soft flexible coating.
- Density @ 25 °C : 1.165 g / cc

- Angle Fillet: Chamfered ready-to-install angle fillet used to eliminate the stress over structural junctions. The strip is manufactured from a distinct material compatible with the requirements of bitumen membrane installation methods.

EXECUTION

3.1 GENERAL

A. The Execution methodology shall be read in conjunction with Manufacturer Literatures and all written instruction to achieved satisfactory quality.

3.2 EXAMINATION

- Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous waterproofing work.
- Test for surface moisture according to ASTM D 4263.
- Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.3 PRE-APPLIED INTEGRALLY BONDED BSW SHEET WATERPROOFING INSTALLATION

- Examination: Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
- For applications over blinding, verify that compacted sub-grade or concrete mud-slab is smooth and sound; and ready to receive integrally bonded BSW sheet.
- Proceed with installation only after unsatisfactory conditions have been corrected.

A. Installation:

- Horizontal Applications: Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
- Place the membrane BSW film side to the substrate. End laps should be staggered to avoid a build-up of layers.
- Accurately position succeeding sheets to overlap the previous sheet along the marked selvedge.
- Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller
- Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail membrane.
- Install sheet waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.
- Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 150 mm beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape or torched patches.
- Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 POST-APPLIED MODIFIED BITUMINOUS SHEET WATERPROOFING INSTALLATION

A. Examination:

- Examine substrates, areas, and conditions, with Installer present, for compliance with requirements

and other conditions affecting performance.

- Verify that concrete has cured and aged for minimum time recommended by waterproofing manufacturer.
- Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
- Verify that concrete substrates are smooth, float finished and monolithic.
- Proceed with installation only after unsatisfactory conditions have been corrected.

B. Surface Preparation:

- Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1.6 mm (1/16 inch).
- Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D6135.

C. Application:

- Install sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D6135.
- Apply quick drying primer to allow membrane application same hour to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- Apply and firmly adhere sheets or torch sheetover area to receive waterproofing. Accurately align sheets and maintain uniform lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
- Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and
- flatten fishmouths and blisters. Patch with sheet waterproofing extending 150 mm beyond repaired areas in all directions.
- Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- Place and secure protection course according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate waterproofing. Protect installed panels during subsequent construction.

3.5 PROJECT QUALITY CONTROL

- The waterproofing manufacturer’s representative shall verify that the installation complies with the waterproofing manufacturer’s requirement. The Contractor shall provide remedial work as necessary to obtain the waterproof manufacturer’s technical representative’s verification.
- The Contractor shall be responsible for all testing required by the waterproofing manufacturer, to give the required warranties. The Engineer shall be permitted access to witness any tests. Two copies of all test results shall be submitted promptly to the Engineer.

3.6 PROTECTION AND CLEANING

- Do not permit foot or vehicular traffic on unprotected modified bituminous sheet membrane
- Protect waterproofing from damage and wear during remainder of construction period.
- Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

Under Ground Tanks/Manholes/Sump Pits (Internal):

3mm thick 2 layers of GRP lining to be done inside water tank/holding tanks/manholes/sump pits etc. Total thickness shall be 6 mm and to be done as per Engineer approval and as per supplier specifications on wall, soffit and base.

Balconies, Wet Areas:

a. Balconies, Kitchen, Baths, Toilets, Pantry, Laundry, OTS, Garbage Rooms and all other wet areas to have 2 coats of High build elastomeric rubberized liquid waterproofing membrane as per consultant approval.

b. Apply a double thickness of waterproofing and embed a joint reinforcing strip in preparation coat when recommended by waterproofing manufacturer.

c. Provide sealant cants around penetrations and at inside corners of deck-to-wall butt joints when recommended by waterproofing manufacturer.

d. Apply waterproofing according to ASTM C 898 and manufacturer's written instructions.

e. Contractor to provide 2 coats of bitumen primer around the bathtub walls up to 100 mm above the height of the bathtub. Contractor to provide 2 coats of bitumen primer on the wall of the shower head up to false ceiling level.

f. Apply a minimum of two coats of waterproofing to obtain a seamless membrane free of entrapped gases, with an average dry film thickness of 1.5 mm or as recommended by the manufacturer.

g. Apply waterproofing to prepared wall terminations and vertical surfaces.

h. Verify wet film thickness of waterproofing every 10 sq.m using a wft gauge

i. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.

j. Do not permit foot traffic on unprotected membrane.

k. Protect waterproofing from damage and wear during remainder of construction period.

l. Waterproofing to be protected by 50mm thick concrete screed mixed with water proofing compound/admixtures.

Roofing and Other Open Spaces:

m. Preparation of Angle Fillet: Cleaning of the surface done by the Main Contractor and making sand and cement, 15cm and 15cm angle fillet will be made around the parapet walls,columns, AC foundations and outlets.

n. Roof & Top floor Combo roof system as per the latest municipality regulations and green building requirement. Contractor to full fill the requirement of U-values/SRI values etc.

o. **Other open to sky spaces +Swimming pool pump room-** should have two coats of rubberized bitumen + two layers of 4mm thick SBS modified bituminous membrane waterproofing reinforced with 180 g/Sqm non-woven polyester mat and overlap of 200mm and end laps 300mm +50mm protection screed.

p. **For Planter and Flower beds-** provide two coats of rubberized bitumen + one layers of 4mm thick SBS modified bituminous membrane waterproofing reinforced with 180 g/Sqm non-woven polyester mat +One layer of Anti root membrane and overlap of 200mm and end laps 300mm +50mm protection screed.

b) **Joints:**

a. Water swelling water bar to be used for all the joints as per manufacture specificationand as per consultant instruction.

b. For normal joint widths of 200-400mm, Master Seal 910 from BASF is placed in the middle of the joint. For added safety thicker walls can be fitted with 2 water bars.

c. Master Seal 910 Water bars are glued into the joint with a special adhesive for Master Seal 910 Water bars. On vertical surfaces the Master Seal 910 is temporarily fixed to the construction joint with a nail until the adhesive dries.

d. Master Seal 910 Water bar MUST always be secured so that the water bar is in close contact with the surface of the substrate otherwise the full waterproofing effect will not be obtained.

e. After placing the Master Seal 910 Water bar the joint area should be kept clean and free of loose dirt and stones before concreting. The minimum concrete cover of Master Seal 910 Water bar is 80mm.

c) **Construction Joints:**

i. Provide construction joints where specified or shown on the drawings. All other joint locations proposed by the Contractor shall be to the Engineer's approval subject to no objection from authority. Locate and make other joints so as not to impair the required strength of the structure. Note particularly that expansion joints shown on the drawings are designed by the Engineer to suit only service conditions of the completed building. All additional construction or expansion joints required to accommodate loading or environmental conditions during construction shall be the Contractor's responsibility. Before concreting of raft, foundation walls or superstructure, submit to the Engineer for approval a detailed description of joints, placing sequence and protective measures proposed, to accommodate differing load and environmental conditions during construction.

ii. Unless otherwise shown, maximum distances between construction joints are;
- Walls; 8m
- Slabs on grade; 7m or 20m with saw-cut joints at 5m centers.
- Suspended slabs greater than 90mm thick and superstructure beams and girders; 25 m.

- Suspended slabs up to 90mm thick; 24m with saw-cut joints at 6m centers.

iii. Place beams, girders, brackets, column capitals, haunches and drop panels with slabs.

iv. Locate near middle of spans of slabs, beams and girders unless a beam intersectsa girder at this point, in which case the girder joint shall be offset twice the beam width and additional shear reinforcement provided to the acceptance of the Engineer.

v. Provide a top end at all construction joints and add a continuous keyway at least 20mm deep to stop end except for slabs 90mm or thinner.

vi. Extend reinforcing through construction joints except for slabs on grade. Add dowels, if necessary, to make total steel passing through top end at least the equivalent of 10 at 300 mm centers each face. Embed dowels at least 500mm on each side of joint.

vii. Before placing new concrete remove all dirt, loose aggregate and laitance from face of existing concrete. Coat face of joint across beans with epoxy adhesive. Saturate other surfaces with water and leave damp.

viii. Allow a minimum of 24 hours between placing adjacent slab sections separated construction joints. Allow a minimum of 4 hours between casting columns and walls and supported slabs.

ix. Before depositing new concrete on or against concrete which has hardened, the form shall be retightened. The surface of the hardened concrete shall be roughened as required by the Engineer, in a manner that will not leave loosened particles of aggregates or damaged concrete at the surface. It shall be thoroughly cleaned of foreign matter and laitance and saturated with water. To ensure an excess of mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and saturated surfaces, including vertical and inclined surfaces, shall first be thoroughly covered with a coating of mortar or neatcement grout against which the new concrete shall be placed before the grout has received its initial set.

x. The placing of concrete shall be carried continuously from joint to joint. The faceedges of all joints which are exposed to view shall be carefully finished to line and elevation.

Combo Roofing System On Flat Roof :

A buildup Roof Waterproofing system that consists of PU Foam Insulator, high dense sprayed rigid foam insulation (40-48 kg/m³) at 70 mm thickness protected by UV elastomeric coating Waterproofing Roof Compound (two coats of 500 microns each) and Geotextile filter membrane (120 gsm), covered with Polypropylene Fiber-reinforced Screed Concrete in slop casted in panels at average 80 mm thickness. Where indicated by the engineer, Expansion /construction Joint Filler board (10 mm) to be induced and filled by Single Component PU sealant, in addition with a topcoat protection layer (DFT 100 micron @ 2 coat) with SRI >90 (or as per the Green building requirement) to be applied acting as an extra solar reflective layer adding to the U Value of the system.

k) Expansion Joint Filler Board:

Expansion Joint Filler Boards to be wood fiber soft boards impregnated with bitumen boards with a high-water resistance, high compression strengths and an extraordinary long durability.

Grade: Impregnated Filler Board

Density: 230 kg/m3
Thickness: 10mm
Water Absorption: ≤ 20% of Vol.

(i) **Swimming Pool & Deck. Water Body, Water Feature, Fountain**

a. 150mm thick guniting with water proofing compound/admixture to be done with the required mix as approved by the consultant on horizontal and vertical.

b. On guniting apply cementitious slurry waterproofing system by crystallization.

c. Dressing of pipe penetration to be done properly as per manufacture recommendation.

d. All the work should be done as per the manufacture recommendation and approved bythe consultant.

(ii) Water Body/Water Feature, Fountain & Flower Bed/Planters Outdoor Sports Activity Zones (Please Refer Drawing Typical Waterproofing Detail Drawing). All The Work Shall Be Done As Per Engineer Approval .

(iii) Water proofing materials for roofs, bathrooms and kitchen to be tested against leaking by filling the same with water for at least (48) hours and as directed by the Consultant.

(iv) The Contractor to submit unconditional 15 years guarantee for the waterproofing supported with unconditional 15 years guarantee from the water-proofing agent.

(v) All the work must be done by the specialized applicator recommended by the supplier and as per consultant approval.

(vi) Contractor should submit at least three applicator pre-qualification documents to consultant for approval.

(vii) Installer qualifications – Installer should have 10-year track record installing waterproofing systems in the region. Installer should have a third party certified quality management system. Installer should also furnish a recommendation letter from manufacturer which should detail waterproofing jobs done together. Installer shall also provide training certificates from manufacturer for supervisors, foreman and team leaders.

(viii) Product Data Sheets, shop drawings, samples and similar submittals all must be approved beforestart the work.

(ix) Product data: Submit manufacturer's data sheet for each product to be used, including written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

(x) Shop drawings: Submit shop drawings showing layout, profiles and product components and extent of waterproofing, including accessories for the waterproofing system. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

(xi) Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

(xii) Product Test Reports: From a government approved independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive

testing of current waterproofing formulations.

(xiii) Samples: Submit verification samples for the waterproofing system.

(xiv) Sample Warranty: Copy of special waterproofing manufacturers and Installer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

(xv) Closeout Submittals:
a. Warranty: Submit manufacturer's product warranty for a minimum period of years as mentioned above.
b. All Warranty/Guarantee should be from the effective date of Taking Over Certificate by Engineer.

(xvi) Manufacturer qualification – Manufacturer should have 10-year track record in the region. Manufacturer to submit certificates of quality management system from a recognized third partyof the like BSI or BVQI operating under ISO 9001, ISO 14001 & OHSAS 18001.

(xvii) Pre-installation meeting: Hold conference, prior to beginning waterproofing work, to review work to be accomplished. Contractor, waterproofing subcontractor, waterproofing system manufacturer's representative, consultant representative and work inspectors shall be present. Contractor shall coordinate on the schedule for conference and notify the Engineer and other attending parties minimum seven days prior to time for conference.

(xviii) Delivery, Storage and Handling
a. Ordering: Comply with the manufacturer's ordering instructions and lead time requirementsto avoid construction delays.

b. Packing, shipping, Handling & Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels clearly identifying product name and manufacturer.

c. Storage and Protection: Store materials in clean, dry and covered area in accordance with manufacturer's written recommendation and to comply with the warranty requirements.

(xix) Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to ASTM C 898 and manufacturer's written instructions.

Contractor must be complying the DM/DDA green building requirement andsubmit the required test report.

12.FINISHES

IMPORTANT NOTE:
Use Low emitting materials (Adhesive, sealants, Paints, coatings, primers etc.VOC limits for all such materials should be within specified limits as per the latest green building regulation.

All project requirements must comply with Dubai Municipality Green Building Regulations and Specifications of the green building consultant.

Contractor have to consider the light weight concrete as approved by consultant to maintain the level difference between the FFL and SSL as mentioned in the drawing.

1. Floor Finishes *(Please refer to Finishes schedule)*

a. Adequately protect troweled concrete floors from damage. Take special measures when moving heavy loads or equipment on them.

b. Keep troweled concrete floors free from oils, grease or other materials likely to damage them,

discolor them or affect bond of applied finishes. Once the building is enclosed, keep floors as dry as possible after curing.

c. To prevent soiling or damage to finish flooring where pedestrian traffic occurs after theflooring has been installed, install and maintain polyethylene membrane or reinforcedkraft paper temporary protection, secured in place and with joints sealed by reinforced pressure sensitive tape.

d. Install plywood panels of minimum 6mm thickness over clean completed finish flooring materials on which further construction work is performed or delivery of products is made, or both. Seal joints between panels with reinforced pressure sensitive tape, and maintain protection during the course of work in progress.

e. Ceramic wall and floor tiles to be fixed as per manufacturer's instructions. All horizontal and vertical joint (not more than 3mm) between tiles to be grouted as per manufacturer's instruction. Color of grouting should be as required by the Consultant/Client. Refer finishing schedule for details and P.C rates.

f. All the wet area grouting material and color as approved by the client.

g. 60mm thick interlock tiles to be provide from approved supplier by Dubai Municipality shape and pattern as per approval and shall be laid on compacted subkha to 95% M.D.D, on 200mm road base and selected aggregated fine. Interlock should be approved by DCL and comply withlatest green building regulation.

h. 80mm thick interlock tiles on the parking areas to be provide from approved supplier by Dubai Municipality. Shape and pattern as per approval and shall be laid on compacted subkha to 95% M.D.D, on 200mm road base and selected aggregated fine. Interlock should be approved by DCL and comply with latest green building regulation.

i. Terrazzo Tiles Generally: Slip Resistant Precast Terrazzo finish on suitable Flexible bedding with grout color to match and with satin finished stainless steel transition strips. Color to coordinate movement joints and other accessories to complete the installation. All tiled Finishes shall be supplied and installed as complete integrated system including fixings, sealants, adhesives, jointing, transition strips, trims and all other accessories/components recommended / supplied by tile manufacturer to suit the service conditions.

j. Stone Wall Tiling Generally: All tiled Finishes shall be supplied and installed as complete integrated systems, including, fixings, sealants, adhesives, jointing, transition strips trims and all other accessories / components recommended/supplied by the manufacturer to suit the surface conditions. Applied Finish: Clear Penetrating water-based sealer that will not affect the appearance of the stone /grout.

Wall to Wall Carpet should be sound absorbing acoustic carpets. Floor has to be level, solid and firm, without cracks and edges. In case of finished floor, the subfloor must be level, normally $\pm$2mm maximum deviation on a 2m straight edge. Linoleum and vinyl flooring should be removed before fitting the carpet. The floor must be clean and dry, evenly absorbent, and free from oil and grease. Heavily absorbent underlay should be treated with primer. The humidity of a concrete sub floor must not exceed 75 to 90% RH Depending on the requirements of the adhesive manufacturer. Any under floor heating must be off and cooled prior to installation and should remain off for two days. where possible the carpet and subfloor must be protected from direct sunlight during installation and for two days afterwards.

k. All tile glue used to be as approved by the Consultant,

l. Grouting and glue to be used for tile fixing as per consultant approval.

m. All bathrooms, kitchen and balcony floor tiles to have 2% slope toward floor traps.

n. Sizes of tiles will be as per the consultant/client requirement and approval.

o. All plaster work and metal for plaster must be from approved supplier.

p. All project requirements must comply with EHS Green Building Regulations and Specifications.

q. All finishes to be strictly as per the drawings, perspective and specifications.

r. Note: No leveling sand under tiles is allowed, All floor tiles and stone shall be fixed with waterproof adhesive over concrete screed. Overall thickness of concrete screed shall be 85mm U.N.O.

2. **Internal Walls:** *(Please refer finishing schedule)*

s. All internal walls to be plastered (1:4) cement sand mortar with required thickness 15mm & painted with approved paint with required thickness & color as per consultant approval and as mentioned in finishing schedule.

t. All walls tiles have up to (20) cm above the level of the false ceiling. All walls to be plastered up to the soffit of the RCC slab.

u. All the tile grout color as per approval as per consultant/client approval.

v. The plaster mix shall be of cement sand ratio of 1 to 4 and shall be applied on top of dash coat of cement sand slurry and all joints of concrete and block work shall be reinforced with 150mm expanded metal 150mm width (exempt 264). All corner shall be protected with angle bead PVC or powder coated. Curing of Plaster minimum 3 days. Plaster shall be leveled smooth & maximum tolerance shall not exceed 3mm in 6m lengths.

w. Internal Paint to Render: All paints shall be washable and acrylic based. Surface preparation to existing substrates to be in accordance with the manufacturers recommendations to suit the service conditions.

x. Glass Reinforced Concrete (GRC), also known as GFRC concrete I GRC [It is a cast concrete substitute] I GRG wall panels, the joints of the panels are filled to create a seamless decorative wall which can be then painted or sprayed to any color or design GRG wall panels, the joints of the panels are filled to create a seamless decorative wall which can be then painted or sprayed to any color or design. All Finishes shall be supplied and installed as complete integrated systems, including, fixings, sealants, adhesives, jointing.

Transition strips trims and all other accessories /components recommended/supplied by the manufacturer to suit the surface conditions. Should be durable in all conditions of weathering including water features, solvent free & no VOCs, Fire Resistant, Light weight, Impact resistant.

3. External Walls: *(Please refer finishing schedule)*

y. Plaster to be with (1:4) cement sand mortar finished with required thickness 20mm with proper leveling as mentioned in the attached elevation drawings.

v. External walls/parapets walls/columns shall be rendered with minimum 20mm sand/ cement plaster

and all internal walls shall be plastered with minimum 15mm thick smooth sand/cement plaster using expamet profiles and metal lath. All corners to be protected with the galvanized corner guard.

w. The external elevation should be matching with the approved perspective and material specified on the drawings and should match the perspective.

x. For the external elevation contractor should submit the method of statement to consultant approval.

y. All the color must have to maintain green building requirement and the certificate shall be submit for consultant approval.

z. Textured weather proof paint from approved supplier. Color as per consultant's approval. Surface preparation to existing substrates to be in accordance with the manufacturers recommendations to suit the service conditions.

aa. Textured weather proof paint from approved supplier. Color as per consultant's approval.

Any recess/groove shown in the elevation should be approved SS/Aluminum material.

bb. All the plaster cracks /undulation/other defect in plaster must be treated by only approved plaster repair materials/chemicals from FOSROC, BASF ,SICA as per the consultant approval.

cc. Natural Stone Cladding: Stone Shall be free from vents, cracks, fissures discoloration or other defects that may adversely affect strength, durability or appearance.

Stone Accessories:

1. Damp proofing and sealer: Provide formulation which is no staining to stone, compatible with joint sealants, and noncorrosive to anchors and attachments.

2. Weeps and Vent Tubes:
Medium–density polyethylene tubing, 6mm outside diameter and of length required to extend from interior face of stone to cavity behind. Install stone plumb and true with joints uniform width and accurately aligned, within tolerance limits.

dd. Transition strips trims and all other accessories /components recommended/supplied by the manufacturer to suit the surface conditions. Should be durable in all conditions of weathering including water features, solvent free & no VOCs, Fire Resistant, Light weight, Impact resistant.

ee. All the external walls, roofs, and floors have an average thermal transmittance (u values) which does not exceed the following values**. (Please follow the approved U-values)**

- **ROOF U = 0.3 W/m2K (max)**
- **EXTERNAL WALL U = 0.57 W/m2K (max)**

ff. Flat and low sloped roofs provided with minimum roof SRI IS > 78

ii. All materials and equipment used to comply with EHS Green Building Regulations and Specifications must be certified / accredited by Authorities.

4. Ceiling: *(Please refer finishing schedule)*

jj. All slabs shall be Hi-tech plaster as per authority and consultant approval.

kk. False ceiling for all the Specified areas on floor levels Gypsum to be provided as per the finishing schedule & as per Samples approved by the Client and Consultants.

ll. False ceiling for all the Specified areas on floor levels Gypsum to be provided as per thefinishing schedule and as per Samples approved by the Client and Consultants.

mm. All the services pipes and duct must be cover with the false ceiling if required, contractor haveto provide the false ceiling without any variation and approved by consultant.

nn. All door frames to be fixed after first coat of paint and they have to be properly protected.

oo. All breakages in block or concrete works for electrical and mechanical installations to be refilled by concrete to the satisfaction of the consultant.

pp. All paints and coatings is used should not exceed allowed limits of (VOC) under authorities.

qq. Access Panels to be Considered as per Reflected False Ceiling Design and to the satisfaction of the consultant.

Note:

Finish exposed surfaces to approval of Engineer. Color, tone, texture, grain, pattern, smoothness, flatness, evenness, matching, transparency and translucency of surfaces shall be to Engineer's approval.

Ensure that adequate protection to prevent damage, as specified herein, to exposed surfaces of stone work, other exterior and interior wall and ceiling surfaces, finished metals, glass, fitmentsand equipment is provided and maintained during handling, storage, installation and until removal is approved, to the satisfaction of the Engineer.

12. ALUMINUM & GLASS :

All Aluminum and Glass section to comply the design requirements, contractor to submit the requiredsection along with the design calculations, the sizes mentioned below are not final and are indicative only.

a. All the accessories/fittings/drainage system/locking arrangement to be from the same system supplier. All aluminum shall be powder coated, color to Engineers approval. Allthe aluminum section used to be heavy duty and compatible with the curtain walling system. All glass/windows to be 28mm double glazed (6+16+6) mm or as mentioned in the drawing. Contractor to consider the design requirement (wind pressure etc.). All Glass to be

   tempered/toughened and make to be Saint-Gobian /Emirates glass or equivalent. Accessories and locks shall be as per consultant approval. U values for the glass to be asper the project requirement as mentioned in the head load calculation. All fixing bolts/screws/nuts to be rust proof. Aluminum profile to be from Gulf Extrusion or equivalent.

b. Supply and fixing heavy duty galvanized steel Cat ladder hot dipped with cage, access platform on every floor expanded mesh supported on angle or Tee sections clipped to plate and supported on I-beam built into the structure and complete fitting/fixing to be providedin all the OTS and lift pit as per specification, drawing and engineer approval

c. All hinges, handles locks and all other accessories are subject to the choice of the engineer.

d. All aluminum sliding doors and windows to be equipped with locks and key.

e. All aluminum doors, windows and ventilators to be provided with all necessary air, dustand water tight devices and accessories.

f. Contractor shall submit a complete list of hardware items with manufacturer's original catalogue with samples of each item for approval.

g. All aluminum and glass work will be tested against leakage by pressured water prior to take over. Contractor is to arrange for such test in presence of engineer. The system must be perfectly sealed against leaking and whistling and to resist wind pressure.

h. No steel or galvanized parts or accessories to be used in or for fixing or supporting the aluminum works. All parts to be of aluminum or stainless steel as approved by the Engineer.

i. Contractor shall verify all Dimensions on site before manufacturing of any openings (Doors, windows, arches Etc.)

j. Grade of stainless steel used to be Grade 316.

k. Approved subcontractor for Aluminum is Venus Aluminum or equivalent as per Engineer approval. Contractor to submit detailed shop drawing for all aluminum and glazing work. All work shall be supplied and installed by the approved sub-contractor from the consultant.

l. Automatic sliding doors to be from Dorma/GEZE or equivalent as per consultant approval.

m. Sealant from Dow Corning or equivalent as per consultant approval.

n. Contractor should bond to work with Approved sub-contractor for the above work strictlyas per consultant approval.

Note: Contractor to consider in their cost all the required fixing accessories

GLAZING SPECIFICATION:

I. Ground Floor: Shop Fronts

All Aluminum and Glass section to comply the design requirements. Specialist Aluminum sub-contractor to design the aluminum sections, its accessories, glass thickness sections.

The glass to be 28mm hermetically sealed structural silicones double glazed unit of the followingmake up;

Outer Lite: 6mm color or as per consultant / client approval fully tempered
Space: 16mm Air Filling
Inner Lite: 6mm) fully tempered

The Optical and Thermal data for the above item should be as follows;

Visible Light Transmittance	: 16 %	U-Value Summer	: 0.28 Btu/Hr. Ft^2 ^0F
Visible Light Reflectance – Out:	21 %	U-Value Summer	: 1.62 $W/m^2.K$
Solar Energy Transmittance	: 6 %	Shading Co-efficient	: 0.25
		Solar Heat Gain Co-efficient: 0.15	

- Protect glass and other finishes against heat, slag and weld spatter by provision of adequate shielding.

II. HANDRAIL *[Excluding Parking and Fire Staircase] :*

a. Balconies:

As per Approved External Façade Design the Railing glass to be 17.52mm laminated with the following make up;

- 8mm color or as per consultant / client approval, tinted fully.
- Tempered.1.52mm clear PVB
- 8mm clear float glass fully tempered.

All Aluminum and Glass section to comply the design requirements.

b. Swimming Pools:

As per Approved Designs Swimming Pool Railing glazing must be tempered safety glass. in case of hazardous locations, identified as locations near swimming pools shatter-resistant safety glass be used

c.Fire Staircases & Disable Ramps:

Fire Staircase Railings to be Powder coated mild steel railings as per Provided Design and the Specifications, approvals issued by the client and the consultant.

Particular Notes:

1. All mentioned glass thickness & strength are minimum and indicative only. The final glass thickness and strength will be determined based on glass strength analysis and system structuralcalculation by the curtain wall fabricators and as approved by Architect.

2. Glass shall conform to the requirement of ASTM C1036, quality Q3 unless otherwise specified.Heat treated glass shall conform to the requirement of ASTM C1048. Tempered glass shall alsoconform to ANSI Z97.1-984. All heat treating shall be by the horizontal process and processed in such a manner as installed on the building.

3. **Insulating glass shall comply with the following standards:**
   a. **E773 Test method for seal durability of sealed insulating glass units**
   b. **E774 specification for seal insulating glass units**
   c. **E546 Test method for frost point of sealed insulating glass units**
   d. **E576 test method for dew / frost of sealed insulating glass units vertical position.**

4. **Laminated glass shall comply to ASTM C1172**

5. **10 years warranty on the double-glazing units and 5 years on the laminated glass to be submitted from the glass fabricators by the name of the project upon the completion.**

6. **Original glass certificate of origin and 10 years warranty on the reflective on low – E coating from the glass agent should be submitted by the name of the project upon the completion.**

IMPORTANT NOTE:
Double Glazing U-values =0.28 BTU/^{0}F Ft^2 Hr
Shading coefficient (SC) =0.25

Note: All the above value must be match with the latest green building requirement.

13. CARPENTARY WORKS & IRON MONGERIES:

General:

a) All carpentry works shall be carried out by reputed carpentry workshop to engineerapproval.
b) Contractor to consider in his installation price the supply and fix by brass screws, 18mm thick

Marine plywood sub-frame to wall width. The sub frame is not included in theprime cost mentioned in BOQ.

c) Fire doors and its ironmongery shall be as per Civil Defense approval.

d) All the main doors, staircase door to be fire rated for two hours. (As per civil defense requirement)

e) Cylinder width should fit the width of door.

f) All carpentry works shall be carried out by reputed carpentry workshop to engineer approval.

g) Contractor must submit samples of all Carpentry works and take approval from the Consultant before Commencement of the construction.

h) Contractor must be submitting the detail drawings and other accessories for consultant approval.

Note: Contractor to consider in their cost all the required fixing accessories and Protection

Wood Finishes:

EXTERNAL WOOD PROTECTION – EPOXY/PU COATING: TWO PACK EPOXY BASED WITH TWO PACK POLYURETHANE TOPCOAT:

Initial Coat/Primer: One (1) full coat of Wood primer Low VOC, A two pack opaque Polyurethane Primer based on suitably modified acrylic polymer containing special additives with optimum pigment volume to give better adhesion between topcoats and wooden substrate, Applied @ 100 microns as a primer (Solids % by volume: >52, Mixing ratio: 4: 1), VOC-429 g/l IED (2010/75/EU)

Finishing Coats: Two (2) coats of Acrylic Pigmented PU Topcoat Low VOC a premium quality two-pack composition based on acrylic resin isocyanate to withstand very aggressive physical and chemical environment like abrasion, heat, light, alcohol, tea hot/ beverages, nail enamel and almost all aliphatic/ aromatic solvents.

WOOD PAINTING – NATURAL STAIN FINISH ***[Type: Wood shield Stain/ Varnish]***

Initial Coats: One (1) coat of Acrylic PU Sanding Sealer (LOW VOC) Clear, a two-pack acrylic Polyurethane Sanding Sealer (LOW VOC) based on suitably modified polyester containing Zinc stearate and other additives to provide a tough, durable and hardwearing low sheen finish with good flow and film build-up. To have VOL.SOL= 40+_2, applied at 100 Mic Dft

Finishing Coats: 2 coats of Acrylic Pu Topcoat LOW VOC Clear, a two pack Polyurethane wood finish & a premium quality two-pack composition based on acrylic resin isocyanate. to withstand

very aggressive physical and chemical environment like abrasion, heat, light, alcohol, tea hot/ beverages, nail enamel and almost all aliphatic/ aromatic solvents to be highly resistant to yellowing. To have VOL.SOL= 50+_2, applied at 60 Mic Dft each

1. KITCHEN CABINET:

a. Modular Kitchen cabinet fully aluminum or 18 mm MDF white colored or as per client approvals with stainless steel sink bowl Germany made aluminum only and with granite top 3cm with hinges to be made in Italy heavy duty including bottle trap and cooker hood.

b. All the handle will be Stainless Bar handles or as approved by the Client or Consultant.

c. Drawers - Soft closing ball bearing –Italy.

d. Hinges - 110 Degree Stainless Steel, soft closing-FGV Italy.

e. The contractor to connect the water supply to the mixer and to provide angle valves for the mixer.

f. Contractor to provide electrical chimney in kitchen.

g. Contractor to provide storage space for material.

h. Contractor to provide Electric power supply to carry out installation by contractor.

i. Contractor to connect the drain of the sink to the floor trap.

j. Approved sub-contractor should submit the detailed shop drawings for consultant approval before start the work.

k. Basic rate for kitchen cabinets (top and bottom) including marble top Kitchen cabinet fromthe approved manufacturer/supplier.

Note: Contractor to consider in their cost all the required fixing accessories and protection.

2. VANITY COUNTER:

(Will be subjected to selection of Sanitary fixtures):

Vanity counter in all bath and toilets shall be as per Approved selection /design by the Client or Consultants or otherwise it should be 3 cm thick (overlaid counter washbasin) with minimum 2' wide with minimum 7 cm splash back Provide moisture resistant MDF cabinet with knobs below the washbasin's vanity counters.

3. GARBAGE CHUTE AND GARBAGE TROLLEYS:

Design supply and Installation of dry garbage collection as per consultant approval. It consists of stainless-steel chute of minimum diameter 600mm, intake doors at every floor, compactor, vent, automatic disinfecting and cleaning device including provision of sprinkler as required by Civil Defense. Providing 2.5 cu.m trolleys as per authority requirement. Approved manufacturer Ostermeir or equivalent.

4. ROAD MARKING AND TRAFFIC SIGNS

Continuous and intermittent centre lines for route direction arrows, parking lines, parking number, etc. as per drawings. Paint all the kerb stones. Road marking paint. Fix hydraulically pressed precast concrete up stand kerb on 20mm 1:3 dry mortar maximum. Column protection guards. Provide parking mirror to the all corner as required by the authority.

5. **WATER FOUNTAIN:** *(Includes Other Water Bodies too)*

a. Contractor should provide the detail design and drawings as mention in the specification belowfor consultant approval and it will be carry out by the approved sub-contractor.

b. Provide required number of submersible pumps to power the waterfall.

c. Underwater LED light with niche warm white to highlight the fountain with the power driver.

d. Sheet waterfall tank with the connection box ABS.

e. Granite wall (water proof) for the vertical water feature at the main entrance.

f. Control panel for the pump and lights with on/off switch, ELCB, MCB, 24hrs timer, etc.

g. Provide necessary plumbing required in E class 16 bar high pressure pipes.

h. Provide necessary electrical cabling and conduiting for the pump and lights.

6. SIGNAGE:

Contractor should provide Stainless steel/Acrylic sheet signage for all the rooms, corridors, entrance etc. as per consultant/client approval.

Entrance guide board shall be Acrylic/Stainless steel sliding type to Engineer approval from exact sign.

Signs showing water heaters, chilled water, gas, firefighting pipes, entry and exit signs, signs related to parking, all service areas and other signs as required by DM/DDA/DM
/DDA and Civil Defense required to hand over the project to engineer approval.

7. MISCELLANEOUS:

a. Type, color, model for bath and accessories with mixture as per selected and approval bythe owner.

b. Traffic Signs, Car Parking markings, traffic signs and sign board, zebra crossing, wheel stoppers, stop signs, no entry signs, mirrors, handicap etc. signs as per drawings and authority requirements.

c. All pipes- over roof fitted on RCC foundation height not less than 10cm. For every Baths, Kitchen and WC fitted separate pipe with non-return valve.

d. Bicycle stand to be provided by the contractor as per approved drawings and as per stander specification and drawings.

e. Contractor to provide corner guard on every corner as per standard and consultant approval.

f. In Basements / driveway, any drainage pipe/electrical lights – protection guard to beprovided.

g. Wheel Stopper to be provided by contractor.

h. Security Camera system on all the floors (corridors), public areas and all entrances and other areas as per the latest authority regulations.

i. Complete Sauna and Steam to be supplied and fixed by the contractor after approval from consultant/ Client.

j. Soft and hard landscaping as per drawing with required native and adaptive vegetation with drip irrigation system as suggested and approved by client and consultant.

k. Providing and fixing entrance floor mats.

l. Providing and fixing Access panels for all the required services (as per the final shop drawings from contractor) from Profilex, Frost or equivalent.

m. Fire Stopping System from Hilti or equivalent.

n. Lintel should be RCC or Steel as per consultant approval.

o. Provided drain pipe and water supply line for washing machine location must be as per drawing in co-ordination with utility drawing / kitchen cabinet.

8. ADDITIONAL:

- In case that contractor missed or overlooked any part of bill of quantity or if Contractor did not include any part which is mentioned clearly in drawings and specification then he has full responsibility to do it without any variation.

- Contractor must consider the specification which is better quality and more prices.

- All the RCC elements including but not limited to foundation, columns and slabs to be constructed properly and should be fair faces and if any honey comb, holes or any other defect in concrete must be treated by only approved Concrete repair materials/chemicals from FOSROC, BASF, SICA as per the consultant approval

- If consultant found that the concrete cannot be repaired than consultant can ask to demolish the casted area and re-cast without any claim and also consultant can ask the contractor to pay the penalty. Consultant decision will be the final decision and contractor cannot be claim for any delay.

9. TESTS:

Any test required by the consultant/authorities on concrete, materials, workmanship or on completed works shall be carried out by the contractor free of cost. Any equipment required for checking/testing shall be supplied by the contractor free of cost. HVAC ducts to be cleaned prior to Testing & Commissioning.

10. FINAL CLEANING:

a. Before final inspection, replace glass mirrors, ceramic tile and granite that have been broken, damaged and/or etched during construction, or which are otherwise defective.

b. Remove Temporary Works as approved by local authorities having jurisdiction and Engineer and make good defects before commencement of final cleaning.

c. Remove dust, stains from mortar, cement, sealants, adhesives, finishing and other materials, soil,

grease, fingerprints and accumulations of construction materials, debris and other rubbish, both interior and exterior, to the building. Perform cleaning in accordance with installer's instructions for each material. Prior to Employer's and Engineer's inspection for certificate of completion, cleaning shall include;

- Washing of exterior paved surfaces at grade and on roofs, and interior concrete floors.

- Cleaning out of;
  i. Pavement, floor and roof drains
  ii. Elevator, pipe and duct shafts.

- Sweeping clean exposed roofing.

- Cleaning and polishing of;
  i. Glass on both interior and exterior faces.
  ii. Mirrors.
  iii. Porcelain, enamel, and finish metals.
  iv. Washroom accessories.

- Vacuum cleaning of ceilings, walls and floors upon which dust has settled.

- Cleaning of;
  i. Exterior wall and structure faces.
  ii. Interior wall faces.
  iii. Interior floors.
  iv. Stairs.
  v.

- Buffing and application of two light coats of wax, each buffed, on vinyl composition floor tile.

- Cleaning of hardware, washroom accessories, mechanical fixtures, lighting fixtures, cover plates, and equipment, including polishing of their finish metal, porcelain, vitreous, and glass components.

d. All finishes in the completed works shall match the quality of approved samples and /or mock- ups upon completion of cleaning otherwise they shall be removed and replaced.

e. Maintain cleaning until Employer has taken formal possession of building or portions thereof.

11.NOTE:

- If any changes made in the specification by owner and by contractor during the construction period must be brought into the consultant notice otherwise. The consultant deemed to go by the above specification only and his decision will be final.

- Above specification is supply and apply by Contractor subject to the owner and the consultant approval strictly.

- Contractor to consider in their cost all the required fixing accessories

The Contractor should check and submit the item wise break up of Bill of Quantity along with their LS offer. Contractor to make BOQ taking reference of particular specification and drawings. Contactors are requested to bring to consultant notice

any missing item not mentioned in the drawing and specification before tender.

Guarantees, warrantees and O&M manuals for the following items shall be submitted by the Main Contractor in favor of the Owner. All guarantees shall be submitted before the issue of the Taking-Over Certificate.

1.	Full maintenance guarantee (Defects Liability)	1 year
2.	Structural Warranty	20 years
3.	Waterproofing guarantee including	15 years
	• Roof, balconies, Terraces	
	• Wet areas (Toilets, kitchen, etc.)	
	• Planter box	
	• Water tank	
	• Swimming pool	
4.	Below ground Membrane Waterproofing	15 years
5.	Termite penetration into the building	20 years
6.	Compressor in any type of Air-conditioning unit	5 years
7.	External & Internal paint/coating, non-peeling & color fast	5 years
8.	Electric water heater	5 years
9.	PVDF (Polyester super durable powder coating)	25 years
10.	Calorifier	10 years

11.	Pumps	10 years
12.	GRP Water tank	15 years
13.	IDU & ODU (AC Machines annual maintenance)	2 years
14.	Generator	10 years

APPENDIX – '1'

CONDITION OF CONTRACT

1. We have studied the Drawings, Specification, Particular Condition and Terms of Contract and we confirm that there are no doubts or ambiguity for electrical works.

2. We understand and confirm that the Tender Drawings are for purpose of estimation only. The exact location of outlet may vary as per site Conditions and as per Engineer's instruction for which necessary allowance is already made in our contract.

3. We shall comply with Specifications, Electrical requirements, 16th Edition of IEE regulations and we shall carry out electrical works with good engineering practice acceptable to all parties irrespective of shown in the drawings or specified in the Contract.

4. We confirm that extra or variations shall be considered only for additional Scope of Works, as directed from the specification for any reason.
5. Consultant and client have right to claim cost saving (if any) for any alternative and deviation from the specification for any reason.

6. We will obtain your approval for coordinated shop drawings and specified material within 2/3 weeks' time from date of our approval and shall arrange the material well in time and will not have any excuse for non-availability of any item.

7. All additional works as per engineer's instruction shall be as per Unit Rate agreed at the time of signing the contract. In case such rate is not covered in given list than mutually agreeable ratein

line with engineer's instruction will be applicable.

8. Any cost implication as a result of approval of drawings, material, site condition and co- ordination with other services shall be our (contractors) responsibility and liability.

9. We will co-ordinate with other Services trades and will incorporate their requirements as partof our Scope of Work without any coat or time implications irrespective of their appearance in tender documents.

10. We shall prepare our Running Bill based on cost split up guide line given by the Consultants.

11. We will provide pre-qualification papers consisting of
    a. No. of personal employed
    b. Their positions, qualification and experience.
    c. No and type of job carried out with their value, completion target or delay.
    d. Same as above but jobs in hand.
    e. Details of available facilities, such as stage space, vehicles, machines, testing Equipment's finance etc.

12. We will not sub-let works any time without your comments we agree to pay penalty of 5% of contract value for any such violation.

13. We will not have any excuses for availability of personal/staff, material and necessary facilities such as transportation, equipment's, finance etc. we agree to pay 5% of Contract value for any such violations.

APPENDIX – '2'

DOCUMENTS REQUIRED BEFORE START THE WORK

Contractor shall submit the following document before execute the work in proper formats and get approval from the consultant: -

1. Signing Authority letter on behalf of Managing Director for the project with contact detail.

2. Performance security is in the form of a bank guarantee.

3. Insurance of Works as per condition of contract clause no. 21.

4. Third Party Insurance as per condition of contract clause no. 23.

5. Insurance against Accident as per condition of contract clause no. 24.

6. Site organization chart.

7. Work program indicating every activity.

8. Cash flow chart reflecting to the work progress.

9. Material submittal schedule reflecting to the work program.
10. List of material required to the site for every activity.
11. Shop drawings submittal schedule.
12. List of proposed sub-contractor/supplier (Minimum three) with contact detail and required schedule.
13. List of labor with their labor card who will work at site.
14. Material submittal formats.
15. Daily progress report formats.
16. Monthly progress report schedule.